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Prototype of the Evaluation Infrastructure

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Abstract

This deliverable describes the specification and implementation of the PROMISE evaluation infrastructure. It provides details about the data logic layer and the service logic layer, which is exposed as a RESTful Web service. Then, it describes the search model for accessing and retrieving the managed resources and the query syntax based on the CQL language.

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Executive Summary

Recent discussions and outlooks for future research challenges in the information access and retrieval field [Agosti et al., 2012a,c; Allan et al., 2012; Hanbury et al., 2012] continue to prompt the compelling need for providing the field with powerful infrastructures that support the experimental evaluation of information access systems in different domains.

One of the major goals of PROMISE is to design and develop an innovative evaluation infrastructure which: (i) manages and provides access to the data produced during the experimental evaluation of multilingual and multimedia information access systems; (ii) allows for the development of rich applications on top of it.

This deliverable reports the continued work for developing the *Distributed Information Retrieval Evaluation Campaign Tool (DIRECT)* system, which is the core and backbone of the PROMISE infrastructure, and relies on the previous activities reported in D3.1 [Agosti et al., 2011b], where a first prototype of the evaluation infrastructure has been described, and in D3.2, D5.1, and D5.2 [Agosti et al., 2011a; Croce et al., 2011; Granato et al., 2011], where requirements and specifications for different aspects of the evaluation infrastructure have been discussed.

D3.2 [Agosti et al., 2011a] introduced the conceptual schema for modeling the entities – such as experiment, run, ground-truth, topic, and so on – which are involved in the experimental evaluation and for describing their relationships. This conceptual schema is the core for designing and developing the evaluation infrastructure and represents, per se, a valuable contribution to the field being a shared "vocabulary" that facilitates researchers and developers in describing and exchanging their data. Here, the proposed conceptual schema has been completely restructured with a twofold goal: (i) to make it suitable for mapping to the relational model, e.g. by removing generalizations; (ii) to simplify it and make it more compact by removing redundant or duplicated concepts which have been aggregated together. The resulting conceptual schema has then been confronted with the stakeholders of the other evaluation initiatives and the research community [Agosti et al., 2012b,c].

The PROMISE infrastructure adopts a modular and layered approach, by distinguishing between: (i) data logic layer, where the managed resources are persisted and stored; (ii) service logic layer, where the managed resources are exposed as a RESTful Web service; (iii) application and interface logic layers, where different applications are built, as the one for managing an evaluation campaign or the one for providing advanced visual analytics tools for exploring the experimental data.

Therefore, the conceptual schema provided the bases for designing the relational schema and its implementation in SQL, which are needed at the data logic layer, as well as the XML schema needed to expose in a uniform and well-defined way the managed resources in the service logic layer. These are two especially valuable contributions to the field.

On the one hand, the relational schema provides researchers and developers with the possibility of developing their own repositories for managing the experimental data, without being forced to adopt the DIRECT system but still keeping the overall coherence, and the SQL implementation of the relational schema represents a concrete example and an how-to map the relational schema for a specific database management system.

On the other hand, the XML schema allows us not only to expose the managed resources via

a RESTful Web service in a uniform way but also provides the means for substantially advancing the possibility of interoperating and exchanging experimental data among evaluation initiatives and researchers. Indeed, the current practice in the field is to exchange data via textual files, in many different formats, often overloaded, or using XML as a "vanilla" syntax wrapped around textual content but without providing a document type or schema. This situation hampers interoperability and produces a big fragmentation which reduces the exploitation of the experimental data [Allan et al., 2012]. The proposed XML schema addresses the current situation and provides an additional benefit: researchers and evaluation initiatives are not forced to adopt the DIRECT system to manage their experimental data but they can continue to use or develop from scratch their own systems, according to their policies and preferred technologies, still being capable of interoperating at the data level, having a common data format at the boundaries of the different systems.

This picture is then completed by the RESTful Web service, which provides an exhaustive API for accessing, managing, and manipulating all the different resources which are offered by the infrastructure. The REST API allows users to create, read, update, delete, and relate all the managed resource. It represents a way of online exposing the experimental data which is not biased towards any specific application or use of the data. All the managed resources can be represented in two different formats: in XML, as discussed above, which is best suited for interoperability and experimental data exchange among systems, and in JSON, which is best suited for easing the development of rich and interactive Web applications.

To the best of our knowledge, the conceptual, relational and XML schemas, the specification of the REST API for managing and accessing resources, and their systematic and exhaustive nature represent an unprecedented effort in the field to progress the use and exploitation of very valuable experimental data.

Since the goal of the evaluation infrastructure is not only to manage resources both also to provide advanced access to them, a powerful query language has been designed and developed. This query language is based on the extend boolean model and allows users to search for resources according to different criteria and mixing exact match and best match clauses in the same query. Furthermore, CQL has beed adopted as syntax for expressing the queries, since it is best suited for being used in a Web-service oriented infrastructure.

Finally, in order to facilitate the creation of rich applications on top of the service layer, the PROMISE infrastructure has been integrated with the Liferay portal, which easily allows for the creation of portlets that provide the building blocks of complex interfaces and visualizations. Several examples of how to develop applications are then available in other PROMISE deliverables, such as for example D5.2 and D5.3 [Angelini et al., 2012a; Granato et al., 2011] which describe how to build a visual analytics environment on top of the evaluation infrastructure.

1 Introduction

This deliverable provides a detailed description and specification of the PROMISE evaluation infrastructure:

1. it describes the conceptual and relational schemas at the core of the infrastructure;

2. it explains the architecture of the infrastructure and the different layers which compose it as well as the integration with Liferay;

3. it introduces the search model and the query language that have been designed to allow for advanced access to the managed resources;

4. it details the REST API available for managing and accessing the available resources and provides example of their representation in the XML and JSON formats.

The goal of this deliverable is twofold: (i) to provide an account and description of all the methodological work which has led to the design and development of the PROMISE infrastructure; (ii) to act as a reference point and documentation for all who need to actually use and develop applications on the PROMISE infrastructure, being the PROMISE partners or other researchers and developers.

This deliverable has been delayed by 6 months with respect to the initially planned schedule because of the difficulty of designing the different conceptual, relational, and XML schemas in an as exhaustive and complete way as possible and of carefully refining and tuning them, with concrete cases at hand. This delay did not affect the other activities in PROMISE which progressed as planned in parallel. On the contrary, it provided an effective opportunity to better align and validate the contents of this deliverable in the light of the outcomes and results produced by other deliverables, as it happened in the case of D4.2 [Reitberger et al., 2012] and D5.3 [Angelini et al., 2012a]. In a sense, this rescheduling gave us also the chance of anticipating some of the revision and refinement work that is expected for the next deliverable on the evaluation infrastructure prototype, D3.5 due at month 36.

The deliverable is organized as follows: Section 2 describes the re-designed conceptual schema; Section 3 explains the mapping from the conceptual to the relational schema; Section 4 introduces the search model which has been developed for advanced access to resources; Section 5 explains the architecture of the PROMISE infrastructure and Section 6 details its integration with the Liferay portal; Section 7 specifies the REST API for managing and accessing the available resources as well as their representation in XML and JSON formats; Section 8 describes the query language derived from the search model previously described and details all the indexes that can be used for searching for resources. Finally, two relevant use case are described: Section 9 provides and validates the proposed models in a concrete use case with real data, i.e. the one of "guerrilla" experiments described in D4.2; Section 10 explains how the portal of the CLEF Initiative has been completely re-designed and implemented to be ready to feed data from and aligned with the PROMISE infrastructure.

2 Conceptual Schema Re-design

The first version of the conceptual schema of the PROMISE evaluation infrastructure has been extensively described in [Agosti et al., 2011a]. This sections describes the re-design process that the conceptual schema has undergone during the development of the evaluation infrastructure.

2.1 Resource Area

In the PROMISE infrastructure the term "resource" refers to a generic entity that concerns evaluation activities and with which a user or a group of users can interact. Resources can be actual data adopted in or produced by these activities (e.g. experimental collections or experiment results), as well as the evaluation activities and tasks carried out within them.
The Resource area has the following entities:

- `Resource`: it is the relationship that involves many resources of a generic evaluation activity. Every Resource entity has an attribute called scope that defines the extent of the resource taken into account; it is a controlled vocabulary: PUBLIC, PRIVATE, SHARED.

- `Namespace`: refers to a logical grouping of identifiers and allows the disambiguation of homonym identifiers belonging to different namespaces.

- `User`: a generic user of the infrastructure.

- `Role`: it indicates the role a user can assume in the evaluation infrastructure.

- `Group`: it is a set of users grouped together.

- `Concept`: a `Concept` is viewed as an idea or notion, a unit of thought. It can be used to define the type of relationships in a semantic environment or to create a taxonomy (for instance a taxonomy of metrics, or statistical tests, and so on).

The most important change in the Resource Area consists in the creation of the `Concept` entity, which groups together many previous entities present in D3.2 [Agosti et al., 2011a] and serves the purpose of managing typed relationships between entities, e.g. to build taxonomies of terms, and, in some sense, resembles the idea of concept introduced by *Simple Knowledge Organization System (SKOS)* [W3C, 2009a,b].

As shown in Figure 1, a recursive relationship allows to link a `Concept` to another `Concept`, and also to create typed links. It is also important to underline that is linked with a high number of other entities from many other areas (examples will be provided in the next subsections).
The relationships between the `Group`, `User` and `Role` entities of this area (Figure 2) remain unchanged. A `User` can `play` none, one or more `Role`(s): for instance, a user can be both an organizer of an evaluation activity and a researcher that carries out the activity, i.e. a participant to the evaluation activity. A `Role` can be `played` by none, one or more users; for instance, an evaluation activity can have one or more participants, e.g. the researchers that are carrying out the experiments for writing a paper. A `User` can `belong` to none, one or more `Groups`; a `Group` needs not necessarily contain a `User`.
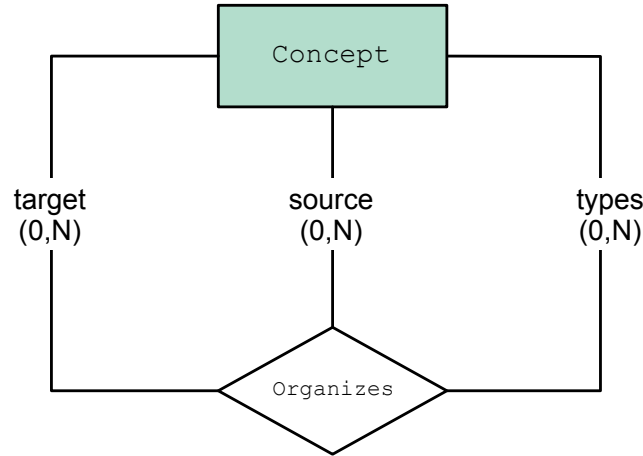
Figure 1: The Concept entity ternary relationship
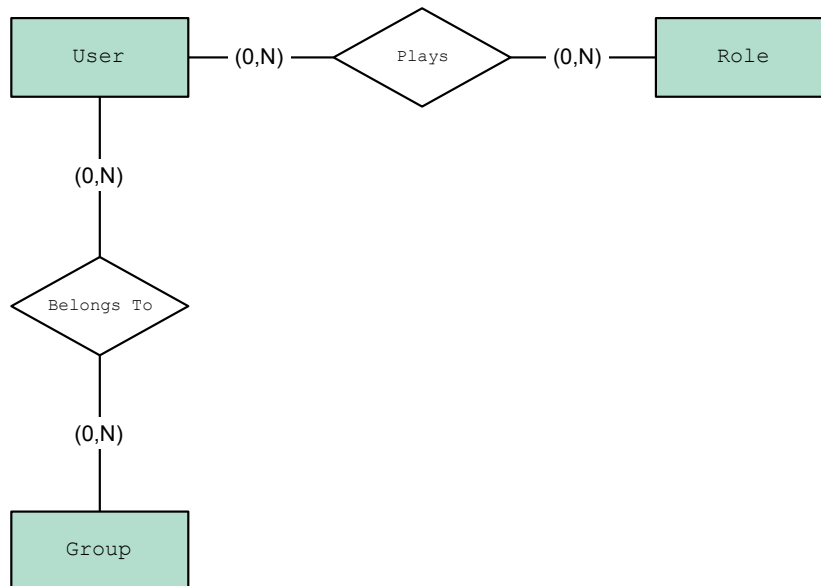
Figure 2: Resource Area relationships

2.2 Metadata Area

The Metadata area has two entities:

- Metadata: metadata is usually defined as "data over data" and it is used to describe the resources of the evaluation infrastructure. Metadata is itself a resource of the infrastructure and thus it can be recursively described by another metadata; this fact is modelled by means of the recursive relationship Relates on the Metadata entity, as shown in Figure 3.

- `Metadata Set`: it is a logical grouping of `Metadata`. The recursive relationship allows to create hierarchies of metadata sets.

This area keeps its two entities, `Metadata` and `Metadata Set`, and each one of them still has the same recursive relationship it had in the previous version of this work. The relationship between the two entities changes, though, from `Owns` to `Is Stored As`.
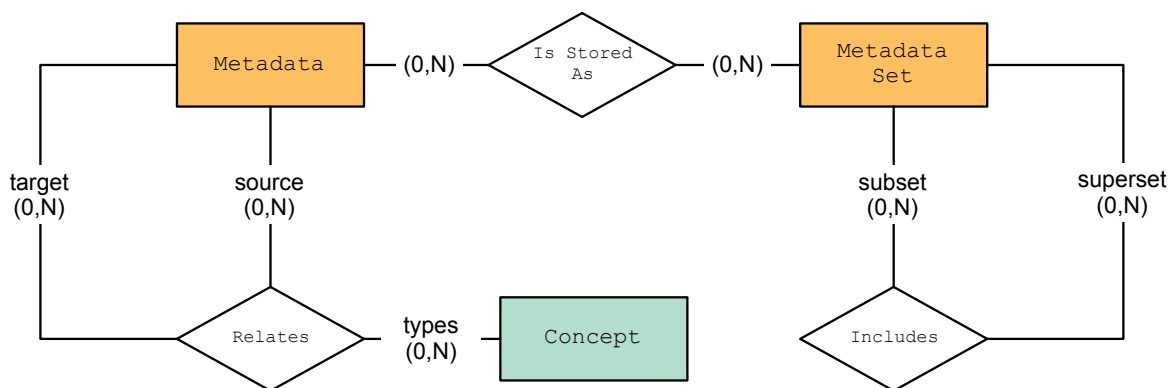
Figure 3: Metadata Area relationships

2.3 Evaluation Activity Area

The entities of this area are:

- `Evaluation Activity`: it is any type of activity that aims at the evaluation of applications, systems, and methodologies for multimodal and multimedia information access and retrieval.

- `Campaign`: it represents the different aspects of an evaluation forum, such as the different campaigns and the different editions of each campaign, the tracks along which the campaign is organized and the tasks in which each track is divided. `Campaign` is a public and shared activity that may be undertaken by, say, academic, commercial and governmental groups that are interested in the activity organized and structured by a third-party body. Participating groups share the data on which evaluation is based and the evaluation metrics, thus allowing comparison across the techniques adopted by the diverse groups

- `Trial`: it identifies an evaluation activity that may be actively run by, for example, a research group, a person or a corporate body for their own interest. It does not have a standard organization like the `Campaign` activity and the body that undertakes the activity defines its organization. In the evaluation infrastructure we assume that a `Trial` activity has to be organized in tasks. In a `Trial` activity there is room for defining heterogeneous organizations as well as new types of evaluation activities that may arise in the course of time.

- `Education`: allows us to envision evaluation activities carried out for educational purposes.

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- `Task`: a `Task` refers to a specific piece of work that is undertaken within the evaluation activity and aims at testing a specific (research) hypothesis. An example is the ad-hoc task in an evaluation campaign, e.g. TREC or CLEF; the aim of the ad-hoc task is to test the ability of retrieval systems to retrieve accurate and complete ranked list of documents (i.e. information units in the DIRECT system) in response to a set of information need statements [Voorhees and Harman 2005]. The research hypothesis does not necessarily refer to the effectiveness of a retrieval technique, but it may concern the effect of a pooling strategy or a user-centric analysis of an application. e.g. a web portal, where the retrieval system may be only one of the constituting blocks. The definition of the Task entity is therefore more general than the one adopted in traditional campaigns since the infrastructure aims at retaining and sharing information on a generic evaluation activity.

- `Track`: `Task`s carried out within a campaign are grouped into `Track`s.

The three former subclasses `Campaign`, `Education` and `Trial`, that were specializations of the `Evaluation Activity` entity, have now become three independent entities, linked to `Evaluation Activity` through `Is a` relationships. The `Series` entity has been removed and replaced by the `Concept` entity.

2.4 Experimental Collection Area

This area has the following entities:

- `Experimental Collection`: it is a logical entity that allows us to set up a traditional IR evaluation environment composed by a corpus, a topic group and a pool.

- `Topic Group`: it is a set of topics, which are grouped together because they are used to address a research task carried out in an evaluation activity.

- `Corpus`: is a set of informative resources, which allows us to perform a series of investigations in a research area; thus, a `Corpus` is composed by one or more `Information Unit`(s).

- `Ground Truth`: it is a general entity referring to a container of assessments. It can be the container of assessments obtained through new techniques different than traditional pooling.

- `Information Unit`: the `Information Unit` is the object on which the evaluated system acts, e.g. the object which is retrieved by the system under evaluation.

- `Pool`: it refers to a container of assessments obtained through the pooling technique. Pool is used in a run experiment of a traditional evaluation campaign.

- `Pool Item`: this entity refers to relevance judgements, which are provided on an `Information Unit` in the `Pool` for a given `Topic`.

- `Topic`: this entity represents the materialization of an information need.

- `Topic Content`: it represents the actual content of a topic field.
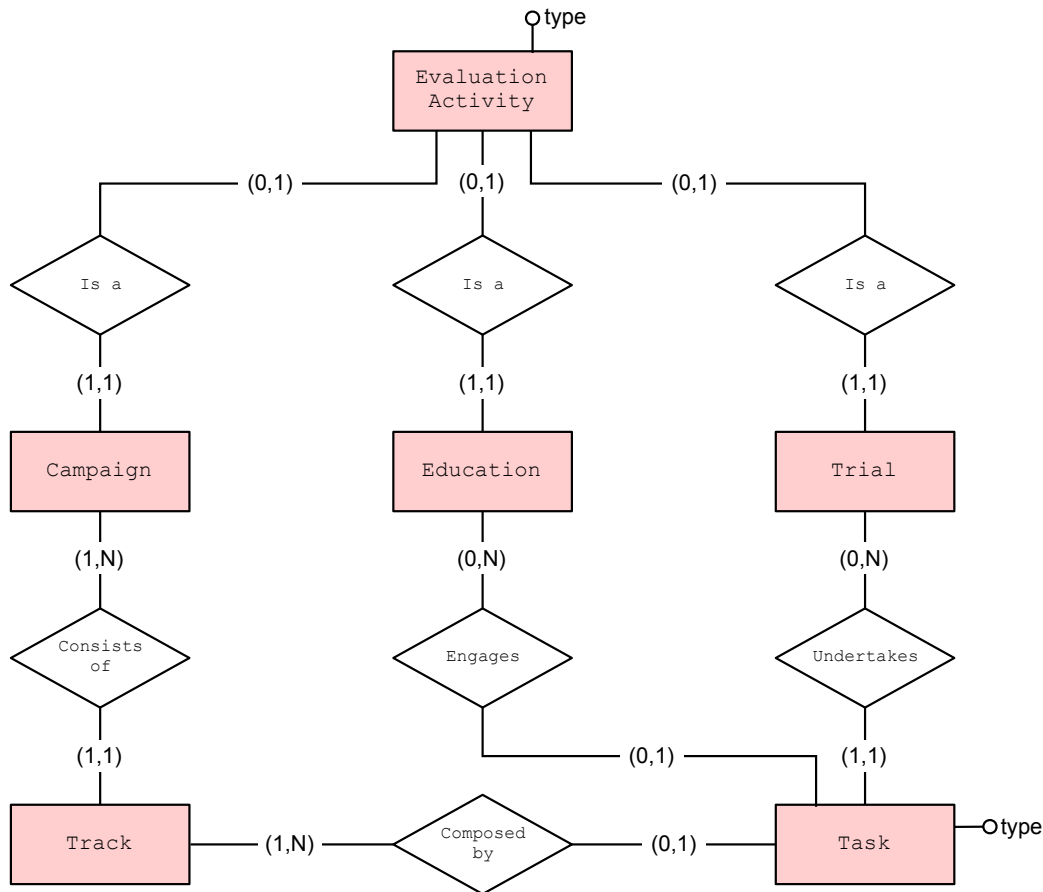
Figure 4: Evaluation Activity Area relationships

The number of entities has decreased, if compared with the last version of this work. The entities that have been removed are: `Topic Field`, `Topic Type`, `Relation`, `Relevance`. On the other hand, `Ground Truth` was added. It is also useful to show the `Concept` entity in this schema, since the `Topic Field` and the `Relevance` are included in it.

The entity formerly named `Document` is now `Information Unit` because it is a more general concept which can be employed to envision wider representation of information; it is not connected to `Corpus` anymore.

Another difference between this version of the conceptual schema and the former one is the cardinality between some of the entities, especially between `Experimental Collection` and, respectively, `Topic Group`, `Corpus` and `Ground Truth` [1].

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[1]It can be stated that the `Ground Truth` entity, although absent in the former version of the schema, has taken the place of `Pool`, being linked to `Experimental Activity` through the same relationship `Employs`.
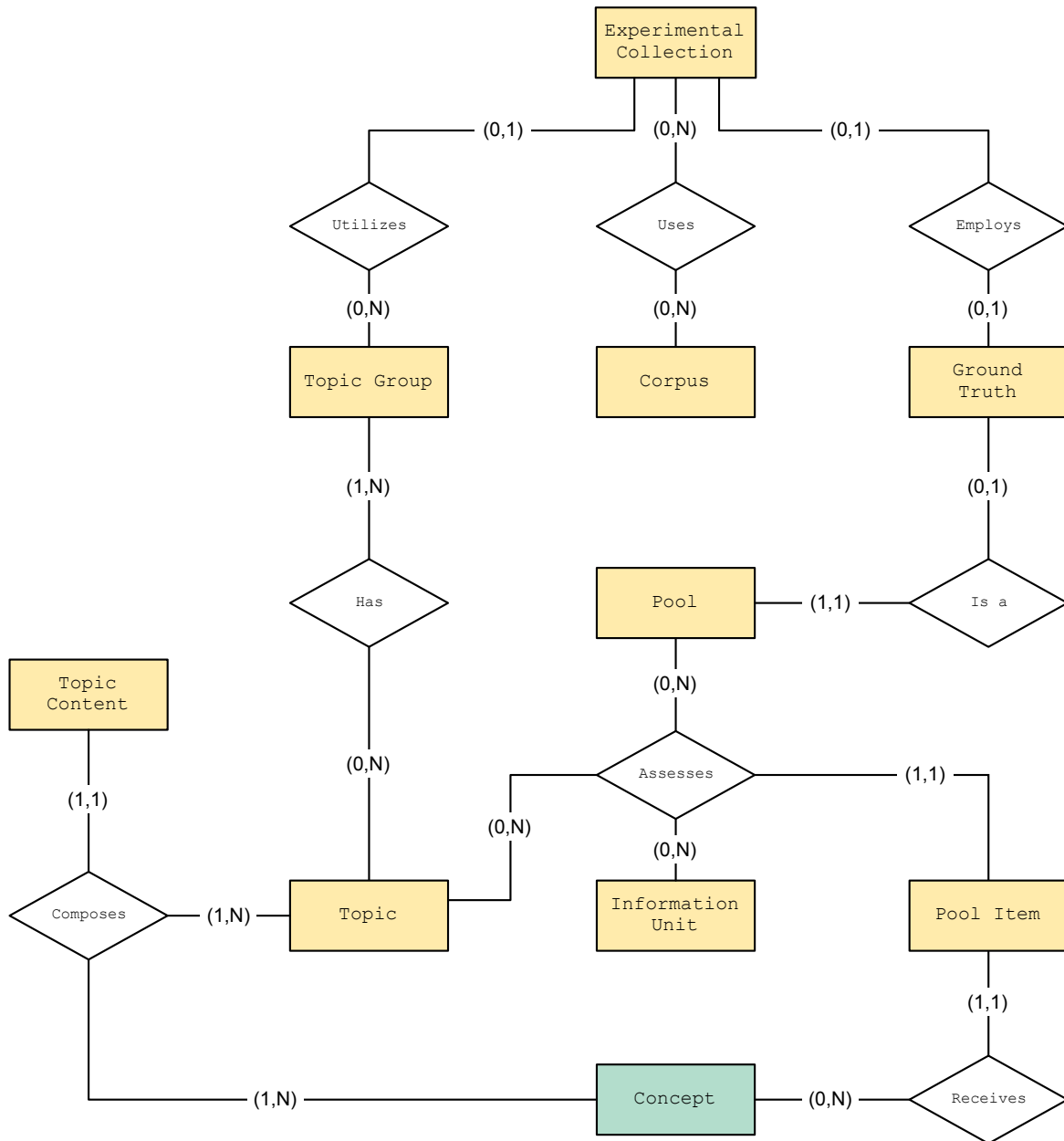
Figure 5: Experimental Collection Area relationships

2.5 Experiment Area

The Experiment area entities are:

- `Experiment`: an `Experiment` is part of the data produced by a system under evaluation.

- `Run`: a `Run` is defined as a ranked list of information units for each topic in the experimental collection.

- `Guerrilla`: a `Guerrilla` experiment identifies an evaluation activity performed on corporate IR systems (e.g. a custom search engine integrated in a corporate Web site). In this case, the evaluation process is defined by a set of experimental activities aimed at assessing different aspects of the application such as the completeness of the index of an ad-hoc search engine or the effectiveness of the multilingual support. For this reason the evaluation metrics can differ from those used during a `Run` experiment, such as precision.

- `Living`: this entity deals with the specific experimental data resulting from the Living Retrieval Laboratories defined in Task 4.4, which will examine the use of operational systems as experimental platform on which to conduct user-based experiments to scale.

- `System`: it represents a running software engine which is under evaluation.

- `Component`: it is a building block of a running system.

- `Application`: it identifies a running software application evaluated during a `Guerrilla` experiment.

- `Configuration`: the `Configuration` entity identifies the configuration of a `System`, a `Component` or an `Application` under evaluation.

`Experiment`, `Run` and `Guerrilla`, formerly specifications of the `Experiment` entity, are now proper entities, and each one of them is connected to `Experiment` through an `Is a` relationship. The `Experiment Type` and `Component Type` entities are now included in `Concept`. Figure 6 shows the relationships between entities in this area.

2.6 Measurement Area

The Measurement area entities are:

- `Statistical Test`: it provides a mechanism for making quantitative decisions about a process or processes. A `Statistical Test` in the evaluation infrastructure represents an example of statistical analysis which can be carried out on the available data.

- `Measure`: it represents the value of a metric calculated on some `Experiments` handled by the infrastructure.

- `Estimate`: it represents the estimated numerical value of a descriptive statistic calculated by the infrastructure.
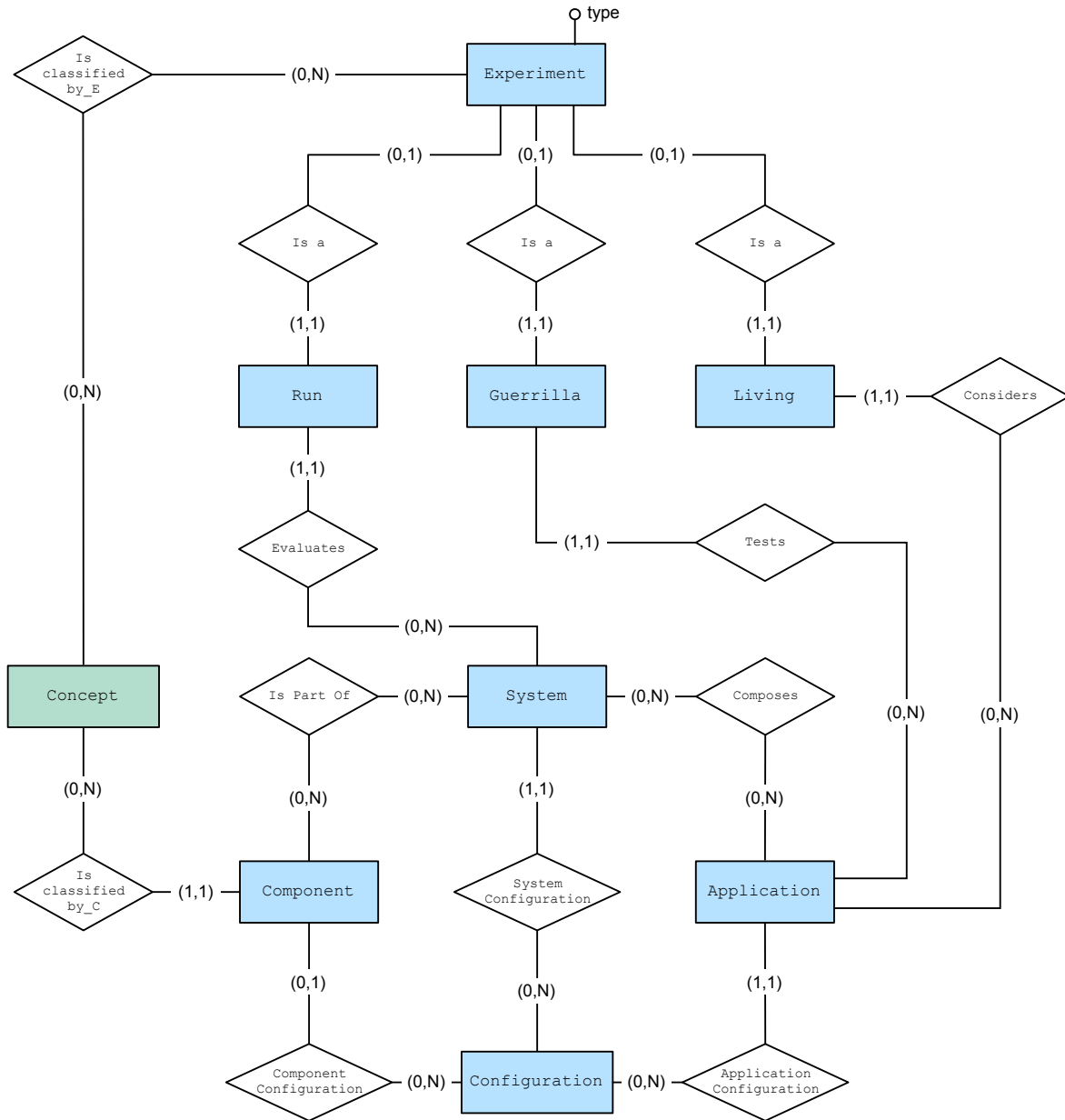
Figure 6: Experiment Area relationships

The `Metric`, `Statistical Analysis` and `Descriptive Statistics` entities are now comprised and represented by the `Concept` entity, thus they no longer appear among the Measurement area entities.

Also, it is not possible to describe `Statistical Test` through `Metadata` anymore. Figure 7 depicts

how `Statistical Test` is now connected to `Concept`.
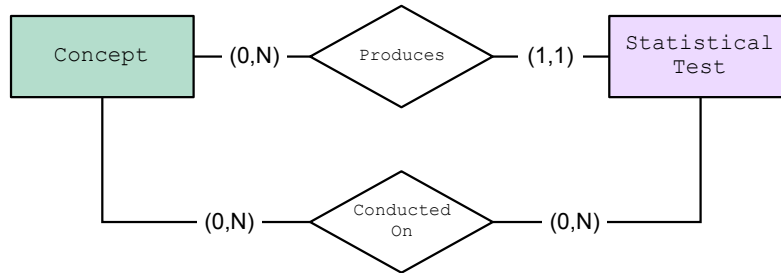
Figure 7: Measurement Area relationships

2.7 Visual Analytics Area

The entities included in this area are:

- `Visualization`: it refers to the information used by the infrastructure to store and recover whichever visualization of the data that the users do.

- `Snapshot`: it stores the snapshots of a visualization.

The `Visualization Type` entity is now included in the `Concept` entity. Figure 8 shows the relationships that link the two entities of this area and the `Concept` entity.
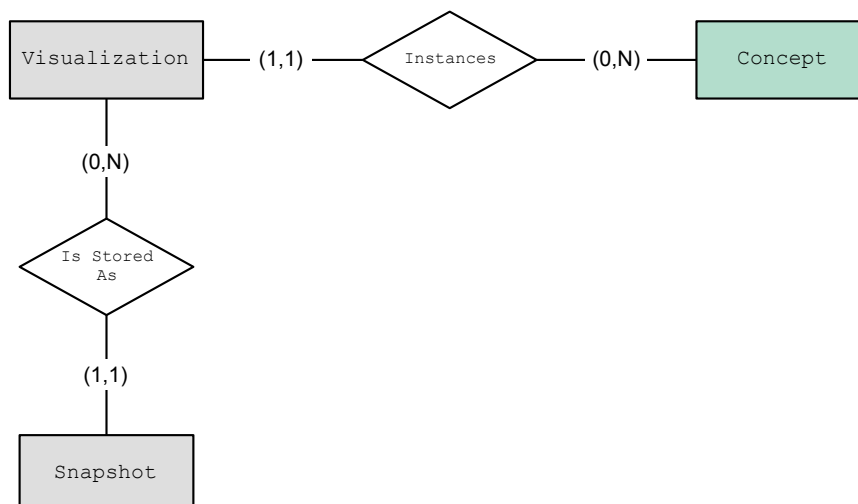
Figure 8: Visual Analytics Area relationships

Since the `Venue` entity has been removed, the Bibliographical area has only one entity left: `Contribution` (see Figure 9). The `Contribution` entity refers to a piece of writing submitted for a publication. A conference or a workshop paper, a journal article, a book, a technical report, a thesis or a manual are examples of contributions.
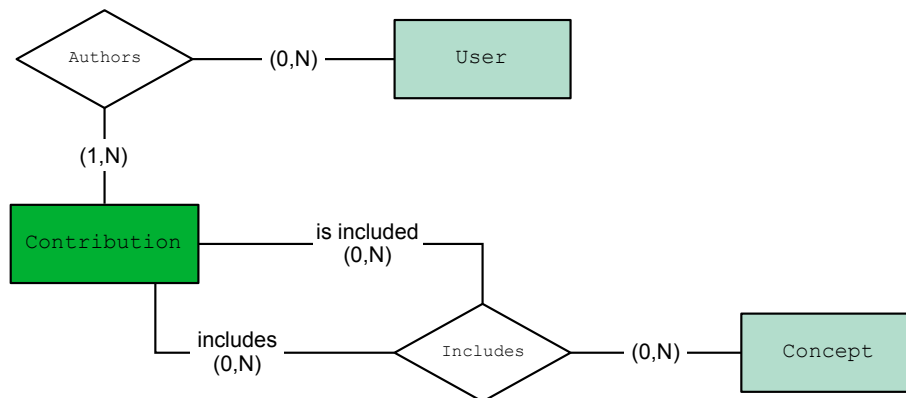
Figure 9: Bibliographical Area relationships

2.9 Inter-area Relationships

Aim of this subsection is to show how the different areas, that until now have been examined separately, interact.

Figure 10 shows the relationships between entities in the Evaluation Activity and Experimental Collection areas. Originally, in [Agosti et al., 2011a], also the Resource area was included, but since the relationship that linked the `User` entity to `Evaluation Activity` and `Task` were removed, Figure 10 depicts entities coming from only two areas.
According to the `Is Used By` relationship between `Task` and `Experimental Collection` a task may or may not use an experimental collection; this allows us to consider tasks where the activity is not based on an experimental test collection (e.g. a task of a trial evaluation activity that is connected to a guerrilla experiment type). Moreover, a task performed within an evaluation activity can exploit more than one experimental collection; for instance, this is the case of a trial evaluation activity where the same weighting scheme or the same methodology is tested across different experimental collections, e.g. TREC 7 and TREC 8 Ad-hoc Test Collection, and TREC2001 Web Track Ad-hoc Test Collection. For tasks that involve a training phase and a test phase (e.g. the CLEF-IP Patent Classification task) the two phases are considered as distinct tasks.

Figure 11 shows the interactions between Evaluation Activity, Experimental Collection, Experiment and Resource areas. Each experiment refers to one and only one user-task pair. A task can
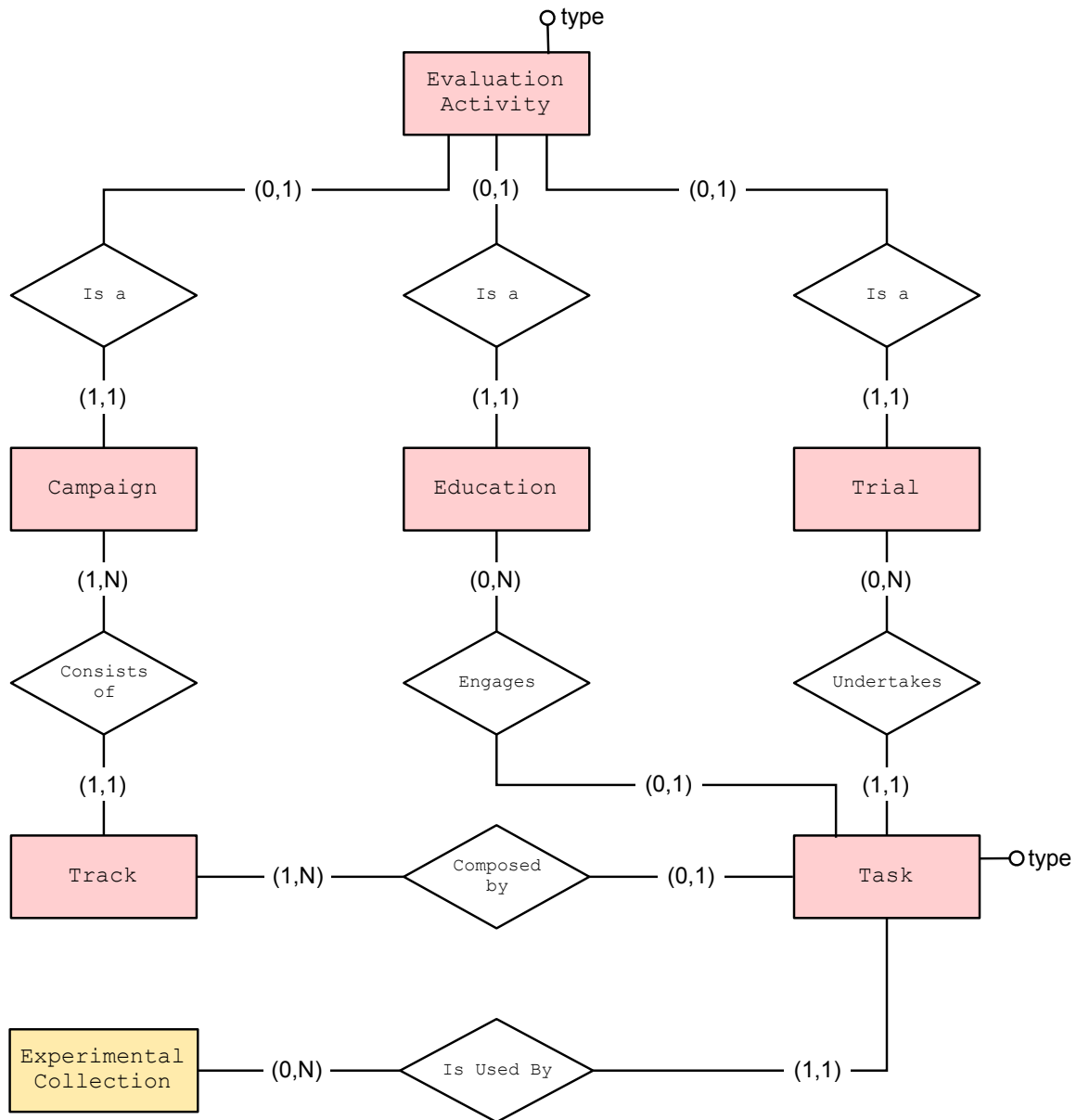
Figure 10: Relationships between entities in the Resource, Evaluation Activity and Experimental Collection Areas

use no, one or more topic fields, where some of the adopted fields can be mandatory: this is modelled by the attribute mandatory of relationship `Uses Topic Field` that involves the `Task` and the `Topic Field` entity.

A run `Comprises` at least one `Run Item`, where each `Run Item` refers to a specific run/topic/information unit triple; an information unit as well as a topic can be related to no, one or more run items through the `Comprises` relationship. Some of the runs retained in the infrastructure are adopted to constitute the pool: a run is pooled in no, one or more pools, while a pool is constituted by run items in at least one run. Lastly, the Is `Assessor` relationship states that a user can be an assessor for no, one or more pools, and that a pool must have at least one assessor.

Figure 12 concerns entities in the Measurement area and their relationship with entities of other areas, i.e. Evaluation Activity area, Experimental Collection area and Experiment area.

Figure 13, depicting relationships between entities in the Evaluation Activity, Experimental Collection, Measurement and Resource areas, is not very different from its former version. The only differences are caused by the substitutions of `Statistical Analysis` with `Concept` and of `Pool` with `Ground Truth`.

A statistical analysis (`Concept` entity) can produce a value for a specific statistical test; the `Statistical Test` value can be `Elaborated From` data in no, one or more `Ground Truths`, or `Calculated From` data from no, one or more `Tasks`, or `Computed From` an `Experiment`. Lastly, a `Statistical Test` value can be obtained by the test `Conducted` on no, one or more `Measures`.

Figure 14 depicts the relationship between the `Visualization` entity and entities in the Evaluation Activity, the Experimental Collection, the Experiment and the Measurement area. Every visualization can be related to no, one or more `Tasks` (see relationship `ViTa`), to no, one or more `Pools` (see relationship `ViPo`), to no, one or more `Experiments` (see relationship `ViEx`), to no, one or more `Statistical Tests` (see relationship `ViSt`). In this latest version of this work, `Visualization` has two more relationships: one with `Measure` (`ViMe`) and one with `Estimate` (`ViEs`).

Figure 15 depicts the relationship between the `Contribution` entity and the entities in the Evaluation Activity, the Experimental Collection, and the Experiment area. The basic rationale behind the introduction of these relationships is that a contribution can refer to data stored in the infrastructure: besides experimental collections and its constituting components (i.e. corpus, pool and topic group) a contribution can refer to no, one or more experiments, evaluation activities, tracks and tasks. That allows us to measure the impact of the PROMISE project both in terms of citations to papers on PROMISE related evaluation activities and citations on data that has resulted from such activities, e.g. experiments and experimental collections. Moreover, that can help identify previous works that exploit the same experimental collection or their constituting component, or concern similar tasks (i.e. experimental hypotheses to be tested).
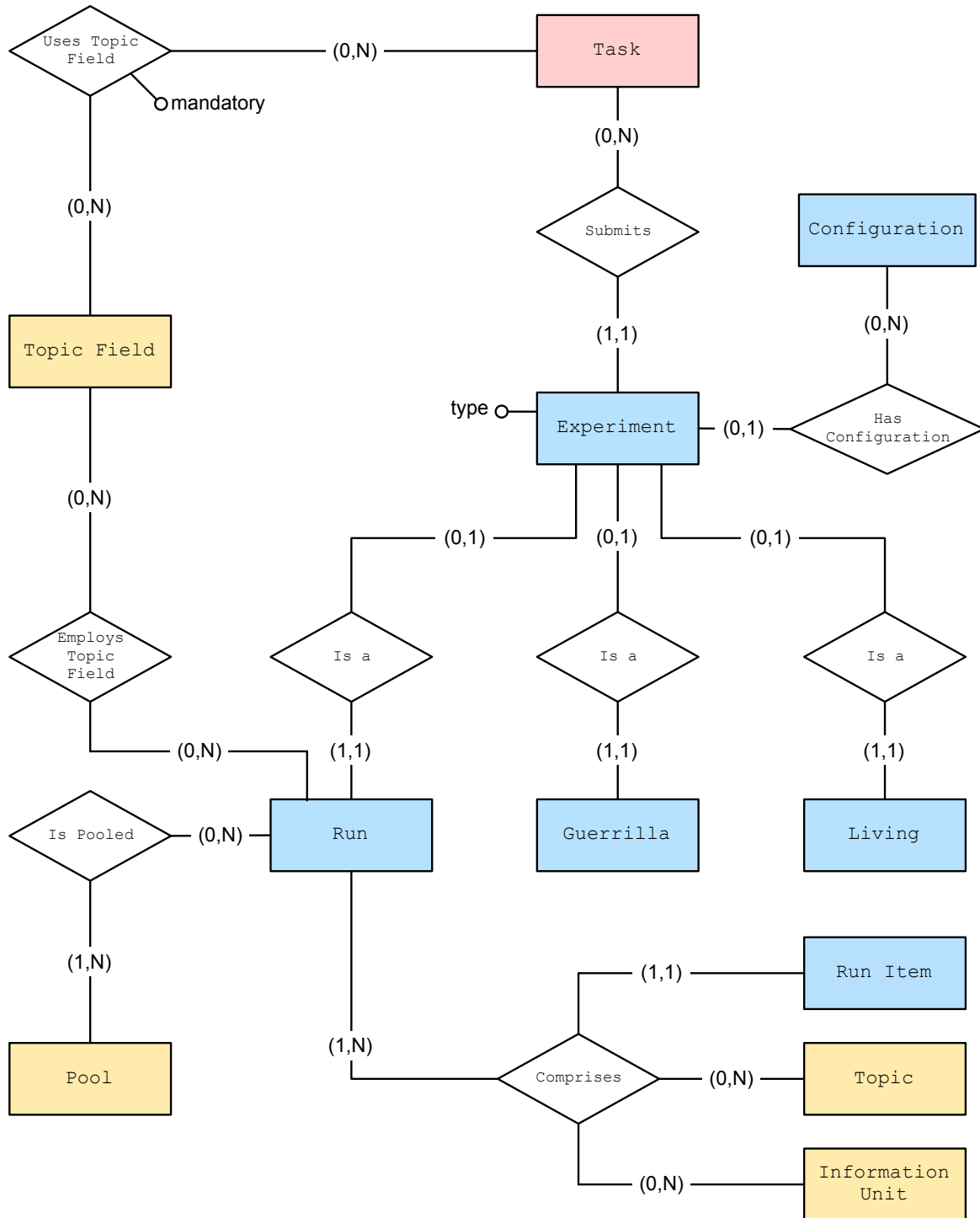
Figure 11: Relationships between entities in the Evaluation Activity, Experimental Collection, Experiment and Resource Areas
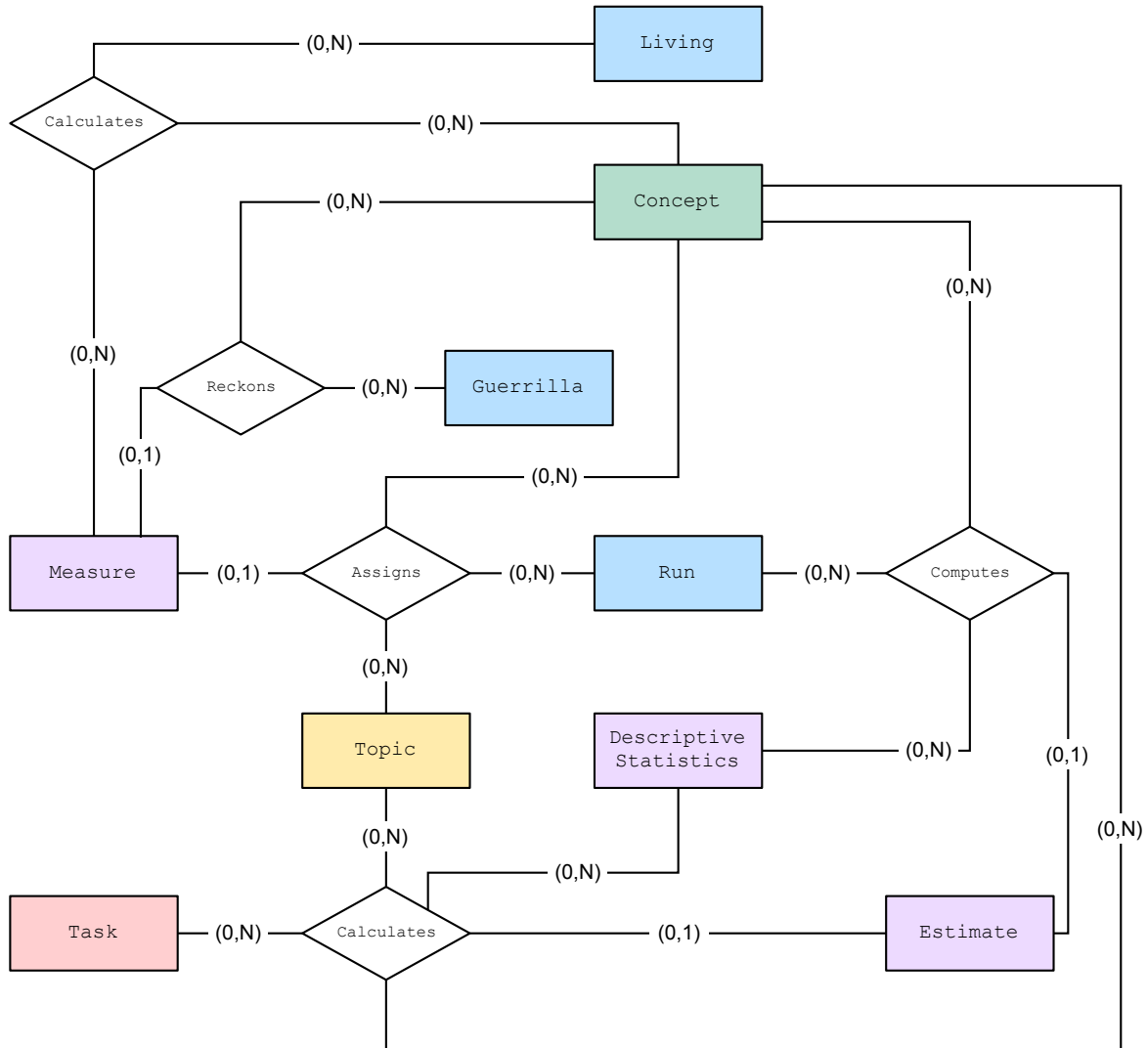
Figure 12: Relationships between entities in the Resource, Evaluation Activity, Experimental Collection, Experiment and Measurement Areas
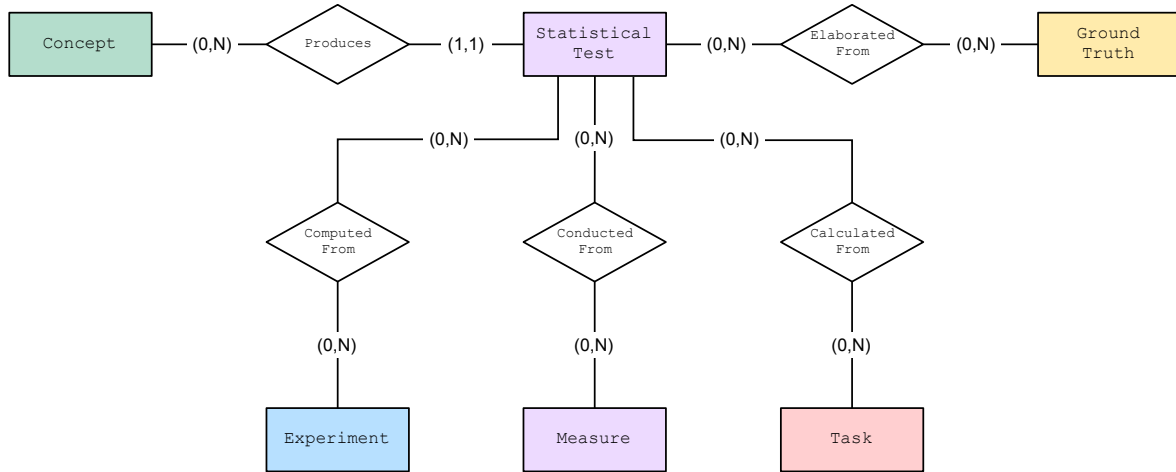
Figure 13: Relationships between entities in the Evaluation Activity, Experimental Collection, Measurement and Resource Areas
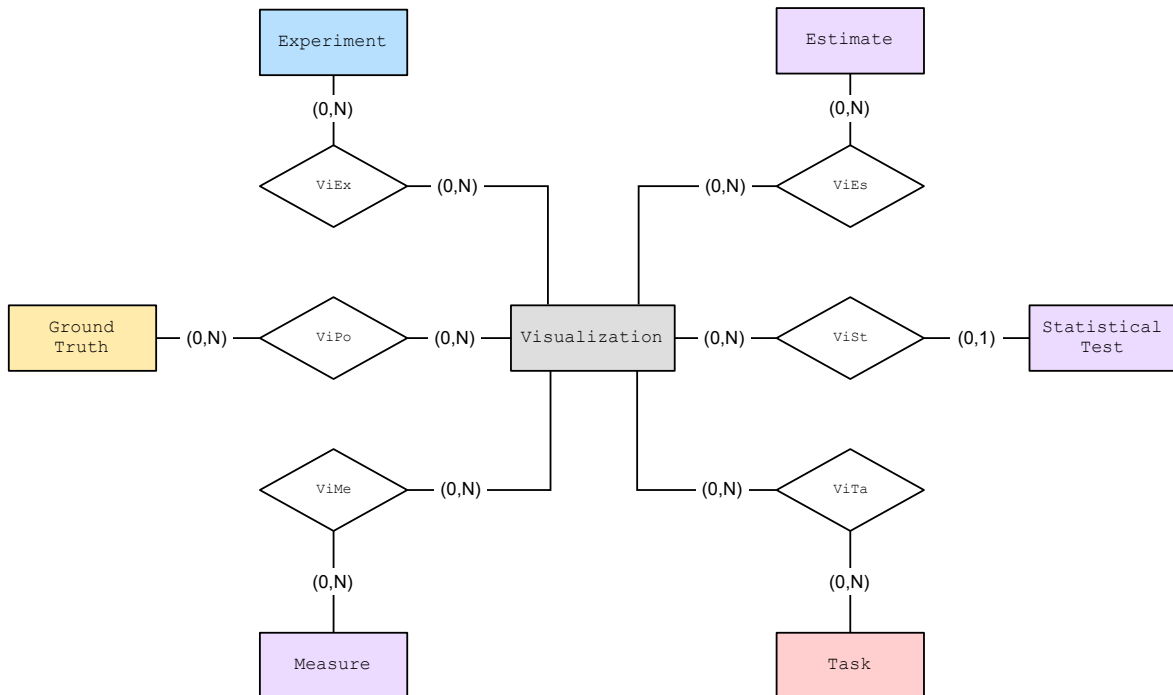
Figure 14: Relationships between the Visualization entity and entities in the Evaluation Activity, Experimental Collection, Experiment and Measurement Areas
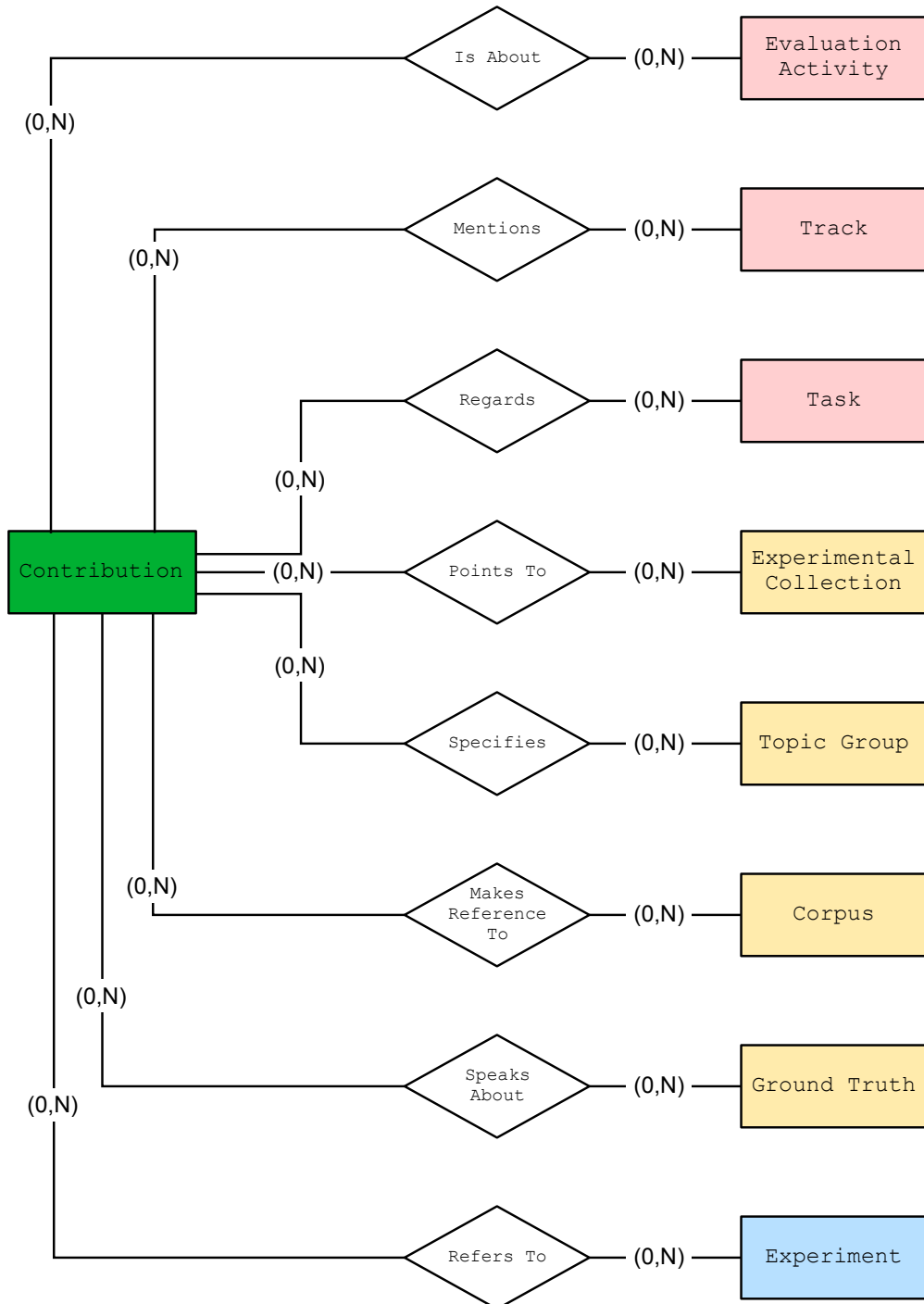
Figure 15: Relationships between the Contribution entity of the Bibliographical area and the entities in the Evaluation Activity, Experimental Collection and Experiment Areas

3 Relational Schema

This section describes the relational schema by examining the relations of each area and describing their attributes. Since the aim of the deliverable is also to give an account of the changes that occurred since the former version of this work, brief notes will be added to point them out. There is one particular modification that affects all the areas, and will consequently be added here: in the previous deliverable, the attributes of the relations were written using underscores to separate different words; in the present one, camel case is used (see, for example, `last_modified` versus `lastModified`).

3.1 Resource Area

The `Namespace` relation maintains the same attributes it had. They can be seen in Table 1

NAMESPACE			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the namespace
description	text		the description of the namespace
created	timestamp with timezone		the creation time stamp of the namespace
lastModified	timestamp with timezone		the last modification time stamp of the namespace
prefix	text	NOT NULL	the prefix of the namespace

Table 1: The Namespace relation

The `Concept` relation is entirely new. It can be seen in Table 2.

CONCEPT			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the concept
<u>ns</u>	text	PK, NOT NULL, references Namespace(id)	the namespace of the concept
created	timestamp with timezone		the creation time stamp of the concept
lastModified	timestamp with timezone		the last modification time stamp of the concept
description	text		the description of the concept

Table 2: The Concept relation

In the `Role` relation (Table 3), the `namespace created` and `lastModified` attributes were added.

ROLE			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the role
<u>ns</u>	text	PK, NOT NULL, references Namespace(id)	the namespace of the role
created	timestamp with timezone		the creation time stamp of the role
lastModified	timestamp with timezone		the last modification time stamp of the role
description	text		the description of the role

Table 3: The Role relation

The `namespace` attribute was also added to the `Group` relation (Table 4).

GROUP			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the group
<u>ns</u>	text	PK, NOT NULL, references Namespace(id)	the namespace of the group
created	timestamp with timezone		the creation time stamp of the group
lastModified	timestamp with timezone		the last modification time stamp of the group
description	text		the description of the group

Table 4: The Group relation

The only change the `User` relation[2] has undergone consists in the removal of the `picture_media_type` attribute. Thus, its attributes are those shown in Table 5.

---

[2]This relation is called `Actor` in the code because of the restriction on the word "user" EXPLAIN WHY

USER			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the user
<u>ns</u>	text	PK, NOT NULL, references Namespace(id)	the namespace of the user
created	timestamp with timezone		the creation time stamp of the user profile
lastModified	timestamp with timezone		the last modification time stamp of the user's profile
lang	char(3)		the language of the user
country	char(3)		the country of the user
pwd	text	NOT NULL	the password of the user
lastName	text		the last/family name of the user
firstName	text		the first name of the user
affiliation	text		the affiliation of the user
email	text		the email of the user
birthDate	date		the birth date of the user
gender	text		the gender of the user
address	text		the address, i.e. street address, of the user
city	text		the city of the user
state	text		the state/province/region of the user
zip	text		the ZIP code of the user
phone	text		the mobile telephone number of the user
facsimile	text		the facsimile number of the user
mobile	text		the user's mobile number
voipCallerId	text		the VoIP caller identifier of the user
homepage	text		the URL of the home page of the user

Table 5: The User relation

The `user` is associated to the `role` relation by means of the `enroll` relationship shown in Table 6.

ENROLL			
Attribute	**Data Type**	**Constraints**	**Description**
sourceID	text	PK, NOT NULL, references User(id)	The unique identifier of the user
sourceNS	text	PK, NOT NULL, references User(ns)	The namespace of the user
sourceID	text	PK, NOT NULL, references Role(id)	The unique identifier of the role
sourceNS	text	PK, NOT NULL, references Role(ns)	The namespace of the role

Table 6: The Enroll relation

The `user` is associated to the `group` relation by means of the `belong` relationship shown in Table 7.

BELONG			
Attribute	**Data Type**	**Constraints**	**Description**
sourceID	text	PK, NOT NULL, references User(id)	The unique identifier of the user
sourceNS	text	PK, NOT NULL, references User(ns)	The namespace of the user
sourceID	text	PK, NOT NULL, references Group(id)	The unique identifier of the group
sourceNS	text	PK, NOT NULL, references Group(ns)	The namespace of the group

Table 7: The Belong relation

Figure 16 provides an overview of the connections between the Resource Area relations.
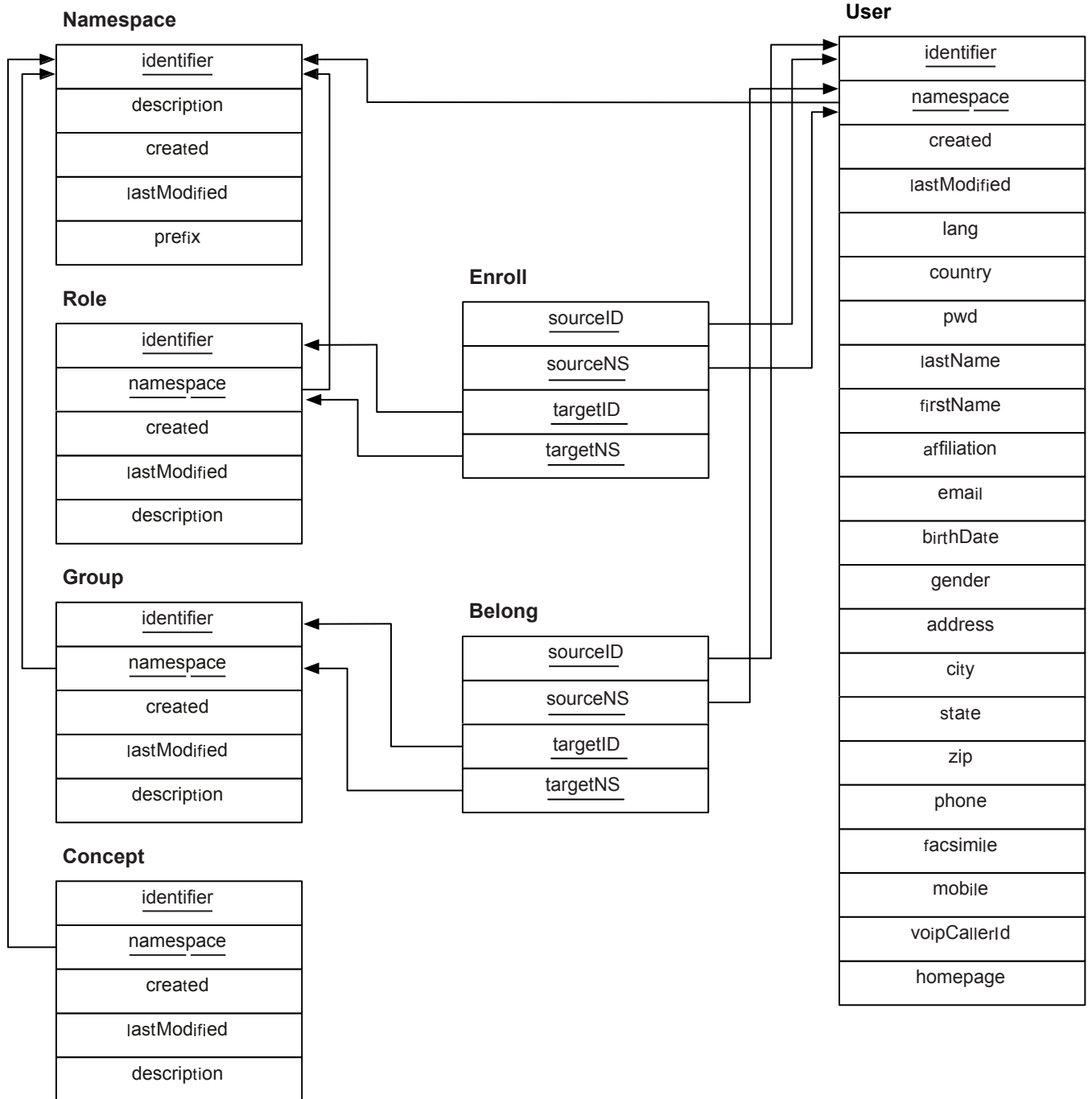
Figure 16: Relational schema of the Resource Area

3.2 Metadata Area

The Metadata Area relations are `Metadata` and `Metadata Set`. `Metadata` (see Table 8) has the same attributes it had in the former version of this work, plus `scope`, `ownerID`, `ownerNS` and `lang`. `scope`, `ownerID` and `ownerNS` have been added to `Metadata Set` as well. As shown in Table 9, `Metadata Set` has another new attribute: `name`.

METADATA			
Attribute	**Data Type**	**Constraints**	**Description**
id	text	PK, NOT NULL	the identifier of the metadata
ns	text	PK, NOT NULL, references Namespace(id)	the namespace of the metadata
created	timestamp with timezone		the creation time stamp of the metadata
lastModified	timestamp with timezone		the last modification time stamp of the metadata
scope	enum		the scope of the metadata
ownerID	text	references User(id)	the identifier of the user who owns the metadata
ownerNS	text	references User(ns)	the namespace of the user who owns the metadata
lang	char(3)		the language of the metadata
fields	xml		the XML dump of the fields of the metadata

Table 8: The Metadata relation

METADATA SET			
Attribute	**Data Type**	**Constraints**	**Description**
id	text	PK, NOT NULL	the identifier of the metadata set
ns	text	PK, NOT NULL, references Namespace(id)	the namespace of the metadata set
created	timestamp with timezone		the creation time stamp of the metadata set
lastModified	timestamp with timezone		the last modification time stamp of the metadata set
scope	enum		the scope of the metadata set
ownerID	text	references User(id)	the identifier of the user who owns the metadata set
ownerNS	text	references User(ns)	the namespace of the user who owns the metadata set
description	text		the description of the metadata set
name	text		the name of the metadata set

Table 9: The Metadata Set relation

The `metadata set` is associated to the `metadata` relation by means of the `own` relation shown in Table 10.

OWN			
Attribute	**Data Type**	**Constraints**	**Description**
sourceID	text	PK, NOT NULL, references Metadata Set(id)	The unique identifier of the metadata set owning the metadata.
sourceNS	text	PK, NOT NULL, references Metadata Set(ns)	The namespace of the metadata set owning the metadata
sourceID	text	PK, NOT NULL, references Metadata(id)	The unique identifier of the owned metadata
sourceNS	text	PK, NOT NULL, references Metadata(ns)	The namespace of the owned metadata

Table 10: The Own relation

It is possible to define relationships (i.e. a set superset (subset) of another set) between sets by means of the `include` relation shown in Table 11.

INCLUDE			
Attribute	**Data Type**	**Constraints**	**Description**
sourceID	text	PK, NOT NULL, references Set(id)	The unique identifier of the superset.
sourceNS	text	PK, NOT NULL, references Set(ns)	The namespace of the superset
targetID	text	PK, NOT NULL, references Set(id)	The unique identifier of the subset
targetNS	text	PK, NOT NULL, references Set(ns)	The namespace of the subset

Table 11: The Include relation

The `Relate` relation establishes relationships among metadata. These relationships can be typed by the means of the `Concept` entity.

RELATE			
Attribute	**Data Type**	**Constraints**	**Description**
sourceID	text	PK, NOT NULL, references Metadata(id)	The unique identifier of the source metadata.
sourceNS	text	PK, NOT NULL, references Metadata(ns)	The namespace of the source metadata
sourceID	text	PK, NOT NULL, references Metadata(id)	The unique identifier of the target metadata
sourceNS	text	PK, NOT NULL, references Metadata(ns)	The namespace of the target metadata
relationID	text	PK, NOT NULL, references Concept(id)	The unique identifier of the concept
relationNS	text	PK, NOT NULL, references Concept(ns)	The namespace of the concept

Table 12: The Relate relation

The connections of the Metadata Area relations are shown in Figure 17.
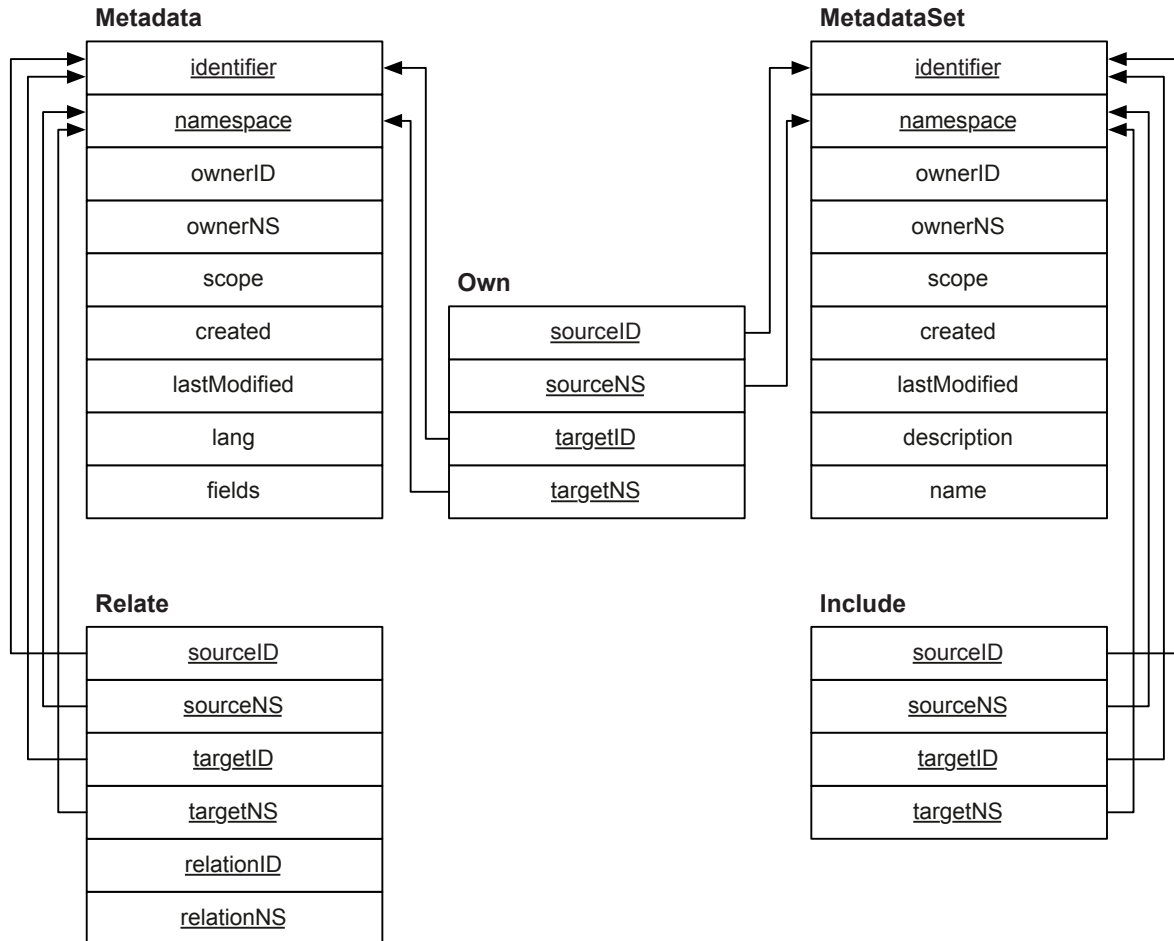
Figure 17: Relational schema of the Metadata Area

3.3 Evaluation Activity Area

Table 13 shows the attributes of the `Evaluation Activity` relation. The new ones are: `scope`, `ownerID`, `ownerNS`, `Type` and `status`.

EVALUATION ACTIVITY			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the evaluation activity
<u>ns</u>	text	PK, NOT NULL, references Namespace(id)	the namespace of the evaluation activity
created	timestamp with timezone		the creation time stamp of the evaluation activity
lastModified	timestamp with timezone		the last modification time stamp of the evaluation activity
scope	enum		the scope of the evaluation activity
ownerID	text	references User(id)	the identifier of the user who owns the evaluation activity
ownerNS	text	references User(ns)	the namespace of the user who owns the evaluation activity
description	text		the description of the evaluation activity
name	text		the name or acronym of the evaluation activity
type		NOT NULL	the type of the evaluation activity
status			the status of the evaluation activity

Table 13: The Evaluation Activity relation

The `Track` relation (Table 14) loses some of the old attributes (`description`, `topic_status`, `pool_status`, `metric_status`) and gains some other ones (`scope`, `ownerID`, `ownerNS`, `evaluationActivityID`, `evaluationActivityNS`).

TRACK			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the track
created	timestamp with timezone		the creation time stamp of the track
lastModified	timestamp with timezone		the last modification time stamp of the track
scope	enum		the scope of the track
ownerID	text	references User(id)	the identifier of the user who owns the track
ownerNS	text	references User(ns)	the namespace of the user who owns the track
description	text		the description of the track
submissionDeadline	date		the date when the participants must submit the experiments
evaluationActivityID	text	NOT NULL, reference EvaluationActivity(id)	the identifier of the evaluation activity to which the track belongs
evaluationActivityNS	text	NOT NULL, reference EvaluationActivity(ns)	the namespace of the evaluation activity to which the track belongs

Table 14: The Track relation

As for the `Task` relation (Table 15), the added attributes are: `scope`, `ownerID`, `ownerNS`, `maxExperiments`, `taskType`, `evaluationActivityID`, `evaluationActivityNS`, `trackID` and `experimentalCollectionID`.

TASK			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the task
created	timestamp with timezone		the creation time stamp of the task
lastModified	timestamp with timezone		the last modification time stamp of the task
scope	enum		the scope of the task
ownerID	text	references User(id)	the identifier of the user who owns the task
ownerNS	text	references User(ns)	the namespace of the user who owns the task
description	text		the description of the task
maxExperiments	int	CHECK (>=0)	the maximum number of experiments that can be submitted for the task
taskType	text	the type of the task	
evaluationActivityID	text	NOT NULL, references EvaluationActivity(id)	the identifier of the evaluation activity to which the task belongs
evaluationActivityNS	text	NOT NULL, references EvaluationActivity(ns)	the namespace of the evaluation activity to which the task belongs
trackID	text	references Track(id)	the identifier of the track that contains the task
experimentalCollectionID	text	NOT NULL, references ExperimentalCollection(id)	the identifier of the experimental collection used by the task

Table 15: The Task relation

Figure 18 shows the interactions between the relations of the Evaluation Activity Area.
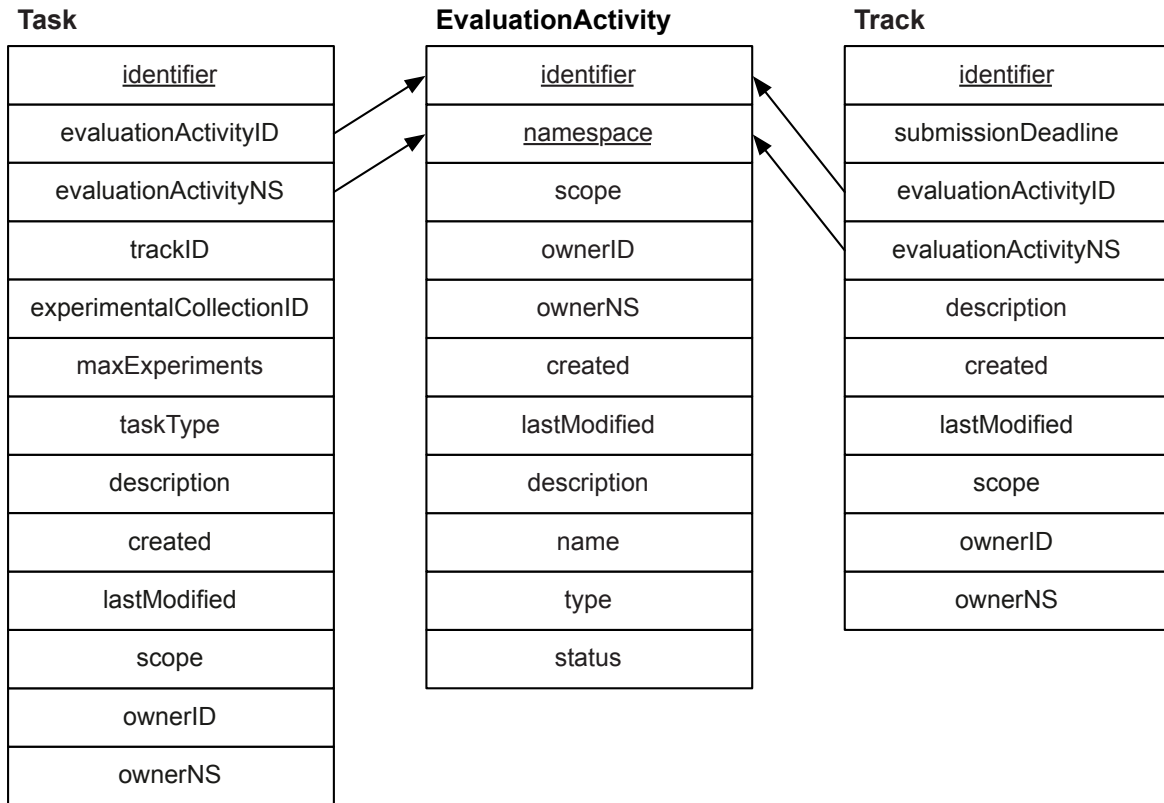
Figure 18: Relational schema of the Evaluation Activity Area

3.4 Experimental Collection Area

The `scope`, `ownerID`, `ownerNS`, `groundTruthID` and `topicGroupID` attributes have been added to The `Experimental Collection` relation (see Table 16).

EXPERIMENTAL COLLECTION			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the experimental collection
created	timestamp with timezone		the creation time stamp of the experimental collection
lastModified	timestamp with timezone		the last modification time stamp of the experimental collection
scope	enum		the scope of the experimental collection
ownerID	text	references User(id)	the identifier of the user who owns the experimental collection
ownerNS	text	references User(ns)	the namespace of the user who owns the experimental collection
description	text		the description of the experimental collection
groundTruthID	text	UNIQUE, references GroundTruth(id)	the unique identifier of the ground truth adopted by the experimental collection
topicGroupID	text	references TopicGroup(id)	the topic group associated to the experimental collection

Table 16: The Experimental Collection relation

As shown in Table 17, the `Information Unit` relation has three more attributes: `description`, `link` and `corpusID`.

INFORMATION UNIT			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the information unit
mediaType	text	NOT NULL	the MIME media type of the information unit
lang	char(3)		the language of the information unit
created	timestamp with timezone		the creation time stamp of the information unit
lastModified	timestamp with timezone		the last modification time stamp of the information unit
description	text		the description of the experimental collection
link	text		the link to an external information unit
corpusID	text	NOT NULL, references Corpus(id)	the identifier of the related Corpus

Table 17: The Information Unit relation

`Corpus` (Table 18) gains `ownerID`, `ownerNS` and `scope`.

CORPUS			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the corpus
created	timestamp with timezone		the creation time stamp of the corpus
lastModified	timestamp with timezone		the last modification time stamp of the corpus
scope	enum		the scope of the corpus
ownerID	text	references User(id)	the identifier of the user who owns the corpus
ownerNS	text	references User(ns)	the namespace of the user who owns the corpus
description	text		the description of the corpus
mediaType	text	NOT NULL	the MIME media type of the corpus
lang	char(3)		the language of the corpus

Table 18: The Corpus relation

While `Topic` remains the same (see Table 19), `Topic Content` gains `topicID, topicConcept-`

ID and `topicConceptNS`, as shown in Table 20.

TOPIC			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the topic
created	timestamp with timezone		the creation time stamp of the topic
lastModified	timestamp with timezone		the last modification time stamp of the topic

Table 19: The Topic relation

TOPIC CONTENT			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the topic content
mediaType	text	NOT NULL	the MIME media type of the topic content
lang	char(3)		the language of the topic content
content	bytea		the content of the topic
topicID	text	NOT NULL	he unique identifier of the topic with this topic content
topicConceptID	text	NOT NULL	the creation time stamp of the topic content
topicConceptNS	text	NOT NULL	the last modification time stamp of the topic content

Table 20: The Topic Content relation

The `ownerID`, `ownerNS` and `scope` attributes were added to the `Topic Group` relation (Table 21).

TOPIC GROUP			
Attribute	**Data Type**	**Constraints**	**Description**
id	text	PK, NOT NULL	the identifier of the topic group
created	timestamp with timezone		the creation time stamp of the topic group
lastModified	timestamp with timezone		the last modification time stamp of the topic group
scope	enum		the scope of the topic group
ownerID	text	references User(id)	the identifier of the user who owns the topic group
ownerNS	text	references User(ns)	the namespace of the user who owns the topic group
description	text		the description of the topic group

Table 21: The Topic Group relation

Formerly `Pool`, `Ground Truth` (Table 22) loses the `assessment_status` attribute, but gains `ownerID`, `ownerNS` and `scope`.

GROUND TRUTH			
Attribute	**Data Type**	**Constraints**	**Description**
id	text	PK, NOT NULL	the identifier of the topic group
created	timestamp with timezone		the creation time stamp of the ground truth
lastModified	timestamp with timezone		the last modification time stamp of the ground truth
scope	enum		the scope of the topic group
ownerID	text	references User(id)	the identifier of the user who owns the ground truth
ownerNS	text	references User(ns)	the namespace of the user who owns the ground truth
description	text		the description of the ground truth

Table 22: The Ground Truth relation

Table 23 shows the attributes of the `Pool Item` relation. `topicID`, `informationUnitID`, `ground-TruthID`, `relevanceID` and `relevanceNS` has been added.

	POOL ITEM		
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the pool item
created	timestamp with timezone		the creation time stamp of the pool item
lastModified	timestamp with timezone		the last modification time stamp of the pool item
topicID	text	NOT NULL, references Topic(id)	the unique identifier of the topic composing the pool item
informationUnitID	text	NOT NULL, CHECK referential integrity InformationUnit(id)	the unique identifier of the information unit composing the pool item
groundTruthID	text	NOT NULL, reference GroundTruth(id)	the unique identifier of the pool composing the pool item
relevanceID	text	NOT NULL, reference Relevance(id)	the unique identifier of the relevance given to the pool item
relevanceNS	text	NOT NULL, reference Relevance(ns)	the unique identifier of the relevance given to the pool item

Table 23: The Pool Item relation

Figure 19 depicts the connections that link the relations of this Area.
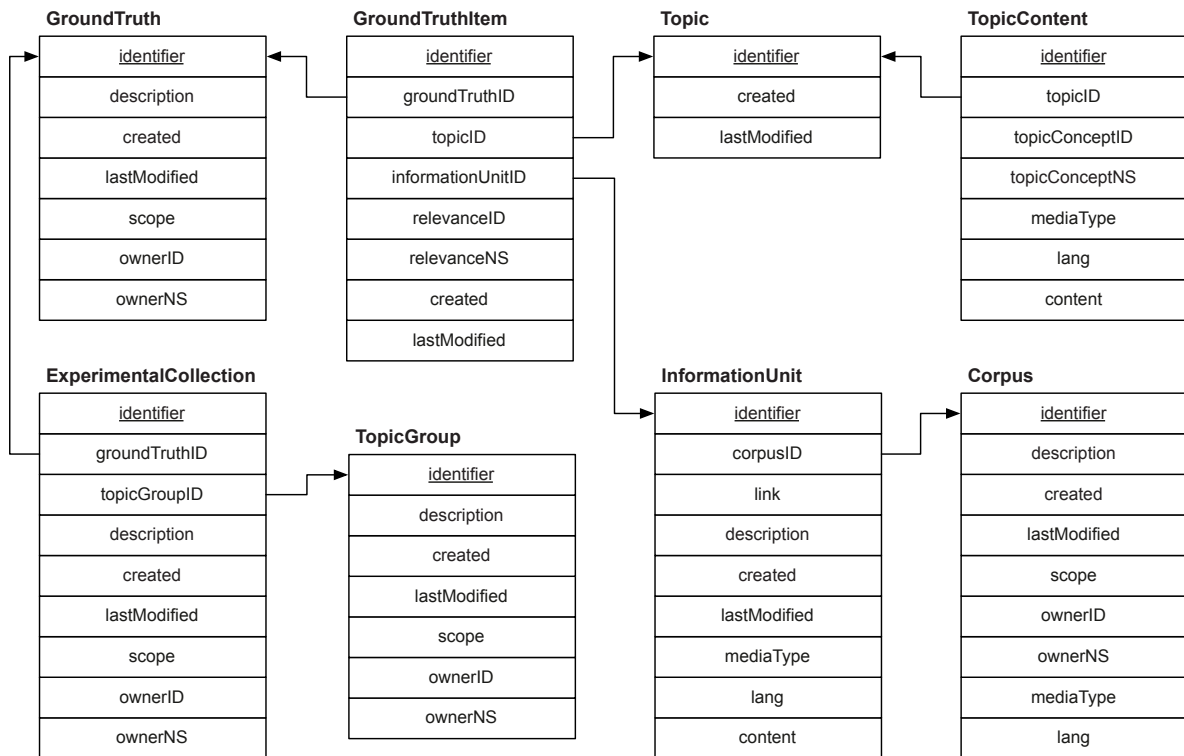
Figure 19: Relational schema of the Experimental Collection Area

3.5 Experiment Area

When examining the relations of this area, a clarification needs to be done. The `Run`, `Guerrilla` and `Living` relations are identical to `Experiment`. EXPLAIN WHY. The only difference consists in the `queryConstruction` attribute of the `Run` relation. For this reason, the tables describing `Experiment` and `Run` will be shown (they are, respectively, Table 24 and Table 25), but the ones regarding `Guerrilla` and `Living` will be omitted. Apart from the usual `ownerID`, `ownerNS` and `scope` attributes, the main innovations in the `Experiment` relation are: `experimentTypeID`, `experiment-TypeNS`, `configurationID` and `taskID`. `query_construction` was removed, and now appears as `queryConstruction` in `Run`.

EXPERIMENT			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the experiment
created	timestamp with timezone		the creation time stamp of the experiment
lastModified	timestamp with timezone		the last modification time stamp of the experiment
scope	enum		the scope of the experiment
ownerID	text	references User(id)	the identifier of the user who owns the experiment
ownerNS	text	references User(ns)	the namespace of the user who owns the experiment
description	text		the description of the experiment
experimentTypeID	text	references Concept(id)	the unique identifier of the Concept related to an Experiment. This concept is used to represent a taxonomy through which it is possible to classify an experiment: e.g. PRIVATE, HELPER, OFFICIAL
experimentTypeNS	text	references Concept(ns)	the namespace of the Concept related to an Experiment. This concept is used to represent a taxonomy through which it is possible to classify an experiment: e.g. PRIVATE, HELPER, OFFICIAL
configurationID	text	references Configuration(id)	the unique identifier of the configuration used in this experiment
taskID	text	NOT NULL, references Task(id)	the unique identifier of the task for which the experiment is submitted

Table 24: The Experiment relation

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RUN			
Attribute	**Data Type**	**Constraints**	**Description**
id	text	PK, NOT NULL	the identifier of the experiment
created	timestamp with timezone		the creation time stamp of the experiment
lastModified	timestamp with timezone		the last modification time stamp of the experiment
scope	enum		the scope of the experiment
ownerID	text	references User(id)	the identifier of the user who owns the experiment
ownerNS	text	references User(ns)	the namespace of the user who owns the experiment
description	text		the description of the experiment
experimentTypeID	text	references Concept(id)	the unique identifier of the Concept related to an Experiment. This concept is used to represent a taxonomy through which it is possible to classify an experiment: e.g. PRIVATE, HELPER, OFFICIAL
experimentTypeNS	text	references Concept(ns)	the namespace of the Concept related to an Experiment. This concept is used to represent a taxonomy through which it is possible to classify an experiment: e.g. PRIVATE, HELPER, OFFICIAL
configurationID	text	references Configuration(id)	the unique identifier of the configuration used in this experiment
taskID	text	NOT NULL, references Task(id)	the unique identifier of the task for which the experiment is submitted
queryCostruction	text		describes how the query has been costructed, e.g. automatic,manual, and it is associated to the type "run"

Table 25: The Run relation

Three attributes have been added to the `Run Item` relation: `experimentID`, `topicID` and in-

`formationUnitID` (see Table 26).

RUN ITEM			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the run item
experimentID	text	NOT NULL, references Experiment(id)	the unique identifier of the experiment
topicID	text	NOT NULL, references Topic(id)	the unique identifier of the topic
informationUnitID	text	NOT NULL, references InformationUnit(id)	the identifier of the information unit
rank	integer	NOT NULL	the rank of the run item
score	real	NOT NULL	the score of the run item

Table 26: The Run Item relation

As shown in Table 27, some attributes were added to the `Component` relation as well: `configurationID`, `componentTypeID`, `componentTypeNS`, `scope`, `ownerID` and `ownerNS`.

COMPONENT			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the component
created	timestamp with timezone		the creation time stamp of the component
lastModified	timestamp with timezone		the last modification time stamp of the component
scope	enum		the scope of the component
ownerID	text	references User(id)	the identifier of the user who owns the component
ownerNS	text	references User(ns)	the namespace of the user who owns the component
description	text		the description of the component
name	text		the name of the component
configurationID	text	NOT NULL, references Configuration(id)	the unique identifier of the component configuration
componentTypeID	text		the unique identifier of the concept defining a component type
componentTypeNS	text		the namespace of the concept defining a component type

Table 27: The Component relation

The `System` and `Application` relations are identical also in what concerns the changes they underwent. In both cases, the `scope`, `ownerID`, `ownerNS` and `configurationID` attributes were added (see, respectively, Table 28 for `System` and Table 29 for `Application`.).

SYSTEM			
Attribute	**Data Type**	**Constraints**	**Description**
id	text	PK, NOT NULL	the identifier of the system
created	timestamp with timezone		the creation time stamp of the system
lastModified	timestamp with timezone		the last modification time stamp of the system
scope	enum		the scope of the system
ownerID	text	references User(id)	the identifier of the user who owns the system
ownerNS	text	references User(ns)	the namespace of the user who owns the system
description	text		the description of the system
name	text		the name of the system
configurationID	text	NOT NULL, references Configuration(id)	the unique identifier of the system configuration

Table 28: The System relation

APPLICATION			
Attribute	**Data Type**	**Constraints**	**Description**
id	text	PK, NOT NULL	the identifier of the application
created	timestamp with timezone		the creation time stamp of the application
lastModified	timestamp with timezone		the last modification time stamp of the application
scope	enum		the scope of the application
ownerID	text	references User(id)	the identifier of the user who owns the application
ownerNS	text	references User(ns)	the namespace of the user who owns the application
description	text		the description of the application
name	text		the name of the application
configurationID	text	NOT NULL, references Configuration(id)	the unique identifier of the configuration of the application

Table 29: The Application relation

The usual attributes `scope`, `ownerID` and `ownerNS` were added to the `Configuration` relation, as shown in Table 30.

CONFIGURATION			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the configuration
scope	enum		the scope of the configuration
ownerID	text	references User(id)	the identifier of the user who owns the configuration
ownerNS	text	references User(ns)	the namespace of the user who owns the configuration
description	text		the description of the configuration
parameters	xml		the parameters defining the configuration

Table 30: The Configuration relation

Figure 20 depicts the relation interaction of the Experiment Area.
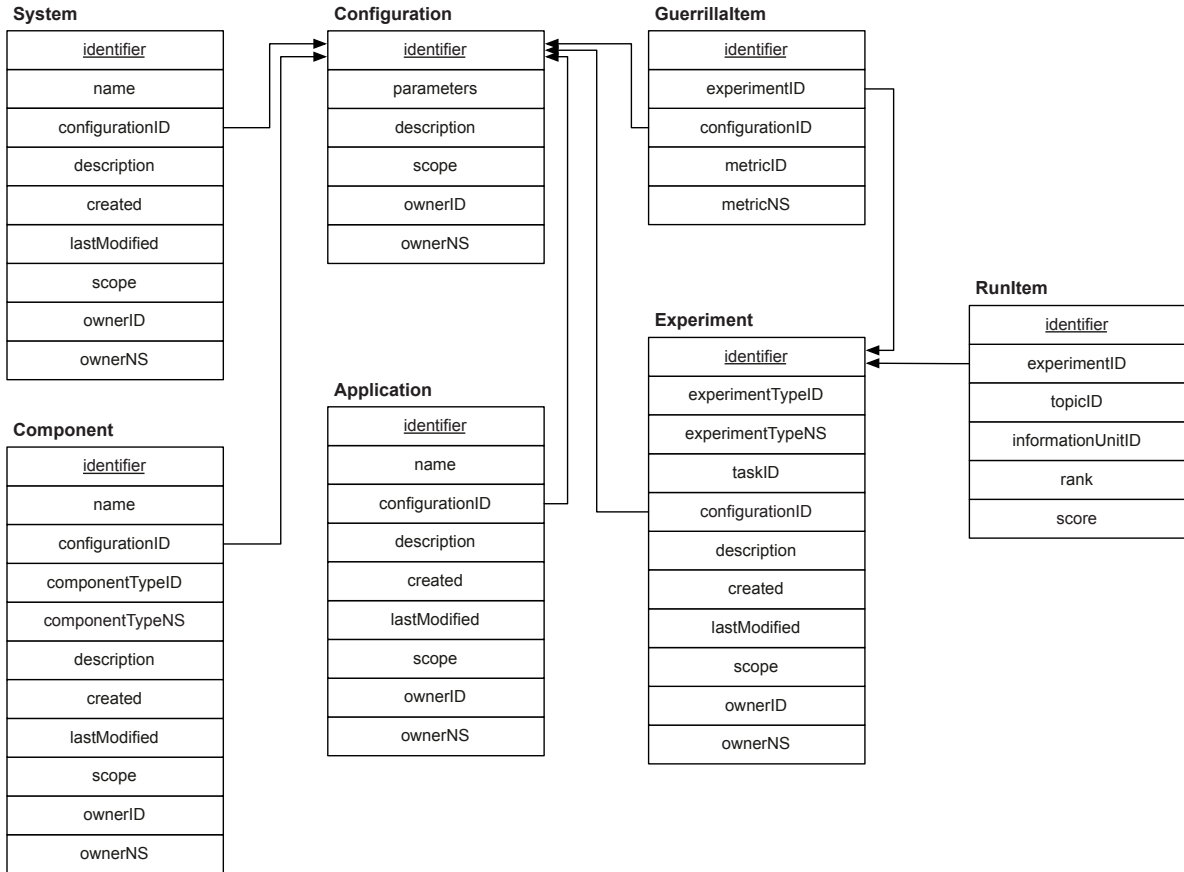
Figure 20: Relational schema of the Experiment Area

3.6 Measurement Area

In the Statistical Test relations, the added attributes are: scope, ownerID, ownerNS, statisticalAnalysisID, statisticalAnalysisNS and visualizationID (see Table 31).

STATISTICAL TEST			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the statistical test
created	timestamp with timezone		the creation time stamp of the statistical test
lastModified	timestamp with timezone		the last modification time stamp of the statistical test
scope	enum		the scope of the statistical test
ownerID	text	references User(id)	the identifier of the user who owns the statistical test
ownerNS	text	references User(ns)	the namespace of the user who owns the statistical test
description	text		the description of the statistical test
parameters	xml		the parameters for reconstructing the statistical test
statisticalAnalysisID	text	NOT NULL, references Concept(id)	the unique identifier of the statistical Analysis (ICI.Concept) related to this statistical test
statisticalAnalysisNS	text	NOT NULL, references Concept(ns)	the namespace of the statistical Analysis (ICI.Concept) related to this statistical test
visualizationID	text	references Visualization(id)	the unique identifier of the visualization of this statistical test

Table 31: The Statistical Test relation

Some attributes were also added to the `Measure` relation (Table 32): `lastModified`, `metricID`, `metricNS`, `runID`, `guerrillaID`, `livingID` and `topicID`. Also, the attribute formerly named `value` is now `valueMeasure`.

MEASURE			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the measure
created	timestamp with timezone		the creation time stamp of the measure
lastModified	timestamp with timezone		the last modification time stamp of the measure
valueMeasure	decimal		the value of the measure
metricID	text	NOT NULL, references Concept(id)	the identifier of the Metric (ICI.Concept) of the measure
metricNS	text	NOT NULL, references Concept(ns)	the namespace of the Metric (ICI.Concept) of the measure
runID	text	references Run(id)	the unique identifier of the run
guerrillaID	text	references Guerrilla(id)	the unique identifier of the guerrilla
livingID	text	references Living(id)	the unique identifier of the living
topicID	text	references Topic(id)	the unique identifier of the topic

Table 32: The Measure relation

The `Estimate` relation changes are almost the same as the ones occurred to `Measure`. There are some differences, though. For example, there is no `valueMeasure`, but, it goes without saying, a `valueEstimate`. Also, three more attributes have been added: `taskID`, `descriptiveStatisticsID` and `descriptiveStatisticsNS`. For comparisons, see Table 33.

ESTIMATE			
Attribute	**Data Type**	**Constraints**	**Description**
id	text	PK, NOT NULL	the identifier of the estimate
created	timestamp with timezone		the creation time stamp of the estimate
lastModified	timestamp with timezone		the last modification time stamp of the estimate
valueEstimate	decimal		the value of the estimate
metricID	text	NOT NULL, references Concept(id)	the identifier of the Metric (ICI.Concept) of the measure
metricNS	text	NOT NULL, references Concept(ns)	the namespace of the Metric (ICI.Concept) of the measure
descriptiveStatisticsID	text	references Concept(id)	the identifier of the Descriptive Statistic (ICI.Concept) of the measure
descriptiveStatisticsNS	text	references Concept(ns)	the identifier of the Descriptive Statistic (ICI.Concept) of the measure
taskID	text	references Task(id)	the unique identifier of the task
runID	text	references Run(id)	the unique identifier of the run
guerrillaID	text	references Guerrilla(id)	the unique identifier of the guerrilla
livingID	text	references Living(id)	the unique identifier of the living
topicID	text	references Topic(id)	the unique identifier of the topic

Table 33: The Estimate relation

Figure 21 shows the interactions of the Measurement Area relations.

Concept

identifier
namespace
created
lastModified
description

Estimate

identifier
valueEstimate
metricID
metricNS
descriptiveStatisticID
descriptiveStatisticNS
taskID
topicID
runID
guerrillaID
livingID
created
lastModified

Measure

identifier
valueMeasure
metricID
metricNS
runID
guerrillaID
livingID
topicID
created
lastModified

StatisticalTest

identifier
statisticalAnalysisID
statisticalAnalysisNS
parameters
visualizationID
created
lastModified
scope
ownerID
ownerNS

Figure 21: Relational schema of the Measurement Area

3.7 Visual Analytics Area

The `Visualization` relation loses `created` and `lastModified`, but gains other attributes: `ownerID`, `ownerNS`, `scope`, `description`, `name`, `visualizationTypeID` and `visualizationTypeNS`.

VISUALIZATION			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the visualization
scope	enum		the scope of the visualization
ownerID	text	references User(id)	the identifier of the user who owns the visualization
ownerNS	text	references User(ns)	the namespace of the user who owns the visualization
parameters	xml		the parameters defining the visualization
created	timestamp with timezone		the creation time stamp of the visualization
lastModified	timestamp with timezone		the last modification time stamp of the visualization
visualizationTypeID	text	NOT NULL, references Concept(id)	the unique identifier for the Visualization Type of this visualization
visualizationTypeNS	text	NOT NULL, references Concept(ns)	the namespace for the Visualization Type of this visualization

Table 34: The Visualization relation

As for the `Snapshot` relation, its new attributes are: `lang`, `ownerID`, `ownerNS`, `scope` and `visualizationID`.

SNAPSHOT			
Attribute	**Data Type**	**Constraints**	**Description**
id	text	PK, NOT NULL	the identifier of the snapshot
mediaType	text	NOT NULL	the MIME media type of the snapshot
lang	char(3)		the language of the snapshot
content	bytea		the content of the snapshot
created	timestamp with timezone		the creation time stamp of the snapshot
lastModified	timestamp with timezone		the last modification time stamp of the snapshot
scope	enum		the scope of the snapshot
ownerID	text	references User(id)	the identifier of the user who owns the snapshot
ownerNS	text	references User(ns)	the namespace of the user who owns the snapshot
visualizationID	text	NOT NULL, references Visualization(id)	the unique identifier of the Visualization related to this snapshot

Table 35: The Snapshot relation

The logic schema of the Visual Analytics Area is shown in Figure 22.

Visualization		Snapshot	
identifier		identifier	
name		visualizationID	
parameters		created	
visualizationTypeID		lastModified	
visualizationTypeNS		scope	
description		ownerID	
created		ownerNS	
lastModified		mediaType	
scope		lang	
ownerID		content	
ownerNS			
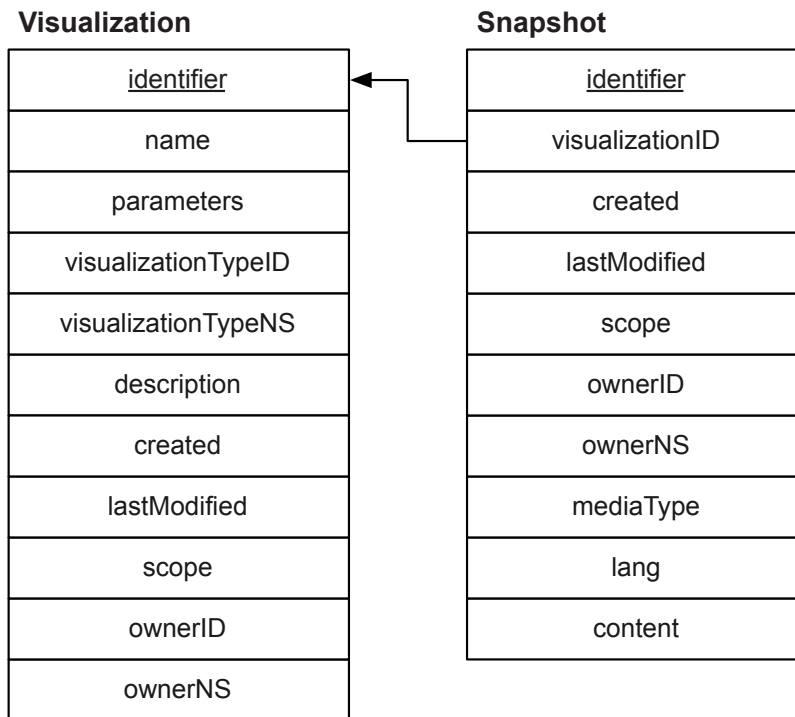
Figure 22: Relational schema of the Visual Analytics Area

3.8 Bibliographical Area

In the `Contribution` relation, some attributes have been removed (`year` and `month`), while some other have been added (`mediaType`, `lang`, `lastModified`, `contributionYear` and `contribution-Type`).

CONTRIBUTION			
Attribute	**Data Type**	**Constraints**	**Description**
<u>id</u>	text	PK, NOT NULL	the identifier of the contribution
<u>ns</u>	text	PK, NOT NULL, references Namespace(id)	the namespace of the contribution
mediaType	text	NOT NULL	the MIME media type of the contribution
lang	char(3)		the language of the contribution
content	bytea		the content of the contribution
created	timestamp with timezone		the creation time stamp of the contribution
lastModified	timestamp with timezone		the last modification time stamp of the contribution
title	text		the title of the contribution
contributionYear	int		the year when the contribution was published or made available
contributionType	text		the type of the contribution

Table 36: The Contribution relation

Figure 23 shows the relational schema of the Bibliographical Area.
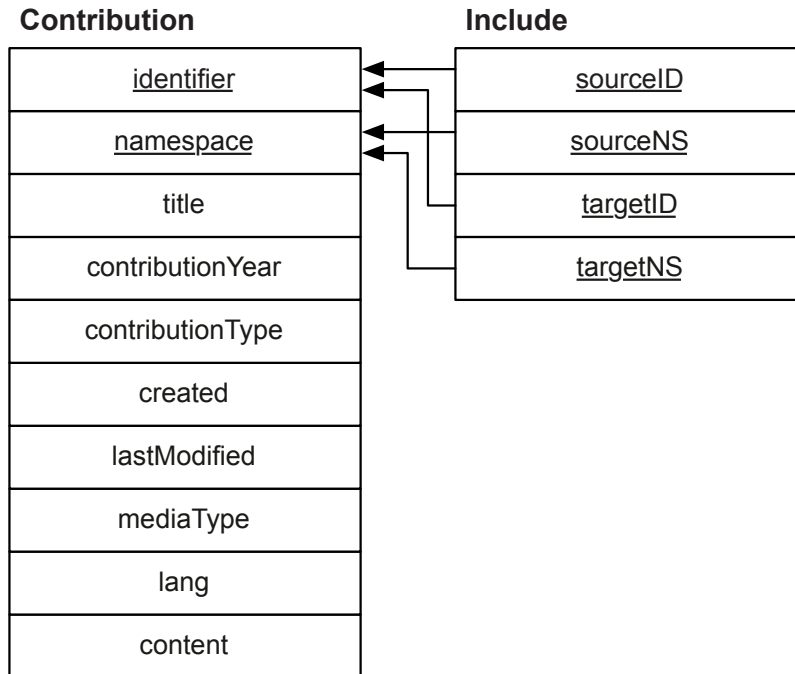
Figure 23: Relational schema of the Bibliographical Area

3.9 Inter-area Relationships

This subsection contains images depicting relational schemas of inter-area relationships.
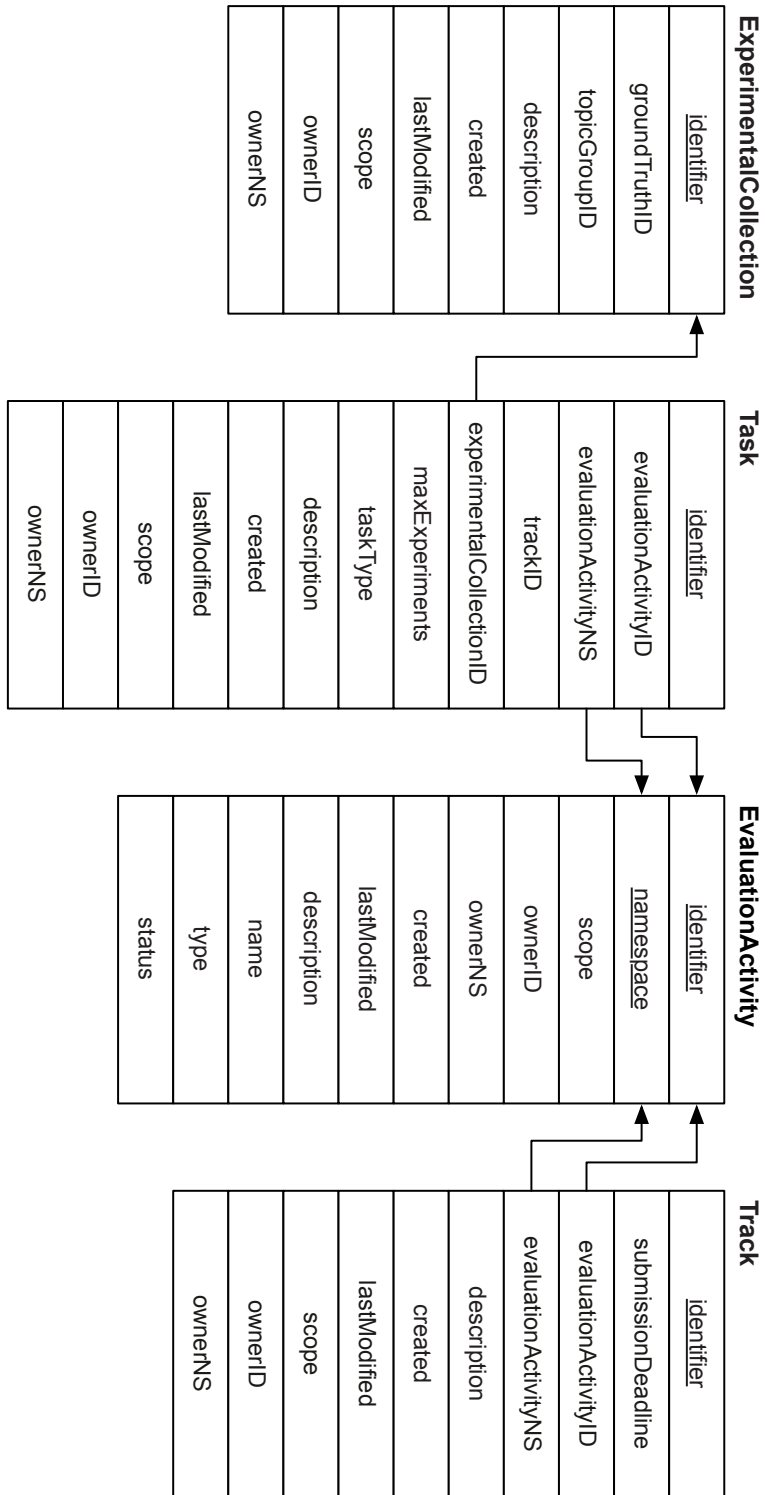
Figure 24: Relational schema of the interactions that occur between the Resource Management Area, the Evaluation Activity Area and the Experimental Collection Area
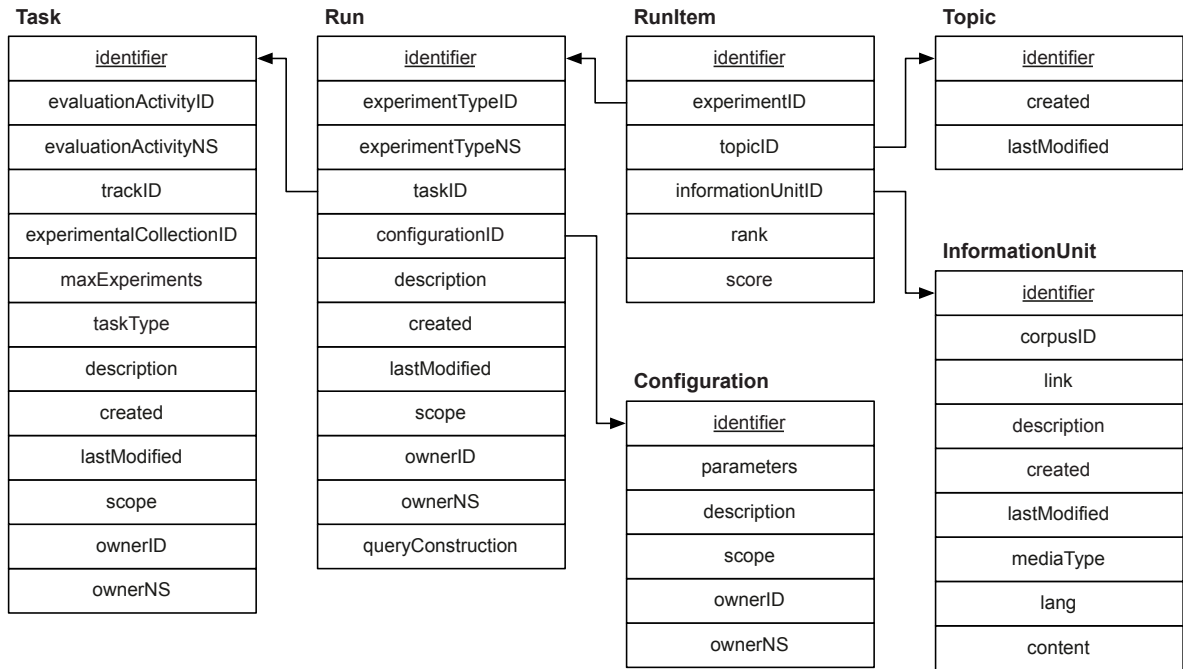
Figure 25: Relational schema of the interactions that occur between the Evaluation Activity Area, the Experimental Collection Area, the Experiment Area and the Resource Area
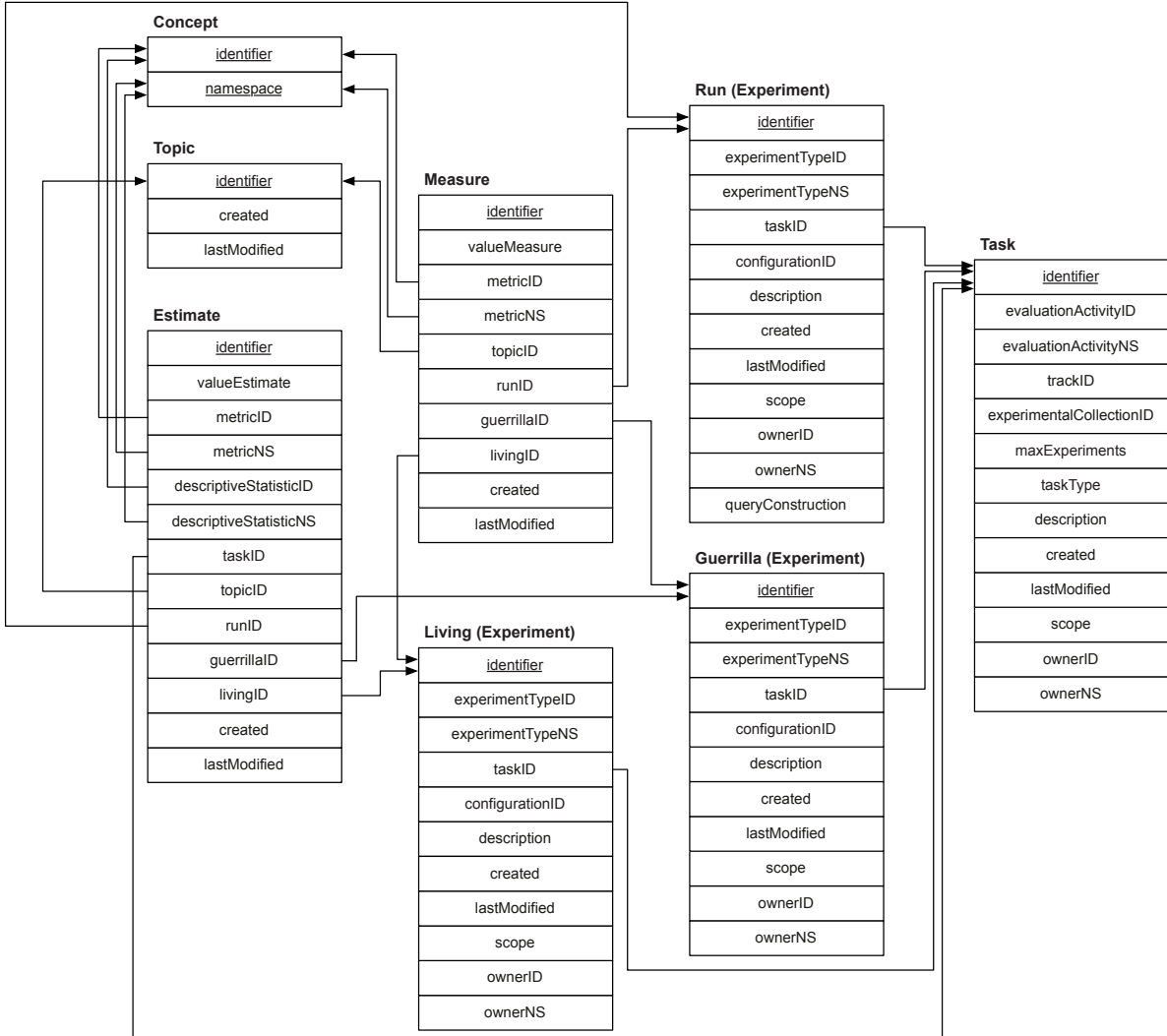
Figure 26: Relationships between entities in the Resource, Evaluation Activity, Experimental Collection, Experiment and Measurement Areas
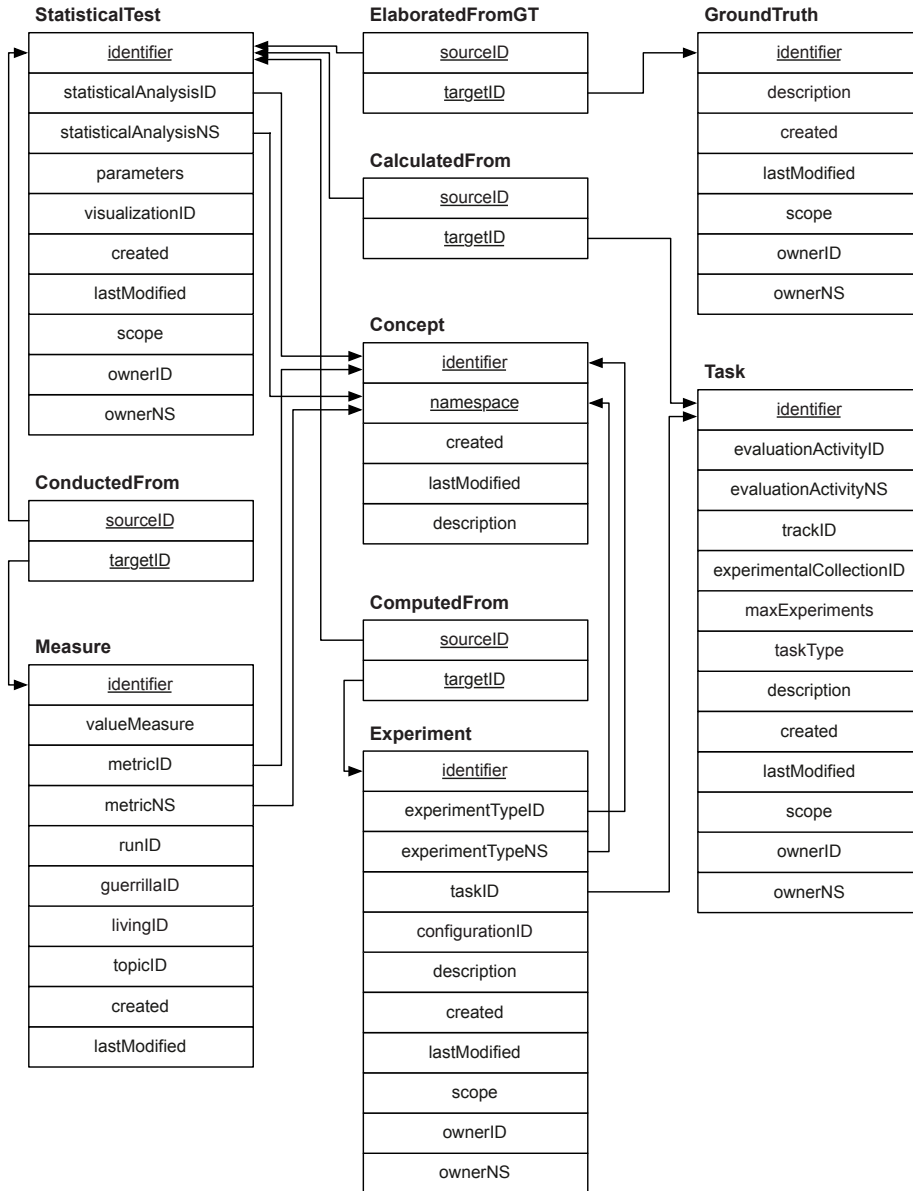
Figure 27: Relationships between entities in the Evaluation Activity, Experimental Collection, Measurement and Resource Areas
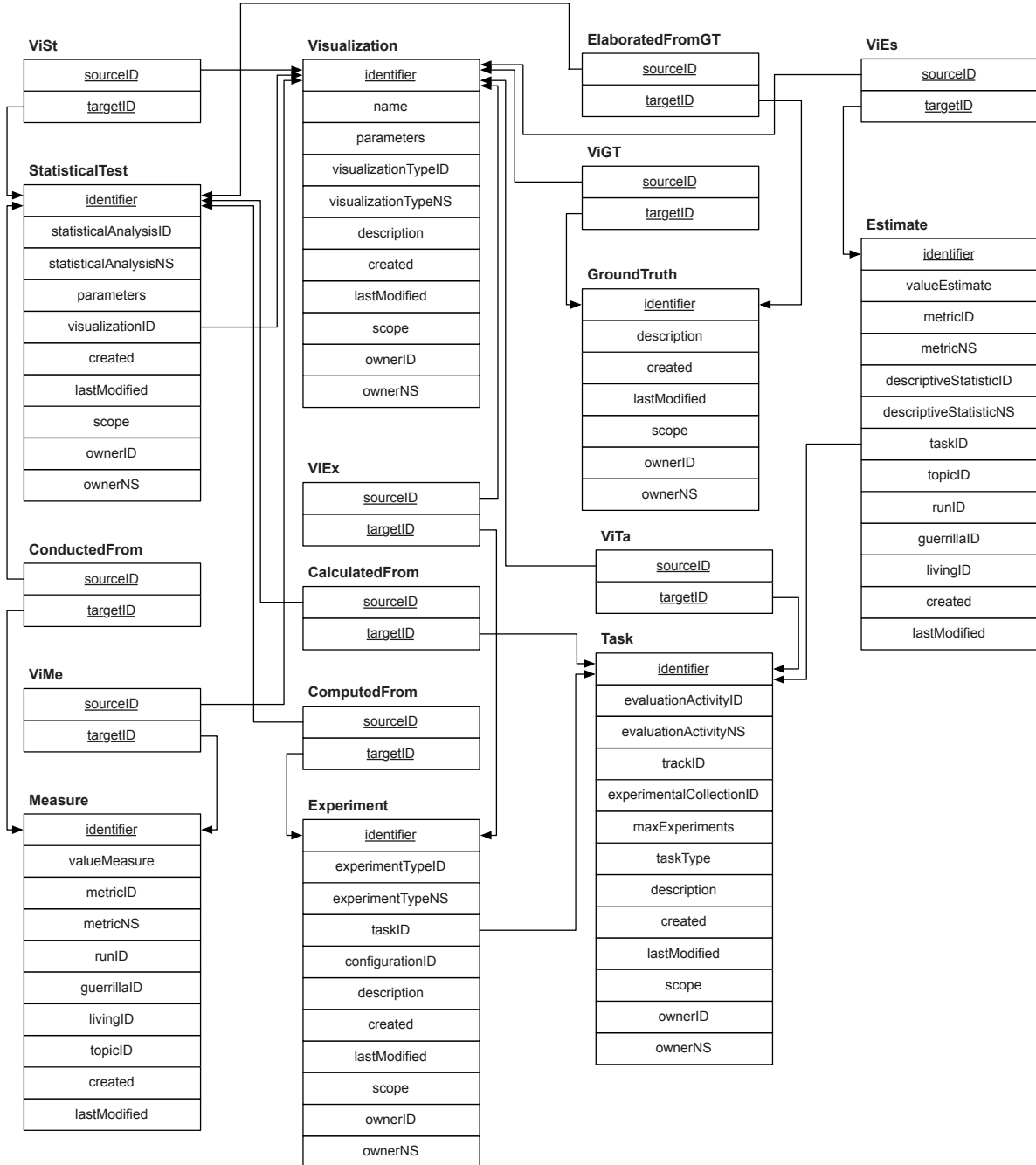
Figure 28: Relationships between the Visualization entity and entities in the Evaluation Activity, Experimental Collection, Experiment and Measurement Areas

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SEVENTH FRAMEWORK
PROGRAMME
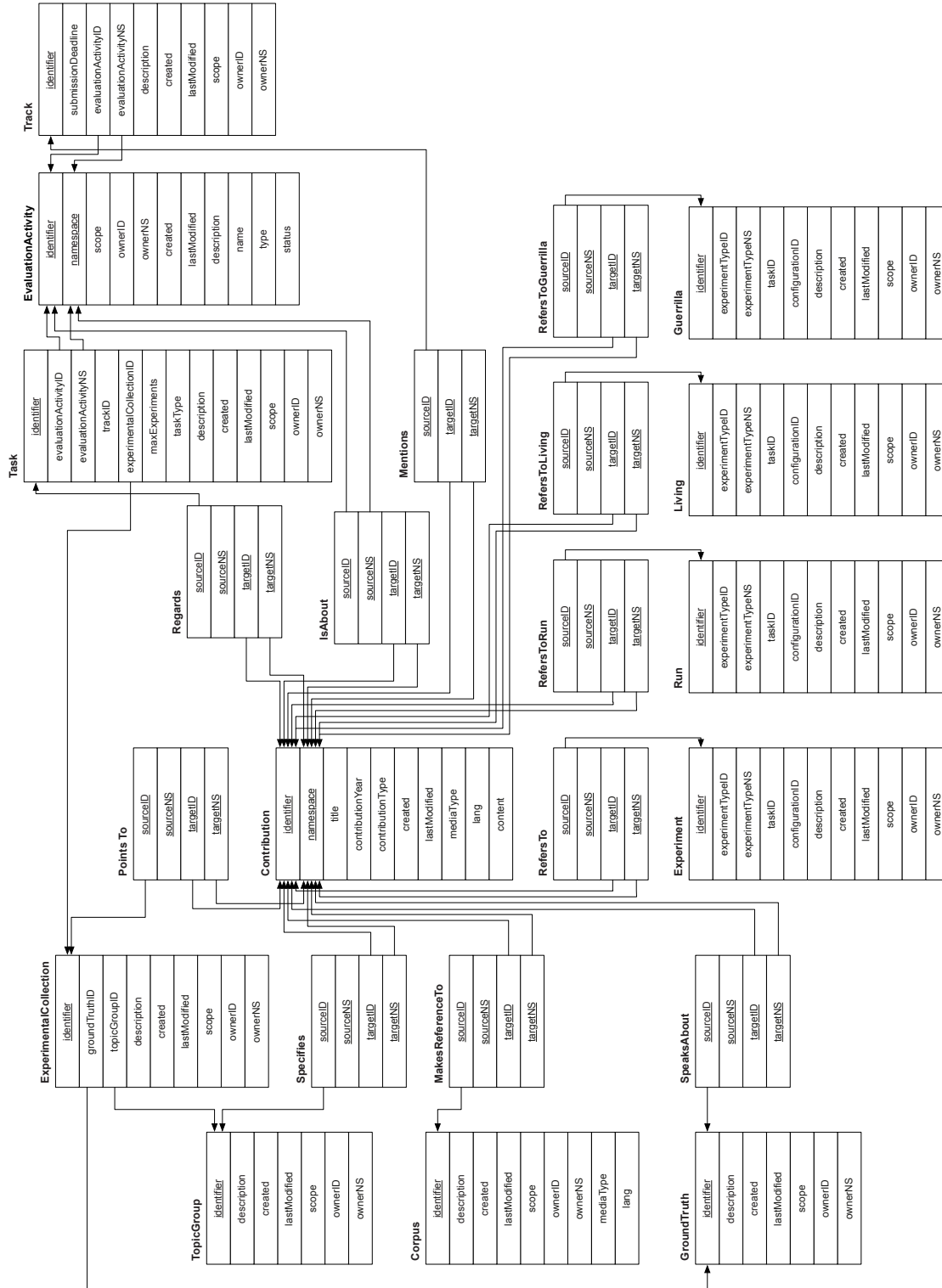
Figure 29: Relationships between the Contribution entity of the Bibliographical Area and the entities in the Evaluation Activity, Experimental Collection and Experiment Areas

4 Search Model

The presence of both structured and unstructured content within the managed resources calls for different types of search functionalities, since structured content can be dealt with exact match searches while unstructured content can be dealt with best match searches. These two different types searches may need to be merged together in a query if, for example, the user wants to retrieve annotations by a given author about a given topic; this could be expressed by a boolean AND query which specifies both the author (structured part) and the content (unstructured part) of the annotations to be searched. Nevertheless, Boolean searches are best suited for dealing with exact match searches and they need to be somewhat extended to also deal with best match searches. Therefore, we need to envision a search strategy able to express complex conditions that involve both exact and best match searches.

The "P-norm" extended boolean model proposed by [Salton et al., 1983] is capable of dealing with and mixing both exact and best match queries, since it is an intermediate between the traditional boolean way of processing queries and the vector space processing model. Indeed, on the one hand, the P-norm model preserves the query structure inherent in the traditional boolean model by distinguishing among different boolean operators (and, or, not); on the other hand, it allows us to retrieve items that would not be retrieved by the traditional boolean model due to its strictness, and to rank them in decreasing order of query-document similarity. Moreover, the P-norm model is able to express queries that range from pure boolean queries to pure vector-space queries, thus offering great flexibility to the user.

Finally, as reported in [Fox et al., 1992; Lee and Fox, 1988], the P-norm both model outperforms the traditional Boolean model in terms of average precision performances, as well as other extensions to the Boolean model, and can achieve performances comparable to the vector space model [Salton et al., 1983] . Therefore, the P-norm extended Boolean model is an ideal candidate to fit our needs of mixing both exact and best match queries and it has been adopted as model in the DIRECT annotation service..

Consider a set of terms $t_1, t_2, \ldots, t_n$ and let $\mathrm{sim}(r, t_i) \in [0, 1]$ be the similarity score of term t_i with respect to the resource $r = (t_1, t_2, \ldots, t_n)$; $\mathrm{sim}(r, t_i) = 0$ if the term t_i is not present in the resource r.

Intuitively, the P-norm model works as follows: in the case of an or-query of the form:

$$\mathrm{sim}(r, t_1) \textbf{ or } \mathrm{sim}(r, t_2) \textbf{ or } \ldots \textbf{ or } \mathrm{sim}(r, t_n)$$

the point having all the n coordinates equal to 0 should be avoided, since it indicates that all the query terms are absent; on the other hand, in the case of an and-query of the form:

$$\mathrm{sim}(r, t_1) \textbf{ and } \mathrm{sim}(r, t_2) \textbf{ and } \ldots \textbf{ and } \mathrm{sim}(r, t_n)$$

the point with all the n coordinates equal to 1 is the most desirable, since it indicates that all the index terms have the maximum weight 1.

According to these observations, resources should be ranked in order of decreasing distance from the point $(0, 0, \ldots, 0)$ for an **or**-query – the closer is a resource to the $(0, 0, \ldots, 0)$ point the

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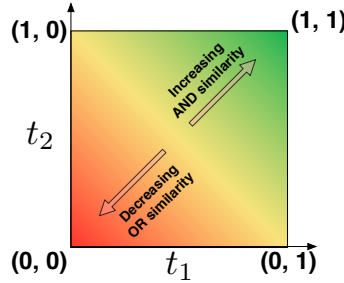
Figure 30: Increasing and decreasing similarity for **and**-queries and **or**-queries.

less is relevant – and in order of increasing distance from the point $(1, 1, \ldots, 1)$ for an **and**-query – the closer is a resource to the $(1, 1, \ldots, 1)$ point the more is relevant.

Figure 30 illustrates these concepts in the bi-dimensional case, that is when a resource contains only two terms t_1 and t_2: the point $(0, 0)$ indicates that both terms t_1 and t_2 are absent from the resource, while the point $(1, 1)$ indicates that both terms are present in the resource.

The model is called P-norm since in its more general form, which will be introduced below, it makes use of the well-known L_p vector norms in order to compute distances among points in a n-dimensional space. We recall that for a vector $\mathbf{v} = (v_1, v_2, \ldots, v_n)$, its P-norm is given by $||\mathbf{v}||_p = \left(v_1^p + v_2^p + \cdots + v_n^p \right)^{\frac{1}{p}}$ where $p \geq 1$ is a real number.

A generalized **or**-query is expressed as $q_{\mathbf{or}(p)} = [t_1 \, \mathbf{or}^p \, t_2 \, \mathbf{or}^p \cdots \mathbf{or}^p \, t_n]$; a generalized **and**-query is expressed as $q_{\mathbf{and}(p)} = [t_1 \, \mathbf{and}^p \, t_2 \, \mathbf{and}^p \cdots \mathbf{and}^p \, t_n]$. The **extended boolean similarity scores** between a resource and a query are defined as:

$$\mathsf{sim}_p^{\mathbf{or}}(r, q) = \left[\frac{\mathsf{sim}(r, t_1)^p + \mathsf{sim}(r, t_2)^p + \cdots + \mathsf{sim}(r, t_n)^p}{n} \right]^{\frac{1}{p}}$$

$$\mathsf{sim}_p^{\mathbf{and}}(r, q) = 1 - \left[\frac{(1 - \mathsf{sim}(r, t_1))^p + (1 - \mathsf{sim}(r, t_2))^p + \cdots + (1 - \mathsf{sim}(r, t_n))^p}{n} \right]^{\frac{1}{p}}$$

where t_i indicates a generic term of the query q. Note that for **not**-queries you have to substitute $1 - \mathsf{sim}(r, t_i)$ to $\mathsf{sim}(r, t_i)$ as term weight.

By varying the value of p between 1 and ∞, it is possible to obtain a query processing intermediate between a pure vector-processing model ($p = 1$) and a traditional boolean processing ($p = \infty$). As observed by [Salton et al., 1983, p. 1025] "the larger the value of p, the more importance is given to the query structure as reflected by the and and or connections. As the value of p decreases, the distinction between an and connection and an or connection becomes weaker, until that distinction disappears completely as p reaches a lower bound of 1".

Finally, the computation of the final query document similarity can be carried out recursively "by first taking the document value with respect to single query terms, then with respect to two-term clauses each containing two single terms, then with respect to larger clauses containing one or more initial two-term clauses and so on until the complete query is considered" [Salton et al., 1983, p. 1026–1027].

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Therefore, the P-norm extended Boolean model provides us with a sound theoretical background for designing the search capabilities of the system. In particular, in order to make the model more intuitive and usable to the end users, we have the following assumption: to restrict its more general formulation:

- only predefined values of p are accepted, that are $1, 2, 5$, and ∞, and are labelled respectively as best match, loose match, fuzzy match[3], and exact match.

This assumption releases users from the need of knowing and understanding the "P-norm" extended Boolean model, still providing them an intuitive way of expressing the degree of strictness they believe it should be applied to the operators. Moreover, besides covering the two extreme cases of vector space and boolean query processing, this assumption takes also in consideration the experimental evidence that showed performance improvement for values of p ranging from 2 to 5 [Fox et al., 1992; Salton et al., 1983]. If the user does not specify any value for p, "exact match" is assumed.

Therefore, the system offers the following extended Boolean operators:

- Best Match

$$\text{sim}^{\textbf{or}}_{\texttt{best}}(r,q) = \text{sim}^{\textbf{and}}_{\texttt{best}}(r,q) = \frac{\text{sim}(r,t_1) + \text{sim}(r,t_2) + \cdots + \text{sim}(r,t_n)}{n}$$

- Loose Match

$$\text{sim}^{\textbf{or}}_{\texttt{loose}}(r,q) = \sqrt[5]{\frac{\text{sim}^5(r,t_1) + \text{sim}^5(r,t_2) + \cdots + \text{sim}^5(r,t_n)}{n}}$$

$$\text{sim}^{\textbf{and}}_{\texttt{loose}}(r,q) = 1 - \sqrt[5]{\frac{\left(1 - \text{sim}(r,t_1)\right)^5 + \left(1 - \text{sim}(r,t_2)\right)^5 + \cdots + \left(1 - \text{sim}(r,t_n)\right)^5}{n}}$$

- Fuzzy Match

$$\text{sim}^{\textbf{or}}_{\texttt{fuzzy}}(r,q) = \sqrt[2]{\frac{\text{sim}^2(r,t_1) + \text{sim}^2(r,t_2) + \cdots + \text{sim}^2(r,t_n)}{n}}$$

$$\text{sim}^{\textbf{and}}_{\texttt{fuzzy}}(r,q) = 1 - \sqrt[2]{\frac{\left(1 - \text{sim}(r,t_1)\right)^2 + \left(1 - \text{sim}(r,t_2)\right)^2 + \cdots + \left(1 - \text{sim}(r,t_n)\right)^2}{n}}$$

- Exact Match

$$\text{sim}^{\textbf{or}}_{\texttt{exact}}(r,q) = \max\left(\text{sim}(r,t_1), \text{sim}(r,t_2), \ldots, \text{sim}(r,t_n)\right)$$
$$\text{sim}^{\textbf{and}}_{\texttt{exact}}(r,q) = \min\left(\text{sim}(r,t_1), \text{sim}(r,t_2), \ldots, \text{sim}(r,t_n)\right)$$

---

[3]Here the term fuzzy does not denote the fuzzy-set theory matching in a strict sense but it refers to the English meaning of vague and imprecise.

5 Architecture

Figure 31 shows the architecture of the system. It consists of three layers – data, application and interface logic layers – in order to achieve a better modularity and to properly describe the behaviour of the service by isolating specific functionalities at the proper layer.

DIRECT is exposed as a RESTful Web Service [Fielding and Taylor, 2002; Richardson and Ruby, 2007] which allows for the development of different applications and plug-ins over it in an open, collaborative, and scalable way which ensure sustainability over the time.

The architecture of DIRECT is designed at a high level of abstraction in terms of abstract *Application Program Interface (API)* using an object-oriented approach. In this way, we can model the behaviour and the functioning of DIRECT without worrying about the actual implementation of each component. Different alternative implementations of each component can be provided, still keeping a coherent view of the whole architecture of the DIRECT system.

We achieve this abstraction level by means of a set of interfaces, which define the behaviour of each component of DIRECT in abstract terms. Then, a set of abstract classes partially implement the interfaces in order to define the actual behaviour common to all of the implementations of each component. Finally, the actual implementation is left to the concrete classes, inherited from the abstract ones, that fit DIRECT into a given architecture. Furthermore, we apply the abstract factory design pattern [Gamma et al., 1995], which uses a factory class that provides concrete implementations of a component, compliant with its interface, in order to guarantee a consistent way of managing the different implementations of each component.

In the design and development of the DIRECT system, we can recognize different layers, which abstracts more and more from the data and focuses more and more on the functionalities over the managed data:

- data logic

  - the relational schema described in Section 3 provides a first abstraction over the managed data;

  - a set of views at database level start to mediate between the relation model adopted in the database and the object oriented model adopted by the upper layers;

  - a set of stored procedures provide a well-defined API for manipulating all the resources at the database level, so that it is not necessary to use several raw *Structured Query Language (SQL)* statements to manipulate a resource but a single and atomic operation is available for each functionality needed on each resource, e.g. creation of a user, deletion of an experiment, and so on.

  - for each resource, there is a *Data Access Object (DAO)* [Alur et al., 2003] which takes care of the actual mapping between the relational and object oriented models as well as of the mapping between the database API for manipulating the resources and the API exposed at the service logic level;

- service logic:
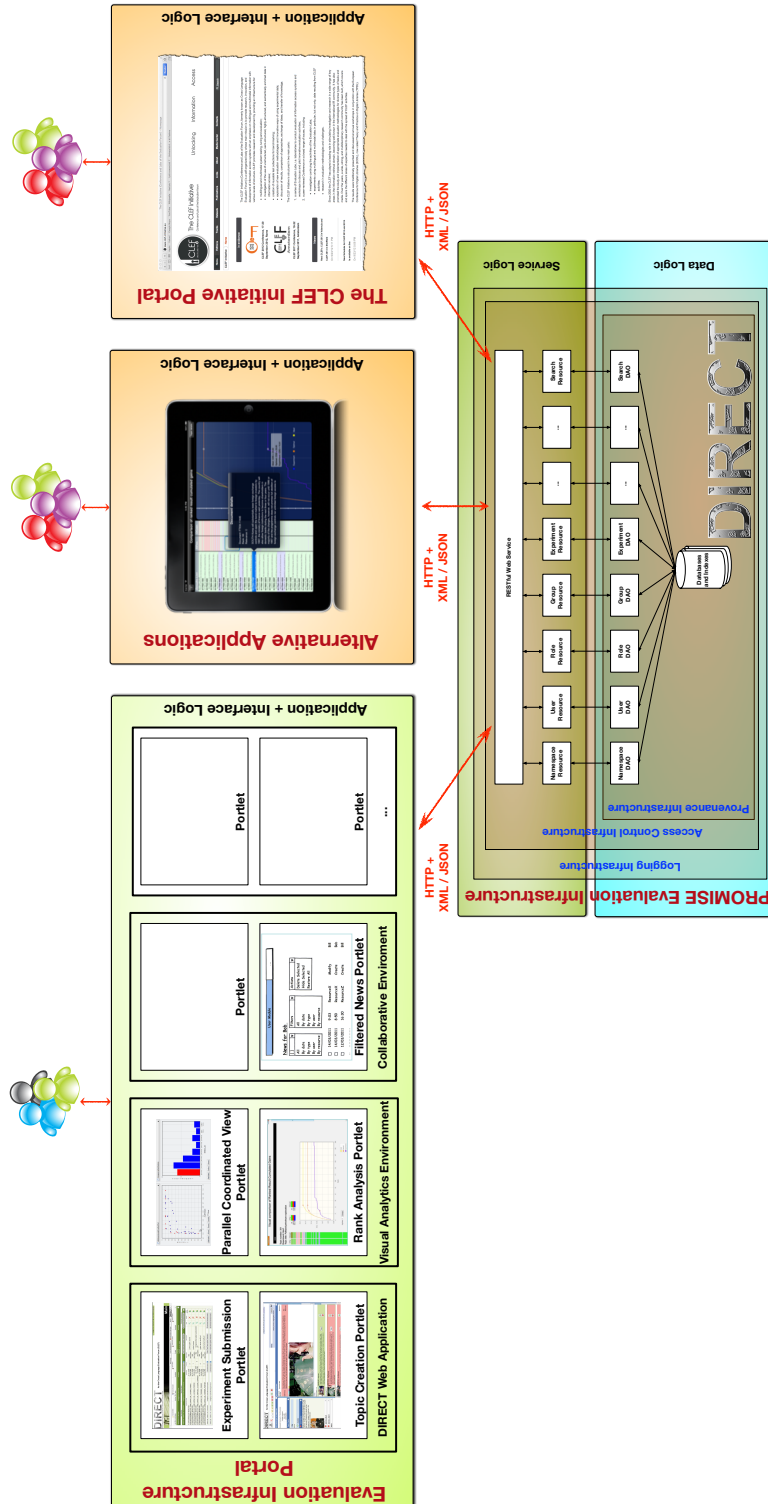
– the *REpresentational State Transfer (REST)* architectural paradigm provides a uniform API for manipulating each resource and naturally maps it to the corresponding methods of the *HyperText Transfer Protocol (HTTP)* protocol, which is used for communication;

– the *eXtensible Markup Language (XML)* schema[4] [W3C, 2004a,b], reported in Appendix A, abstracts the managed data and information for usage and consumption by other applications, services, and portals.

Over these layers there are the application and interface logic layers where the applications actually accessed by end users are. Different applications can be build on top of the infrastructure, with many different purposes: we have the PROMISE infrastructure portal, where the applications for managing an evaluation campaign and the visual analytics environment [Angelini et al., 2012b] are; we have a small prototype of an iPad application for assessing the experimental results [Di Buccio et al., 2011a,b]; and, the new portal for the CLEF initiative[5], discussed in Section 10.

The DIRECT system has been developed by using the Java[6] programming language, which ensures good portability of the system across different platforms. We used the PostgreSQL[7] *DataBase Management System (DBMS)* for the actual and its full text extension for indexing and searching the full text components of the managed resources. The Apache Tomcat[8] Web container and the Restlet[9] framework have been used for developing the DIRECT RESTful Web Application.

Finally, DIRECT makes use of the *IMS Component Integrator (ICI)* library, developed by University of Padua, which provides the basic framework for the development of the systems, as well as some common resources, such as users, roles, groups, and so on.

5.1 Logging Infrastructure

The *Logging Infrastructure*, which lays behind all the components of the DIRECT system, captures information such as the user name, the *Internet Protocol (IP)* address of the connecting host, the action that has been invoked by the user, the messages exchanged among the components of the system in order to carry out the requested action, any error condition, and so on. Moreover, as far as the DIRECT RESTful Web Application is concerned, it captures also the HTTP [Fielding et al., 1999] logs and represents them according to the W3C Extended Log File Format [Hallam-Baker and Behlendorf, 1996]. Furthermore, the log events can be accessed and searched interactively by means of (possibly) complex extended Boolean queries, comprising both exact and best match clauses, giving thus the possibility to mine and fully exploit them.

5.2 Access Control Infrastructure

The *Access Control Infrastructure* takes care of monitoring the access to the various resources and functionalities offered by the system. On the basis of the requested operation, it performs:

---

[4]http://ims.dei.unipd.it/data/xml/direct.3.00.xsd
[5]http://www.clef-initiative.eu/
[6]http://www.oracle.com/technetwork/java/index.html
[7]http://www.postgresql.org/
[8]http://tomcat.apache.org/
[9]http://www.restlet.org/

- *authentication*, i.e. it asks for the user credentials before allowing to perform an operation;

- *authorization*, i.e. it verifies that the user currently logged in holds sufficient rights to perform the requested operation;

The access control policies can be dynamically configured and changed over the time by defining roles, i.e. groups of users, entitled to perform given operations. This allows institutions to define and put in place their own rules in a flexible way according to their internal organization and working practices.

The following default roles are available:

- USERS, the generic users of the system;

- ROOTS, the users who administer the system.

Note that the configuration of new roles require a restart of the system.

Moreover, the access control infrastructure provides fine-grained control over the access to the specific resources, based on the permission granted to the resources, e.g. only the owner of a private resource and read it, even if the reading of that resource is granted to all roles.

The fine-grained access control to resources is managed via groups of users, which can have different access permissions. the general rules are as follows:

- *private resources*: they can be read and modified only by the owner of the resource;

- *shared resources*: they can be read and modified by the owner of the resource; then, a list of groups can share the resource with different access permission, namely "read only", which means that the users of that group can only read but not modify the resource, and "read/write", which means that the users of that group can read and modify the resource;

- *public resources*: they can be read by everybody; they can be read and modified by the owner of the resource; then, a list of groups can share the resource with different access permission, namely "read only", which means that the users of that group can only read but not modify the resource, and "read/write", which means that the users of that group can read and modify the resource;

5.3 Provenance Infrastructure

The *Provenance Infrastructure* keeps fine trace, for each resource managed by the system, of its full lineage since its first creation, allowing us to reconstruct its fully history and modifications over the time.

Provenance events are statements about a resource of the form:

$$\texttt{<when> <who> <predicate> <what> <why>}$$

where:

- `when`: is the time stamp at which the event occurred;

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- `who`: is the user who caused the event;

- `predicate`: is the action carried out in the event, i.e. CREATED, READ, or DELETED;

- `what`: is the resource originated by the event, i.e. a dump of the actual content of the resource;

- `why`: is the motivation that originated the event, i.e. the operation performed by the system that led to a modification of the resource.

For all these events, a dump of a resource is stored in the Provenance Infrastructure, thus allowing us to access to the different versions of it over the time, even after it has been deleted from the system.

The XML document below reports an example of provenance event for a namespace representing an evaluation campaign. As it can be noted, the namespace has be initially created, (rows 47–66) then it has been updated (it description has been changed – rows 26–46) and, finally, it has been deleted from the system (rows 5–25).

```xml
 1 <?xml version="1.0" encoding="UTF-8"?>
 2 <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
 3   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 4   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
 5   <ims:provenance-event ims:serial-identifier="5382260">
 6     <ims:when>
 7       2012-08-31T15:34:39.256+02:00
 8     </ims:when>
 9     <ims:who>
10       <ims:user ims:identifier="administrator"
11         ims:namespace="http://ims.dei.unipd.it/" />
12     </ims:who>
13     <ims:predicate>
14       DELETED
15     </ims:predicate>
16     <ims:what>
17       <ims:namespace ims:identifier="http://www.ns1.org/" ims:prefix="ns1"
18         ims:description="Namespace of Information Retrieval Evaluation Campaign 1."
19         ims:created="2012-08-31T15:33:25.882+02:00"
20         ims:last-modified="2012-08-31T15:34:27.130+02:00" />
21     </ims:what>
22     <ims:why>
23       DELETE_NAMESPACE
24     </ims:why>
25   </ims:provenance-event>
26   <ims:provenance-event ims:serial-identifier="5372986">
27     <ims:when>
28       2012-08-31T15:34:27.130+02:00
29     </ims:when>
30     <ims:who>
31       <ims:user ims:identifier="administrator"
32         ims:namespace="http://ims.dei.unipd.it/" />
33     </ims:who>
34     <ims:predicate>
35       UPDATED
36     </ims:predicate>
37     <ims:what>
38       <ims:namespace ims:identifier="http://www.ns1.org/" ims:prefix="ns1"
39         ims:description="Namespace of Information Retrieval Evaluation Campaign 1."
40         ims:created="2012-08-31T15:33:25.882+02:00"
```

```
41        ims:last-modified="2012-08-31T15:34:27.130+02:00" />
42     </ims:what>
43     <ims:why>
44       UPDATE_NAMESPACE
45     </ims:why>
46   </ims:provenance-event>
47   <ims:provenance-event ims:serial-identifier="5351829">
48     <ims:when>
49       2012-08-31T15:33:25.882+02:00
50     </ims:when>
51     <ims:who>
52       <ims:user ims:identifier="administrator" ims:namespace="http://ims.dei.unipd.it/" />
53     </ims:who>
54     <ims:predicate>
55       CREATED
56     </ims:predicate>
57     <ims:what>
58       <ims:namespace ims:identifier="http://www.ns1.org/" ims:prefix="ns1"
59         ims:description="Namespace of Evaluation Campaign 1."
60         ims:created="2012-08-31T15:33:25.882+02:00"
61         ims:last-modified="2012-08-31T15:33:25.882+02:00" />
62     </ims:what>
63     <ims:why>
64       CREATE_NAMESPACE
65     </ims:why>
66   </ims:provenance-event>
67 </ims:direct>
```

5.4 Optimistic Locking

To cope with concurrency issues, the DIRECT system adopts an optimistic locking approach [Kung and Robinson, 1981] based on the last modification timestamp of the resources.

Both the creation and last modification timestamps are automatically managed by the system, so you do not need to specify them when you create a resource and you do not need to update them when you modify a resource.

As a general rule, when you modify a resource, you have to use the same last modification timestamp you have received by the system when reading the resource. If the system contains a last modification timestamp less than or equal to the last modification timestamp you are providing, then it is fair to update the resource. Otherwise, if the system contains a last modification timestamp greater than the last modification timestamp you are providing, then it means that the resource has been modified after you read it and a concurrency exception is raised.

6 Liferay Integration

This section describes the integration of the infrastructure into Liferay — see [Agosti et al., 2011b] for a general insight on the Liferay system in the *Participative Research labOratory for Multimedia and Multilingual Information Systems Evaluation (PROMISE)* context. In particular, we will describe the management of the DIRECT users, roles and groups (see 5) using the administration tools provided by the Liferay backend interfaces. Section 6.1 provides a general overview on how it is possible to manage different portals on a single Liferay instance. This will be useful in order to understand the general sowtware configuration which brings together Liferay and DIRECT. Then it proceeds on to the Liferay administration system, which provides control over Users, Roles and User Groups. Finally, section 6.2 provides some technical insights in order to describe the logic behind the synchronization mechanism between the Liferay backend interface and the DIRECT system.

6.1 How Liferay structures a portal

At its most basic level, a Liferay server consists of one or more portals. Portals have users, and these users can be categorized into various collections. Some of these collections can also have web pages that compose a portion of a website.

It is possible to define many portals per portal server, and each portal has its own set of **users** and **user collections**. Figure 32 displays this graphically.
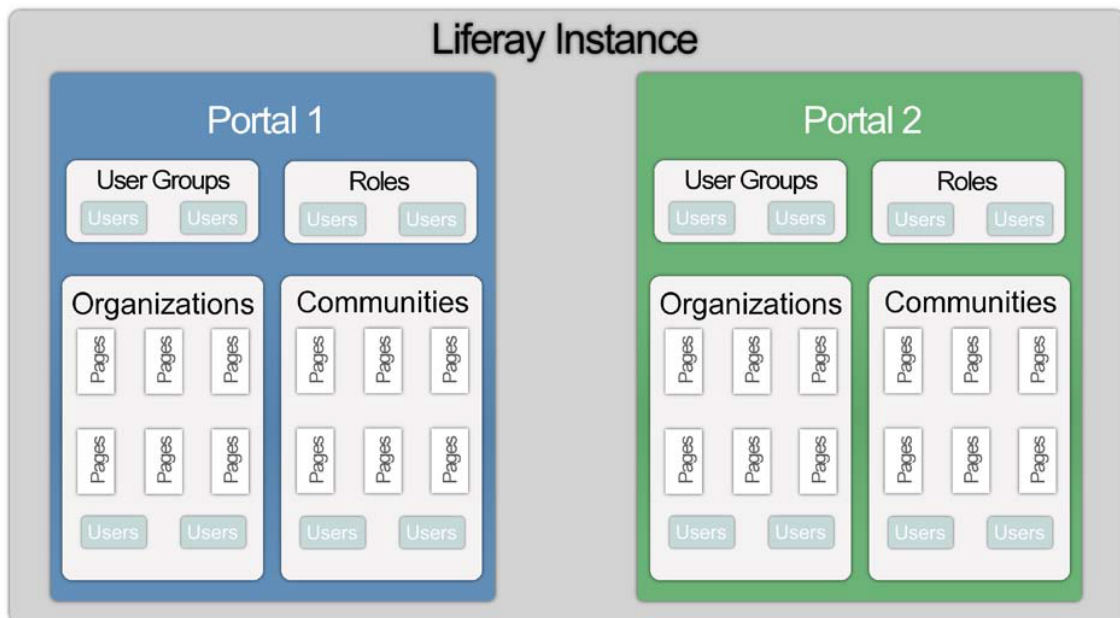
Figure 32: A single Liferay Portal installation can host many different portals, all with separate users and content.

As shown in figure 32, each portal has users, and those users themselves can be organized

into several different types of collections: Roles, Organizations, Communities, User Groups, or any combination of those collections within that portal.

Referring to section 5, in order to achieve a first level of integration between the DIRECT infrastructure and Liferay, we have developed a mechanism to synchronize the DIRECT Users, Roles and Users Groups with the Liferay counterparts.

6.1.1 Role-based access control

Traditional membership security models address two basic criteria: **authentication** (who has access) and **authorization** (what they can do).

- Authentication is a process of determining whether someone or something is, in fact, who or what it is declared to be.

- Authorization is a process of finding out if the person, once identified, is permitted to have access to a resource.

A Liferay portal extends the preceding security model by terminologies: Resources, Users, Organizations, Locations, User Groups, Communities, Roles, Permissions, and so on. The portal provides a role-based, fine-grained permission security model — a full access control security model. At the same time, it also provides a set of administrative tools (which we will discuss later) which can be used to configure and control membership.

The remainder of this section will explore these concepts and relationships among these terminologies, as shown in figure 33.
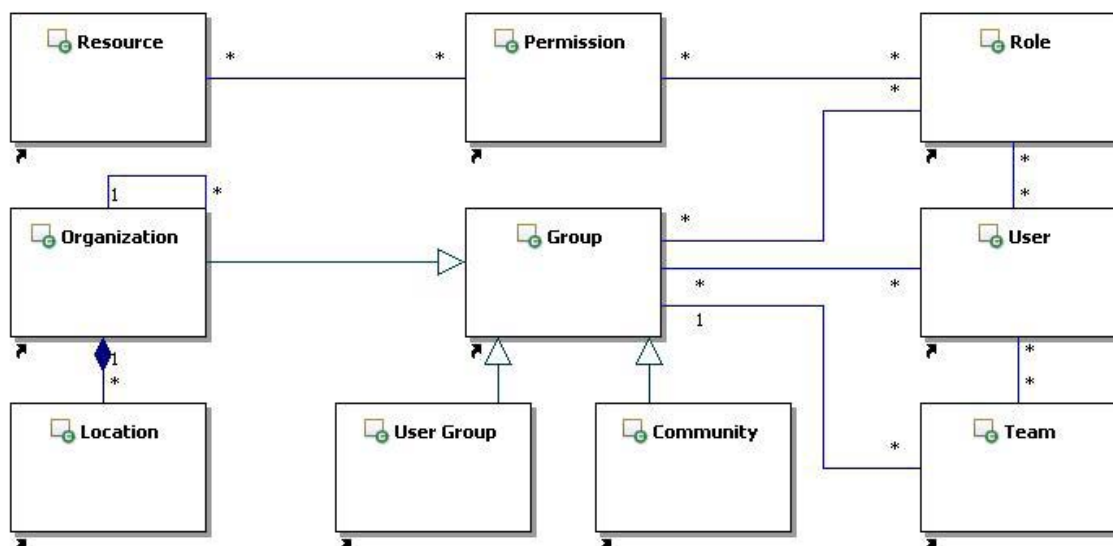
Figure 33: The Liferay roled-based access control model.

6.1.2 Role and permission

As shown in Figure 33, a **Resource** is a base object. It can be a portlet (for example, Message Boards, Calendar, Document Library, and so on), an entity (for example, Message Board Topics, Calendar Event, Document Library Folder, and so on), and a file (for example, documents, images, applications, and so on). Resources are scoped into portal, group, page, and contentâĂ˘model-resource and application (or portlet) types.

A **Permission** is an action on a resource. Portal-level permissions can be assigned to the portal (for example, Users, User Groups, Communities, and Organizations) through roles. Group-level permissions can be assigned to groups (for example, organization and communities). Page-level permissions can be assigned to page layouts. Model permissions can be assigned to model resources, (for example, blogs entries, web content, and so on). Portlet permission can be assigned to portlets (for example, view, configuration, and so on).

A **Role** is a collection of permissions. Roles can be assigned to a User, User Group, Community, Location, or Organization. If a role is assigned to a user group, community, organization, or location, then all users who are members of that entity receive permissions of the role.

A **User** is an individual who performs tasks using the portal. Depending on the permissions that have been assigned via roles, the user either has permission or doesn't have permission to perform certain tasks.

In Liferay, a **User Group** is a special group with no context, which may hold a number of users. In other words, users can be gathered into user groups. Users can be assigned to user groups, and permissions can be assigned to user groups via roles too. Therefore, every user that belongs to that user group will receive role-based permissions.

This logic reflects the administration of Users, Roles and User Groups presented in section 5 with some slight differences. In particular, in the DIRECT system a Role refers to which actions a specific User can performs (e.g. creating a new namespace, creating User Groups and so on), a User Group specifies a set of Users defining the resources that can be accessed or not.

6.2 Database configuration

This section focuses on the software design of the synchronization mechanism between Liferay and DIRECT.

As shown in Figure 34, the Liferay system and the DIRECT infrastructure are managed by two distinct PostgresSQL databases. In particular, an independent portal instance which directly interfaces with the DIRECT backbone and, at a final stage, it will host the overall PROMISE evaluation infrastructure.

As shown in Figure 34, the Liferay database includes two distinct schemas:

- `public`, which stores all the tables bundled with a Liferay 6.0.6 installation;

- `ici`, which stores the trigger function used for the Liferay/DIRECT synchronization, together with the *hstore* and *dblink* PostgresSQL extensions (see later in this section).

A DIRECT instance has been installed on a separate Tomcat server and it is built upon a database which includes the following schemas:

- `direct`, which stores all the tables presented in 2 and 3;

- `ici`, which stores all the tables, views, functions and triggers related to the ICI library;

- `ici_datatypes`, in which all the ICI data types are deifned;

- `public`, which stores the tables and function defined by the PostgresSQL dbink extension (see later for details).

A set of triggers has been added to the Liferay database (i.e. `ici` schema) in order to synchronize the management of Users, Roles and User Groups between the two systems.
Table 37 lists the trigger functions related to each Liferay entity.

Figure 34: Database configuration.

Trigger function	Action
usertriggerinsert()	Creates a new User.
usertriggerdelete()	Deletes an existing User.
usertriggerupdate()	Updates an existing user.
grouptriggerinsert()	Creates a new Group.
grouptriggerupdate()	Updates the information of an existing Group.
grouptriggerdelete()	Deletes an existing Group.
roletriggerinsert()	Creates a new role.
roletriggerdelete()	Deletes an existing role.
roletriggerupdate()	Updates the information of an existing role.
usergrouptriggerinsert()	Assigns a user to a Group.
usergrouptriggerdelete()	Remove a user from a Group.
usergrouptriggerdelete()	Removes a user from a Group.
userpasswordtriggerupdate()	Changes the password of an existing user.
roletriggerinsert()	Assigns a user to a Role.
roletriggerdelete()	Removes a user from a Role.

Table 37: Trigger functions for the Liferay/DIRECT synchronization.

As depicted in Figure 34, the remote connection between the two databases makes use of the *dblink* PostgresSQL — a module which supports connections to other PostgreSQL databases from within a database session. The parameters for the *dblink* connection to the DIRECT database are stored into a special table which contains a pair (Instance ID, parameters).
The *Instance ID* refers to the identifier of the DIRECT Liferay portal instance. Moreover, the portal instance's *Web ID* matches the namespace of the DIRECT infrastructure.
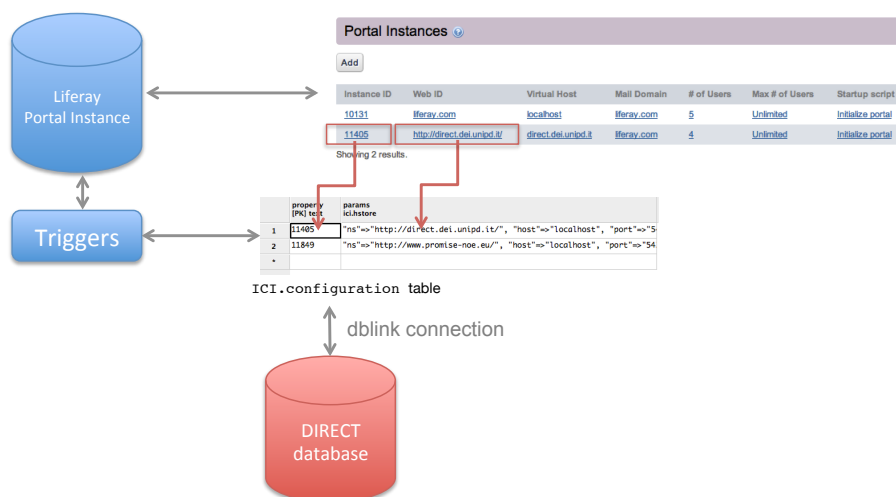
Figure 35: Lowe-level synchronization between Liferay and DIRECT.

Figure 35 depicts the inter-connections between the two system. For example, when a new User Group is created using the Liferay back-end interface, the trigger function called `grouptriggerinsert()` is fired. It checks the parent Instance ID (11405 in the example) and if it exists in the configuration table, a new *dblink* connection is established to the DIRECT database. The pair (`User Group ID;namespace`) is used to create the correpsonding User Group in the `ici` schema. Note that the Web ID of the parent portal instance corresponds to the User Group `namespace`.

The following XML code (see 7.7) is the result of the creation of 5 User Groups using the Liferay control panel and it can be compared to the corresponding back-end interface shown in Figure 36.

```xml
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
3    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
5    <ims:group ims:created="2012-09-22T20:07:46.165+02:00"
6      ims:description="Description for user group 1."
7      ims:identifier="User group 1"/>
8    <ims:group ims:created="2012-09-22T20:08:22.899+02:00"
9      ims:description="Description for user group 2."
10     ims:identifier="User group 2"
11     ims:last-modified="2012-09-22T20:08:22.899+02:00"
12     ims:namespace="http://direct.dei.unipd.it/"/>
13   <ims:group ims:created="2012-09-22T20:08:36.546+02:00"
14     ims:description="Description for user group 3."
15     ims:identifier="User group 3"
16     ims:last-modified="2012-09-22T20:08:36.546+02:00"
17     ims:namespace="http://direct.dei.unipd.it/"/>
18   <ims:group ims:created="2012-09-22T20:08:48.280+02:00"
19     ims:description="Description for user group 4."
20     ims:identifier="User group 4"
21     ims:last-modified="2012-09-22T20:08:48.280+02:00"
22     ims:namespace="http://direct.dei.unipd.it/"/>
23   <ims:group ims:created="2012-09-22T20:09:01.173+02:00"
24     ims:description="Description for user group 5."
25     ims:identifier="User group 5"
26     ims:last-modified="2012-09-22T20:09:01.173+02:00"
27     ims:namespace="http://direct.dei.unipd.it/"/>
28 </ims:direct>
```
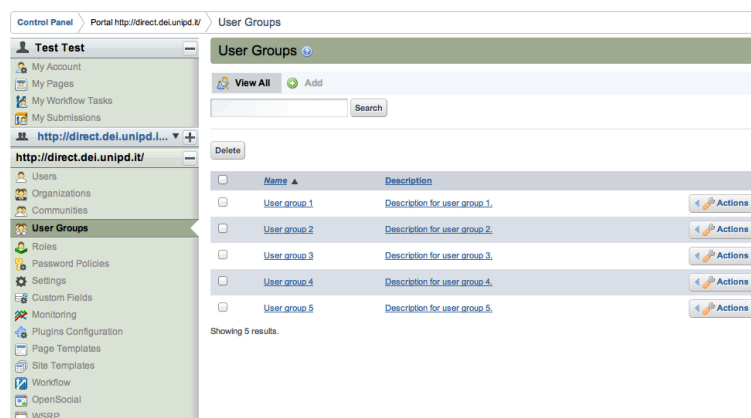

Figure 36: User group interface.

7 RESTful WebService

As discussed in the previous section, the DIRECT is accessible to client applications by means of a RESTful Web Service [Fielding and Taylor, 2002; Richardson and Ruby, 2007].

The DIRECT RESTful Web Service offers several API build around the following main resources:

- **namespace**: manages all the operations related to namespaces and their provenance;

- **role**: manages all the operations related to roles of users and their provenance;

- **group**: manages all the operations related to groups of users and their provenance;

- **user**: manages all the operations related to users and their provenance;

- **concept**: manages all the operations related to concepts and their provenance;

- **log event**: manages all the operations related to log events;

- **metadata**: the metadata managed by the system;

- **metadata set**: sets grouping metadata according to various criteria;

- **application**: identifies a running software application which can be evaluated by an evaluation activity;

- **component**: represents a building block of a running system;

- **configuration**: identifies the configuration of a component, a system or an application under evaluation;

- **contribution**: refers to a paper (e.g., a conference paper, a working note, a technical report, a journal paper);

- **corpus**: represents a set of informative units, which allows us to perform a series of investigations in a research area;

- **estimate**: represents the value of a metric (which is represented by means of a concept) calculated on some experiment handled by the infrastructure;

- **evaluation activity**: represents any type of activity aiming at the evaluation of applications, systems, or methodologies for information access;

- **campaign**: represents a traditional evaluation activity divided into tracks and tasks;

- **education**: represents an evaluation activity carried out for educational purposes;

- **trial**: represents an evaluation activity that may be actively run by a research group, a person or a corporate body for their own interest;

- **experimental Collection**: represents a logical entity that allows us to set up a traditional IR evaluation environment composed by a corpus, a set of topics and a set of relevance judgments;

- **experiment**: represents a part of the data produced by a system under evaluation;

- **experiment item**: represents an item of an experiment, that is a retrieved information unit for a given topic;

- **ground truth**: represents a container of assessments obtained through the pooling technique;

- **ground truth item**: represents a single item of a ground truth.;

- **guerrilla**: represents an innovative step in the experimental evaluation panorama. The main purpose is to perform application-centric evaluation;

- **information unit**: represents the object on which the evaluated system acts; e.g., the object which is retrieved by the system under evaluation;

- **measure**: represents the value of a metric calculated on some experiment handled by the infrastructure;

- **pool**: represents a container of assessments obtained through the pooling technique;

- **run**: represents a part of the data produced by a system under evaluation;

- **run item**: represents an item of an experiment of type run, that is a retrieved information unit for a given topic;

- **snapshot**: stores the snapshot of a visualization;

- **statistical test**: represents mechanism for making quantitative decisions about a process or processes;

- **system**: represents a running software engine, which is under evaluation;

- **task**: represents a piece of work that is undertaken within an evaluation activity and aims at testing a specific (research) hypothesis;

- **topic group**: represents a set of topics, which are grouped together because they are used to address a research task carried out in an evaluation activity;

- **topic**: represents the materialization of an information need;

- **track**: represents a group of tasks carried within a campaign;

- **visualization**: refers to the information used by the infrastructure to store and recover whichever visualization of the data that the users do;

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- **search**: manages the search of resources according to queries which comply with the DIRECT CQL Context Set, described later on in Section 8;

- **list**: manages the search and listing of resources according to queries which comply with the DIRECT *Contextual Query Language (CQL)* Context Set, described later on in Section 8.

The API for accessing the various resources are described in detail in the following. Each section presents: the *Uniform Resource Identifier (URI)* [Berners-Lee et al., 2005] to be used to refer to the desired resource; the method to be used to access the resource (GET, POST, PUT, DELETE, HEAD); the request parameters; the response HTTP status code [Fielding et al., 1999] and body for the different possible cases.

As discussed in Section 5.2 about the Access Control Infrastructure, some resources are publicly available, some others require authentication before being accessed. The DIRECT RESTFul Web Service makes use of the basic HTTP authentication scheme [Fielding et al., 1999; Franks et al., 1999].

If you try to access a resource that needs authentication, you will receive, as response, an authentication challenge with HTTP status code `401 - Unauthorized` asking you for a user name and password.

Remember that DIRECT uniquely identifies users by means of their unique identifier and namespace: such information must be provided in the user name field of the HTTP Basic Authentication Scheme. To separate between the unique user identifier and the namespace, you should use the `;` (semicolon) symbol.

Therefore, the user name must be provided with the following syntax:

<div align="center">

`user-identifier;namespace`

</div>

Moreover, since the namespace is usually identified by means of an URI which may contain characters that needs to be escaped, the proper URI encoding has to be performed according to [Berners-Lee et al., 2005]. Consider the following example: for the user `direct` in the namespace `http://direct.dei.unipd.it/`, you should use as user name field for the HTTP Basic Authentication Scheme:

<div align="center">

`direct;http%3A%2F%2Fdirect%2Edei%2Eunipd%2Eit%2F`

</div>

Finally, note that all the URI presented in the following sections are relative to a base URI which depends on the installation of the DIRECT system. Therefore, these URI needs to be appended to the base URI.

All the resources supports two input and output formats: XML [W3C, 2006, 2008] and *JavaScript Object Notation (JSON)* [Crockford, 2006]. This can be set by using the standard HTTP headers: `Content-Type` for specifying the input format and `Accept` for the desired output format followed by either `application/xml` or `application/json` *Multipurpose Internet Mail Extensions (MIME)* media types.

The remainder of this section is organized as follows: Section 5.4 describes the optimistic locking mechanism adopted by the DIRECT annotation service; Section 7.1 explains the error messages

returned by the systems and provides an example of the representation in XML and JSON; Sections from 7.2 to 7.41 describe the different resources managed by the DIRECT annotation service and for each resource provide the API for accessing it as well as an example of its representation in XML and JSON.

7.1 Error Messages

Table 38 summarizes the error conditions reported by the system. These error conditions are common across all the resources managed by the system.

For each error condition, the table contains:

- the HTTP status code;

- the Error Code;

- a short description.

For each error condition, the response body contains detailed diagnostic messaged further explaining it.

HTTP Status Code	Error Code	Description
400 – Bad Request	C2002 – INVALID_PARAMETER	An invalid parameter (null, empty, missing, ...) has been provided
400 – Bad Request	C2003 – MAL-FORMED_REPRESENTATION	A malformed representation of a resource (not well-formed, not valid, ...) has been provided
401 – Unauthorized	C3000 – AUTHENTICA-TION_REQUIRED	An attempt to access a resource without the required authentication has been performed
403 – Forbidden	C3001 – INSUFFI-CIENT_ACCESS_RIGHTS	An attempt to access a resource with insufficient access rights has been performed
404 – Not Found	C4003 – NOT_FOUND_RESOURCE	An attempt to refer to an inexistent resource has been performed
405 – Method Not Allowed	C1001 – UNSUP-PORTED_OPERATION	An unsupported operation has been requested
406 – Not Acceptable	C2000 – UNSUP-PORTED_OUTPUT_FORMAT	An unsupported output format has been requested

HTTP Status Code	Error Code	Description
409 – Conflict	C4002 – DUPLICATED_RESOURCE	An attempt to create an already existing resource has been performed
409 – Conflict	C4004 – NOT_MODIFIABLE_RESOURCE	An attempt to update or delete a resource that cannot be modified has been performed
409 – Conflict	C4005 – CONCURRENT_RESOURCE_MODIFICATION	An attempt to update a resource that has been concurrently updated has been performed
415 – Unsupported Media Type	C2001 – UNSUPPORTED_INPUT_FORMAT	An unsupported input format has been provided
500 – Internal Server Error	C1000 – INTERNAL_ERROR	An error internal to the system has occurred

Table 38: Error messages and status codes.

7.1.1 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
3   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
5   <ims:error ims:identifier="7d50ee98-9bb4-4952-a6f4-141e4fad8491" ims:code="0C4001"
6     ims:type="INVALID_RESOURCE" ims:created="2012-08-01T19:09:30.852+02:00">
7     <ims:details ims:language="eng">
8       invalid resource
9     </ims:details>
10    <ims:diagnostic>
11      java.lang.IllegalArgumentException: Invalid resource.
12        at it.unipd.dei.ims.ici.resource.representation.ErrorRepresentation.
13          setUpBeforeClass(ErrorRepresentation.java:45)
14        at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
15        at sun.reflect.NativeMethodAccessorImpl.
16          invoke(NativeMethodAccessorImpl.java:39)
17        at sun.reflect.DelegatingMethodAccessorImpl.
18          invoke(DelegatingMethodAccessorImpl.java:25)
19        at java.lang.reflect.Method.invoke(Method.java:597)
20        at org.junit.runners.model.FrameworkMethod$1.
21          runReflectiveCall(FrameworkMethod.java:45)
22        at org.junit.internal.runners.model.ReflectiveCallable.
23          run(ReflectiveCallable.java:15)
24        at org.junit.runners.model.FrameworkMethod.
25          invokeExplosively(FrameworkMethod.java:42)
26        at org.junit.internal.runners.statements.RunBefores.
27          evaluate(RunBefores.java:27)
28        at org.junit.runners.ParentRunner.run(ParentRunner.java:300)
29        at org.eclipse.jdt.internal.junit4.runner.JUnit4TestReference.
30          run(JUnit4TestReference.java:50)
31        at org.eclipse.jdt.internal.junit.runner.TestExecution.
```

```
32          run(TestExecution.java:38)
33        at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
34          runTests(RemoteTestRunner.java:467)
35        at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
36          runTests(RemoteTestRunner.java:683)
37        at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
38          run(RemoteTestRunner.java:390)
39        at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
40          main(RemoteTestRunner.java:197)
41      </ims:diagnostic>
42    </ims:error>
43 </ims:direct>
```

7.1.2 JSON Representation

```
1 {
2    "direct":{
3       "error":{
4          "identifier":"7d50ee98-9bb4-4952-a6f4-141e4fad8491",
5          "code":"C4001",
6          "type":"INVALID_RESOURCE",
7          "created":"2012-08-01T19:09:30.852+02:00",
8          "details":{
9             "language":"eng",
10            "details":"invalid resource"
11         },
12         "diagnostic":"java.lang.IllegalArgumentException: Invalid resource.\n\t
13          at it.unipd.dei.ims.ici.resource.representation.ErrorRepresentation.
14            setUpBeforeClass(ErrorRepresentation.java:45)\n\t
15          at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)\n\t
16          at sun.reflect.NativeMethodAccessorImpl.
17            invoke(NativeMethodAccessorImpl.java:39)\n\t
18          at sun.reflect.DelegatingMethodAccessorImpl.
19            invoke(DelegatingMethodAccessorImpl.java:25)\n\t
20          at java.lang.reflect.Method.invoke(Method.java:597)\n\t
21          at org.junit.runners.model.FrameworkMethod$1.
22            runReflectiveCall(FrameworkMethod.java:45)\n\t
23          at org.junit.internal.runners.model.ReflectiveCallable.
24            run(ReflectiveCallable.java:15)\n\t
25          at org.junit.runners.model.FrameworkMethod.
26            invokeExplosively(FrameworkMethod.java:42)\n\t
27          at org.junit.internal.runners.statements.RunBefores.
28            evaluate(RunBefores.java:27)\n\t
29          at org.junit.runners.ParentRunner.run(ParentRunner.java:300)\n\t
30        at org.eclipse.jdt.internal.junit4.runner.JUnit4TestReference.
31          run(JUnit4TestReference.java:50)\n\t
32          at org.eclipse.jdt.internal.junit.runner.TestExecution.
33            run(TestExecution.java:38)\n\t
34          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
35            runTests(RemoteTestRunner.java:467)\n\t
36          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
37            runTests(RemoteTestRunner.java:683)\n\t
38          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
39            run(RemoteTestRunner.java:390)\n\t
40          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
41            main(RemoteTestRunner.java:197)\n"
42      }
43   }
44 }
```

7.2 Log Event Resource

7.2.1 API

Action	HTTP Method	URI
READ_LOG_EVENT	GET	/log-event/{id}
LIST_LOG_EVENTS	GET	/log-event/last/{n}

Table 39: API for accessing the log event resource.

where {id} is the unique identifier of the log event and {n} is the number of log event to be listed.

7.2.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
3   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
5   <ims:log-event ims:serial-identifier="1000" ims:level="INFO"
6     ims:created="2012-08-01T19:18:04.987+02:00">
7     <ims:message>
8       message
9     </ims:message>
10    <ims:user ims:identifier="user-1" ims:namespace="http://ims.dei.unipd.it/" />
11    <ims:action>
12      AUTHENTICATE_USER
13    </ims:action>
14    <ims:ip>
15      127.0.2.1
16    </ims:ip>
17    <ims:resource ims:identifier="resource 1"
18      ims:namespace="http://www.openarchives.org/OAI/2.0/oai_dc/">
19      <ims:resource-class>
20        resource class 1
21      </ims:resource-class>
22    </ims:resource>
23    <ims:thread>
24      thread 1
25    </ims:thread>
26    <ims:class-name>
27      class 1
28    </ims:class-name>
29    <ims:method>
30      method 1
31    </ims:method>
32    <ims:line-number>
33      37
34    </ims:line-number>
35    <ims:class-file>
36      file 1
37    </ims:class-file>
38    <ims:throwable>
39      java.lang.IllegalArgumentException: Invalid resource.
40        at it.unipd.dei.ims.ici.resource.representation.ErrorRepresentation.
```

```
41              setUpBeforeClass(ErrorRepresentation.java:45)
42          at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
43          at sun.reflect.NativeMethodAccessorImpl.
44            invoke(NativeMethodAccessorImpl.java:39)
45          at sun.reflect.DelegatingMethodAccessorImpl.
46            invoke(DelegatingMethodAccessorImpl.java:25)
47          at java.lang.reflect.Method.invoke(Method.java:597)
48          at org.junit.runners.model.FrameworkMethod$1.
49            runReflectiveCall(FrameworkMethod.java:45)
50          at org.junit.internal.runners.model.ReflectiveCallable.
51            run(ReflectiveCallable.java:15)
52          at org.junit.runners.model.FrameworkMethod.
53            invokeExplosively(FrameworkMethod.java:42)
54          at org.junit.internal.runners.statements.RunBefores.
55            evaluate(RunBefores.java:27)
56          at org.junit.runners.ParentRunner.run(ParentRunner.java:300)
57          at org.eclipse.jdt.internal.junit4.runner.JUnit4TestReference.
58            run(JUnit4TestReference.java:50)
59          at org.eclipse.jdt.internal.junit.runner.TestExecution.
60            run(TestExecution.java:38)
61          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
62            runTests(RemoteTestRunner.java:467)
63          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
64            runTests(RemoteTestRunner.java:683)
65          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
66            run(RemoteTestRunner.java:390)
67          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
68            main(RemoteTestRunner.java:197)
69      </ims:throwable>
70    </ims:log-event>
71 </ims:direct>
```

7.2.3   JSON Representation

```
1 {
2    "direct":{
3       "log-event":{
4          "serial-identifier":1000,
5          "level":"INFO",
6          "created":"2012-08-01T19:18:04.987+02:00",
7          "message":"message",
8          "user":{
9             "identifier":"user-1",
10            "namespace":"http://ims.dei.unipd.it/"
11         },
12         "action":"AUTHENTICATE_USER",
13         "resource":{
14            "identifier":"resource 1",
15            "namespace":"http://www.openarchives.org/OAI/2.0/oai_dc/",
16            "resource-class":"resource class 1"
17         },
18         "ip":"127.0.2.1",
19         "thread":"thread 1",
20         "class-name":"class 1",
21         "method":"method 1",
22         "line-number":37,
23         "class-file":"file 1",
24         "throwable":"java.lang.IllegalArgumentException: Invalid resource.\n\t
25          at it.unipd.dei.ims.ici.resource.representation.ErrorRepresentation.
26            setUpBeforeClass(ErrorRepresentation.java:45)\n\t
```

```
27          at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)\n\t
28          at sun.reflect.NativeMethodAccessorImpl.
29            invoke(NativeMethodAccessorImpl.java:39)\n\t
30          at sun.reflect.DelegatingMethodAccessorImpl.
31            invoke(DelegatingMethodAccessorImpl.java:25)\n\t
32          at java.lang.reflect.Method.invoke(Method.java:597)\n\t
33          at org.junit.runners.model.FrameworkMethod$1.
34            runReflectiveCall(FrameworkMethod.java:45)\n\t
35          at org.junit.internal.runners.model.ReflectiveCallable.
36            run(ReflectiveCallable.java:15)\n\t
37          at org.junit.runners.model.FrameworkMethod.
38            invokeExplosively(FrameworkMethod.java:42)\n\t
39          at org.junit.internal.runners.statements.RunBefores.
40            evaluate(RunBefores.java:27)\n\t
41          at org.junit.runners.ParentRunner.run(ParentRunner.java:300)\n\t
42        at org.eclipse.jdt.internal.junit4.runner.JUnit4TestReference.
43          run(JUnit4TestReference.java:50)\n\t
44          at org.eclipse.jdt.internal.junit.runner.TestExecution.
45            run(TestExecution.java:38)\n\t
46          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
47            runTests(RemoteTestRunner.java:467)\n\t
48          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
49            runTests(RemoteTestRunner.java:683)\n\t
50          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
51            run(RemoteTestRunner.java:390)\n\t
52          at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
53            main(RemoteTestRunner.java:197)\n"
54      }
55    }
56 }
```

7.3 Namespace Resource

7.3.1 API

Action	HTTP Method	URI
CREATE_NAMESPACE	POST	/namespace
READ_NAMESPACE	GET	/namespace/{id}
UPDATE_NAMESPACE	PUT	/namespace/{id}
DELETE_NAMESPACE	DELETE	/namespace/{id}
LIST_NAMESPACES	GET	/namespace
LIST_NAMESPACE_PROVENANCE_EVENTS	GET	/namespace/{id}/provenance

Table 40: API for accessing the namespace resource.

where {id} is the unique identifier of the namespace.

7.3.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
3   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```
4   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
5   <ims:namespace ims:identifier="http://www.ns1.com/" ims:prefix="ns1"
6     ims:description="namespace 1"
7     ims:created="2012-08-01T18:52:28.193+02:00"
8     ims:last-modified="2012-08-01T18:52:28.193+02:00" />
9  </ims:direct>
```

7.3.3 JSON Representation

```
1  {
2     "direct":{
3        "namespace":{
4           "identifier":"http://www.ns1.com/",
5           "prefix":"ns1",
6           "description":"namespace 1",
7           "created":"2012-08-01T18:52:28.193+02:00",
8           "last-modified":"2012-08-01T18:52:28.193+02:00"
9        }
10    }
11 }
```

7.4 Concept Resource

7.4.1 API

Action	HTTP Method	URI
CREATE_CONCEPT	POST	/concept
READ_CONCEPT	GET	/concept/{id};{ns}
UPDATE_CONCEPT	PUT	/concept/{id};{ns}
DELETE_CONCEPT	DELETE	/concept/{id};{ns}
LIST_CONCEPTS	GET	/concept
RELATE_CONCEPT	GET, PUT, POST	/concept/{source-id};{source-ns}/link/{target-id};{target-ns}/relation/{relation-id};{relation-ns}
UNRELATE_CONCEPT		/concept/{source-id};{source-ns}/link/{target-id};{target-ns}
LIST_CONCEPT_PROVENANCE_EVENTS	GET	/concept/{id};{ns}/provenance

Table 41: API for accessing the concept resource.

where {id} is the unique identifier of the concept and {ns} is the namespace to which the concept belongs. When relating/unrelating concepts, {source-id} and {source-ns} are the identifier and namespace of the source concept; {target-id} and {target-ns} are the identifier and namespace of the target concept; {relation-id} and {relation-ns} are the identifier and namespace of the concept expressing the relation between the source and target concepts. This allows us to create taxonomies and knowledge organization systems of concepts, if needed.

7.4.2 XML Representation

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
3    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
5    <ims:concept ims:identifier="c1" ims:namespace="http://ims.dei.unipd.it/"
6      ims:description="concept 1"
7      ims:created="2012-08-01T19:01:34.064+02:00"
8      ims:last-modified="2012-08-01T19:01:34.064+02:00">
9      <ims:links>
10       <ims:link>
11         <ims:concept ims:identifier="author"
12           ims:namespace="http://ims.dei.unipd.it/" />
13         <ims:relation>
14           <ims:concept ims:identifier="IS_A"
15             ims:namespace="http://ims.dei.unipd.it/" />
16         </ims:relation>
17         <ims:concept ims:identifier="c1"
18           ims:namespace="http://ims.dei.unipd.it/" />
19       </ims:link>
20       <ims:link>
21         <ims:concept ims:identifier="reviewer"
22           ims:namespace="http://ims.dei.unipd.it/" />
23         <ims:relation>
24           <ims:concept ims:identifier="OWNS-A"
25             ims:namespace="http://ims.dei.unipd.it/" />
26         </ims:relation>
27         <ims:concept ims:identifier="c1"
28           ims:namespace="http://ims.dei.unipd.it/" />
29       </ims:link>
30       <ims:link>
31         <ims:concept ims:identifier="c1"
32           ims:namespace="http://ims.dei.unipd.it/" />
33         <ims:relation>
34           <ims:concept ims:identifier="HAS_A"
35             ims:namespace="http://ims.dei.unipd.it/" />
36         </ims:relation>
37         <ims:concept ims:identifier="publisher"
38           ims:namespace="http://ims.dei.unipd.it/" />
39       </ims:link>
40       <ims:link>
41         <ims:concept ims:identifier="c1"
42           ims:namespace="http://ims.dei.unipd.it/" />
43         <ims:relation>
44           <ims:concept ims:identifier="LIKES"
45             ims:namespace="http://ims.dei.unipd.it/" />
46         </ims:relation>
47         <ims:concept ims:identifier="curator"
48           ims:namespace="http://ims.dei.unipd.it/" />
49       </ims:link>
50     </ims:links>
51   </ims:concept>
52  </ims:direct>
```

7.4.3 JSON Representation

```
1  {
2    "direct":{
```

```
 3        "concept":{
 4           "identifier":"c1",
 5           "namespace":"http://ims.dei.unipd.it/",
 6           "description":"concept 1",
 7           "created":"2012-08-01T19:01:34.064+02:00",
 8           "last-modified":"2012-08-01T19:01:34.064+02:00",
 9           "links":[
10              {
11                 "link":{
12                    "concept":{
13                       "identifier":"author",
14                       "namespace":"http://ims.dei.unipd.it/"
15                    },
16                    "relation":{
17                       "concept":{
18                          "identifier":"IS_A",
19                          "namespace":"http://ims.dei.unipd.it/"
20                       }
21                    },
22                    "concept":{
23                       "identifier":"c1",
24                       "namespace":"http://ims.dei.unipd.it/"
25                    }
26                 }
27              },
28              {
29                 "link":{
30                    "concept":{
31                       "identifier":"reviewer",
32                       "namespace":"http://ims.dei.unipd.it/"
33                    },
34                    "relation":{
35                       "concept":{
36                          "identifier":"OWNS-A",
37                          "namespace":"http://ims.dei.unipd.it/"
38                       }
39                    },
40                    "concept":{
41                       "identifier":"c1",
42                       "namespace":"http://ims.dei.unipd.it/"
43                    }
44                 }
45              },
46              {
47                 "link":{
48                    "concept":{
49                       "identifier":"c1",
50                       "namespace":"http://ims.dei.unipd.it/"
51                    },
52                    "relation":{
53                       "concept":{
54                          "identifier":"HAS_A",
55                          "namespace":"http://ims.dei.unipd.it/"
56                       }
57                    },
58                    "concept":{
59                       "identifier":"publisher",
60                       "namespace":"http://ims.dei.unipd.it/"
61                    }
62                 }
```

```
63                },
64                {
65                    "link":{
66                        "concept":{
67                            "identifier":"c1",
68                            "namespace":"http://ims.dei.unipd.it/"
69                        },
70                        "relation":{
71                            "concept":{
72                                "identifier":"LIKES",
73                                "namespace":"http://ims.dei.unipd.it/"
74                            }
75                        },
76                        "concept":{
77                            "identifier":"curator",
78                            "namespace":"http://ims.dei.unipd.it/"
79                        }
80                    }
81                }
82            ]
83        }
84    }
85 }
```

7.5 Group Resource

7.5.1 API

Action	HTTP Method	URI
CREATE_GROUP	POST	/group
READ_GROUP	GET	/group/{id};{ns}
UPDATE_GROUP	PUT	/group/{id};{ns}
DELETE_GROUP	DELETE	/group/{id};{ns}
LIST_GROUPS	GET	/group
LIST_GROUP_PROVENANCE_EVENTS	GET	/group/{id};{ns}/provenance

Table 42: API for accessing the group resource.

where {id} is the unique identifier of the group and {ns} is the namespace to which the group belongs.

7.5.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
3   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
5   <ims:group ims:identifier="g1" ims:namespace="http://ims.dei.unipd.it/"
6     ims:description="group 1"
7     ims:created="2012-08-01T19:24:40.991+02:00"
8     ims:last-modified="2012-08-01T19:24:40.991+02:00">
9     <ims:users>
```

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```
10          <ims:user ims:identifier="user-1" ims:namespace="http://ims.dei.unipd.it/" />
11          <ims:user ims:identifier="user-2" ims:namespace="http://ims.dei.unipd.it/" />
12          <ims:user ims:identifier="user-3" ims:namespace="http://ims.dei.unipd.it/" />
13      </ims:users>
14    </ims:group>
15 </ims:direct>
```

7.5.3 JSON Representation

```json
1 {
2    "direct":{
3       "group":{
4          "identifier":"g1",
5          "namespace":"http://ims.dei.unipd.it/",
6          "description":"group 1",
7          "created":"2012-08-01T19:24:40.991+02:00",
8          "last-modified":"2012-08-01T19:24:40.991+02:00",
9          "users":[
10             {
11                "user":{
12                   "identifier":"user-1",
13                   "namespace":"http://ims.dei.unipd.it/"
14                }
15             },
16             {
17                "user":{
18                   "identifier":"user-2",
19                   "namespace":"http://ims.dei.unipd.it/"
20                }
21             },
22             {
23                "user":{
24                   "identifier":"user-3",
25                   "namespace":"http://ims.dei.unipd.it/"
26                }
27             }
28          ]
29       }
30    }
31 }
```

7.6 Role Resource

7.6.1 API

Action	HTTP Method	URI
CREATE_ROLE	POST	/role
READ_ROLE	GET	/role/{id};{ns}
UPDATE_ROLE	PUT	/role/{id};{ns}
DELETE_ROLE	DELETE	/role/{id};{ns}
LIST_ROLES	GET	/role
LIST_ROLE_PROVENANCE_EVENTS	GET	/role/{id};{ns}/provenance

Table 43: API for accessing the role resource.

where {id} is the unique identifier of the role and {ns} is the namespace to which the role belongs.

7.6.2   XML Representation

```xml
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
3   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
5   <ims:role ims:identifier="r1" ims:namespace="http://ims.dei.unipd.it/"
6     ims:description="role 1"
7     ims:created="2012-08-01T19:24:40.991+02:00"
8     ims:last-modified="2012-08-01T19:24:40.991+02:00">
9     <ims:users>
10       <ims:user ims:identifier="user-1" ims:namespace="http://ims.dei.unipd.it/" />
11       <ims:user ims:identifier="user-2" ims:namespace="http://ims.dei.unipd.it/" />
12       <ims:user ims:identifier="user-3" ims:namespace="http://ims.dei.unipd.it/" />
13     </ims:users>
14   </ims:role>
15 </ims:direct>
```

7.6.3   JSON Representation

```json
1 {
2   "direct":{
3     "role":{
4       "identifier":"r1",
5       "namespace":"http://ims.dei.unipd.it/",
6       "description":"role 1",
7       "created":"2012-08-01T19:24:40.991+02:00",
8       "last-modified":"2012-08-01T19:24:40.991+02:00",
9       "users":[
10         {
11           "user":{
12             "identifier":"user-1",
13             "namespace":"http://ims.dei.unipd.it/"
14           }
15         },
16         {
17           "user":{
18             "identifier":"user-2",
19             "namespace":"http://ims.dei.unipd.it/"
20           }
21         },
22         {
23           "user":{
24             "identifier":"user-3",
25             "namespace":"http://ims.dei.unipd.it/"
26           }
27         }
28       ]
29     }
30   }
31 }
```

7.7   User Resource

7.7.1   API

Action	HTTP Method	URI
CREATE_USER	POST	/user
READ_USER	GET	/user/{id};{ns}
UPDATE_USER	PUT	/user/{id};{ns}
DELETE_USER	DELETE	/user/{id};{ns}
CHANGE_USER_PASSWORD	PUT	/user/{id};{ns}/changePassword
AUTHENTICATE_USER	GET, PUT, POST, DELETE, OPTIONS, HEAD	/user/authenticate
ADD_USER_TO_GROUP	GET, PUT, POST	/user/{id};{ns}/member/ {owner-id};{owner-ns}
REMOVE_USER_FROM_GROUP	DELETE	/user/{id};{ns}/member/ {owner-id};{owner-ns}
ADD_USER_TO_ROLE	GET, PUT, POST	/user/{id};{ns}/subscriber/ {owner-id};{owner-ns}
REMOVE_USER_FROM_ROLE	DELETE	/user/{id};{ns}/subscriber/ {owner-id};{owner-ns}
LIST_USERS	GET	/user
LIST_USER_PROVENANCE_EVENTS	GET	/user/{id};{ns}/provenance

Table 44: API for accessing the user resource.

where {id} is the unique identifier of the user and {ns} is the namespace to which the user belongs while {owner-id} and {owner-ns} are the identifier and namespace of the group/role to which the user belongs.

7.7.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
3   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
5   <ims:user ims:identifier="u1" ims:namespace="http://ims.dei.unipd.it/"
6     ims:first-name="firstName" ims:last-name="lastName"
7     ims:affiliation="affiliation" ims:e-mail="email@email.org"
8     ims:birth-date="2012-08-01" ims:gender="MALE"
9     ims:address="address" ims:city="city" ims:state="state" ims:zip="zip"
10    ims:country="ITA" ims:language="ita" ims:phone="123456" ims:facsimile="123456"
11    ims:mobile="123456" ims:voip-caller-id="voipCallerId"
12    ims:homepage="www.homepage.com"
13    ims:created="2012-08-01T19:33:41.893+02:00"
14    ims:last-modified="2012-08-01T19:33:41.893+02:00">
15    <ims:groups>
16      <ims:group ims:identifier="group-1" ims:namespace="http://ims.dei.unipd.it/" />
17      <ims:group ims:identifier="group-2" ims:namespace="http://ims.dei.unipd.it/" />
```

```
18        <ims:group ims:identifier="group-3" ims:namespace="http://ims.dei.unipd.it/" />
19      </ims:groups>
20      <ims:roles>
21        <ims:role ims:identifier="role-1" ims:namespace="http://ims.dei.unipd.it/" />
22        <ims:role ims:identifier="role-2" ims:namespace="http://ims.dei.unipd.it/" />
23        <ims:role ims:identifier="role-3" ims:namespace="http://ims.dei.unipd.it/" />
24      </ims:roles>
25    </ims:user>
26 </ims:direct>
```

7.7.3 JSON Representation

```
1  {
2    "direct":{
3      "user":{
4        "identifier":"u1",
5        "namespace":"http://ims.dei.unipd.it/",
6        "first-name":"firstName",
7        "last-name":"lastName",
8        "affiliation":"affiliation",
9        "e-mail":"email@email.org",
10       "birth-date":"2012-08-01",
11       "gender":"MALE",
12       "address":"address",
13       "city":"city",
14       "state":"state",
15       "zip":"zip",
16       "country":"ITA",
17       "language":"ita",
18       "phone":"123456",
19       "facsimile":"123456",
20       "mobile":"123456",
21       "voip-caller-id":"voipCallerId",
22       "homepage":"www.homepage.com",
23       "created":"2012-08-01T19:33:41.893+02:00",
24       "last-modified":"2012-08-01T19:33:41.893+02:00",
25       "groups":[
26         {
27           "group":{
28             "identifier":"group-1",
29             "namespace":"http://ims.dei.unipd.it/"
30           }
31         },
32         {
33           "group":{
34             "identifier":"group-2",
35             "namespace":"http://ims.dei.unipd.it/"
36           }
37         },
38         {
39           "group":{
40             "identifier":"group-3",
41             "namespace":"http://ims.dei.unipd.it/"
42           }
43         }
44       ],
45       "roles":[
46         {
47           "role":{
48             "identifier":"role-1",
```

```
49                        "namespace":"http://ims.dei.unipd.it/"
50                    }
51                },
52                {
53                    "role":{
54                        "identifier":"role-2",
55                        "namespace":"http://ims.dei.unipd.it/"
56                    }
57                },
58                {
59                    "role":{
60                        "identifier":"role-3",
61                        "namespace":"http://ims.dei.unipd.it/"
62                    }
63                }
64            ]
65        }
66    }
67 }
```

7.8   Metadata Set Resource

7.8.1   API

Action	HTTP Method	URI
CREATE_METADATA_SET	POST	/metadata-set
READ_METADATA_SET	GET	/metadata-set/{id};{ns}
UPDATE_METADATA_SET	PUT	/metadata-set/{id};{ns}
DELETE_METADATA_SET	DELETE	/metadata-set/{id};{ns}
INCLUDE_SUBSET_INTO_SUPERSET	GET, PUT, POST	/metadata-set/{id};{ns}/member/{owner-id};{owner-ns}
EXCLUDE_SUBSET_FROM_SUPERSET	DELETE	/metadata-set/{id};{ns}/member/{owner-id};{owner-ns}
LIST_METADATA_SETS	GET	/metadata-set
LIST_METADATA_SET_PROVENANCE_EVENTS	GET	/metadata-set/{id};{ns}/provenance
SHARE_METADATA_SET	GET, POST, PUT	/metadata-set/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}
UNSHARE_METADATA_SET	DELETE	/metadata-set/{id}/share/{sharer-id};{sharer-ns}

Table 45: API for accessing the metadata set resource.

where {id} is the unique identifier of the metadata set and {ns} is the namespace to which the metadata set belongs while {owner-id} and {owner-ns} are the identifier and namespace of the super-set to which the metadata set belongs.

7.8.2 XML Representation

```xml
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
3    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
5    <ims:metadata-set ims:identifier="ms1" ims:namespace="http://ims.dei.unipd.it/"
6      ims:name="set1" ims:description="metadata set 1"
7      ims:scope="PUBLIC" ims:created="2012-08-02T13:50:29.143+02:00"
8      ims:last-modified="2012-08-02T13:50:29.143+02:00">
9      <ims:supersets>
10       <ims:metadata-set ims:identifier="superset-1"
11         ims:namespace="http://ims.dei.unipd.it/" />
12       <ims:metadata-set ims:identifier="superset-2"
13         ims:namespace="http://ims.dei.unipd.it/" />
14     </ims:supersets>
15     <ims:subsets>
16       <ims:metadata-set ims:identifier="subset-1"
17         ims:namespace="http://ims.dei.unipd.it/" />
18       <ims:metadata-set ims:identifier="subset-2"
19         ims:namespace="http://ims.dei.unipd.it/" />
20     </ims:subsets>
21   </ims:metadata-set>
22 </ims:direct>
```

7.8.3 JSON Representation

```json
1  {
2    "direct":{
3      "metadata-set":{
4        "identifier":"ms1",
5        "namespace":"http://ims.dei.unipd.it/",
6        "name":"set1",
7        "description":"metadata set 1",
8        "scope":"PUBLIC",
9        "created":"2012-08-02T13:50:29.143+02:00",
10       "last-modified":"2012-08-02T13:50:29.143+02:00",
11       "supersets":[
12         {
13           "metadata-set":{
14             "identifier":"superset-1",
15             "namespace":"http://ims.dei.unipd.it/"
16           }
17         },
18         {
19           "metadata-set":{
20             "identifier":"superset-2",
21             "namespace":"http://ims.dei.unipd.it/"
22           }
23         }
24       ],
25       "subsets":[
26         {
```

```
27              "metadata-set":{
28                  "identifier":"subset-1",
29                  "namespace":"http://ims.dei.unipd.it/"
30              }
31          },
32          {
33              "metadata-set":{
34                  "identifier":"subset-2",
35                  "namespace":"http://ims.dei.unipd.it/"
36              }
37          }
38      ]
39      }
40  }
41 }
```

7.9 Metadata Resource

7.9.1 API

Action	HTTP Method	URI
CREATE_METADATA	POST	`/metadata`
READ_METADATA	GET	`/metadata/{id};{ns}`
UPDATE_METADATA	PUT	`/metadata/{id};{ns}`
DELETE_METADATA	DELETE	`/metadata/{id};{ns}`

ADD_METADATA_TO_METADATA_SET	GET, PUT, POST	`/metadata/{id};{ns}/`
		`member/{owner-id};`
		`{owner-ns}`

REMOVE_METADATA_FROM_METADATA_SET	DELETE	`/metadata/{id};{ns}/`
		`member/{owner-id};`
		`{owner-ns}`

LIST_METADATA_BELONGING_TO_METADATA_SET	GET	`/metadata/member/` `{owner-id};{owner-ns}`
LIST_METADATA	GET	`/metadata`
LIST_METADATA_PROVENANCE_EVENTS	GET	`/metadata/{id};{ns}/` `provenance`

SHARE_METADATA	GET, POST, PUT	`/metadata/{id}/`
		`share/{sharer-id};`
		`{sharer-ns}/permission/`
		`{access-permission}`

UNSHARE_METADATA	DELETE	`/metadata/{id}/share/` `{sharer-id};{sharer-ns}`

Table 46: API for accessing the metadata resource.

where {id} is the unique identifier of the metadata set and {ns} is the namespace to which the
metadata set belongs while {owner-id} and {owner-ns} are the identifier and namespace of the

metadata set to which the metadata belongs.

7.9.2 XML Representation

```
 1 <?xml version="1.0" encoding="UTF-8"?>
 2 <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
 3   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 4   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
 5   <ims:metadata xmlns:dc="http://purl.org/dc/elements/1.1/"
 6     xmlns:dmy="http://www.dummy.org/"
 7     ims:identifier="md1" ims:namespace="http://ims.dei.unipd.it/"
 8     ims:language="eng" ims:scope="PUBLIC"
 9     ims:created="2012-08-02T14:04:33.995+02:00"
10     ims:last-modified="2012-08-02T14:04:33.995+02:00"
11     dc:subject="a subject attribute"
12     dc:contributor="a contributor attribute">
13     <ims:metadata-sets>
14       <ims:metadata-set ims:identifier="metadata-set-1"
15         ims:namespace="http://ims.dei.unipd.it/" />
16       <ims:metadata-set ims:identifier="metadata-set-2"
17         ims:namespace="http://ims.dei.unipd.it/" />
18     </ims:metadata-sets>
19     <ims:fields>
20       <dc:type>
21         a type field
22       </dc:type>
23       <dc:type>
24         another type field
25       </dc:type>
26       <dc:type>
27         a type field
28       </dc:type>
29       <dc:type>
30         another type field
31       </dc:type>
32       <dc:identifier>
33         an identifier field
34       </dc:identifier>
35       <dc:coverage>
36         a coverage field
37       </dc:coverage>
38       <dc:title>
39         a title field
40       </dc:title>
41       <dc:title>
42         another title field
43       </dc:title>
44       <dc:publisher>
45         a publisher field
46       </dc:publisher>
47       <dc:contributor>
48         a contributor field
49       </dc:contributor>
50       <dmy:accessCondition dc:date="2010-01-01" dc:relation="a relation">
51         <dc:contributor>
52           a contributor
53         </dc:contributor>
54         <dc:creator>
55           a locator
```

```
56        </dc:creator>
57      </dmy:accessCondition>
58      <dmy:shelfLocator dc:date="2010-01-01" dc:relation="a relation">
59        a format field with attributes
60      </dmy:shelfLocator>
61      <dmy:holdingSimple>
62        <dc:contributor>
63          a contributor
64        </dc:contributor>
65        <dc:creator>
66          a locator
67        </dc:creator>
68      </dmy:holdingSimple>
69    </ims:fields>
70  </ims:metadata>
71 </ims:direct>
```

7.9.3   JSON Representation

```
1 {
2    "direct":{
3      "metadata":{
4        "identifier":"md1",
5        "namespace":"http://ims.dei.unipd.it/",
6        "language":"aar",
7        "created":"2012-08-02T14:04:33.995+02:00",
8        "last-modified":"2012-08-02T14:04:33.995+02:00",
9        "scope":"PUBLIC",
10       "schemas":[
11         {
12           "dc":"http://purl.org/dc/elements/1.1/"
13         },
14         {
15           "dmy":"http://www.dummy.org/"
16         }
17       ],
18       "attributes":[
19         {
20           "subject":{
21             "schema":"dc",
22             "value":"a subject attribute"
23           }
24         },
25         {
26           "contributor":{
27             "schema":"dc",
28             "value":"a contributor attribute"
29           }
30         }
31       ],
32       "metadata-sets":[
33         {
34           "metadata-set":{
35             "identifier":"metadata-set-1",
36             "namespace":"http://ims.dei.unipd.it/"
37           }
38         },
39         {
40           "metadata-set":{
41             "identifier":"metadata-set-2",
```

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```
42                  "namespace":"http://ims.dei.unipd.it/"
43              }
44          }
45      ],
46      "fields":[
47          {
48              "type":{
49                  "schema":"dc",
50                  "value":"a type field"
51              }
52          },
53          {
54              "type":{
55                  "schema":"dc",
56                  "value":"another type field"
57              }
58          },
59          {
60              "type":{
61                  "schema":"dc",
62                  "value":"a type field"
63              }
64          },
65          {
66              "type":{
67                  "schema":"dc",
68                  "value":"another type field"
69              }
70          },
71          {
72              "identifier":{
73                  "schema":"dc",
74                  "value":"an identifier field"
75              }
76          },
77          {
78              "coverage":{
79                  "schema":"dc",
80                  "value":"a coverage field"
81              }
82          },
83          {
84              "title":{
85                  "schema":"dc",
86                  "value":"a title field"
87              }
88          },
89          {
90              "title":{
91                  "schema":"dc",
92                  "value":"another title field"
93              }
94          },
95          {
96              "publisher":{
97                  "schema":"dc",
98                  "value":"a publisher field"
99              }
100         },
101         {
```

promise

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SEVENTH FRAMEWORK
PROGRAMME

```
102              "contributor":{
103                 "schema":"dc",
104                 "value":"a contributor field"
105              }
106          },
107          {
108             "accessCondition":{
109                "schema":"dmy",
110                "attributes":[
111                   {
112                      "date":{
113                         "schema":"dc",
114                         "value":"2010-01-01"
115                      }
116                   },
117                   {
118                      "relation":{
119                         "schema":"dc",
120                         "value":"a relation"
121                      }
122                   }
123                ],
124                "sub-fields":[
125                   {
126                      "contributor":{
127                         "schema":"dc",
128                         "value":"a contributor"
129                      }
130                   },
131                   {
132                      "creator":{
133                         "schema":"dc",
134                         "value":"a locator"
135                      }
136                   }
137                ]
138             }
139          },
140          {
141             "shelfLocator":{
142                "schema":"dmy",
143                "attributes":[
144                   {
145                      "date":{
146                         "schema":"dc",
147                         "value":"2010-01-01"
148                      }
149                   },
150                   {
151                      "relation":{
152                         "schema":"dc",
153                         "value":"a relation"
154                      }
155                   }
156                ],
157                "value":"a format field with attributes"
158             }
159          },
160          {
161             "holdingSimple":{
```

```
162                        "schema":"dmy",
163                        "sub-fields":[
164                           {
165                              "contributor":{
166                                 "schema":"dc",
167                                 "value":"a contributor"
168                              }
169                           },
170                           {
171                              "creator":{
172                                 "schema":"dc",
173                                 "value":"a locator"
174                              }
175                           }
176                        ]
177                     }
178                  }
179               ]
180            }
181         }
182 }
```

7.10   Search Resource

7.10.1   API

Action	HTTP Method	URI
SEARCH	POST	/search
SEARCH	GET	/search?query={query}
SEARCH	GET	/search/{query}

Table 47: API for accessing the search resource.

where {query} is the query expressed using the query language discussed in Section 8. In the GET version you need to URI encode the {query} parameter while in the POST version you send the query as body of the HTTP entity.

The next two sections show an example of the representation of the results.

7.10.2   XML Representation

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
3    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
5    <ims:result ims:identifier="029b427d-62f7-451e-8945-1c22dc6e5ffa"
6      ims:created="2012-08-02T10:21:34.294+02:00"
7        ims:size="3">
8      <ims:query ims:identifier="987f8a05-e688-4626-bd68-f9da63fe8c18"
9        ims:created="2012-08-02T10:21:34.294+02:00">
10       <ims:cql>
11         ici.namespace.created &gt; 1970-01-01
12       </ims:cql>
```

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```
13      </ims:query>
14      <ims:resource-class>
15        it.unipd.dei.ims.ici.resource.Namespace
16      </ims:resource-class>
17      <ims:items>
18        <ims:item ims:identifier="1b848114-a975-4646-839c-712227bcff8b" ims:rank="0"
19          ims:score="1.0E0" />
20        <ims:item ims:identifier="9e812fc7-a21f-4ae5-9101-4adf2b423dac" ims:rank="1"
21          ims:score="9.0E-1" />
22        <ims:item ims:identifier="155611e5-07cb-418b-9839-6a0424c0388f" ims:rank="2"
23          ims:score="8.0E-1" />
24      </ims:items>
25    </ims:result>
26 </ims:direct>
```

7.10.3   JSON Representation

```
1  {
2    "direct":{
3      "result":{
4        "identifier":"dea70afa-9897-4acc-a96c-4e70cdff256e",
5        "created":"2012-08-02T10:26:48.482+02:00",
6        "size":3,
7        "query":{
8          "identifier":"63a49b47-74a4-4eab-b24d-e77d1ab68102",
9          "created":"2012-08-02T10:26:48.482+02:00",
10         "cql":"ici.namespace.created > 1970-01-01"
11       },
12       "resource-class":"it.unipd.dei.ims.ici.resource.Namespace",
13       "items":[
14         {
15           "item":{
16             "identifier":"3a8dd857-ca03-437f-869b-711a0839f0d2",
17             "rank":0,
18             "score":1.0
19           }
20         },
21         {
22           "item":{
23             "identifier":"e98045ff-fabf-499b-97e8-dc5f0eeabfd5",
24             "rank":1,
25             "score":0.9
26           }
27         },
28         {
29           "item":{
30             "identifier":"f97a5456-ccfe-4523-aec3-67bc3c9f9b71",
31             "rank":2,
32             "score":0.8
33           }
34         }
35       ]
36     }
37   }
38 }
```

7.11   List Resource

7.11.1   API

Action	HTTP Method	URI
SEARCH	POST	`/list`
SEARCH	GET	`/list?query={query}`
SEARCH	GET	`/list/{query}`

Table 48: API for accessing the list resource.

where `{query}` is the query expressed using the query language discussed in Section 8. In the GET version you need to URI encode the `{query}` parameter while in the POST version you send the query as body of the HTTP entity.

The `list` resource works the same way as the `search` resource but, instead of returning a list of result items together with their score and rank, it directly returns the resources which correspond to the query.

7.12 Application Resource

Identifies a running software Application which can be evaluated by an evaluation activity such as a Guerrilla Experiment.

7.12.1 API

Action	HTTP Method	URI
CREATE_APPLICATION	POST	`/application`
READ_APPLICATION	GET	`/application/{id}`
UPDATE_APPLICATION	PUT	`/application/{id}`
DELETE_APPLICATION	DELETE	`/application/{id}`
LIST_APPLICATIONS	GET	`/application`
LIST_APPLICATIONS_PROVENANCE_EVENTS	GET	`/application/{id}/provenance`
ADD_COMPONENT_TO_APPLICATION	POST	`/application/{id}/component/{id}`
REMOVE_COMPONENT_FROM_APPLICATION	DELETE	`/application/{id}/component/{id}`
LIST_COMPONENT_FROM_APPLICATION	GET	`/application/{id}/component`
ADD_CONFIGURATION_TO_APPLICATION	POST	`/application/{id}/configuration/{id}`
REMOVE_CONFIGURATION_FROM_APPLICATION	DELETE	`/application/{id}/configuration`
READ_CONFIGURATION_FROM_APPLICATION	GET	`/application/{id}/configuration`

Action	HTTP Method	URI
ADD_SYSTEM_TO_APPLICATION	POST	`/application/{id}/ system/{id}`
REMOVE_SYSTEM_FROM_APPLICATION	DELETE	`/application/{id}/ system/{id}`
LIST_SYSTEM_FROM_APPLICATION	GET	`/application/{id}/ system`
SHARE_APPLICATION	GET, POST, PUT	`/application/{id}/ share/{sharer-id}; {sharer-ns}/ permission/ {access-permission}`
UNSHARE_APPLICATION	DELETE	`/application/{id}/ share/{sharer-id}; {sharer-ns}`

Table 49: API for accessing the application resource.

where `{id}` is the unique identifier of the application.

The next two sections show an example of the representation of the results.

7.12.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:application
7     ims:identifier="app-1"
8     ims:description="Description of app 1"
9     ims:name="Name of app 1"
10    ims:scope="SHARED"
11    ims:created="2012-09-13T17:17:25.378+02:00"
12    ims:last-modified="2012-09-13T17:17:25.378+02:00">
13    <ims:owner>
14      <ims:user
15        ims:identifier="user-1"
16        ims:namespace="http://ims.dei.unipd.it/" />
17    </ims:owner>
18    <ims:sharings>
19      <ims:sharing>
20        <ims:group
21          ims:identifier="group-1"
22          ims:namespace="http://ims.dei.unipd.it/" />
23        <ims:access-permission>DENIED</ims:access-permission>
24      </ims:sharing>
25      <ims:sharing>
26        <ims:group
27          ims:identifier="group-2"
```

```
28              ims:namespace="http://ims.dei.unipd.it/" />
29            <ims:access-permission>READ_ONLY</ims:access-permission>
30          </ims:sharing>
31          <ims:sharing>
32            <ims:group
33              ims:identifier="group-3"
34              ims:namespace="http://ims.dei.unipd.it/" />
35            <ims:access-permission>READ_WRITE</ims:access-permission>
36          </ims:sharing>
37        </ims:sharings>
38        <ims:links>
39          <ims:link>
40            <ims:metadata
41              ims:identifier="md-1"
42              ims:namespace="http://ims.dei.unipd.it/" />
43            <ims:relation>
44              <ims:concept
45                ims:identifier="isPartOf"
46                ims:namespace="http://ims.dei.unipd.it/" />
47            </ims:relation>
48            <ims:application ims:identifier="app-1" />
49          </ims:link>
50          <ims:link>
51            <ims:metadata
52              ims:identifier="md-2"
53              ims:namespace="http://ims.dei.unipd.it/" />
54            <ims:relation>
55              <ims:concept
56                ims:identifier="isCopyrightOf"
57                ims:namespace="http://ims.dei.unipd.it/" />
58            </ims:relation>
59            <ims:application ims:identifier="app-1" />
60          </ims:link>
61          <ims:link>
62            <ims:metadata
63              ims:identifier="md-3"
64              ims:namespace="http://ims.dei.unipd.it/" />
65            <ims:relation>
66              <ims:concept
67                ims:identifier="isDescriptionOf"
68                ims:namespace="http://ims.dei.unipd.it/" />
69            </ims:relation>
70            <ims:application ims:identifier="app-1" />
71          </ims:link>
72        </ims:links>
73        <ims:configuration ims:identifier="cnf-1" />
74      </ims:application>
75 </ims:direct>
```

7.12.3 JSON Representation

```
1 {
2    "direct":{
3       "application":{
4          "identifier":"app-1",
5          "name":"Name of app 1",
6          "description":"Description of app 1",
7          "scope":"SHARED",
8          "created":"2012-09-14T10:04:05.310+02:00",
9          "last-modified":"2012-09-14T10:04:05.310+02:00",
```

```json
10          "owner":{
11              "user":{
12                  "identifier":"user-1",
13                  "namespace":"http://ims.dei.unipd.it/"
14              }
15          },
16          "sharings":[
17              {
18                  "sharing":{
19                      "group":{
20                          "identifier":"group-1",
21                          "namespace":"http://ims.dei.unipd.it/"
22                      },
23                      "access-permission":"DENIED"
24                  }
25              },
26              {
27                  "sharing":{
28                      "group":{
29                          "identifier":"group-2",
30                          "namespace":"http://ims.dei.unipd.it/"
31                      },
32                      "access-permission":"READ_ONLY"
33                  }
34              },
35              {
36                  "sharing":{
37                      "group":{
38                          "identifier":"group-3",
39                          "namespace":"http://ims.dei.unipd.it/"
40                      },
41                      "access-permission":"READ_WRITE"
42                  }
43              }
44          ],
45          "links":[
46              {
47                  "link":{
48                      "metadata":{
49                          "identifier":"md-1",
50                          "namespace":"http://ims.dei.unipd.it/"
51                      },
52                      "relation":{
53                          "concept":{
54                              "identifier":"isPartOf",
55                              "namespace":"http://ims.dei.unipd.it/"
56                          }
57                      },
58                      "application":{
59                          "identifier":"app-1"
60                      }
61                  }
62              },
63              {
64                  "link":{
65                      "metadata":{
66                          "identifier":"md-2",
67                          "namespace":"http://ims.dei.unipd.it/"
68                      },
69                      "relation":{
```

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```
 70                         "concept":{
 71                             "identifier":"isCopyrightOf",
 72                             "namespace":"http://ims.dei.unipd.it/"
 73                         }
 74                     },
 75                     "application":{
 76                         "identifier":"app-1"
 77                     }
 78                 }
 79             },
 80             {
 81                 "link":{
 82                     "metadata":{
 83                         "identifier":"md-3",
 84                         "namespace":"http://ims.dei.unipd.it/"
 85                     },
 86                     "relation":{
 87                         "concept":{
 88                             "identifier":"isDescriptionOf",
 89                             "namespace":"http://ims.dei.unipd.it/"
 90                         }
 91                     },
 92                     "application":{
 93                         "identifier":"app-1"
 94                     }
 95                 }
 96             }
 97         ],
 98         "configuration":{
 99             "identifier":"cnf-1"
100         }
101     }
102   }
103 }
```

7.13   Component Resource

Represents a building block of a running System.

7.13.1   API

Action	HTTP Method	URI
CREATE_COMPONENT	POST	/component
READ_COMPONENT	GET	/component/{id}
UPDATE_COMPONENT	PUT	/component/{id}
DELETE_COMPONENT	DELETE	/component/{id}
LIST_COMPONENTS	GET	/component
LIST_COMPONENTS_PROVENANCE_EVENTS	GET	/component/{id}/ provenance
ADD_CONFIGURATION_TO_COMPONENT	POST	/component/{id}/ configuration/{id}

Action	HTTP Method	URI
REMOVE_CONFIGURATION_FROM_COMPONENT	DELETE	`/component/{id}/ configuration`
READ_CONFIGURATION_FROM_COMPONENT	GET	`/component/{id}/ configuration`
SHARE_COMPONENT	GET, POST, PUT	`/component/{id}/ share/{sharer-id}; {sharer-ns}/ permission/ {access-permission}`
UNSHARE_COMPONENT	DELETE	`/component/{id}/ share/{sharer-id}; {sharer-ns}`

Table 50: API for accessing the component resource.

where `{id}` is the unique identifier of the component.

The next two sections show an example of the representation of the results.

7.13.2 XML Representation

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct
3    xmlns:ims="http://ims.dei.unipd.it/"
4    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6    <ims:component
7      ims:identifier="cmp-1"
8      ims:created="2012-09-13T17:32:16.787+02:00"
9      ims:last-modified="2012-09-13T17:32:16.787+02:00"
10     ims:name="Name of component"
11     ims:description="Description of the component"
12     ims:scope="SHARED">
13     <ims:owner>
14       <ims:user
15         ims:identifier="user-1"
16         ims:namespace="http://ims.dei.unipd.it/" />
17     </ims:owner>
18     <ims:sharings>
19       <ims:sharing>
20         <ims:group
21           ims:identifier="group-1"
22           ims:namespace="http://ims.dei.unipd.it/" />
23         <ims:access-permission>DENIED</ims:access-permission>
24       </ims:sharing>
25       <ims:sharing>
26         <ims:group
27           ims:identifier="group-2"
28           ims:namespace="http://ims.dei.unipd.it/" />
29         <ims:access-permission>READ_ONLY</ims:access-permission>
30       </ims:sharing>
```

```
31        <ims:sharing>
32          <ims:group
33            ims:identifier="group-3"
34            ims:namespace="http://ims.dei.unipd.it/" />
35          <ims:access-permission>READ_WRITE</ims:access-permission>
36        </ims:sharing>
37      </ims:sharings>
38      <ims:links>
39        <ims:link>
40          <ims:metadata
41            ims:identifier="md-1"
42            ims:namespace="http://ims.dei.unipd.it/" />
43          <ims:relation>
44            <ims:concept
45              ims:identifier="isDescriptionOf"
46              ims:namespace="http://ims.dei.unipd.it/" />
47          </ims:relation>
48          <ims:component ims:identifier="cmp-1" />
49        </ims:link>
50        <ims:link>
51          <ims:metadata
52            ims:identifier="md-2"
53            ims:namespace="http://ims.dei.unipd.it/" />
54          <ims:relation>
55            <ims:concept
56              ims:identifier="isCopyrightOf"
57              ims:namespace="http://ims.dei.unipd.it/" />
58          </ims:relation>
59          <ims:component ims:identifier="cmp-1" />
60        </ims:link>
61        <ims:link>
62          <ims:metadata
63            ims:identifier="md-3"
64            ims:namespace="http://ims.dei.unipd.it/" />
65          <ims:relation>
66            <ims:concept
67              ims:identifier="isAdministrationOf"
68              ims:namespace="http://ims.dei.unipd.it/" />
69          </ims:relation>
70          <ims:component ims:identifier="cmp-1" />
71        </ims:link>
72      </ims:links>
73      <ims:concept
74        ims:identifier="cnc-1"
75        ims:namespace="http://ims.dei.unipd.it/" />
76      <ims:configuration ims:identifier="cnf-1" />
77    </ims:component>
78 </ims:direct>
```

7.13.3 JSON Representation

```
1 {
2    "direct":{
3       "component":{
4          "identifier":"cmp-1",
5          "name":"Name of component",
6          "description":"Description of the component",
7          "scope":"SHARED",
8          "created":"2012-09-13T17:32:16.787+02:00",
9          "last-modified":"2012-09-13T17:32:16.787+02:00",
```

```
10          "owner":{
11            "user":{
12                "identifier":"user-1",
13                "namespace":"http://ims.dei.unipd.it/"
14            }
15          },
16          "sharings":[
17            {
18                "sharing":{
19                  "group":{
20                      "identifier":"group-1",
21                      "namespace":"http://ims.dei.unipd.it/"
22                  },
23                  "access-permission":"DENIED"
24                }
25            },
26            {
27                "sharing":{
28                  "group":{
29                      "identifier":"group-2",
30                      "namespace":"http://ims.dei.unipd.it/"
31                  },
32                  "access-permission":"READ_ONLY"
33                }
34            },
35            {
36                "sharing":{
37                  "group":{
38                      "identifier":"group-3",
39                      "namespace":"http://ims.dei.unipd.it/"
40                  },
41                  "access-permission":"READ_WRITE"
42                }
43            }
44          ],
45          "links":[
46            {
47                "link":{
48                  "metadata":{
49                      "identifier":"md-1",
50                      "namespace":"http://ims.dei.unipd.it/"
51                  },
52                  "relation":{
53                      "concept":{
54                        "identifier":"isDescriptionOf",
55                        "namespace":"http://ims.dei.unipd.it/"
56                      }
57                  },
58                  "component":{
59                      "identifier":"cmp-1"
60                  }
61                }
62            },
63            {
64                "link":{
65                  "metadata":{
66                      "identifier":"md-2",
67                      "namespace":"http://ims.dei.unipd.it/"
68                  },
69                  "relation":{
```

D3.3: Prototype of the Evaluation Infrastructure

```
70            "concept":{
71                "identifier":"isCopyrightOf",
72                "namespace":"http://ims.dei.unipd.it/"
73            }
74          },
75          "component":{
76                "identifier":"cmp-1"
77          }
78        }
79      },
80      {
81        "link":{
82          "metadata":{
83                "identifier":"md-3",
84                "namespace":"http://ims.dei.unipd.it/"
85          },
86          "relation":{
87                "concept":{
88                    "identifier":"isAdministrationOf",
89                    "namespace":"http://ims.dei.unipd.it/"
90                }
91          },
92          "component":{
93                "identifier":"cmp-1"
94          }
95        }
96      }
97    ],
98    "configuration":{
99        "identifier":"cnf-1"
100   },
101   "concept":{
102       "identifier":"cnc-1",
103       "namespace":"http://ims.dei.unipd.it/"
104   }
105 }
106 }
107 }
```

7.14   Configuration Resource

Identifies the configuration of a component, a system or an application under evaluation.

7.14.1   API

Action	HTTP Method	URI
CREATE_CONFIGURATION	POST	/configuration
READ_CONFIGURATION	GET	/configuration/{id}
UPDATE_CONFIGURATION	PUT	/configuration/{id}
DELETE_CONFIGURATION	DELETE	/configuration/{id}
LIST_CONFIGURATIONS	GET	/configuration
LIST_CONFIGURATION_PROVENANCE_EVENTS	GET	/configuration/{id}/provenance

Action	HTTP Method	URI

Table 51: API for accessing the configuration resource.

where {id} is the unique identifier of the configuration.

The next two sections show an example of the representation of the results.

7.14.2 XML Representation

```xml
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct
3    xmlns:ims="http://ims.dei.unipd.it/"
4    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6    <ims:configuration
7      ims:identifier="c1"
8      ims:description="description of the configuration"
9      ims:created="2012-09-13T17:59:35.603+02:00"
10     ims:last-modified="2012-09-13T17:59:35.603+02:00">
11     <ims:parameters>
12       <ims:parameter>
13         <ims:concept
14           ims:identifier="parameterA"
15           ims:namespace="http://direct.dei.unipd.it/" />
16         <ims:value>value A</ims:value>
17       </ims:parameter>
18       <ims:parameter>
19         <ims:concept
20           ims:identifier="parameterB"
21           ims:namespace="http://direct.dei.unipd.it/" />
22         <ims:value>value B</ims:value>
23       </ims:parameter>
24       <ims:parameter>
25         <ims:concept
26           ims:identifier="parameterC"
27           ims:namespace="http://direct.dei.unipd.it/" />
28         <ims:value>value C</ims:value>
29       </ims:parameter>
30     </ims:parameters>
31   </ims:configuration>
32 </ims:direct>
```

7.14.3 JSON Representation

```json
1  {
2    "direct":{
3      "configuration":{
4        "identifier":"c1",
5        "created":"2012-09-13T17:59:35.603+02:00",
6        "last-modified":"2012-09-13T17:59:35.603+02:00",
7        "description":"description of the configuration",
8        "parameters":[
9          {
10           "parameter":{
11             "concept":{
12               "identifier":"parameterA",
```

```
13                              "namespace":"http://direct.dei.unipd.it/"
14                      },
15                      "value":"value A"
16                  }
17              },
18              {
19                  "parameter":{
20                      "concept":{
21                          "identifier":"parameterB",
22                          "namespace":"http://direct.dei.unipd.it/"
23                      },
24                      "value":"value B"
25                  }
26              },
27              {
28                  "parameter":{
29                      "concept":{
30                          "identifier":"parameterC",
31                          "namespace":"http://direct.dei.unipd.it/"
32                      },
33                      "value":"value C"
34                  }
35              }
36          ]
37      }
38  }
39 }
```

7.15   Contribution Resource

Refers to a paper (e.g., a conference paper, a working note, a technical report, a journal paper) which has been published or that is publicly available and that its related.

7.15.1   API

Action	HTTP Method	URI
CREATE_CONTRIBUTION	POST	/contribution
READ_CONTRIBUTION	GET	/contribution/{id}
UPDATE_CONTRIBUTION	PUT	/contribution/{id}
DELETE_CONTRIBUTION	DELETE	/contribution/{id}
LIST_CONTRIBUTIONS	GET	/contribution
LIST_CONTRIBUTION_PROVENANCE_EVENTS	GET	/contribution/{id}/ provenance
ADD_CONTRIBUTION_TO_CONTRIBUTION	POST	/contribution/{id}/ contribution/{id}
REMOVE_CONTRIBUTION_FROM_CONTRIBUTION	DELETE	/contribution/{id}/ contribution/{id}
LIST_CONTRIBUTIONS_FROM_CONTRIBUTION	GET	/contribution/{id}/ contribution

Action	HTTP Method	URI
ADD_AUTHOR_TO_CONTRIBUTION	POST	`/contribution/{id}/ user/{id};{ns}`
REMOVE_AUTHOR_FROM_CONTRIBUTION	DELETE	`/contribution/{id}/ user/{id};{ns}`
LIST_AUTHOR_FROM_CONTRIBUTION	GET	`/contribution/{id}/ user`
SHARE_CONTRIBUTION	GET, POST, PUT	`/contribution/{id}/ share/{sharer-id}; {sharer-ns}/ permission/ {access-permission}`
UNSHARE_CONTRIBUTION	DELETE	`/contribution/{id}/ share/{sharer-id}; {sharer-ns}`

Table 52: API for accessing the contribution resource.

where `{id}` is the unique identifier of the contribution.

The next two sections show an example of the representation of the results.

7.15.2 XML Representation

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct
3    xmlns:ims="http://ims.dei.unipd.it/"
4    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6    <ims:contribution
7      ims:identifier="ctb-1"
8      ims:created="2012-09-13T18:00:44.675+02:00"
9      ims:last-modified="2012-09-13T18:00:44.675+02:00"
10     ims:title="title of ctb 1"
11     ims:year="2012"
12     ims:media-type="application/xml"
13     ims:language="ita">
14     <ims:authors>
15       <ims:user
16         ims:identifier="u1"
17         ims:namespace="http://ims.dei.unipd.it/" />
18       <ims:user
19         ims:identifier="u2"
20         ims:namespace="http://ims.dei.unipd.it/" />
21       <ims:user
22         ims:identifier="u3"
23         ims:namespace="http://ims.dei.unipd.it/" />
24     </ims:authors>
25     <ims:links>
26       <ims:link>
27         <ims:metadata
```

```
28            ims:identifier="md-1"
29            ims:namespace="http://ims.dei.unipd.it/" />
30        <ims:relation>
31          <ims:concept
32            ims:identifier="isDescriptionOf"
33            ims:namespace="http://ims.dei.unipd.it/" />
34        </ims:relation>
35        <ims:contribution ims:identifier="ctb-1" />
36      </ims:link>
37      <ims:link>
38        <ims:metadata
39          ims:identifier="md-2"
40          ims:namespace="http://ims.dei.unipd.it/" />
41        <ims:relation>
42          <ims:concept
43            ims:identifier="isCopyrightOf"
44            ims:namespace="http://ims.dei.unipd.it/" />
45        </ims:relation>
46        <ims:contribution ims:identifier="ctb-1" />
47      </ims:link>
48      <ims:link>
49        <ims:metadata
50          ims:identifier="md-3"
51          ims:namespace="http://ims.dei.unipd.it/" />
52        <ims:relation>
53          <ims:concept
54            ims:identifier="isAdministrativeOf"
55            ims:namespace="http://ims.dei.unipd.it/" />
56        </ims:relation>
57        <ims:contribution ims:identifier="ctb-1" />
58      </ims:link>
59      <ims:link>
60        <ims:contribution ims:identifier="ctb-s1" />
61        <ims:relation>
62          <ims:concept
63            ims:identifier="INCLUDES"
64            ims:namespace="http://ims.dei.unipd.it/" />
65        </ims:relation>
66        <ims:contribution ims:identifier="ctb-1" />
67      </ims:link>
68      <ims:link>
69        <ims:contribution ims:identifier="ctb-s2" />
70        <ims:relation>
71          <ims:concept
72            ims:identifier="INCLUDES"
73            ims:namespace="http://ims.dei.unipd.it/" />
74        </ims:relation>
75        <ims:contribution ims:identifier="ctb-1" />
76      </ims:link>
77      <ims:link>
78        <ims:contribution ims:identifier="ctb-1" />
79        <ims:relation>
80          <ims:concept
81            ims:identifier="IS_INCLUDED_BY"
82            ims:namespace="http://ims.dei.unipd.it/" />
83        </ims:relation>
84        <ims:contribution ims:identifier="ctb-t1" />
85      </ims:link>
86      <ims:link>
87        <ims:contribution ims:identifier="ctb-1" />
```

```
 88          <ims:relation>
 89            <ims:concept
 90              ims:identifier="IS_INCLUDED_BY"
 91              ims:namespace="http://ims.dei.unipd.it/" />
 92          </ims:relation>
 93          <ims:contribution ims:identifier="ctb-t2" />
 94        </ims:link>
 95      </ims:links>
 96      <ims:content>
 97        <contribution_content>Flexible and Indepenedent Graphical
 98          Application </contribution_content>
 99      </ims:content>
100    </ims:contribution>
101 </ims:direct>
```

7.15.3 JSON Representation

```
  1 {
  2    "direct":{
  3       "contribution":{
  4          "identifier":"ctb-1",
  5          "created":"2012-09-13T18:00:44.675+02:00",
  6          "last-modified":"2012-09-13T18:00:44.675+02:00",
  7          "title":"title of ctb 1",
  8          "year":"2012",
  9          "authors":[
 10             {
 11                "user":{
 12                   "identifier":"u1",
 13                   "namespace":"http://ims.dei.unipd.it/"
 14                }
 15             },
 16             {
 17                "user":{
 18                   "identifier":"u2",
 19                   "namespace":"http://ims.dei.unipd.it/"
 20                }
 21             },
 22             {
 23                "user":{
 24                   "identifier":"u3",
 25                   "namespace":"http://ims.dei.unipd.it/"
 26                }
 27             }
 28          ],
 29          "media-type":"application/xml",
 30          "language":"ita",
 31          "content":{
 32             "content":"<contribution_content>Flexible and Indepenedent
 33                       Graphical Application </contribution_content>"
 34          },
 35          "links":[
 36             {
 37                "link":{
 38                   "metadata":{
 39                      "identifier":"md-1",
 40                      "namespace":"http://ims.dei.unipd.it/"
 41                   },
 42                   "relation":{
 43                      "concept":{
```

```
 44                             "identifier":"isDescriptionOf",
 45                             "namespace":"http://ims.dei.unipd.it/"
 46                         }
 47                     },
 48                     "contribution":{
 49                         "identifier":"ctb-1"
 50                     }
 51                 }
 52             },
 53             {
 54                 "link":{
 55                     "metadata":{
 56                         "identifier":"md-2",
 57                         "namespace":"http://ims.dei.unipd.it/"
 58                     },
 59                     "relation":{
 60                         "concept":{
 61                             "identifier":"isCopyrightOf",
 62                             "namespace":"http://ims.dei.unipd.it/"
 63                         }
 64                     },
 65                     "contribution":{
 66                         "identifier":"ctb-1"
 67                     }
 68                 }
 69             },
 70             {
 71                 "link":{
 72                     "metadata":{
 73                         "identifier":"md-3",
 74                         "namespace":"http://ims.dei.unipd.it/"
 75                     },
 76                     "relation":{
 77                         "concept":{
 78                             "identifier":"isAdministrativeOf",
 79                             "namespace":"http://ims.dei.unipd.it/"
 80                         }
 81                     },
 82                     "contribution":{
 83                         "identifier":"ctb-1"
 84                     }
 85                 }
 86             },
 87             {
 88                 "link":{
 89                     "contribution":{
 90                         "identifier":"ctb-s1"
 91                     },
 92                     "relation":{
 93                         "concept":{
 94                             "identifier":"INCLUDES",
 95                             "namespace":"http://ims.dei.unipd.it/"
 96                         }
 97                     },
 98                     "contribution":{
 99                         "identifier":"ctb-1"
100                     }
101                 }
102             },
103             {
```

```
104            "link":{
105                "contribution":{
106                    "identifier":"ctb-s2"
107                },
108                "relation":{
109                    "concept":{
110                        "identifier":"INCLUDES",
111                        "namespace":"http://ims.dei.unipd.it/"
112                    }
113                },
114                "contribution":{
115                    "identifier":"ctb-1"
116                }
117            }
118        },
119        {
120            "link":{
121                "contribution":{
122                    "identifier":"ctb-1"
123                },
124                "relation":{
125                    "concept":{
126                        "identifier":"IS_INCLUDED_BY",
127                        "namespace":"http://ims.dei.unipd.it/"
128                    }
129                },
130                "contribution":{
131                    "identifier":"ctb-t1"
132                }
133            }
134        },
135        {
136            "link":{
137                "contribution":{
138                    "identifier":"ctb-1"
139                },
140                "relation":{
141                    "concept":{
142                        "identifier":"IS_INCLUDED_BY",
143                        "namespace":"http://ims.dei.unipd.it/"
144                    }
145                },
146                "contribution":{
147                    "identifier":"ctb-t2"
148                }
149            }
150        }
151    ]
152    }
153 }
154 }
```

7.16   Corpus Resource

Represents a set of informative units, which allows us to perform a series of investigations in a research area.

7.16.1   API

Action	HTTP Method	URI
CREATE_CORPUS	POST	/corpus
READ_CORPUS	GET	/corpus/{id}
UPDATE_CORPUS	PUT	/corpus/{id}
DELETE_CORPUS	DELETE	/corpus/{id}
LIST_CORPORA	GET	/corpus
LIST_CORPUS_PROVENANCE_EVENTS	GET	/corpus/{id}/ provenance
ADD_INFORMATION_UNIT_TO_CORPUS	POST	/corpus/{id}/ information-unit/ {id}
REMOVE_INFORMATION_UNIT_FROM_CORPUS	DELETE	/corpus/{id}/ information-unit/ {id}
LIST_INFORMATION_UNIT_FROM_CORPUS	GET	/corpus/{id}/ information-unit
ADD_CONTRIBUTION_TO_CORPUS	POST	/corpus/{id}/ contribution/{id}
REMOVE_CONTRIBUTION_FROM_CORPUS	DELETE	/corpus/{id}/ contribution/{id}
LIST_CONTRIBUTION_FROM_CORPUS	GET	/corpus/{id}/ contribution
SHARE_CORPUS	GET, POST, PUT	/corpus/{id}/ share/{sharer-id}; {sharer-ns}/ permission/ {access-permission}
UNSHARE_CORPUS	DELETE	/corpus/{id}/ share/{sharer-id}; {sharer-ns}

Table 53: API for accessing the corpus resource.

where {id} is the unique identifier of the corpus.

The next two sections show an example of the representation of the results.

7.16.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
```

```
 6  <ims:corpus
 7    ims:identifier="c1"
 8    ims:description="Description of corpus, e.g. Wall Street Journal, 1987"
 9    ims:scope="SHARED"
10    ims:created="2012-09-13T18:02:04.035+02:00"
11    ims:last-modified="2012-09-13T18:02:04.035+02:00">
12    <ims:owner>
13      <ims:user
14        ims:identifier="user-1"
15        ims:namespace="http://ims.dei.unipd.it/" />
16    </ims:owner>
17    <ims:sharings>
18      <ims:sharing>
19        <ims:group
20          ims:identifier="group-1"
21          ims:namespace="http://ims.dei.unipd.it/" />
22        <ims:access-permission>DENIED</ims:access-permission>
23      </ims:sharing>
24      <ims:sharing>
25        <ims:group
26          ims:identifier="group-2"
27          ims:namespace="http://ims.dei.unipd.it/" />
28        <ims:access-permission>READ_ONLY</ims:access-permission>
29      </ims:sharing>
30      <ims:sharing>
31        <ims:group
32          ims:identifier="group-3"
33          ims:namespace="http://ims.dei.unipd.it/" />
34        <ims:access-permission>READ_WRITE</ims:access-permission>
35      </ims:sharing>
36    </ims:sharings>
37    <ims:links>
38      <ims:link>
39        <ims:metadata
40          ims:identifier="md-1"
41          ims:namespace="http://ims.dei.unipd.it/" />
42        <ims:relation>
43          <ims:concept
44            ims:identifier="isDescriptionOf"
45            ims:namespace="http://ims.dei.unipd.it/" />
46        </ims:relation>
47        <ims:corpus ims:identifier="c1" />
48      </ims:link>
49      <ims:link>
50        <ims:metadata
51          ims:identifier="md-2"
52          ims:namespace="http://ims.dei.unipd.it/" />
53        <ims:relation>
54          <ims:concept
55            ims:identifier="isCopyrightOf"
56            ims:namespace="http://ims.dei.unipd.it/" />
57        </ims:relation>
58        <ims:corpus ims:identifier="c1" />
59      </ims:link>
60      <ims:link>
61        <ims:metadata
62          ims:identifier="md-3"
63          ims:namespace="http://ims.dei.unipd.it/" />
64        <ims:relation>
65          <ims:concept
```

```
66              ims:identifier="isAdministrationOf"
67              ims:namespace="http://ims.dei.unipd.it/" />
68          </ims:relation>
69          <ims:corpus ims:identifier="c1" />
70        </ims:link>
71      </ims:links>
72      <ims:media-types>
73        <ims:media-type>application/atom+xml;charset=ISO-8859-1</ims:media-type>
74        <ims:media-type>application/json</ims:media-type>
75      </ims:media-types>
76      <ims:languages>
77        <ims:language>ita</ims:language>
78        <ims:language>eng</ims:language>
79        <ims:language>fra</ims:language>
80      </ims:languages>
81    </ims:corpus>
82 </ims:direct>
```

7.16.3   JSON Representation

```
1 {
2    "direct":{
3      "corpus":{
4        "identifier":"c1",
5        "description":"Description of corpus, e.g. Wall Street Journal, 1987",
6        "scope":"SHARED",
7        "created":"2012-09-13T18:02:04.035+02:00",
8        "last-modified":"2012-09-13T18:02:04.035+02:00",
9        "owner":{
10         "user":{
11           "identifier":"user-1",
12           "namespace":"http://ims.dei.unipd.it/"
13         }
14       },
15       "sharings":[
16         {
17           "sharing":{
18             "group":{
19               "identifier":"group-1",
20               "namespace":"http://ims.dei.unipd.it/"
21             },
22             "access-permission":"DENIED"
23           }
24         },
25         {
26           "sharing":{
27             "group":{
28               "identifier":"group-2",
29               "namespace":"http://ims.dei.unipd.it/"
30             },
31             "access-permission":"READ_ONLY"
32           }
33         },
34         {
35           "sharing":{
36             "group":{
37               "identifier":"group-3",
38               "namespace":"http://ims.dei.unipd.it/"
39             },
40             "access-permission":"READ_WRITE"
```

```
41                    }
42               }
43         ],
44         "links":[
45              {
46                   "link":{
47                        "metadata":{
48                             "identifier":"md-1",
49                             "namespace":"http://ims.dei.unipd.it/"
50                        },
51                        "relation":{
52                             "concept":{
53                                  "identifier":"isDescriptionOf",
54                                  "namespace":"http://ims.dei.unipd.it/"
55                             }
56                        },
57                        "corpus":{
58                             "identifier":"c1"
59                        }
60                   }
61              },
62              {
63                   "link":{
64                        "metadata":{
65                             "identifier":"md-2",
66                             "namespace":"http://ims.dei.unipd.it/"
67                        },
68                        "relation":{
69                             "concept":{
70                                  "identifier":"isCopyrightOf",
71                                  "namespace":"http://ims.dei.unipd.it/"
72                             }
73                        },
74                        "corpus":{
75                             "identifier":"c1"
76                        }
77                   }
78              },
79              {
80                   "link":{
81                        "metadata":{
82                             "identifier":"md-3",
83                             "namespace":"http://ims.dei.unipd.it/"
84                        },
85                        "relation":{
86                             "concept":{
87                                  "identifier":"isAdministrationOf",
88                                  "namespace":"http://ims.dei.unipd.it/"
89                             }
90                        },
91                        "corpus":{
92                             "identifier":"c1"
93                        }
94                   }
95              }
96         ],
97         "languages":[
98              {
99                   "language":"ita"
100              },
```

D3.3: Prototype of the Evaluation Infrastructure

```
101            {
102                "language":"eng"
103            },
104            {
105                "language":"fra"
106            }
107        ],
108        "media-types":[
109            {
110                "media-type":"application/atom+xml;charset=ISO-8859-1"
111            },
112            {
113                "media-type":"application/json"
114            }
115        ]
116    }
117  }
118 }
```

7.17   Estimate Resource

Represents the value of a Metric (which is represented by means of a Concept) calculated on some Experiment handled by the infrastructure.

7.17.1   API

Action	HTTP Method	URI
CREATE_ESTIMATE	POST	/estimate
READ_ESTIMATE	GET	/estimate/{id}
UPDATE_ESTIMATE	PUT	/estimate/{id}
DELETE_ESTIMATE	DELETE	/estimate/{id}
LIST_ESTIMATES	GET	/estimate
LIST_ESTIMATE_PROVENANCE_EVENTS	GET	/estimate/{id}/provenance

Table 54: API for accessing the estimate resource.

where {id} is the unique identifier of the estimate.
    The next two sections show an example of the representation of the results.

7.17.2   XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:estimate
7     ims:identifier="est-1"
8     ims:value="0.1"
9     ims:created="2012-09-13T18:04:32.133+02:00"
```

```
10      ims:last-modified="2012-09-13T18:04:32.133+02:00">
11      <ims:descriptive-statistic>
12        <ims:concept
13          ims:identifier="ds-1"
14          ims:namespace="http://ims.dei.unipd.it/" />
15      </ims:descriptive-statistic>
16      <ims:metric>
17        <ims:concept
18          ims:identifier="mtc-1"
19          ims:namespace="http://ims.dei.unipd.it/" />
20      </ims:metric>
21      <ims:run ims:identifier="run-1" />
22      <ims:task ims:identifier="tsk-1" />
23      <ims:topic ims:identifier="tpc-1" />
24    </ims:estimate>
25 </ims:direct>
```

7.17.3 JSON Representation

```
1 {
2    "direct":{
3       "estimate":{
4          "identifier":"est-1",
5          "created":"2012-09-13T18:04:32.133+02:00",
6          "last-modified":"2012-09-13T18:04:32.133+02:00",
7          "value":"0.1",
8          "descriptive-statistic":{
9             "concept":{
10               "identifier":"ds-1",
11               "namespace":"http://ims.dei.unipd.it/"
12            }
13         },
14         "metric":{
15            "concept":{
16               "identifier":"mtc-1",
17               "namespace":"http://ims.dei.unipd.it/"
18            }
19         },
20         "run":{
21            "identifier":"run-1"
22         },
23         "task":{
24            "identifier":"tsk-1"
25         },
26         "topic":{
27            "identifier":"tpc-1"
28         }
29      }
30   }
31 }
```

7.18 Evaluation Activity Resource

Represents any type of activity aiming at the evaluation of applications, systems, or methodologies for information access.

7.18.1 API

Action	HTTP Method	URI
CREATE_EVALUATION-ACTIVITY	POST	`/evaluation-activity`
READ_EVALUATION-ACTIVITY	GET	`/evaluation-activity/{id};{ns}`
UPDATE_EVALUATION-ACTIVITY	PUT	`/evaluation-activity/{id};{ns}`
DELETE_EVALUATION-ACTIVITY	DELETE	`/evaluation-activity/{id};{ns}`
LIST_EVALUATION-ACTIVITIES	GET	`/evaluation-activity`
LIST_EVALUATION-ACTIVITY_PROVENANCE_EVENTS	GET	`/evaluation-activity/{id};{ns}/provenance`
ADD_CONTRIBUTION_TO_EVALUATION_ACTIVITY	POST	`/evaluation-activity/{id};{ns}/contribution/{id}`
REMOVE_CONTRIBUTION_FROM_EVALUATION_ACTIVITY	DELETE	`/evaluation-activity/{id};{ns}/contribution/{id}`
LIST_CONTRIBUTION_FROM_EVALUATION_ACTIVITY	GET	`/evaluation-activity/{id};{ns}/contribution`
ADD_TASK_TO_EVALUATION_ACTIVITY	POST	`/evaluation-activity/{id};{ns}/task/{id}`
REMOVE_TASK_FROM_EVALUATION_ACTIVITY	DELETE	`/evaluation-activity/{id};{ns}/task/{id}`
LIST_TASK_FROM_EVALUATION_ACTIVITY	GET	`/evaluation-activity/{id};{ns}/task`
SHARE_EVALUATION_ACTIVITY	GET, POST, PUT	`/evaluation-activity/{id};{ns}/share/{sharer-id};{sharer-ns}/permission/{access-permission}`
UNSHARE_EVALUATION_ACTIVITY	DELETE	`/evaluation-activity/{id};{ns}/share/{sharer-id};{sharer-ns}`

Table 55: API for accessing the evaluation-activity resource.

where `{id}` is the unique identifier of the evaluation-activity and `{ns}` is the namespace to which the evaluation-activity belongs.

The next two sections show an example of the representation of the results.

7.18.2 XML Representation

```xml
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct
3    xmlns:ims="http://ims.dei.unipd.it/"
4    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6    <ims:evaluation-activity
7      ims:identifier="ea-1"
8      ims:namespace="http://ims.dei.unipd.it/"
9      ims:name="Name of evaluation activity 1"
10     ims:description="Description of evaluation activity, e.g. CLEF 2012"
11     ims:status="AVAILABLE"
12     ims:scope="SHARED"
13     ims:created="2012-09-13T18:12:34.954+02:00"
14     ims:last-modified="2012-09-13T18:12:34.954+02:00">
15     <ims:owner>
16       <ims:user
17         ims:identifier="user-1"
18         ims:namespace="http://ims.dei.unipd.it/" />
19     </ims:owner>
20     <ims:sharings>
21       <ims:sharing>
22         <ims:group
23           ims:identifier="group-1"
24           ims:namespace="http://ims.dei.unipd.it/" />
25         <ims:access-permission>DENIED</ims:access-permission>
26       </ims:sharing>
27       <ims:sharing>
28         <ims:group
29           ims:identifier="group-2"
30           ims:namespace="http://ims.dei.unipd.it/" />
31         <ims:access-permission>READ_ONLY</ims:access-permission>
32       </ims:sharing>
33       <ims:sharing>
34         <ims:group
35           ims:identifier="group-3"
36           ims:namespace="http://ims.dei.unipd.it/" />
37         <ims:access-permission>READ_WRITE</ims:access-permission>
38       </ims:sharing>
39     </ims:sharings>
40     <ims:links>
41       <ims:link>
42         <ims:metadata
43           ims:identifier="md-1"
44           ims:namespace="http://ims.dei.unipd.it/" />
45         <ims:relation>
46           <ims:concept
47             ims:identifier="isDescriptionOf"
48             ims:namespace="http://ims.dei.unipd.it/" />
49         </ims:relation>
50         <ims:evaluation-activity ims:identifier="ea-1" />
51       </ims:link>
52       <ims:link>
53         <ims:metadata
54           ims:identifier="md-2"
55           ims:namespace="http://ims.dei.unipd.it/" />
56         <ims:relation>
57           <ims:concept
58             ims:identifier="isCopyrightOf"
```

```
59                 ims:namespace="http://ims.dei.unipd.it/" />
60           </ims:relation>
61           <ims:evaluation-activity ims:identifier="ea-1" />
62       </ims:link>
63       <ims:link>
64         <ims:metadata
65           ims:identifier="md-3"
66           ims:namespace="http://ims.dei.unipd.it/" />
67         <ims:relation>
68           <ims:concept
69             ims:identifier="isAdministrationOf"
70             ims:namespace="http://ims.dei.unipd.it/" />
71         </ims:relation>
72         <ims:evaluation-activity ims:identifier="ea-1" />
73       </ims:link>
74     </ims:links>
75   </ims:evaluation-activity>
76 </ims:direct>
```

7.18.3   JSON Representation

```
1 {
2    "direct":{
3       "evaluation-activity":{
4          "identifier":"ea-1",
5          "namespace":"http://ims.dei.unipd.it/",
6          "name":"Name of evaluation activity 1",
7          "description":"Description of evaluation activity, e.g. CLEF 2012",
8          "status":"AVAILABLE",
9          "scope":"SHARED",
10         "created":"2012-09-13T18:12:34.954+02:00",
11         "last-modified":"2012-09-13T18:12:34.954+02:00",
12         "owner":{
13            "user":{
14               "identifier":"user-1",
15               "namespace":"http://ims.dei.unipd.it/"
16            }
17         },
18         "sharings":[
19            {
20               "sharing":{
21                  "group":{
22                     "identifier":"group-1",
23                     "namespace":"http://ims.dei.unipd.it/"
24                  },
25                  "access-permission":"DENIED"
26               }
27            },
28            {
29               "sharing":{
30                  "group":{
31                     "identifier":"group-2",
32                     "namespace":"http://ims.dei.unipd.it/"
33                  },
34                  "access-permission":"READ_ONLY"
35               }
36            },
37            {
38               "sharing":{
39                  "group":{
```

```
40              "identifier":"group-3",
41              "namespace":"http://ims.dei.unipd.it/"
42          },
43          "access-permission":"READ_WRITE"
44      }
45    }
46  ],
47  "links":[
48    {
49      "link":{
50        "metadata":{
51          "identifier":"md-1",
52          "namespace":"http://ims.dei.unipd.it/"
53        },
54        "relation":{
55          "concept":{
56            "identifier":"isDescriptionOf",
57            "namespace":"http://ims.dei.unipd.it/"
58          }
59        },
60        "evaluation-activity":{
61          "identifier":"ea-1"
62        }
63      }
64    },
65    {
66      "link":{
67        "metadata":{
68          "identifier":"md-2",
69          "namespace":"http://ims.dei.unipd.it/"
70        },
71        "relation":{
72          "concept":{
73            "identifier":"isCopyrightOf",
74            "namespace":"http://ims.dei.unipd.it/"
75          }
76        },
77        "evaluation-activity":{
78          "identifier":"ea-1"
79        }
80      }
81    },
82    {
83      "link":{
84        "metadata":{
85          "identifier":"md-3",
86          "namespace":"http://ims.dei.unipd.it/"
87        },
88        "relation":{
89          "concept":{
90            "identifier":"isAdministrationOf",
91            "namespace":"http://ims.dei.unipd.it/"
92          }
93        },
94        "evaluation-activity":{
95          "identifier":"ea-1"
96        }
97      }
98    }
99  ]
```

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```
100        }
101    }
102 }
```

7.19   Campaign Resource

Deals with the different aspects of an evaluation forum, such as the different campaigns and the different editions, the tracks along which the campaign is organized and the tasks in which each track is divided. A peculiar characteristic of a Campaign is to be a public and shared activity that may be undertaken by accademic, commercial ad governmental groups that are interested in the activity organized and structured by a third-party body. The concept of campaign derives from the traditional IR view of an evaluation activity on which basis the major international evaluation initiatives (e.g. TREC, CLEF and NTCIR) rely.

7.19.1   API

Action	HTTP Method	URI
CREATE_CAMPAIGN	POST	/campaign
READ_CAMPAIGN	GET	/campaign/{id};{ns}
UPDATE_CAMPAIGN	PUT	/campaign/{id};{ns}
DELETE_CAMPAIGN	DELETE	/campaign/{id};{ns}
LIST_CAMPAIGNS	GET	/campaign
LIST_CAMPAIGN_PROVENANCE_EVENTS	GET	/campaign/{id};{ns}/ provenance
ADD_CONTRIBUTION_TO_CAMPAIGN	POST	/campaign/{id};{ns}/ contribution/{id}
REMOVE_CONTRIBUTION_FROM_CAMPAIGN	DELETE	/campaign/{id};{ns}/ contribution/{id}
LIST_CONTRIBUTION_FROM_CAMPAIGN	GET	/campaign/{id};{ns}/ contribution
ADD_TASK_TO_CAMPAIGN	POST	/campaign/{id};{ns}/ task/{id}
REMOVE_TASK_FROM_CAMPAIGN	DELETE	/campaign/{id};{ns}/ task/{id}
LIST_TASK_FROM_CAMPAIGN	GET	/campaign/{id};{ns}/ task
ADD_TRACK_TO_CAMPAIGN	POST	/campaign/{id};{ns}/ track/{id}
REMOVE_TRACK_FROM_CAMPAIGN	DELETE	/campaign/{id};{ns}/ track/{id}
LIST_TRACK_FROM_CAMPAIGN	GET	/campaign/{id};{ns}/ track

Action	HTTP Method	URI
SHARE_TRACK	GET, POST, PUT	/track/{id};{ns}/ share/{sharer-id}; {sharer-ns}/ permission/ {access-permission}
UNSHARE_TRACK	DELETE	/track/{id};{ns}/ share/{sharer-id}; {sharer-ns}

Table 56: API for accessing the campaign resource.

where {id} is the unique identifier of the campaign and {ns} is the namespace to which the campaign belongs.

The next two sections show an example of the representation of the results.

7.19.2 XML Representation

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct
3    xmlns:ims="http://ims.dei.unipd.it/"
4    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6    <ims:campaign
7      ims:identifier="c-1"
8      ims:namespace="http://ims.dei.unipd.it/"
9      ims:name="Name of campaign 1"
10     ims:description="Description of campaign 1"
11     ims:status="AVAILABLE"
12     ims:scope="SHARED"
13     ims:created="2012-09-13T18:12:34.955+02:00"
14     ims:last-modified="2012-09-13T18:12:34.955+02:00">
15     <ims:owner>
16       <ims:user
17         ims:identifier="user-1"
18         ims:namespace="http://ims.dei.unipd.it/" />
19     </ims:owner>
20     <ims:sharings>
21       <ims:sharing>
22         <ims:group
23           ims:identifier="group-1"
24           ims:namespace="http://ims.dei.unipd.it/" />
25         <ims:access-permission>DENIED</ims:access-permission>
26       </ims:sharing>
27       <ims:sharing>
28         <ims:group
29           ims:identifier="group-2"
30           ims:namespace="http://ims.dei.unipd.it/" />
31         <ims:access-permission>READ_ONLY</ims:access-permission>
32       </ims:sharing>
33       <ims:sharing>
34         <ims:group
```

```
35              ims:identifier="group-3"
36              ims:namespace="http://ims.dei.unipd.it/" />
37            <ims:access-permission>READ_WRITE</ims:access-permission>
38          </ims:sharing>
39        </ims:sharings>
40        <ims:links>
41          <ims:link>
42            <ims:metadata
43              ims:identifier="md-1"
44              ims:namespace="http://ims.dei.unipd.it/" />
45            <ims:relation>
46              <ims:concept
47                ims:identifier="isDescriptionOf"
48                ims:namespace="http://ims.dei.unipd.it/" />
49            </ims:relation>
50            <ims:evaluation-activity ims:identifier="c-1" />
51          </ims:link>
52          <ims:link>
53            <ims:metadata
54              ims:identifier="md-2"
55              ims:namespace="http://ims.dei.unipd.it/" />
56            <ims:relation>
57              <ims:concept
58                ims:identifier="isCopyrightOf"
59                ims:namespace="http://ims.dei.unipd.it/" />
60            </ims:relation>
61            <ims:evaluation-activity ims:identifier="c-1" />
62          </ims:link>
63          <ims:link>
64            <ims:metadata
65              ims:identifier="md-3"
66              ims:namespace="http://ims.dei.unipd.it/" />
67            <ims:relation>
68              <ims:concept
69                ims:identifier="isAdministrationOf"
70                ims:namespace="http://ims.dei.unipd.it/" />
71            </ims:relation>
72            <ims:evaluation-activity ims:identifier="c-1" />
73          </ims:link>
74        </ims:links>
75      </ims:campaign>
76  </ims:direct>
```

7.19.3   JSON Representation

```
1  {
2    "direct":{
3      "campaign":{
4        "identifier":"c-1",
5        "namespace":"http://ims.dei.unipd.it/",
6        "name":"Name of campaign 1",
7        "description":"Description of campaign 1",
8        "status":"AVAILABLE",
9        "scope":"SHARED",
10       "created":"2012-09-13T18:12:34.955+02:00",
11       "last-modified":"2012-09-13T18:12:34.955+02:00",
12       "owner":{
13         "user":{
14           "identifier":"user-1",
15           "namespace":"http://ims.dei.unipd.it/"
```

```
 16                    }
 17            },
 18            "sharings":[
 19                {
 20                    "sharing":{
 21                        "group":{
 22                            "identifier":"group-1",
 23                            "namespace":"http://ims.dei.unipd.it/"
 24                        },
 25                        "access-permission":"DENIED"
 26                    }
 27                },
 28                {
 29                    "sharing":{
 30                        "group":{
 31                            "identifier":"group-2",
 32                            "namespace":"http://ims.dei.unipd.it/"
 33                        },
 34                        "access-permission":"READ_ONLY"
 35                    }
 36                },
 37                {
 38                    "sharing":{
 39                        "group":{
 40                            "identifier":"group-3",
 41                            "namespace":"http://ims.dei.unipd.it/"
 42                        },
 43                        "access-permission":"READ_WRITE"
 44                    }
 45                }
 46            ],
 47            "links":[
 48                {
 49                    "link":{
 50                        "metadata":{
 51                            "identifier":"md-1",
 52                            "namespace":"http://ims.dei.unipd.it/"
 53                        },
 54                        "relation":{
 55                            "concept":{
 56                                "identifier":"isDescriptionOf",
 57                                "namespace":"http://ims.dei.unipd.it/"
 58                            }
 59                        },
 60                        "evaluation-activity":{
 61                            "identifier":"c-1"
 62                        }
 63                    }
 64                },
 65                {
 66                    "link":{
 67                        "metadata":{
 68                            "identifier":"md-2",
 69                            "namespace":"http://ims.dei.unipd.it/"
 70                        },
 71                        "relation":{
 72                            "concept":{
 73                                "identifier":"isCopyrightOf",
 74                                "namespace":"http://ims.dei.unipd.it/"
 75                            }
```

```
 76                    },
 77                    "evaluation-activity":{
 78                        "identifier":"c-1"
 79                    }
 80                }
 81            },
 82            {
 83                "link":{
 84                    "metadata":{
 85                        "identifier":"md-3",
 86                        "namespace":"http://ims.dei.unipd.it/"
 87                    },
 88                    "relation":{
 89                        "concept":{
 90                            "identifier":"isAdministrationOf",
 91                            "namespace":"http://ims.dei.unipd.it/"
 92                        }
 93                    },
 94                    "evaluation-activity":{
 95                        "identifier":"c-1"
 96                    }
 97                }
 98            }
 99        ]
100    }
101  }
102 }
```

7.20 Education Resource

Represents an evaluation activity carried out for educational purposes.

7.20.1 API

Action	HTTP Method	URI
CREATE_EDUCATION	POST	/education
READ_EDUCATION	GET	/education/{id};{ns}
UPDATE_EDUCATION	PUT	/education/{id};{ns}
DELETE_EDUCATION	DELETE	/education/{id};{ns}
LIST_EDUCATIONS	GET	/education
LIST_EDUCATION_PROVENANCE_EVENTS	GET	/education/{id}; {ns}/provenance
ADD_CONTRIBUTION_TO_EDUCATION	POST	/education/{id}; {ns}/contribution/ {id}
REMOVE_CONTRIBUTION_FROM_EDUCATION	DELETE	/education/{id}; {ns}/contribution/ {id}
LIST_CONTRIBUTION_FROM_EDUCATION	GET	/education/{id}; {ns}/contribution

Action	HTTP Method	URI
ADD_TASK_TO_EDUCATION	POST	`/education/{id};` `{ns}/task/{id}`
REMOVE_TASK_FROM_EDUCATION	DELETE	`/education/{id};` `{ns}/task/{id}`
LIST_TASK_FROM_EDUCATION	GET	`/education/{id};` `{ns}/task`

SHARE_EDUCATION	GET,
	POST,
	PUT
		`/education/{id};`
		`{ns}/share/`
		`{sharer-id};`
		`{sharer-ns}/`
		`permission/`
		`{access-permission}`

UNSHARE_EDUCATION	DELETE	`/education/{id};`
		`{ns}/share/`
		`{sharer-id};`
		`{sharer-ns}`

Table 57: API for accessing the education resource.

where `{id}` is the unique identifier of the education and `{ns}` is the namespace to which the education belongs.

The next two sections show an example of the representation of the results.

7.20.2   XML Representation

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct
3    xmlns:ims="http://ims.dei.unipd.it/"
4    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6    <ims:education
7      ims:identifier="edu-1"
8      ims:namespace="http://ims.dei.unipd.it/"
9      ims:name="Name of education 1"
10     ims:description="Description of education 1"
11     ims:status="AVAILABLE"
12     ims:scope="SHARED"
13     ims:created="2012-09-13T18:12:34.955+02:00"
14     ims:last-modified="2012-09-13T18:12:34.955+02:00">
15     <ims:owner>
16       <ims:user
17         ims:identifier="user-1"
18         ims:namespace="http://ims.dei.unipd.it/" />
19     </ims:owner>
20     <ims:sharings>
21       <ims:sharing>
22         <ims:group
23           ims:identifier="group-1"
```

```
24              ims:namespace="http://ims.dei.unipd.it/" />
25            <ims:access-permission>DENIED</ims:access-permission>
26          </ims:sharing>
27          <ims:sharing>
28            <ims:group
29              ims:identifier="group-2"
30              ims:namespace="http://ims.dei.unipd.it/" />
31            <ims:access-permission>READ_ONLY</ims:access-permission>
32          </ims:sharing>
33          <ims:sharing>
34            <ims:group
35              ims:identifier="group-3"
36              ims:namespace="http://ims.dei.unipd.it/" />
37            <ims:access-permission>READ_WRITE</ims:access-permission>
38          </ims:sharing>
39        </ims:sharings>
40        <ims:links>
41          <ims:link>
42            <ims:metadata
43              ims:identifier="md-1"
44              ims:namespace="http://ims.dei.unipd.it/" />
45            <ims:relation>
46              <ims:concept
47                ims:identifier="isDescriptionOf"
48                ims:namespace="http://ims.dei.unipd.it/" />
49            </ims:relation>
50            <ims:evaluation-activity ims:identifier="edu-1" />
51          </ims:link>
52          <ims:link>
53            <ims:metadata
54              ims:identifier="md-2"
55              ims:namespace="http://ims.dei.unipd.it/" />
56            <ims:relation>
57              <ims:concept
58                ims:identifier="isCopyrightOf"
59                ims:namespace="http://ims.dei.unipd.it/" />
60            </ims:relation>
61            <ims:evaluation-activity ims:identifier="edu-1" />
62          </ims:link>
63          <ims:link>
64            <ims:metadata
65              ims:identifier="md-3"
66              ims:namespace="http://ims.dei.unipd.it/" />
67            <ims:relation>
68              <ims:concept
69                ims:identifier="isAdministrationOf"
70                ims:namespace="http://ims.dei.unipd.it/" />
71            </ims:relation>
72            <ims:evaluation-activity ims:identifier="edu-1" />
73          </ims:link>
74        </ims:links>
75      </ims:education>
76 </ims:direct>
```

7.20.3   JSON Representation

```
1 {
2    "direct":{
3       "education":{
4          "identifier":"edu-1",
```

```
 5         "namespace":"http://ims.dei.unipd.it/",
 6         "name":"Name of education 1",
 7         "description":"Description of education 1",
 8         "status":"AVAILABLE",
 9         "scope":"SHARED",
10         "created":"2012-09-13T18:12:34.955+02:00",
11         "last-modified":"2012-09-13T18:12:34.955+02:00",
12         "owner":{
13            "user":{
14               "identifier":"user-1",
15               "namespace":"http://ims.dei.unipd.it/"
16            }
17         },
18         "sharings":[
19            {
20               "sharing":{
21                  "group":{
22                     "identifier":"group-1",
23                     "namespace":"http://ims.dei.unipd.it/"
24                  },
25                  "access-permission":"DENIED"
26               }
27            },
28            {
29               "sharing":{
30                  "group":{
31                     "identifier":"group-2",
32                     "namespace":"http://ims.dei.unipd.it/"
33                  },
34                  "access-permission":"READ_ONLY"
35               }
36            },
37            {
38               "sharing":{
39                  "group":{
40                     "identifier":"group-3",
41                     "namespace":"http://ims.dei.unipd.it/"
42                  },
43                  "access-permission":"READ_WRITE"
44               }
45            }
46         ],
47         "links":[
48            {
49               "link":{
50                  "metadata":{
51                     "identifier":"md-1",
52                     "namespace":"http://ims.dei.unipd.it/"
53                  },
54                  "relation":{
55                     "concept":{
56                        "identifier":"isDescriptionOf",
57                        "namespace":"http://ims.dei.unipd.it/"
58                     }
59                  },
60                  "evaluation-activity":{
61                     "identifier":"edu-1"
62                  }
63               }
64            },
```

```
 65                    {
 66                        "link":{
 67                            "metadata":{
 68                                "identifier":"md-2",
 69                                "namespace":"http://ims.dei.unipd.it/"
 70                            },
 71                            "relation":{
 72                                "concept":{
 73                                    "identifier":"isCopyrightOf",
 74                                    "namespace":"http://ims.dei.unipd.it/"
 75                                }
 76                            },
 77                            "evaluation-activity":{
 78                                "identifier":"edu-1"
 79                            }
 80                        }
 81                    },
 82                    {
 83                        "link":{
 84                            "metadata":{
 85                                "identifier":"md-3",
 86                                "namespace":"http://ims.dei.unipd.it/"
 87                            },
 88                            "relation":{
 89                                "concept":{
 90                                    "identifier":"isAdministrationOf",
 91                                    "namespace":"http://ims.dei.unipd.it/"
 92                                }
 93                            },
 94                            "evaluation-activity":{
 95                                "identifier":"edu-1"
 96                            }
 97                        }
 98                    }
 99                ]
100            }
101        }
102 }
```

7.21   Trial Resource

Represents an evaluation activity that may be actively run by a research group, a person or a corporate body for their own interest.

7.21.1   API

Action	HTTP Method	URI
CREATE_TRIAL	POST	/trial
READ_TRIAL	GET	/trial/{id};{ns}
UPDATE_TRIAL	PUT	/trial/{id};{ns}
DELETE_TRIAL	DELETE	/trial/{id};{ns}
LIST_TRIALS	GET	/trial
LIST_TRIAL_PROVENANCE_EVENTS	GET	/trial/{id};{ns}/provenance

Action	HTTP Method	URI
ADD_CONTRIBUTION_TO_TRIAL	POST	/trial/{id};{ns}/ contribution/{id}
REMOVE_CONTRIBUTION_FROM_TRIAL	DELETE	/trial/{id};{ns}/ contribution/{id}
LIST_CONTRIBUTION_FROM_TRIAL	GET	/trial/{id};{ns}/ contribution
ADD_TASK_TO_TRIAL	POST	/trial/{id};{ns}/ task/{id}
REMOVE_TASK_FROM_TRIAL	DELETE	/trial/{id};{ns}/ task/{id}
LIST_TASK_FROM_TRIAL	GET	/trial/{id};{ns}/ task
SHARE_TRAIL	GET, POST, PUT	/trial/{id};{ns}/ share/{sharer-id}; {sharer-ns}/ permission/ {access-permission}
UNSHARE_TRIAL	DELETE	/trial/{id};{ns}/ share/{sharer-id}; {sharer-ns}

Table 58: API for accessing the trial resource.

where {id} is the unique identifier of the trial and {ns} is the namespace to which the trial belongs. The next two sections show an example of the representation of the results.

7.21.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:trial
7     ims:identifier="t-1"
8     ims:namespace="http://ims.dei.unipd.it/"
9     ims:name="Name of trial 1"
10    ims:description="Description of trial 1"
11    ims:status="AVAILABLE"
12    ims:scope="SHARED"
13    ims:created="2012-09-13T18:12:34.955+02:00"
14    ims:last-modified="2012-09-13T18:12:34.955+02:00">
15    <ims:owner>
16      <ims:user
17        ims:identifier="user-1"
18        ims:namespace="http://ims.dei.unipd.it/" />
```

```
19      </ims:owner>
20      <ims:sharings>
21        <ims:sharing>
22          <ims:group
23            ims:identifier="group-1"
24            ims:namespace="http://ims.dei.unipd.it/" />
25          <ims:access-permission>DENIED</ims:access-permission>
26        </ims:sharing>
27        <ims:sharing>
28          <ims:group
29            ims:identifier="group-2"
30            ims:namespace="http://ims.dei.unipd.it/" />
31          <ims:access-permission>READ_ONLY</ims:access-permission>
32        </ims:sharing>
33        <ims:sharing>
34          <ims:group
35            ims:identifier="group-3"
36            ims:namespace="http://ims.dei.unipd.it/" />
37          <ims:access-permission>READ_WRITE</ims:access-permission>
38        </ims:sharing>
39      </ims:sharings>
40      <ims:links>
41        <ims:link>
42          <ims:metadata
43            ims:identifier="md-1"
44            ims:namespace="http://ims.dei.unipd.it/" />
45          <ims:relation>
46            <ims:concept
47              ims:identifier="isDescriptionOf"
48              ims:namespace="http://ims.dei.unipd.it/" />
49          </ims:relation>
50          <ims:evaluation-activity ims:identifier="t-1" />
51        </ims:link>
52        <ims:link>
53          <ims:metadata
54            ims:identifier="md-2"
55            ims:namespace="http://ims.dei.unipd.it/" />
56          <ims:relation>
57            <ims:concept
58              ims:identifier="isCopyrightOf"
59              ims:namespace="http://ims.dei.unipd.it/" />
60          </ims:relation>
61          <ims:evaluation-activity ims:identifier="t-1" />
62        </ims:link>
63        <ims:link>
64          <ims:metadata
65            ims:identifier="md-3"
66            ims:namespace="http://ims.dei.unipd.it/" />
67          <ims:relation>
68            <ims:concept
69              ims:identifier="isAdministrationOf"
70              ims:namespace="http://ims.dei.unipd.it/" />
71          </ims:relation>
72          <ims:evaluation-activity ims:identifier="t-1" />
73        </ims:link>
74      </ims:links>
75    </ims:trial>
76 </ims:direct>
```

7.21.3 JSON Representation

```
1  {
2      "direct":{
3          "trial":{
4              "identifier":"t-1",
5              "namespace":"http://ims.dei.unipd.it/",
6              "name":"Name of trial 1",
7              "description":"Description of trial 1",
8              "status":"AVAILABLE",
9              "scope":"SHARED",
10             "created":"2012-09-13T18:12:34.955+02:00",
11             "last-modified":"2012-09-13T18:12:34.955+02:00",
12             "owner":{
13                 "user":{
14                     "identifier":"user-1",
15                     "namespace":"http://ims.dei.unipd.it/"
16                 }
17             },
18             "sharings":[
19                 {
20                     "sharing":{
21                         "group":{
22                             "identifier":"group-1",
23                             "namespace":"http://ims.dei.unipd.it/"
24                         },
25                         "access-permission":"DENIED"
26                     }
27                 },
28                 {
29                     "sharing":{
30                         "group":{
31                             "identifier":"group-2",
32                             "namespace":"http://ims.dei.unipd.it/"
33                         },
34                         "access-permission":"READ_ONLY"
35                     }
36                 },
37                 {
38                     "sharing":{
39                         "group":{
40                             "identifier":"group-3",
41                             "namespace":"http://ims.dei.unipd.it/"
42                         },
43                         "access-permission":"READ_WRITE"
44                     }
45                 }
46             ],
47             "links":[
48                 {
49                     "link":{
50                         "metadata":{
51                             "identifier":"md-1",
52                             "namespace":"http://ims.dei.unipd.it/"
53                         },
54                         "relation":{
55                             "concept":{
56                                 "identifier":"isDescriptionOf",
57                                 "namespace":"http://ims.dei.unipd.it/"
58                             }
```

```
 59                    },
 60                    "evaluation-activity":{
 61                         "identifier":"t-1"
 62                    }
 63                }
 64            },
 65            {
 66                "link":{
 67                    "metadata":{
 68                         "identifier":"md-2",
 69                         "namespace":"http://ims.dei.unipd.it/"
 70                    },
 71                    "relation":{
 72                         "concept":{
 73                             "identifier":"isCopyrightOf",
 74                             "namespace":"http://ims.dei.unipd.it/"
 75                         }
 76                    },
 77                    "evaluation-activity":{
 78                         "identifier":"t-1"
 79                    }
 80                }
 81            },
 82            {
 83                "link":{
 84                    "metadata":{
 85                         "identifier":"md-3",
 86                         "namespace":"http://ims.dei.unipd.it/"
 87                    },
 88                    "relation":{
 89                         "concept":{
 90                             "identifier":"isAdministrationOf",
 91                             "namespace":"http://ims.dei.unipd.it/"
 92                         }
 93                    },
 94                    "evaluation-activity":{
 95                         "identifier":"t-1"
 96                    }
 97                }
 98            }
 99        ]
100    }
101  }
102 }
```

7.22 Experimental Collection Resource

Represents a logical entity that allows us to set up a traditional IR evaluation environment.

7.22.1 API

Action	HTTP Method	URI
CREATE_EXPERIMENTAL_COLLECTION	POST	/experimental-collection
READ_EXPERIMENTAL_COLLECTION	GET	/experimental-collection/{id}
UPDATE_EXPERIMENTAL_COLLECTION	PUT	/experimental-collection/{id}

Action	HTTP Method	URI
DELETE_EXPERIMENTAL_COLLECTION	DELETE	`/experimental-collection/` `{id}`
LIST_EXPERIMENTAL_COLLECTIONS	GET	`/experimental-collection`
LIST_EXPERIMENTAL_COLLECTION_PROVENANCE_EVENTS	GET	`/experimental-collection/` `{id}/provenance`
ADD_CONTRIBUTION_TO_EXPERIMENTAL_COLLECTION	POST	`/experimental-collection/` `{id}/contribution/{id}`
REMOVE_CONTRIBUTION_FROM_EXPERIMENTAL_COLLECTION	DELETE	`/experimental-collection/` `{id}/contribution/{id}`
LIST_CONTRIBUTION_FROM_EXPERIMENTAL_COLLECTION	GET	`/experimental-collection/` `{id}/contribution`
ADD_CORPUS_TO_EXPERIMENTAL_COLLECTION	POST	`/experimental-collection/` `{id}/corpus/{id}`
REMOVE_CORPUS_FROM_EXPERIMENTAL_COLLECTION	DELETE	`/experimental-collection/` `{id}/corpus/{id}`
LIST_CORPUS_FROM_EXPERIMENTAL_COLLECTION	GET	`/experimental-collection/` `{id}/corpus`
ADD_TASK_TO_EXPERIMENTAL_COLLECTION	POST	`/experimental-collection/` `{id}/task/{id}`
REMOVE_TASK_FROM_EXPERIMENTAL_COLLECTION	DELETE	`/experimental-collection/` `{id}/task/{id}`
LIST_TASK_FROM_EXPERIMENTAL_COLLECTION	GET	`/experimental-collection/` `{id}/task`
ADD_TOPIC_GROUP_TO_EXPERIMENTAL_COLLECTION	POST	`/experimental-collection/` `{id}/topic-group/{id}`
REMOVE_TOPIC_GROUP_FROM_EXPERIMENTAL_COLLECTION	DELETE	`/experimental-collection/` `{id}/topic-group/{id}`
LIST_TOPIC_GROUP_FROM_EXPERIMANTAL_COLLECTION	GET	`/experimental-collection/` `{id}/topic-group`

SHARE_EXPERIMENTAL_COLLECTION	GET,
	POST,
	PUT
		`/experimental-collection/`
		`{id}/share/{sharer-id};`
		`{sharer-ns}/permission/`
		`{access-permission}`

UNSHARE_EXPERIMENTAL_COLLECTION	DELETE	`/experimental-collection/`
		`{id}/share/{sharer-id};`
		`{sharer-ns}`

Table 59: API for accessing the experimental-collection resource.

where `{id}` is the unique identifier of the experimental-collection.

The next two sections show an example of the representation of the results.

7.22.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
```

```
6    <ims:experimental-collection
7      ims:identifier="ec-1"
8      ims:description="description of experimental collection"
9      ims:scope="SHARED"
10     ims:created="2012-09-13T18:25:15.595+02:00"
11     ims:last-modified="2012-09-13T18:25:15.595+02:00">
12     <ims:owner>
13       <ims:user
14         ims:identifier="user-1"
15         ims:namespace="http://ims.dei.unipd.it/" />
16     </ims:owner>
17     <ims:sharings>
18       <ims:sharing>
19         <ims:group
20           ims:identifier="group-1"
21           ims:namespace="http://ims.dei.unipd.it/" />
22         <ims:access-permission>DENIED</ims:access-permission>
23       </ims:sharing>
24       <ims:sharing>
25         <ims:group
26           ims:identifier="group-2"
27           ims:namespace="http://ims.dei.unipd.it/" />
28         <ims:access-permission>READ_ONLY</ims:access-permission>
29       </ims:sharing>
30       <ims:sharing>
31         <ims:group
32           ims:identifier="group-3"
33           ims:namespace="http://ims.dei.unipd.it/" />
34         <ims:access-permission>READ_WRITE</ims:access-permission>
35       </ims:sharing>
36     </ims:sharings>
37     <ims:links>
38       <ims:link>
39         <ims:metadata
40           ims:identifier="md-1"
41           ims:namespace="http://ims.dei.unipd.it/" />
42         <ims:relation>
43           <ims:concept
44             ims:identifier="isDescriptionOf"
45             ims:namespace="http://ims.dei.unipd.it/" />
46         </ims:relation>
47         <ims:experimental-collection
48           ims:identifier="ec-1" />
49       </ims:link>
50       <ims:link>
51         <ims:metadata
52           ims:identifier="md-2"
53           ims:namespace="http://ims.dei.unipd.it/" />
54         <ims:relation>
55           <ims:concept
56             ims:identifier="isCopyrightOf"
57             ims:namespace="http://ims.dei.unipd.it/" />
58         </ims:relation>
59         <ims:experimental-collection
60           ims:identifier="ec-1" />
61       </ims:link>
62       <ims:link>
63         <ims:metadata
64           ims:identifier="md-3"
65           ims:namespace="http://ims.dei.unipd.it/" />
```

```
66          <ims:relation>
67            <ims:concept
68              ims:identifier="isAdministrationOf"
69              ims:namespace="http://ims.dei.unipd.it/" />
70          </ims:relation>
71          <ims:experimental-collection
72            ims:identifier="ec-1" />
73        </ims:link>
74      </ims:links>
75      <ims:topic-group ims:identifier="tg1" />
76      <ims:corpora>
77        <ims:corpus ims:identifier="c1" />
78        <ims:corpus ims:identifier="c2" />
79        <ims:corpus ims:identifier="c3" />
80        <ims:corpus ims:identifier="c4" />
81      </ims:corpora>
82      <ims:ground-truth ims:identifier="gt1" />
83    </ims:experimental-collection>
84 </ims:direct>
```

7.22.3   JSON Representation

```
1  {
2    "direct":{
3      "experimental-collection":{
4        "identifier":"ec-1",
5        "description":"description of experimental collection",
6        "scope":"SHARED",
7        "created":"2012-09-13T18:25:15.595+02:00",
8        "last-modified":"2012-09-13T18:25:15.595+02:00",
9        "owner":{
10          "user":{
11            "identifier":"user-1",
12            "namespace":"http://ims.dei.unipd.it/"
13          }
14        },
15        "sharings":[
16          {
17            "sharing":{
18              "group":{
19                "identifier":"group-1",
20                "namespace":"http://ims.dei.unipd.it/"
21              },
22              "access-permission":"DENIED"
23            }
24          },
25          {
26            "sharing":{
27              "group":{
28                "identifier":"group-2",
29                "namespace":"http://ims.dei.unipd.it/"
30              },
31              "access-permission":"READ_ONLY"
32            }
33          },
34          {
35            "sharing":{
36              "group":{
37                "identifier":"group-3",
38                "namespace":"http://ims.dei.unipd.it/"
```

```
39                    },
40                    "access-permission":"READ_WRITE"
41                }
42            }
43        ],
44        "links":[
45            {
46                "link":{
47                    "metadata":{
48                        "identifier":"md-1",
49                        "namespace":"http://ims.dei.unipd.it/"
50                    },
51                    "relation":{
52                        "concept":{
53                            "identifier":"isDescriptionOf",
54                            "namespace":"http://ims.dei.unipd.it/"
55                        }
56                    },
57                    "experimental-collection":{
58                        "identifier":"ec-1"
59                    }
60                }
61            },
62            {
63                "link":{
64                    "metadata":{
65                        "identifier":"md-2",
66                        "namespace":"http://ims.dei.unipd.it/"
67                    },
68                    "relation":{
69                        "concept":{
70                            "identifier":"isCopyrightOf",
71                            "namespace":"http://ims.dei.unipd.it/"
72                        }
73                    },
74                    "experimental-collection":{
75                        "identifier":"ec-1"
76                    }
77                }
78            },
79            {
80                "link":{
81                    "metadata":{
82                        "identifier":"md-3",
83                        "namespace":"http://ims.dei.unipd.it/"
84                    },
85                    "relation":{
86                        "concept":{
87                            "identifier":"isAdministrationOf",
88                            "namespace":"http://ims.dei.unipd.it/"
89                        }
90                    },
91                    "experimental-collection":{
92                        "identifier":"ec-1"
93                    }
94                }
95            }
96        ],
97        "topic-group":{
98            "identifier":"tg1"
```

```
 99                 },
100         "corpora":[
101             {
102                 "corpus":{
103                     "identifier":"c1"
104                 }
105             },
106             {
107                 "corpus":{
108                     "identifier":"c2"
109                 }
110             },
111             {
112                 "corpus":{
113                     "identifier":"c3"
114                 }
115             },
116             {
117                 "corpus":{
118                     "identifier":"c4"
119                 }
120             }
121         ],
122         "ground-truth":{
123             "identifier":"gt1"
124         }
125     }
126   }
127 }
```

7.23   Experiment Resource

Represents a part of the data produced by a system under evaluation.

7.23.1   API

Action	HTTP Method	URI
CREATE_EXPERIMENT	POST	/experiment
READ_EXPERIMENT	GET	/experiment/{id}
UPDATE_EXPERIMENT	PUT	/experiment/{id}
DELETE_EXPERIMENT	DELETE	/experiment/{id}
LIST_EXPERIMENTS	GET	/experiment
LIST_EXPERIMENT_PROVENANCE_EVENTS	GET	/experiment/{id}/ provenance
ADD_CONFIGURATION_TO_EXPERIMENT	POST	/experiment/{id}/ configuration/{id}
REMOVE_CONFIGURATION_FROM_EXPERIMENT	DELETE	/experiment/{id}/ configuration
READ_CONFIGURATION_FROM_EXPERIMENT	GET	/experiment/{id}/ configuration

Action	HTTP Method	URI
ADD_CONTRIBUTION_TO_EXPERIMENT	POST	`/experiment/{id}/contribution/{id}`
REMOVE_CONTRIBUTION_FROM_EXPERIMENT	DELETE	`/experiment/{id}/contribution/{id}`
LIST_CONTRIBUTION_FROM_EXPERIMENT	GET	`/experiment/{id}/contribution`
ADD_EXPERIMENT_ITEM_TO_EXPERIMENT	POST	`/experiment/{id}/experiment-item/{id}`
REMOVE_EXPERIMENT_ITEM_FROM_EXPERIMENT	DELETE	`/experiment/{id}/experiment-item/{id}`
LIST_EXPERIMENT_ITEM_FROM_EXPERIMENT	GET	`/experiment/{id}/experiment-item`
ADD_MEASURE_TO_EXPERIMENT	POST	`/experiment/{id}/measure/{id}`
REMOVE_MEASURE_FROM_EXPERIMENT	DELETE	`/experiment/{id}/measure/{id}`
LIST_MEASURE_FROM_EXPERIMENT	GET	`/experiment/{id}/measure`
ADD_STATISTICAL_TEST_TO_EXPERIMENT	POST	`/experiment/{id}/statistical-test/{id}`
REMOVE_STATISTICAL_TEST_FROM_EXPERIMENT	DELETE	`/experiment/{id}/statistical-test/{id}`
LIST_STATISTICAL_TEST_FROM_EXPERIMENT	GET	`/experiment/{id}/statistical-test`
SHARE_EXPERIMENT	GET, POST, PUT	`/experiment/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}`
UNSHARE_EXPERIMENT	DELETE	`/experiment/{id}/share/{sharer-id};{sharer-ns}`

Table 60: API for accessing the experiment resource.

where `{id}` is the unique identifier of the experiment.

The next two sections show an example of the representation of the results.

7.23.2 XML Representation

```xml
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct
3    xmlns:ims="http://ims.dei.unipd.it/"
4    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6    <ims:experiment
7      ims:identifier="exp-1"
8      ims:description="Description of experiment, e.g. experiment submitted to TREC7"
9      ims:scope="SHARED"
10     ims:created="2012-09-13T18:27:29.748+02:00"
11     ims:last-modified="2012-09-13T18:27:29.748+02:00">
12     <ims:owner>
13       <ims:user
14         ims:identifier="user-1"
15         ims:namespace="http://ims.dei.unipd.it/" />
16     </ims:owner>
17     <ims:sharings>
18       <ims:sharing>
19         <ims:group
20           ims:identifier="group-1"
21           ims:namespace="http://ims.dei.unipd.it/" />
22         <ims:access-permission>DENIED</ims:access-permission>
23       </ims:sharing>
24       <ims:sharing>
25         <ims:group
26           ims:identifier="group-2"
27           ims:namespace="http://ims.dei.unipd.it/" />
28         <ims:access-permission>READ_ONLY</ims:access-permission>
29       </ims:sharing>
30       <ims:sharing>
31         <ims:group
32           ims:identifier="group-3"
33           ims:namespace="http://ims.dei.unipd.it/" />
34         <ims:access-permission>READ_WRITE</ims:access-permission>
35       </ims:sharing>
36     </ims:sharings>
37     <ims:links>
38       <ims:link>
39         <ims:metadata
40           ims:identifier="md-1"
41           ims:namespace="http://ims.dei.unipd.it/" />
42         <ims:relation>
43           <ims:concept
44             ims:identifier="isDescriptionOf"
45             ims:namespace="http://ims.dei.unipd.it/" />
46         </ims:relation>
47         <ims:experiment ims:identifier="exp-1" />
48       </ims:link>
49       <ims:link>
50         <ims:metadata
51           ims:identifier="md-2"
52           ims:namespace="http://ims.dei.unipd.it/" />
53         <ims:relation>
54           <ims:concept
55             ims:identifier="isCopyrightOf"
56             ims:namespace="http://ims.dei.unipd.it/" />
57         </ims:relation>
58         <ims:experiment ims:identifier="exp-1" />
```

```
59      </ims:link>
60      <ims:link>
61        <ims:metadata
62          ims:identifier="md-3"
63          ims:namespace="http://ims.dei.unipd.it/" />
64        <ims:relation>
65          <ims:concept
66            ims:identifier="isAdministrationOf"
67            ims:namespace="http://ims.dei.unipd.it/" />
68        </ims:relation>
69        <ims:experiment ims:identifier="exp-1" />
70      </ims:link>
71    </ims:links>
72    <ims:task ims:identifier="task-1" />
73    <ims:configuration ims:identifier="configuration-1" />
74   </ims:experiment>
75 </ims:direct>
```

7.23.3   JSON Representation

```
1 {
2    "direct":{
3       "experiment":{
4          "identifier":"exp-1",
5          "description":"Description of experiment, e.g. experiment submitted to TREC7",
6          "scope":"SHARED",
7          "created":"2012-09-13T18:27:29.748+02:00",
8          "last-modified":"2012-09-13T18:27:29.748+02:00",
9          "owner":{
10             "user":{
11                "identifier":"user-1",
12                "namespace":"http://ims.dei.unipd.it/"
13             }
14          },
15          "sharings":[
16             {
17                "sharing":{
18                   "group":{
19                      "identifier":"group-1",
20                      "namespace":"http://ims.dei.unipd.it/"
21                   },
22                   "access-permission":"DENIED"
23                }
24             },
25             {
26                "sharing":{
27                   "group":{
28                      "identifier":"group-2",
29                      "namespace":"http://ims.dei.unipd.it/"
30                   },
31                   "access-permission":"READ_ONLY"
32                }
33             },
34             {
35                "sharing":{
36                   "group":{
37                      "identifier":"group-3",
38                      "namespace":"http://ims.dei.unipd.it/"
39                   },
40                   "access-permission":"READ_WRITE"
```

```json
41                      }
42                  }
43              ],
44              "links":[
45                  {
46                      "link":{
47                          "metadata":{
48                              "identifier":"md-1",
49                              "namespace":"http://ims.dei.unipd.it/"
50                          },
51                          "relation":{
52                              "concept":{
53                                  "identifier":"isDescriptionOf",
54                                  "namespace":"http://ims.dei.unipd.it/"
55                              }
56                          },
57                          "experiment":{
58                              "identifier":"exp-1"
59                          }
60                      }
61                  },
62                  {
63                      "link":{
64                          "metadata":{
65                              "identifier":"md-2",
66                              "namespace":"http://ims.dei.unipd.it/"
67                          },
68                          "relation":{
69                              "concept":{
70                                  "identifier":"isCopyrightOf",
71                                  "namespace":"http://ims.dei.unipd.it/"
72                              }
73                          },
74                          "experiment":{
75                              "identifier":"exp-1"
76                          }
77                      }
78                  },
79                  {
80                      "link":{
81                          "metadata":{
82                              "identifier":"md-3",
83                              "namespace":"http://ims.dei.unipd.it/"
84                          },
85                          "relation":{
86                              "concept":{
87                                  "identifier":"isAdministrationOf",
88                                  "namespace":"http://ims.dei.unipd.it/"
89                              }
90                          },
91                          "experiment":{
92                              "identifier":"exp-1"
93                          }
94                      }
95                  }
96              ],
97              "task":{
98                  "identifier":"task-1"
99              },
100             "configuration":{
```

```
101              "identifier":"configuration -1"
102          }
103       }
104    }
105 }
```

7.24 Experiment Item Resource

Represents an item of an Experiment, that is a retrieved information unit for a given Topic.

7.24.1 API

Action	HTTP Method	URI
CREATE_EXPERIMENT-ITEM	POST	/experiment-item
READ_EXPERIMENT-ITEM	GET	/experiment-item/{id}
UPDATE_EXPERIMENT-ITEM	PUT	/experiment-item/{id}
DELETE_EXPERIMENT-ITEM	DELETE	/experiment-item/{id}
LIST_EXPERIMENT-ITEMS	GET	/experiment-item
LIST_EXPERIMENT-ITEM_PROVENANCE_EVENTS	GET	/experiment-item/{id}/provenance

Table 61: API for accessing the experiment-item resource.

where {id} is the unique identifier of the experiment-item.

The next two sections show an example of the representation of the results.

7.24.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:experiment-item ims:identifier="ei-1">
7     <ims:experiment ims:identifier="exp-1" />
8   </ims:experiment-item>
9 </ims:direct>
```

7.24.3 JSON Representation

```
1 {
2   "direct":{
3     "experiment-item":{
4       "identifier":"ei-1",
5       "experiment":{
```

```
6              "identifier":"exp-1"
7          }
8      }
9   }
10 }
```

7.25   Ground Truth Resource

Represents a container of assessments obtained through the pooling technique.

7.25.1   API

Action	HTTP Method	URI
CREATE_GROUND-TRUTH	POST	/ground-truth
READ_GROUND-TRUTH	GET	/ground-truth/{id}
UPDATE_GROUND-TRUTH	PUT	/ground-truth/{id}
DELETE_GROUND-TRUTH	DELETE	/ground-truth/{id}
LIST_GROUND-TRUTHS	GET	/ground-truth
LIST_GROUND-TRUTH_PROVENANCE_EVENTS	GET	/ground-truth/{id}/provenance
ADD_CONTRIBUTION_TO_GROUND-TRUTH	POST	/ground-truth/{id}/contribution/{id}
REMOVE_CONTRIBUTION_FROM_GROUND-TRUTH	DELETE	/ground-truth/{id}/contribution/{id}
LIST_CONTRIBUTION_FROM_GROUND_TRUTH	GET	/ground-truth/{id}/contribution
ADD_GROUND_TRUTH_ITEM_TO_GROUND_TRUTH	POST	/ground-truth/{id}/ /ground-truth-item/{id}
REMOVE_GROUND_TRUTH_ITEM_FROM_GROUND_TRUTH	DELETE	/ground-truth/{id}/ground-truth-item/{id}
LIST_GROUND_TRUTH_ITEM_FROM_GROUND_TRUTH	GET	/ground-truth/{id}/ground-truth-item
ADD_STATISTICAL_TEST_TO_GROUND-TRUTH	POST	/ground-truth/{id}/statistical-test/{id}
REMOVE_STATISTICAL_TEST_FROM_GROUND-TRUTH	DELETE	/ground-truth/{id}/statistical-test/{id}
LIST_STATISTICAL_TEST_FROM_GROUND_TRUTH	GET	/ground-truth/{id}/statistical-test

Action	HTTP Method	URI
SHARE_GROUND_TRUTH	GET, POST, PUT	`/ground-truth/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}`
UNSHARE_GROUND_TRUTH	DELETE	`/ground-truth/{id}/share/{sharer-id};{sharer-ns}`

Table 62: API for accessing the ground-truth resource.

where `{id}` is the unique identifier of the ground-truth.

The next two sections show an example of the representation of the results.

7.25.2 XML Representation

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ims:direct
  xmlns:ims="http://ims.dei.unipd.it/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
  <ims:ground-truth
    ims:identifier="gt1"
    ims:description="Description of ground truth"
    ims:scope="SHARED"
    ims:created="2012-09-13T18:30:01.195+02:00"
    ims:last-modified="2012-09-13T18:30:01.196+02:00">
    <ims:owner>
      <ims:user
        ims:identifier="user-1"
        ims:namespace="http://ims.dei.unipd.it/" />
    </ims:owner>
    <ims:sharings>
      <ims:sharing>
        <ims:group
          ims:identifier="group-1"
          ims:namespace="http://ims.dei.unipd.it/" />
        <ims:access-permission>DENIED</ims:access-permission>
      </ims:sharing>
      <ims:sharing>
        <ims:group
          ims:identifier="group-2"
          ims:namespace="http://ims.dei.unipd.it/" />
        <ims:access-permission>READ_ONLY</ims:access-permission>
      </ims:sharing>
      <ims:sharing>
        <ims:group
          ims:identifier="group-3"
          ims:namespace="http://ims.dei.unipd.it/" />
        <ims:access-permission>READ_WRITE</ims:access-permission>
      </ims:sharing>
    </ims:sharings>
```

```
37      <ims:links>
38        <ims:link>
39          <ims:metadata
40            ims:identifier="md-1"
41            ims:namespace="http://ims.dei.unipd.it/" />
42          <ims:relation>
43            <ims:concept
44              ims:identifier="isDescriptionOf"
45              ims:namespace="http://ims.dei.unipd.it/" />
46          </ims:relation>
47          <ims:ground-truth ims:identifier="gt1" />
48        </ims:link>
49        <ims:link>
50          <ims:metadata
51            ims:identifier="md-2"
52            ims:namespace="http://ims.dei.unipd.it/" />
53          <ims:relation>
54            <ims:concept
55              ims:identifier="isCopyrightOf"
56              ims:namespace="http://ims.dei.unipd.it/" />
57          </ims:relation>
58          <ims:ground-truth ims:identifier="gt1" />
59        </ims:link>
60        <ims:link>
61          <ims:metadata
62            ims:identifier="md-3"
63            ims:namespace="http://ims.dei.unipd.it/" />
64          <ims:relation>
65            <ims:concept
66              ims:identifier="isAdministrationOf"
67              ims:namespace="http://ims.dei.unipd.it/" />
68          </ims:relation>
69          <ims:ground-truth ims:identifier="gt1" />
70        </ims:link>
71      </ims:links>
72    </ims:ground-truth>
73 </ims:direct>
```

7.25.3   JSON Representation

```
1 {
2    "direct":{
3      "ground-truth":{
4        "identifier":"gt1",
5        "description":"Description of ground truth",
6        "scope":"SHARED",
7        "created":"2012-09-13T18:30:01.195+02:00",
8        "last-modified":"2012-09-13T18:30:01.196+02:00",
9        "owner":{
10         "user":{
11           "identifier":"user-1",
12           "namespace":"http://ims.dei.unipd.it/"
13         }
14       },
15       "sharings":[
16         {
17           "sharing":{
18             "group":{
19               "identifier":"group-1",
20               "namespace":"http://ims.dei.unipd.it/"
```

```
21                    },
22                    "access-permission":"DENIED"
23                }
24            },
25            {
26                "sharing":{
27                    "group":{
28                        "identifier":"group-2",
29                        "namespace":"http://ims.dei.unipd.it/"
30                    },
31                    "access-permission":"READ_ONLY"
32                }
33            },
34            {
35                "sharing":{
36                    "group":{
37                        "identifier":"group-3",
38                        "namespace":"http://ims.dei.unipd.it/"
39                    },
40                    "access-permission":"READ_WRITE"
41                }
42            }
43        ],
44        "links":[
45            {
46                "link":{
47                    "metadata":{
48                        "identifier":"md-1",
49                        "namespace":"http://ims.dei.unipd.it/"
50                    },
51                    "relation":{
52                        "concept":{
53                            "identifier":"isDescriptionOf",
54                            "namespace":"http://ims.dei.unipd.it/"
55                        }
56                    },
57                    "ground-truth":{
58                        "identifier":"gt1"
59                    }
60                }
61            },
62            {
63                "link":{
64                    "metadata":{
65                        "identifier":"md-2",
66                        "namespace":"http://ims.dei.unipd.it/"
67                    },
68                    "relation":{
69                        "concept":{
70                            "identifier":"isCopyrightOf",
71                            "namespace":"http://ims.dei.unipd.it/"
72                        }
73                    },
74                    "ground-truth":{
75                        "identifier":"gt1"
76                    }
77                }
78            },
79            {
80                "link":{
```

```
81                    "metadata":{
82                        "identifier":"md-3",
83                        "namespace":"http://ims.dei.unipd.it/"
84                    },
85                    "relation":{
86                        "concept":{
87                            "identifier":"isAdministrationOf",
88                            "namespace":"http://ims.dei.unipd.it/"
89                        }
90                    },
91                    "ground-truth":{
92                        "identifier":"gt1"
93                    }
94                }
95            }
96        ]
97    }
98 }
99 }
```

7.26 Ground Truth Item Resource

Represents an item of a GroundTruth.

7.26.1 API

Action	HTTP Method	URI
CREATE_GROUND_TRUTH_ITEM	POST	/ground-truth-item
READ_GROUND_TRUTH_ITEM	GET	/ground-truth-item/{id}
UPDATE_GROUND_TRUTH_ITEM	PUT	/ground-truth-item/{id}
DELETE_GROUND_TRUTH_ITEM	DELETE	/ground-truth-item/{id}
LIST_GROUND_TRUTH_ITEMS	GET	/ground-truth-item
LIST_GROUND_TRUTH_ITEM_PROVENANCE_EVENTS	GET	/ground-truth-item/{id}/provenance

Table 63: API for accessing the ground-truth-item resource.

where {id} is the unique identifier of the ground-truth-item.

The next two sections show an example of the representation of the results.

7.26.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```
 5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
 6 <ims:ground-truth-item
 7    ims:identifier="gti1"
 8    ims:created="2012-09-13T18:28:51.811+02:00"
 9    ims:last-modified="2012-09-13T18:28:51.811+02:00">
10    <ims:ground-truth ims:identifier="gt1" />
11    <ims:user
12      ims:identifier="user-1"
13      ims:namespace="http://ims.dei.unipd.it/" />
14    <ims:concept
15      ims:identifier="assessment1"
16      ims:namespace="http://ims.dei.unipd.it/" />
17  </ims:ground-truth-item>
18 </ims:direct>
```

7.26.3   JSON Representation

```
 1 {
 2    "direct":{
 3      "ground-truth-item":{
 4        "identifier":"gti1",
 5        "created":"2012-09-13T18:28:51.811+02:00",
 6        "last-modified":"2012-09-13T18:28:51.811+02:00",
 7        "ground-truth":{
 8          "identifier":"gt1"
 9        },
10        "user":{
11          "identifier":"user-1",
12          "namespace":"http://ims.dei.unipd.it/"
13        },
14        "concept":{
15          "identifier":"assessment1",
16          "namespace":"http://ims.dei.unipd.it/"
17        }
18      }
19    }
20 }
```

7.27   Guerrilla Resource

The Guerrilla Resource is defined in Section 9 at page 256 as a use case to show how the DIRECT system handles innovative experiment types.

7.28   Information Unit Resource

Represents the object on which the evaluated system acts; e.g., the object which is retrieved by the system under evaluation.

7.28.1   API

Action	HTTP Method	URI
CREATE_INFORMATION_UNIT	POST	`/information-unit`

Action	HTTP Method	URI
READ_INFORMATION_UNIT	GET	/information-unit/{id}
UPDATE_INFORMATION_UNIT	PUT	/information-unit/{id}
DELETE_INFORMATION_UNIT	DELETE	/information-unit/{id}
LIST_INFORMATION_UNITS	GET	/information-unit
LIST_INFORMATION_UNIT_PROVENANCE_EVENTS	GET	/information-unit/{id}/provenance

Table 64: API for accessing the information-unit resource.

where `{id}` is the unique identifier of the information-unit.

The next two sections show an example of the representation of the results.

7.28.2 XML Representation

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct
3    xmlns:ims="http://ims.dei.unipd.it/"
4    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6    <ims:information-unit
7      ims:identifier="iu1"
8      ims:created="2012-09-13T18:31:22.810+02:00"
9      ims:last-modified="2012-09-13T18:31:22.810+02:00"
10     ims:media-type="application/xml"
11     ims:language="ita"
12     ims:uri="http://www.uri1.com/">
13     <ims:corpus ims:identifier="c1" />
14     <ims:content>
15       <DOC>
16         <DOCNO>FT911-3</DOCNO>
17         <PROFILE>AN-BEOA7AAIFT</PROFILE>
18         <DATE>910514</DATE>
19         <HEADLINE>FT 14 MAY 91 - International Company News: Contigas
20           plans DM900m east German project</HEADLINE>
21       </DOC>
22     </ims:content>
23   </ims:information-unit>
24 </ims:direct>
```

7.28.3 JSON Representation

```
1  {
2    "direct":{
3      "information-unit":{
4        "identifier":"iu1",
5        "created":"2012-09-13T18:31:22.810+02:00",
6        "last-modified":"2012-09-13T18:31:22.810+02:00",
7        "media-type":"application/xml",
```

```
8          "language":"ita",
9          "uri":"http://www.uri1.com/",
10         "corpus":{
11            "identifier":"c1"
12         },
13         "content":{
14            "content":"<DOC><DOCNO>FT911-3</DOCNO>
15            <PROFILE>AN-BEOA7AAIFT</PROFILE>
16            <DATE>910514</DATE>
17            <HEADLINE>FT 14 MAY 91 - International Company News: Contigas
18                     plans DM900m east German project</HEADLINE>
19                     </DOC>"
20         }
21      }
22   }
23 }
```

7.29 Measure Resource

Represents the value of a Metric (which is represented by means of a Concept) calculated on some Experiment handled by the infrastructure.

7.29.1 API

Action	HTTP Method	URI
CREATE_MEASURE	POST	/measure
READ_MEASURE	GET	/measure/{id}
UPDATE_MEASURE	PUT	/measure/{id}
DELETE_MEASURE	DELETE	/measure/{id}
LIST_MEASURE	GET	/measure
LIST_MEASURE_PROVENANCE_EVENTS	GET	/measure/{id}/provenance

Table 65: API for accessing the measure resource.

where {id} is the unique identifier of the measure.

The next two sections show an example of the representation of the results.

7.29.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:measure
7     ims:identifier="m-1"
8     ims:created="2012-09-13T18:32:37.874+02:00"
9     ims:last-modified="2012-09-13T18:32:37.874+02:00">
10    <ims:concept
11       ims:identifier="mtc-1"
```

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```
12          ims:namespace="http://ims.dei.unipd.it/" />
13      <ims:value>0.1</ims:value>
14      <ims:experiment ims:identifier="exp-1" />
15      <ims:topic ims:identifier="tpc-1" />
16    </ims:measure>
17 </ims:direct>
```

7.29.3   JSON Representation

```
1 {
2    "direct":{
3       "measure":{
4          "identifier":"m-1",
5          "created":"2012-09-13T18:32:37.874+02:00",
6          "last-modified":"2012-09-13T18:32:37.874+02:00",
7          "value":"0.1",
8          "concept":{
9             "identifier":"mtc-1",
10            "namespace":"http://ims.dei.unipd.it/"
11         },
12         "experiment":{
13            "identifier":"exp-1"
14         },
15         "topic":{
16            "identifier":"tpc-1"
17         }
18      }
19   }
20 }
```

7.30   Pool Resource

Represents a container of assessments obtained through the pooling technique.

7.30.1   API

Action	HTTP Method	URI
CREATE_POOL	POST	/pool
READ_POOL	GET	/pool/{id}
UPDATE_POOL	PUT	/pool/{id}
DELETE_POOL	DELETE	/pool/{id}
LIST_POOLS	GET	/pool
LIST_POOL_PROVENANCE_EVENTS	GET	/pool/{id}/provenance
ADD_POOL_ITEM_TO_POOL	POST	/pool/{id}/pool-item/{id}
REMOVE_POOL_ITEM_FROM_POOL	DELETE	/pool/{id}/pool-item/{id}
LIST_POOL_ITEM_FROM_POOL	GET	/pool{id}/pool-item
ADD_RUN_TO_POOL	POST	/pool/{id}/run/{id}

Action	HTTP Method	URI
REMOVE_RUN_FROM_POOL	DELETE	`/pool/{id}/run/{id}`
LIST_RUN_FROM_POOL	GET	`/pool/{id}/run`
SHARE_POOL	GET, POST, PUT	`/pool/{id}/share/ {sharer-id}; {sharer-ns}/ permission/ {access-permission}`
UNSHARE_POOL	DELETE	`/pool/{id}/share/ {sharer-id}; {sharer-ns}`

Table 66: API for accessing the pool resource.

where `{id}` is the unique identifier of the pool.

The next two sections show an example of the representation of the results.

7.30.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:pool
7     ims:identifier="gt1"
8     ims:description="Description of pool 1"
9     ims:scope="SHARED"
10    ims:created="2012-09-13T18:35:28.262+02:00"
11    ims:last-modified="2012-09-13T18:35:28.262+02:00">
12    <ims:owner>
13      <ims:user
14        ims:identifier="user-1"
15        ims:namespace="http://ims.dei.unipd.it/" />
16    </ims:owner>
17    <ims:sharings>
18      <ims:sharing>
19        <ims:group
20          ims:identifier="group-1"
21          ims:namespace="http://ims.dei.unipd.it/" />
22        <ims:access-permission>DENIED</ims:access-permission>
23      </ims:sharing>
24      <ims:sharing>
25        <ims:group
26          ims:identifier="group-2"
27          ims:namespace="http://ims.dei.unipd.it/" />
28        <ims:access-permission>READ_ONLY</ims:access-permission>
29      </ims:sharing>
30      <ims:sharing>
31        <ims:group
32          ims:identifier="group-3"
33          ims:namespace="http://ims.dei.unipd.it/" />
```

```
34            <ims:access-permission>READ_WRITE</ims:access-permission>
35          </ims:sharing>
36        </ims:sharings>
37      <ims:links>
38        <ims:link>
39          <ims:metadata
40            ims:identifier="md-1"
41            ims:namespace="http://ims.dei.unipd.it/" />
42          <ims:relation>
43            <ims:concept
44              ims:identifier="isDescriptionOf"
45              ims:namespace="http://ims.dei.unipd.it/" />
46          </ims:relation>
47          <ims:pool ims:identifier="gt1" />
48        </ims:link>
49        <ims:link>
50          <ims:metadata
51            ims:identifier="md-2"
52            ims:namespace="http://ims.dei.unipd.it/" />
53          <ims:relation>
54            <ims:concept
55              ims:identifier="isCopyrightOf"
56              ims:namespace="http://ims.dei.unipd.it/" />
57          </ims:relation>
58          <ims:pool ims:identifier="gt1" />
59        </ims:link>
60        <ims:link>
61          <ims:metadata
62            ims:identifier="md-3"
63            ims:namespace="http://ims.dei.unipd.it/" />
64          <ims:relation>
65            <ims:concept
66              ims:identifier="isAdministrationOf"
67              ims:namespace="http://ims.dei.unipd.it/" />
68          </ims:relation>
69          <ims:pool ims:identifier="gt1" />
70        </ims:link>
71      </ims:links>
72    </ims:pool>
73 </ims:direct>
```

7.30.3   JSON Representation

```
1 {
2    "direct":{
3      "pool":{
4        "identifier":"gt1",
5        "description":"Description of pool 1",
6        "scope":"SHARED",
7        "created":"2012-09-13T18:35:28.262+02:00",
8        "last-modified":"2012-09-13T18:35:28.262+02:00",
9        "owner":{
10          "user":{
11            "identifier":"user-1",
12            "namespace":"http://ims.dei.unipd.it/"
13          }
14        },
15        "sharings":[
16          {
17            "sharing":{
```

```
18                         "group":{
19                             "identifier":"group-1",
20                             "namespace":"http://ims.dei.unipd.it/"
21                         },
22                         "access-permission":"DENIED"
23                     }
24                 },
25                 {
26                     "sharing":{
27                         "group":{
28                             "identifier":"group-2",
29                             "namespace":"http://ims.dei.unipd.it/"
30                         },
31                         "access-permission":"READ_ONLY"
32                     }
33                 },
34                 {
35                     "sharing":{
36                         "group":{
37                             "identifier":"group-3",
38                             "namespace":"http://ims.dei.unipd.it/"
39                         },
40                         "access-permission":"READ_WRITE"
41                     }
42                 }
43             ],
44             "links":[
45                 {
46                     "link":{
47                         "metadata":{
48                             "identifier":"md-1",
49                             "namespace":"http://ims.dei.unipd.it/"
50                         },
51                         "relation":{
52                             "concept":{
53                                 "identifier":"isDescriptionOf",
54                                 "namespace":"http://ims.dei.unipd.it/"
55                             }
56                         },
57                         "pool":{
58                             "identifier":"gt1"
59                         }
60                     }
61                 },
62                 {
63                     "link":{
64                         "metadata":{
65                             "identifier":"md-2",
66                             "namespace":"http://ims.dei.unipd.it/"
67                         },
68                         "relation":{
69                             "concept":{
70                                 "identifier":"isCopyrightOf",
71                                 "namespace":"http://ims.dei.unipd.it/"
72                             }
73                         },
74                         "pool":{
75                             "identifier":"gt1"
76                         }
77                     }
```

```
78              },
79              {
80          "link":{
81              "metadata":{
82                  "identifier":"md-3",
83                  "namespace":"http://ims.dei.unipd.it/"
84              },
85              "relation":{
86                  "concept":{
87                      "identifier":"isAdministrationOf",
88                      "namespace":"http://ims.dei.unipd.it/"
89                  }
90              },
91              "pool":{
92                  "identifier":"gt1"
93              }
94          }
95          }
96      ]
97      }
98  }
99 }
```

7.31   Pool Item Resource

Represents a relevance judgement provided on an Information Unit in the Ground Truth in the context of a given Topic.

7.31.1   API

Action	HTTP Method	URI
CREATE_POOL-ITEM	POST	/pool-item
READ_POOL-ITEM	GET	/pool-item/{id}
UPDATE_POOL-ITEM	PUT	/pool-item/{id}
DELETE_POOL-ITEM	DELETE	/pool-item/{id}
LIST_POOL-ITEMS	GET	/pool-item
LIST_POOL-ITEM_PROVENANCE_EVENTS	GET	/pool-item/{id}/ provenance

Table 67: API for accessing the pool-item resource.

where {id} is the unique identifier of the pool-item.

The next two sections show an example of the representation of the results.

7.31.2   XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:pool-item
7     ims:identifier="pi1"
8     ims:created="2012-09-13T18:33:41.787+02:00"
9     ims:last-modified="2012-09-13T18:33:41.787+02:00">
10    <ims:pool ims:identifier="gt1" />
11    <ims:user
12      ims:identifier="user-1"
13      ims:namespace="http://ims.dei.unipd.it/" />
14    <ims:concept
15      ims:identifier="assessment1"
16      ims:namespace="http://ims.dei.unipd.it/" />
17    <ims:topic ims:identifier="t1" />
18    <ims:information-unit ims:identifier="iu1" />
19  </ims:pool-item>
20 </ims:direct>
```

7.31.3   JSON Representation

```
1  {
2    "direct":{
3      "pool-item":{
4        "identifier":"pi1",
5        "created":"2012-09-13T18:33:41.787+02:00",
6        "last-modified":"2012-09-13T18:33:41.787+02:00",
7        "pool":{
8          "identifier":"gt1"
9        },
10       "user":{
11         "identifier":"user-1",
12         "namespace":"http://ims.dei.unipd.it/"
13       },
14       "concept":{
15         "identifier":"assessment1",
16         "namespace":"http://ims.dei.unipd.it/"
17       },
18       "topic":{
19         "identifier":"t1"
20       },
21       "information-unit":{
22         "identifier":"iu1"
23       }
24     }
25   }
26 }
```

7.32   Run Resource

Represents a part of the data produced by a system under evaluation.

7.32.1   API

Action	HTTP Method	URI
CREATE_RUN	POST	/run
READ_RUN	GET	/run/{id}

Action	HTTP Method	URI
UPDATE_RUN	PUT	/run/{id}
DELETE_RUN	DELETE	/run/{id}
LIST_RUNS	GET	/run
LIST_RUN_PROVENANCE_EVENTS	GET	/run/{id}/provenance
ADD_ESTIMATE_TO_RUN	POST	/run/{id}/estimate/ {id}
REMOVE_ESTIMATE_FROM_RUN	DELETE	/run/{id}/estimate/ {id}
LIST_ESTIMATE_FROM_RUN	GET	/run/{id}/estimate
ADD_RUN_ITEM_TO_RUN	POST	/run/{id}/run-item/ {id}
REMOVE_RUN_ITEM_FROM_RUN	DELETE	/run/{id}/run-item/ {id}
LIST_RUN_ITEM_FROM_RUN	GET	/run/{id}/run-item
SHARE_RUN	GET, POST, PUT	/run/{id}/share/ {sharer-id}; {sharer-ns}/ permission/ {access-permission}
UNSHARE_RUN	DELETE	/run/{id}/share/ {sharer-id}; {sharer-ns}

Table 68: API for accessing the run resource.

where {id} is the unique identifier of the run.

The next two sections show an example of the representation of the results.

7.32.2 XML Representation

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct
3    xmlns:ims="http://ims.dei.unipd.it/"
4    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6    <ims:run
7      ims:identifier="r-1"
8      ims:description="Description of Run, e.g. att98atdc"
9      ims:query-construction="Query Constrution, e.g. title filtered run-0.282"
10     ims:scope="SHARED"
11     ims:created="2012-09-13T18:38:00.653+02:00"
12     ims:last-modified="2012-09-13T18:38:00.653+02:00">
13     <ims:owner>
14       <ims:user
15         ims:identifier="user-1"
```

```
16            ims:namespace="http://ims.dei.unipd.it/" />
17      </ims:owner>
18      <ims:sharings>
19        <ims:sharing>
20          <ims:group
21            ims:identifier="group-1"
22            ims:namespace="http://ims.dei.unipd.it/" />
23          <ims:access-permission>DENIED</ims:access-permission>
24        </ims:sharing>
25        <ims:sharing>
26          <ims:group
27            ims:identifier="group-2"
28            ims:namespace="http://ims.dei.unipd.it/" />
29          <ims:access-permission>READ_ONLY</ims:access-permission>
30        </ims:sharing>
31        <ims:sharing>
32          <ims:group
33            ims:identifier="group-3"
34            ims:namespace="http://ims.dei.unipd.it/" />
35          <ims:access-permission>READ_WRITE</ims:access-permission>
36        </ims:sharing>
37      </ims:sharings>
38      <ims:links>
39        <ims:link>
40          <ims:metadata
41            ims:identifier="md-1"
42            ims:namespace="http://ims.dei.unipd.it/" />
43          <ims:relation>
44            <ims:concept
45              ims:identifier="isDescriptionOf"
46              ims:namespace="http://ims.dei.unipd.it/" />
47          </ims:relation>
48          <ims:run ims:identifier="r-1" />
49        </ims:link>
50        <ims:link>
51          <ims:metadata
52            ims:identifier="md-2"
53            ims:namespace="http://ims.dei.unipd.it/" />
54          <ims:relation>
55            <ims:concept
56              ims:identifier="isCopyrightOf"
57              ims:namespace="http://ims.dei.unipd.it/" />
58          </ims:relation>
59          <ims:run ims:identifier="r-1" />
60        </ims:link>
61        <ims:link>
62          <ims:metadata
63            ims:identifier="md-3"
64            ims:namespace="http://ims.dei.unipd.it/" />
65          <ims:relation>
66            <ims:concept
67              ims:identifier="isAdministrationOf"
68              ims:namespace="http://ims.dei.unipd.it/" />
69          </ims:relation>
70          <ims:run ims:identifier="r-1" />
71        </ims:link>
72      </ims:links>
73      <ims:task ims:identifier="tsk-1" />
74      <ims:configuration ims:identifier="cnf-1" />
75      <ims:topic-fields>
```

```
76        <ims:concept
77           ims:identifier="isFieldOf"
78           ims:namespace="http://ims.dei.unipd.it/" />
79        <ims:concept
80           ims:identifier="isFieldOf2"
81           ims:namespace="http://ims.dei.unipd.it/" />
82     </ims:topic-fields>
83     <ims:system ims:identifier="sys-1" />
84   </ims:run>
85 </ims:direct>
```

7.32.3   JSON Representation

```
1  {
2     "direct":{
3        "run":{
4           "identifier":"r-1",
5           "description":"Description of Run, e.g. att98atdc",
6           "query-construction":"Query Constrution, e.g. title filtered run-0.282",
7           "scope":"SHARED",
8           "created":"2012-09-13T18:38:00.653+02:00",
9           "last-modified":"2012-09-13T18:38:00.653+02:00",
10          "owner":{
11             "user":{
12                "identifier":"user-1",
13                "namespace":"http://ims.dei.unipd.it/"
14             }
15          },
16          "sharings":[
17             {
18                "sharing":{
19                   "group":{
20                      "identifier":"group-1",
21                      "namespace":"http://ims.dei.unipd.it/"
22                   },
23                   "access-permission":"DENIED"
24                }
25             },
26             {
27                "sharing":{
28                   "group":{
29                      "identifier":"group-2",
30                      "namespace":"http://ims.dei.unipd.it/"
31                   },
32                   "access-permission":"READ_ONLY"
33                }
34             },
35             {
36                "sharing":{
37                   "group":{
38                      "identifier":"group-3",
39                      "namespace":"http://ims.dei.unipd.it/"
40                   },
41                   "access-permission":"READ_WRITE"
42                }
43             }
44          ],
45          "links":[
46             {
47                "link":{
```

```
 48                         "metadata":{
 49                             "identifier":"md-1",
 50                             "namespace":"http://ims.dei.unipd.it/"
 51                         },
 52                         "relation":{
 53                             "concept":{
 54                                 "identifier":"isDescriptionOf",
 55                                 "namespace":"http://ims.dei.unipd.it/"
 56                             }
 57                         },
 58                         "run":{
 59                             "identifier":"r-1"
 60                         }
 61                     }
 62                 },
 63                 {
 64                     "link":{
 65                         "metadata":{
 66                             "identifier":"md-2",
 67                             "namespace":"http://ims.dei.unipd.it/"
 68                         },
 69                         "relation":{
 70                             "concept":{
 71                                 "identifier":"isCopyrightOf",
 72                                 "namespace":"http://ims.dei.unipd.it/"
 73                             }
 74                         },
 75                         "run":{
 76                             "identifier":"r-1"
 77                         }
 78                     }
 79                 },
 80                 {
 81                     "link":{
 82                         "metadata":{
 83                             "identifier":"md-3",
 84                             "namespace":"http://ims.dei.unipd.it/"
 85                         },
 86                         "relation":{
 87                             "concept":{
 88                                 "identifier":"isAdministrationOf",
 89                                 "namespace":"http://ims.dei.unipd.it/"
 90                             }
 91                         },
 92                         "run":{
 93                             "identifier":"r-1"
 94                         }
 95                     }
 96                 }
 97             ],
 98             "task":{
 99                 "identifier":"tsk-1"
100             },
101             "configuration":{
102                 "identifier":"cnf-1"
103             },
104             "system":{
105                 "identifier":"sys-1"
106             },
107             "topic-fields":[
```

```
108            {
109                "concept":{
110                    "identifier":"isFieldOf",
111                    "namespace":"http://ims.dei.unipd.it/"
112                }
113            },
114            {
115                "concept":{
116                    "identifier":"isFieldOf2",
117                    "namespace":"http://ims.dei.unipd.it/"
118                }
119            }
120        ]
121    }
122  }
123 }
```

7.33 Run Item Resource

Represents an item of an Experiment of type Run, that is a retrieved information unit for a given Topic.

7.33.1 API

Action	HTTP Method	URI
CREATE_RUN_ITEM	POST	/run-item
READ_RUN_ITEM	GET	/run-item/{id}
UPDATE_RUN_ITEM	PUT	/run-item/{id}
DELETE_RUN_ITEM	DELETE	/run-item/{id}
LIST_RUN_ITEMS	GET	/run-item
LIST_RUN_ITEM_PROVENANCE_EVENTS	GET	/run-item/{id}/ provenance

Table 69: API for accessing the run-item resource.

where {id} is the unique identifier of the run-item.
The next two sections show an example of the representation of the results.

7.33.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:run-item
7     ims:identifier="ri1"
8     ims:rank="4"
9     ims:score="5.4" >
10    <ims:run ims:identifier="run-1" />
```

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D3.3: Prototype of the Evaluation Infrastructure

Network of Excellence co-funded by the 7th Framework Programme of the European Commission, grant agreement n. 258191

7.33.3 JSON Representation

```
1 {
2    "direct":{
3        "run-item":{
4            "identifier":"ri1",
5            "rank":"4",
6            "score":"5.4",
7            "run":{
8                "identifier":"run-1"
9            },
10            "topic":{
11                "identifier":"tpc-1"
12            },
13            "information-unit":{
14                "identifier":"iu-1"
15            }
16        }
17    }
18 }
```

7.34 Snapshot Resource

Stores the snapshot of a visualization.

7.34.1 API

Action	HTTP Method	URI
CREATE_SNAPSHOT	POST	`/snapshot`
READ_SNAPSHOT	GET	`/snapshot/{id}`
UPDATE_SNAPSHOT	PUT	`/snapshot/{id}`
DELETE_SNAPSHOT	DELETE	`/snapshot/{id}`
LIST_SNAPSHOTS	GET	`/snapshot`
LIST_SNAPSHOT_PROVENANCE_EVENTS	GET	`/snapshot/{id}/provenance`
SHARE_SNAPSHOT	GET, POST, PUT	`/snapshot/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}`
UNSHARE_SNAPSHOT	DELETE	`/snapshot/{id}/share/{sharer-id};{sharer-ns}`

Table 70: API for accessing the snapshot resource.

where {id} is the unique identifier of the snapshot.

The next two sections show an example of the representation of the results.

The next two sections show an example of the representation of the results.

7.34.2   XML Representation

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct
3    xmlns:ims="http://ims.dei.unipd.it/"
4    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6    <ims:snapshot
7      ims:identifier="sn-1"
8      ims:created="2012-09-13T18:39:07.632+02:00"
9      ims:last-modified="2012-09-13T18:39:07.632+02:00"
10     ims:media-type="application/x-gzip"
11     ims:language="aze">
12     <ims:content ims:content-transfer-encoding="base64">PGNvbnRlbnQ+c25hcHNob3QgaW1hZ2U8L2NvbnRlbnRQ+
13     </ims:content>
14     <ims:visualization ims:identifier="v-1" />
15   </ims:snapshot>
16 </ims:direct>
```

7.34.3   JSON Representation

```
1  {
2    "direct":{
3      "snapshot":{
4        "identifier":"sn-1",
5        "created":"2012-09-13T18:39:07.632+02:00",
6        "last-modified":"2012-09-13T18:39:07.632+02:00",
7        "media-type":"application/x-gzip",
8        "language":"aze",
9        "content":{
10          "content-transfer-encoding":"base64",
11          "content":"PGNvbnRlbnQ+c25hcHNob3QgaW1hZ2U8L2NvbnRlbnRQ+"
12        },
13        "visualization":{
14          "identifier":"v-1"
15        }
16      }
17    }
18 }
```

7.35   Statistical Test Resource

Represents mechanism for making quantitative decisions about a process or processes.

7.35.1   API

Action	HTTP Method	URI
CREATE_STATISTICAL_TEST	POST	`/statistical-test`

Action	HTTP Method	URI
READ_STATISTICAL_TEST	GET	/statistical-test/{id}
UPDATE_STATISTICAL_TEST	PUT	/statistical-test/{id}
DELETE_STATISTICAL_TEST	DELETE	/statistical-test/{id}
LIST_STATISTICAL_TESTS	GET	/statistical-test
LIST_STATISTICAL_TEST_PROVENANCE_EVENTS	GET	/statistical-test/{id}/provenance
SHARE_STATISTICAL_TEST	GET, POST, PUT	/statistical-test/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}
UNSHARE_STATISTICAL_TEST	DELETE	/statistical-test/{id}/share/{sharer-id};{sharer-ns}

Table 71: API for accessing the statistical-test resource.

where {id} is the unique identifier of the statistical-test.

The next two sections show an example of the representation of the results.

7.35.2 XML Representation

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct
3    xmlns:ims="http://ims.dei.unipd.it/"
4    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6    <ims:statistical-test
7      ims:identifier="st-1"
8      ims:created="2012-09-13T18:43:54.399+02:00"
9      ims:last-modified="2012-09-13T18:43:54.399+02:00"
10     ims:scope="SHARED">
11     <ims:owner>
12       <ims:user
13         ims:identifier="user-1"
14         ims:namespace="http://ims.dei.unipd.it/" />
15     </ims:owner>
16     <ims:sharings>
17       <ims:sharing>
18         <ims:group
19           ims:identifier="group-1"
20           ims:namespace="http://ims.dei.unipd.it/" />
```

```
21          <ims:access-permission>DENIED</ims:access-permission>
22        </ims:sharing>
23        <ims:sharing>
24          <ims:group
25            ims:identifier="group-2"
26            ims:namespace="http://ims.dei.unipd.it/" />
27          <ims:access-permission>READ_ONLY</ims:access-permission>
28        </ims:sharing>
29        <ims:sharing>
30          <ims:group
31            ims:identifier="group-3"
32            ims:namespace="http://ims.dei.unipd.it/" />
33          <ims:access-permission>READ_WRITE</ims:access-permission>
34        </ims:sharing>
35      </ims:sharings>
36      <ims:parameters>
37        <ims:parameter>
38          <ims:concept
39            ims:identifier="parameterA"
40            ims:namespace="http://direct.dei.unipd.it/" />
41          <ims:value>value 1</ims:value>
42        </ims:parameter>
43        <ims:parameter>
44          <ims:concept
45            ims:identifier="parameterB"
46            ims:namespace="http://direct.dei.unipd.it/" />
47          <ims:value>value 2</ims:value>
48        </ims:parameter>
49        <ims:parameter>
50          <ims:concept
51            ims:identifier="parameterC"
52            ims:namespace="http://direct.dei.unipd.it/" />
53          <ims:value>value 3</ims:value>
54        </ims:parameter>
55      </ims:parameters>
56      <ims:concept
57        ims:identifier="test type, e.g. t-test"
58        ims:namespace="http://ims.dei.unipd.it/" />
59      <ims:metrics>
60        <ims:concept
61          ims:identifier="Mean average precision"
62          ims:namespace="http://ims.dei.unipd.it/" />
63        <ims:concept
64          ims:identifier="Fall-out"
65          ims:namespace="http://ims.dei.unipd.it/" />
66        <ims:concept
67          ims:identifier="F-measure"
68          ims:namespace="http://ims.dei.unipd.it/" />
69      </ims:metrics>
70      <ims:ground-truths>
71        <ims:ground-truth ims:identifier="gt-1" />
72        <ims:ground-truth ims:identifier="gt-2" />
73        <ims:ground-truth ims:identifier="gt-3" />
74      </ims:ground-truths>
75      <ims:tasks>
76        <ims:task ims:identifier="tsk-1" />
77        <ims:task ims:identifier="tsk-2" />
78        <ims:task ims:identifier="tsk-3" />
79      </ims:tasks>
80      <ims:measures>
```

```
81        <ims:measure ims:identifier="meas-1" />
82        <ims:measure ims:identifier="meas-2" />
83        <ims:measure ims:identifier="meas-3" />
84      </ims:measures>
85      <ims:experiments>
86        <ims:experiment ims:identifier="exp-1" />
87        <ims:experiment ims:identifier="exp-2" />
88        <ims:experiment ims:identifier="exp-3" />
89      </ims:experiments>
90   </ims:statistical-test>
91 </ims:direct>
```

7.35.3   JSON Representation

```
1 {
2    "direct":{
3        "statistical-test":{
4            "identifier":"st-1",
5            "created":"2012-09-13T18:40:32.055+02:00",
6            "last-modified":"2012-09-13T18:40:32.055+02:00",
7            "concept":{
8                "identifier":"test type, e.g. t-test",
9                "namespace":"http://ims.dei.unipd.it/"
10           },
11           "parameters":[
12               {
13                   "parameter":{
14                       "concept":{
15                           "identifier":"parameterA",
16                           "namespace":"http://direct.dei.unipd.it/"
17                       },
18                       "value":"value 1"
19                   }
20               },
21               {
22                   "parameter":{
23                       "concept":{
24                           "identifier":"parameterB",
25                           "namespace":"http://direct.dei.unipd.it/"
26                       },
27                       "value":"value 2"
28                   }
29               },
30               {
31                   "parameter":{
32                       "concept":{
33                           "identifier":"parameterC",
34                           "namespace":"http://direct.dei.unipd.it/"
35                       },
36                       "value":"value 3"
37                   }
38               }
39           ],
40           "metrics":[
41               {
42                   "concept":{
43                       "identifier":"Mean average precision",
44                       "namespace":"http://ims.dei.unipd.it/"
45                   }
46               },
```

```
 47                {
 48                    "concept":{
 49                        "identifier":"Fall-out",
 50                        "namespace":"http://ims.dei.unipd.it/"
 51                    }
 52                },
 53                {
 54                    "concept":{
 55                        "identifier":"F-measure",
 56                        "namespace":"http://ims.dei.unipd.it/"
 57                    }
 58                }
 59            ],
 60            "ground-truths":[
 61                {
 62                    "ground-truth":{
 63                        "identifier":"gt-1"
 64                    }
 65                },
 66                {
 67                    "ground-truth":{
 68                        "identifier":"gt-2"
 69                    }
 70                },
 71                {
 72                    "ground-truth":{
 73                        "identifier":"gt-3"
 74                    }
 75                }
 76            ],
 77            "tasks":[
 78                {
 79                    "task":{
 80                        "identifier":"tsk-1"
 81                    }
 82                },
 83                {
 84                    "task":{
 85                        "identifier":"tsk-2"
 86                    }
 87                },
 88                {
 89                    "task":{
 90                        "identifier":"tsk-3"
 91                    }
 92                }
 93            ],
 94            "measures":[
 95                {
 96                    "measure":{
 97                        "identifier":"meas-1"
 98                    }
 99                },
100                {
101                    "measure":{
102                        "identifier":"meas-2"
103                    }
104                },
105                {
106                    "measure":{
```

```
107                        "identifier":"meas-3"
108                    }
109                }
110            ],
111            "experiments":[
112                {
113                    "experiment":{
114                        "identifier":"exp-1"
115                    }
116                },
117                {
118                    "experiment":{
119                        "identifier":"exp-2"
120                    }
121                },
122                {
123                    "experiment":{
124                        "identifier":"exp-3"
125                    }
126                }
127            ]
128        }
129    }
130 }
```

7.36   System Resource

Represents a running software engine, which is under evaluation.

7.36.1   API

Action	HTTP Method	URI
CREATE_SYSTEM	POST	/system
READ_SYSTEM	GET	/system/{id}
UPDATE_SYSTEM	PUT	/system/{id}
DELETE_SYSTEM	DELETE	/system/{id}
READ_SYSTEM _FROM_RUN	GET	/system/{id}/run
LIST_SYSTEMS	GET	/system
LIST_SYSTEM_PROVENANCE_EVENTS	GET	/system/{id}/ provenance
ADD_COMPONENT_TO_SYSTEM	POST	/system/{id}/ component/{id}
REMOVE_COMPONENT_FROM_SYSTEM	DELETE	/system/{id}/ component/{id}
LIST_COMPONENT_FROM_SYSTEM	GET	/system/{id}/ component
ADD_CONFIGURATION_TO_SYSTEM	POST	/system/{id}/ configuration/{id}

Action	HTTP Method	URI
REMOVE_CONFIGURATION_FROM_SYSTEM	DELETE	/system/{id}/ configuration/{id}
READ_CONFIGURATION_FROM_SYSTEM	GET	/system/{id}/ configuration
ADD_RUN_TO_SYSTEM	POST	/system/{id}/run/ {id}
REMOVE_RUN_FROM_SYSTEM	DELETE	/system/{id}/run/ {id}
LIST_RUN_FROM_SYSTEM	GET	/system/{id}/run
LIST_APPLICATION_FROM_SYSTEM	GET	/system{id}/ application
SHARE_SYSTEM	GET, POST, PUT	/system/{id}/ share/{sharer-id}; {sharer-ns}/ permission/ {access-permission}
UNSHARE_SYSTEM	DELETE	/system/{id}/ share/{sharer-id}; {sharer-ns}

Table 72: API for accessing the system resource.

where {id} is the unique identifier of the system.

The next two sections show an example of the representation of the results.

7.36.2   XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:system
7     ims:identifier="sys-1"
8     ims:name="Name of sys-1"
9     ims:description="Description of sys-1"
10    ims:scope="SHARED"
11    ims:created="2012-09-13T18:41:29.831+02:00"
12    ims:last-modified="2012-09-13T18:41:29.831+02:00">
13    <ims:owner>
14      <ims:user
15        ims:identifier="user-1"
16        ims:namespace="http://ims.dei.unipd.it/" />
17    </ims:owner>
18    <ims:sharings>
19      <ims:sharing>
20        <ims:group
```

promise

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SEVENTH FRAMEWORK
PROGRAMME

```
21          ims:identifier="group-1"
22          ims:namespace="http://ims.dei.unipd.it/" />
23        <ims:access-permission>DENIED</ims:access-permission>
24      </ims:sharing>
25      <ims:sharing>
26        <ims:group
27          ims:identifier="group-2"
28          ims:namespace="http://ims.dei.unipd.it/" />
29        <ims:access-permission>READ_ONLY</ims:access-permission>
30      </ims:sharing>
31      <ims:sharing>
32        <ims:group
33          ims:identifier="group-3"
34          ims:namespace="http://ims.dei.unipd.it/" />
35        <ims:access-permission>READ_WRITE</ims:access-permission>
36      </ims:sharing>
37    </ims:sharings>
38    <ims:links>
39      <ims:link>
40        <ims:metadata
41          ims:identifier="md-1"
42          ims:namespace="http://ims.dei.unipd.it/" />
43        <ims:relation>
44          <ims:concept
45            ims:identifier="isPartOf"
46            ims:namespace="http://ims.dei.unipd.it/" />
47        </ims:relation>
48        <ims:system ims:identifier="sys-1" />
49      </ims:link>
50      <ims:link>
51        <ims:metadata
52          ims:identifier="md-2"
53          ims:namespace="http://ims.dei.unipd.it/" />
54        <ims:relation>
55          <ims:concept
56            ims:identifier="isCopyrightOf"
57            ims:namespace="http://ims.dei.unipd.it/" />
58        </ims:relation>
59        <ims:system ims:identifier="sys-1" />
60      </ims:link>
61      <ims:link>
62        <ims:metadata
63          ims:identifier="md-3"
64          ims:namespace="http://ims.dei.unipd.it/" />
65        <ims:relation>
66          <ims:concept
67            ims:identifier="isDescriptionOf"
68            ims:namespace="http://ims.dei.unipd.it/" />
69        </ims:relation>
70        <ims:system ims:identifier="sys-1" />
71      </ims:link>
72    </ims:links>
73    <ims:configuration ims:identifier="cnf-1" />
74  </ims:system>
75 </ims:direct>
```

7.36.3   JSON Representation

```
1 {
2    "direct":{
```

```
 3        "system":{
 4            "identifier":"sys-1",
 5            "created":"2012-09-13T18:41:29.831+02:00",
 6            "last-modified":"2012-09-13T18:41:29.831+02:00",
 7            "name":"Name of sys-1",
 8            "description":"Description of sys-1",
 9            "scope":"SHARED",
10            "owner":{
11                "user":{
12                    "identifier":"user-1",
13                    "namespace":"http://ims.dei.unipd.it/"
14                }
15            },
16            "sharings":[
17                {
18                    "sharing":{
19                        "group":{
20                            "identifier":"group-1",
21                            "namespace":"http://ims.dei.unipd.it/"
22                        },
23                        "access-permission":"DENIED"
24                    }
25                },
26                {
27                    "sharing":{
28                        "group":{
29                            "identifier":"group-2",
30                            "namespace":"http://ims.dei.unipd.it/"
31                        },
32                        "access-permission":"READ_ONLY"
33                    }
34                },
35                {
36                    "sharing":{
37                        "group":{
38                            "identifier":"group-3",
39                            "namespace":"http://ims.dei.unipd.it/"
40                        },
41                        "access-permission":"READ_WRITE"
42                    }
43                }
44            ],
45            "links":[
46                {
47                    "link":{
48                        "metadata":{
49                            "identifier":"md-1",
50                            "namespace":"http://ims.dei.unipd.it/"
51                        },
52                        "relation":{
53                            "concept":{
54                                "identifier":"isPartOf",
55                                "namespace":"http://ims.dei.unipd.it/"
56                            }
57                        },
58                        "system":{
59                            "identifier":"sys-1"
60                        }
61                    }
62                },
```

```
 63                    {
 64                        "link":{
 65                            "metadata":{
 66                                "identifier":"md-2",
 67                                "namespace":"http://ims.dei.unipd.it/"
 68                            },
 69                            "relation":{
 70                                "concept":{
 71                                    "identifier":"isCopyrightOf",
 72                                    "namespace":"http://ims.dei.unipd.it/"
 73                                }
 74                            },
 75                            "system":{
 76                                "identifier":"sys-1"
 77                            }
 78                        }
 79                    },
 80                    {
 81                        "link":{
 82                            "metadata":{
 83                                "identifier":"md-3",
 84                                "namespace":"http://ims.dei.unipd.it/"
 85                            },
 86                            "relation":{
 87                                "concept":{
 88                                    "identifier":"isDescriptionOf",
 89                                    "namespace":"http://ims.dei.unipd.it/"
 90                                }
 91                            },
 92                            "system":{
 93                                "identifier":"sys-1"
 94                            }
 95                        }
 96                    }
 97                ],
 98                "configuration":{
 99                    "configuration":{
100                        "identifier":"cnf-1"
101                    }
102                }
103            }
104        }
105 }
```

7.37   Task Resource

Represents a piece of work that is undertaken within an EvaluationActivity and aims at testing a specific (research) hypothesis.

7.37.1   API

Action	HTTP Method	URI
CREATE_TASK	POST	/task
READ_TASK	GET	/task/{id}
UPDATE_TASK	PUT	/task/{id}

Action	HTTP Method	URI
DELETE_TASK	DELETE	/task/{id}
LIST_TASKS	GET	/task
LIST_TASK_PROVENANCE_EVENTS	GET	/task/{id}/provenance
ADD_CONTRIBUTION_TO_TASK	POST	/task/{id}/contribution/{id}
REMOVE_CONTRIBUTION_FROM_TASK	DELETE	/task/{id}/contribution/{id}
LIST_CONTRIBUTION_FROM_TASK	GET	/task/{id}/contribution
ADD_ESTIMATE_TO_TASK	POST	/task/{id}/estimate/{id}
REMOVE_ESTIMATE_FROM_TASK	DELETE	/task/{id}/estimate/{id}
LIST_ESTIMATE_FROM_TASK	GET	/task/{id}/estimate
ADD_MEASURE_TO_TASK	POST	/task/{id}/measure/{id}
REMOVE_MEASURE_FROM_TASK	DELETE	/task/{id}/measure/{id}
LIST_MEASURE_FROM_TASK	GET	/task/{id}/measure
ADD_RUN_TO_TASK	POST	/task/{id}/run/{id}
REMOVE_RUN_FROM_TASK	DELETE	/task/{id}/run/{id}
LIST_RUN_FROM_TASK	GET	/task/{id}/run
ADD_STATISTICAL_TEST_TO_TASK	POST	/task/{id}/statistical-test/{id}
REMOVE_STATISTICAL_TEST_FROM_TASK	DELETE	/task/{id}/statistical-test/{id}
LIST_STATISTICAL_TEST_FROM_TASK	GET	/task/{id}/statistical-test
ADD_TOPIC_FIELD_TO_TASK	POST	/task/{id}/topic-field/{id};{ns}
REMOVE_TOPIC_FIELD_FROM_TASK	DELETE	/task/{id}/topic-field/{id};{ns}
LIST_TOPIC_FIELD_FROM_TASK	GET	/task/{id}/topic-field

Action	HTTP Method	URI
SHARE_TASK	GET, POST, PUT	/task/{id}/share/ {sharer-id}; {sharer-ns}/ permission/ {access-permission}
UNSHARE_TASK	DELETE	/task/{id}/share/ {sharer-id}; {sharer-ns}

Table 73: API for accessing the task resource.

where {id} is the unique identifier of the task.

The next two sections show an example of the representation of the results.

7.37.2 XML Representation

```xml
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:task
7     ims:identifier="tsk-1"
8     ims:created="2012-09-13T18:46:19.914+02:00"
9     ims:last-modified="2012-09-13T18:46:19.915+02:00"
10    ims:description="Description of task, e.g. diversity task"
11    ims:maximum-experiments-allowed="100"
12    ims:scope="SHARED">
13    <ims:owner>
14      <ims:user
15        ims:identifier="user-1"
16        ims:namespace="http://ims.dei.unipd.it/" />
17    </ims:owner>
18    <ims:sharings>
19      <ims:sharing>
20        <ims:group
21          ims:identifier="group-1"
22          ims:namespace="http://ims.dei.unipd.it/" />
23        <ims:access-permission>DENIED</ims:access-permission>
24      </ims:sharing>
25      <ims:sharing>
26        <ims:group
27          ims:identifier="group-2"
28          ims:namespace="http://ims.dei.unipd.it/" />
29        <ims:access-permission>READ_ONLY</ims:access-permission>
30      </ims:sharing>
31      <ims:sharing>
32        <ims:group
33          ims:identifier="group-3"
34          ims:namespace="http://ims.dei.unipd.it/" />
35        <ims:access-permission>READ_WRITE</ims:access-permission>
36      </ims:sharing>
```

```
37    </ims:sharings>
38    <ims:links>
39      <ims:link>
40        <ims:metadata
41          ims:identifier="md-1"
42          ims:namespace="http://ims.dei.unipd.it/" />
43        <ims:relation>
44          <ims:concept
45            ims:identifier="isDescriptionOf"
46            ims:namespace="http://ims.dei.unipd.it/" />
47        </ims:relation>
48        <ims:task ims:identifier="tsk-1" />
49      </ims:link>
50      <ims:link>
51        <ims:metadata
52          ims:identifier="md-2"
53          ims:namespace="http://ims.dei.unipd.it/" />
54        <ims:relation>
55          <ims:concept
56            ims:identifier="isCopyrightOf"
57            ims:namespace="http://ims.dei.unipd.it/" />
58        </ims:relation>
59        <ims:task ims:identifier="tsk-1" />
60      </ims:link>
61      <ims:link>
62        <ims:metadata
63          ims:identifier="md-3"
64          ims:namespace="http://ims.dei.unipd.it/" />
65        <ims:relation>
66          <ims:concept
67            ims:identifier="isAdministrationOf"
68            ims:namespace="http://ims.dei.unipd.it/" />
69        </ims:relation>
70        <ims:task ims:identifier="tsk-1" />
71      </ims:link>
72    </ims:links>
73    <ims:campaign
74      ims:identifier="c-1"
75      ims:namespace="http://ims.dei.unipd.it/" />
76    <ims:track ims:identifier="trk-1" />
77    <ims:experimental-collection
78      ims:identifier="ec-1" />
79  </ims:task>
80 </ims:direct>
```

7.37.3   JSON Representation

```
1 {
2    "direct":{
3       "task":{
4          "identifier":"tsk-1",
5          "created":"2012-09-13T18:46:19.914+02:00",
6          "last-modified":"2012-09-13T18:46:19.915+02:00",
7          "description":"Description of task, e.g. diversity task",
8          "maximum-experiments-allowed":"100",
9          "scope":"SHARED",
10         "owner":{
11            "user":{
12               "identifier":"user-1",
13               "namespace":"http://ims.dei.unipd.it/"
```

```
14                  }
15              },
16              "sharings":[
17                  {
18                      "sharing":{
19                          "group":{
20                              "identifier":"group-1",
21                              "namespace":"http://ims.dei.unipd.it/"
22                          },
23                          "access-permission":"DENIED"
24                      }
25                  },
26                  {
27                      "sharing":{
28                          "group":{
29                              "identifier":"group-2",
30                              "namespace":"http://ims.dei.unipd.it/"
31                          },
32                          "access-permission":"READ_ONLY"
33                      }
34                  },
35                  {
36                      "sharing":{
37                          "group":{
38                              "identifier":"group-3",
39                              "namespace":"http://ims.dei.unipd.it/"
40                          },
41                          "access-permission":"READ_WRITE"
42                      }
43                  }
44              ],
45              "links":[
46                  {
47                      "link":{
48                          "metadata":{
49                              "identifier":"md-1",
50                              "namespace":"http://ims.dei.unipd.it/"
51                          },
52                          "relation":{
53                              "concept":{
54                                  "identifier":"isDescriptionOf",
55                                  "namespace":"http://ims.dei.unipd.it/"
56                              }
57                          },
58                          "task":{
59                              "identifier":"tsk-1"
60                          }
61                      }
62                  },
63                  {
64                      "link":{
65                          "metadata":{
66                              "identifier":"md-2",
67                              "namespace":"http://ims.dei.unipd.it/"
68                          },
69                          "relation":{
70                              "concept":{
71                                  "identifier":"isCopyrightOf",
72                                  "namespace":"http://ims.dei.unipd.it/"
73                              }
```

```
74                  },
75                  "task":{
76                      "identifier":"tsk-1"
77                  }
78              }
79          },
80          {
81              "link":{
82                  "metadata":{
83                      "identifier":"md-3",
84                      "namespace":"http://ims.dei.unipd.it/"
85                  },
86                  "relation":{
87                      "concept":{
88                          "identifier":"isAdministrationOf",
89                          "namespace":"http://ims.dei.unipd.it/"
90                      }
91                  },
92                  "task":{
93                      "identifier":"tsk-1"
94                  }
95              }
96          }
97      ],
98      "campaign":{
99          "identifier":"c-1",
100         "namespace":"http://ims.dei.unipd.it/"
101     },
102     "track":{
103         "identifier":"trk-1"
104     },
105     "experimental-collection":{
106         "identifier":"ec-1"
107     }
108     }
109   }
110 }
```

7.38 Topic Group Resource

Represents a set of topics, which are grouped together because they are used to address a research task carried out in an evaluation activity.

7.38.1 API

Action	HTTP Method	URI
CREATE_TOPIC_GROUP	POST	/topic-group
READ_TOPIC_GROUP	GET	/topic-group/{id}
UPDATE_TOPIC_GROUP	PUT	/topic-group/{id}
DELETE_TOPIC_GROUP	DELETE	/topic-group/{id}
LIST_TOPIC_GROUPS	GET	/topic-group
LIST_TOPIC_GROUP_PROVENANCE_EVENTS	GET	/topic-group/{id}/provenance

Action	HTTP Method	URI
ADD_CONTRIBUTION_TO_TOPIC_GROUP	POST	`/topic-group/{id}/` `contribution/{id}`
REMOVE_CONTRIBUTION_FROM_TOPIC_GROUP	DELETE	`/topic-group/{id}/` `contribution/{id}`
LIST_CONTRIBUTION_FROM_TOPIC_GROUP	GET	`/topic-group/{id}/` `contribution`
ADD_TOPIC_TO_TOPIC_GROUP	POST	`/topic-group/{id}/` `topic/{id}`
REMOVE_TOPIC_FROM_TOPIC_GROUP	DELETE	`/topic-group/{id}/` `topic/{id}`
LIST_TOPIC_FROM_TOPIC_GROUP	GET	`/topic-group/{id}/` `topic`
SHARE_TOPIC_GROUP	GET, POST, PUT	`/topic-group/{id}/` `share/{sharer-id};` `{sharer-ns}/` `permission/` `{access-permission}`
UNSHARE_TOPIC_GROUP	DELETE	`/topic-group/{id}/` `share/{sharer-id};` `{sharer-ns}`

Table 74: API for accessing the topic-group resource.

where `{id}` is the unique identifier of the topic-group.

The next two sections show an example of the representation of the results.

7.38.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:topic-group
7     ims:identifier="tg-1"
8     ims:description="description of topic group 1"
9     ims:scope="SHARED"
10    ims:created="2012-09-13T18:47:21.387+02:00"
11    ims:last-modified="2012-09-13T18:47:21.387+02:00">
12    <ims:owner>
13      <ims:user
14        ims:identifier="user-1"
15        ims:namespace="http://ims.dei.unipd.it/" />
16    </ims:owner>
17    <ims:sharings>
18      <ims:sharing>
```

```
19          <ims:group
20            ims:identifier="group-1"
21            ims:namespace="http://ims.dei.unipd.it/" />
22          <ims:access-permission>DENIED</ims:access-permission>
23        </ims:sharing>
24        <ims:sharing>
25          <ims:group
26            ims:identifier="group-2"
27            ims:namespace="http://ims.dei.unipd.it/" />
28          <ims:access-permission>READ_ONLY</ims:access-permission>
29        </ims:sharing>
30        <ims:sharing>
31          <ims:group
32            ims:identifier="group-3"
33            ims:namespace="http://ims.dei.unipd.it/" />
34          <ims:access-permission>READ_WRITE</ims:access-permission>
35        </ims:sharing>
36      </ims:sharings>
37      <ims:links>
38        <ims:link>
39          <ims:metadata
40            ims:identifier="md-1"
41            ims:namespace="http://ims.dei.unipd.it/" />
42          <ims:relation>
43            <ims:concept
44              ims:identifier="isDescriptionOf"
45              ims:namespace="http://ims.dei.unipd.it/" />
46          </ims:relation>
47          <ims:topic-group ims:identifier="tg-1" />
48        </ims:link>
49        <ims:link>
50          <ims:metadata
51            ims:identifier="md-2"
52            ims:namespace="http://ims.dei.unipd.it/" />
53          <ims:relation>
54            <ims:concept
55              ims:identifier="isCopyrightOf"
56              ims:namespace="http://ims.dei.unipd.it/" />
57          </ims:relation>
58          <ims:topic-group ims:identifier="tg-1" />
59        </ims:link>
60        <ims:link>
61          <ims:metadata
62            ims:identifier="md-3"
63            ims:namespace="http://ims.dei.unipd.it/" />
64          <ims:relation>
65            <ims:concept
66              ims:identifier="isAdministrationOf"
67              ims:namespace="http://ims.dei.unipd.it/" />
68          </ims:relation>
69          <ims:topic-group ims:identifier="tg-1" />
70        </ims:link>
71      </ims:links>
72      <ims:topics>
73        <ims:topic ims:identifier="t1" />
74        <ims:topic ims:identifier="t2" />
75        <ims:topic ims:identifier="t3" />
76        <ims:topic ims:identifier="t4" />
77      </ims:topics>
78  </ims:topic-group>
```

7.38.3 JSON Representation

```json
1 {
2    "direct":{
3       "topic-group":{
4          "identifier":"tg-1",
5          "created":"2012-09-13T18:47:21.387+02:00",
6          "last-modified":"2012-09-13T18:47:21.387+02:00",
7          "description":"description of topic group 1",
8          "scope":"SHARED",
9          "owner":{
10             "user":{
11                "identifier":"user-1",
12                "namespace":"http://ims.dei.unipd.it/"
13             }
14          },
15          "sharings":[
16             {
17                "sharing":{
18                   "group":{
19                      "identifier":"group-1",
20                      "namespace":"http://ims.dei.unipd.it/"
21                   },
22                   "access-permission":"DENIED"
23                }
24             },
25             {
26                "sharing":{
27                   "group":{
28                      "identifier":"group-2",
29                      "namespace":"http://ims.dei.unipd.it/"
30                   },
31                   "access-permission":"READ_ONLY"
32                }
33             },
34             {
35                "sharing":{
36                   "group":{
37                      "identifier":"group-3",
38                      "namespace":"http://ims.dei.unipd.it/"
39                   },
40                   "access-permission":"READ_WRITE"
41                }
42             }
43          ],
44          "links":[
45             {
46                "link":{
47                   "metadata":{
48                      "identifier":"md-1",
49                      "namespace":"http://ims.dei.unipd.it/"
50                   },
51                   "relation":{
52                      "concept":{
53                         "identifier":"isDescriptionOf",
54                         "namespace":"http://ims.dei.unipd.it/"
55                      }
56                   },
```

```json
 57                       "topic-group":{
 58                           "identifier":"tg-1"
 59                       }
 60                   }
 61               },
 62               {
 63                   "link":{
 64                       "metadata":{
 65                           "identifier":"md-2",
 66                           "namespace":"http://ims.dei.unipd.it/"
 67                       },
 68                       "relation":{
 69                           "concept":{
 70                               "identifier":"isCopyrightOf",
 71                               "namespace":"http://ims.dei.unipd.it/"
 72                           }
 73                       },
 74                       "topic-group":{
 75                           "identifier":"tg-1"
 76                       }
 77                   }
 78               },
 79               {
 80                   "link":{
 81                       "metadata":{
 82                           "identifier":"md-3",
 83                           "namespace":"http://ims.dei.unipd.it/"
 84                       },
 85                       "relation":{
 86                           "concept":{
 87                               "identifier":"isAdministrationOf",
 88                               "namespace":"http://ims.dei.unipd.it/"
 89                           }
 90                       },
 91                       "topic-group":{
 92                           "identifier":"tg-1"
 93                       }
 94                   }
 95               }
 96           ],
 97           "topics":[
 98               {
 99                   "topic":{
100                       "identifier":"t1"
101                   }
102               },
103               {
104                   "topic":{
105                       "identifier":"t2"
106                   }
107               },
108               {
109                   "topic":{
110                       "identifier":"t3"
111                   }
112               },
113               {
114                   "topic":{
115                       "identifier":"t4"
116                   }
```

D3.3: Prototype of the Evaluation Infrastructure

```
117              }
118          ]
119      }
120  }
121 }
```

7.39   Topic Resource

Represents the materialization of an information need.

7.39.1   API

Action	HTTP Method	URI
CREATE_TOPIC	POST	/topic
READ_TOPIC	GET	/topic/{id}
UPDATE_TOPIC	PUT	/topic/{id}
DELETE_TOPIC	DELETE	/topic/{id}
LIST_TOPICS	GET	/topic
LIST_TOPIC_PROVENANCE_EVENTS	GET	/topic/{id}/ provenance
ADD_TOPIC_FIELD_TO_TOPIC	POST	/topic/{id}/ topic-field
UPDATE_TOPIC_FIELD_FROM_TOPIC	PUT	/topic/{id}/ topic-field/{id}; {ns}
DELETE_TOPIC_FIELD_FROM_TOPIC	DELETE	/topic/{id}/ topic-field/{id}; {ns}
READ_TOPIC_FIELD_FROM_TOPIC	GET	/topic/{id}/ topic-field/{id}; {ns}

Table 75: API for accessing the topic resource.

where {id} is the unique identifier of the topic.
The next two sections show an example of the representation of the results.

7.39.2   XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:topic
```

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Network of Excellence co-funded by the 7th Framework Programme of the European Commission, grant agreement n. 258191

```
7     ims:identifier="tpc-1"
8     ims:created="2012-09-13T18:48:25.056+02:00"
9     ims:last-modified="2012-09-13T18:48:25.056+02:00">
10    <ims:topic-fields>
11      <ims:topic-field>
12        <ims:concept
13          ims:identifier="isFieldOf"
14          ims:namespace="http://ims.dei.unipd.it/" />
15        <ims:topic-field-contents>
16          <ims:topic-field-content
17            ims:media-type="application/json"
18            ims:language="abk">
19          <ims:content>&lt;title&gt;title A&lt;/title&gt;</ims:content>
20          </ims:topic-field-content>
21          <ims:topic-field-content
22            ims:media-type="application/pdf"
23            ims:language="ada">
24          <ims:content ims:content-transfer-encoding="base64">PGR1c2M+ZGVzY3JpcHRpb248L2R1c2M+
25            </ims:content>
26          </ims:topic-field-content>
27        </ims:topic-field-contents>
28      </ims:topic-field>
29      <ims:topic-field>
30        <ims:concept
31          ims:identifier="isFieldOf2"
32          ims:namespace="http://ims.dei.unipd.it/" />
33        <ims:topic-field-contents>
34          <ims:topic-field-content
35            ims:media-type="application/msword"
36            ims:language="bik">
37          <ims:content ims:content-transfer-encoding="base64">PHRpdGxlPnRpdGxlIEI8L3RpdGxlPg==
38            </ims:content>
39          </ims:topic-field-content>
40        </ims:topic-field-contents>
41      </ims:topic-field>
42    </ims:topic-fields>
43  </ims:topic>
44 </ims:direct>
```

7.39.3   JSON Representation

```
1 {
2    "direct":{
3      "topic":{
4        "identifier":"tpc-1",
5        "created":"2012-09-13T18:48:25.056+02:00",
6        "last-modified":"2012-09-13T18:48:25.056+02:00",
7        "topic-fields":[
8          {
9            "topic-field":{
10             "concept":{
11               "identifier":"isFieldOf",
12               "namespace":"http://ims.dei.unipd.it/"
13             }
14            },
15            "topic-field-contents":[
16              {
17                "topic-field-content":{
18                  "media-type":"application/json",
19                  "language":"abk",
```

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```
20                  "content":{
21                      "content":"<title>title A</title>"
22                  }
23              }
24          },
25          {
26              "topic-field-content":{
27                  "media-type":"application/pdf",
28                  "language":"ada",
29                  "content":{
30                      "content-transfer-encoding":"base64",
31                      "content":"PGRlc2M+ZGVzY3JpcHRpb248L2Rlc2M+"
32                  }
33              }
34          }
35      ]
36  },
37  {
38      "topic-field":{
39          "concept":{
40              "identifier":"isFieldOf2",
41              "namespace":"http://ims.dei.unipd.it/"
42          }
43      },
44      "topic-field-contents":[
45          {
46              "topic-field-content":{
47                  "media-type":"application/msword",
48                  "language":"bik",
49                  "content":{
50                      "content-transfer-encoding":"base64",
51                      "content":"PHRpdGxlPnRpdGxlIEI8L3RpdGxlPg=="
52                  }
53              }
54          }
55      ]
56  }
57  ]
58  }
59  }
60 }
```

7.40   Track Resource

Represents a group of Tasks carried within an Evaluation Activity of type campaign.

7.40.1   API

Action	HTTP Method	URI
CREATE_TRACK	POST	/track
READ_TRACK	GET	/track/{id}
UPDATE_TRACK	PUT	/track/{id}
DELETE_TRACK	DELETE	/track/{id}
LIST_TRACKS	GET	/track

Action	HTTP Method	URI
LIST_TRACK_PROVENANCE_EVENTS	GET	`/track/{id}/provenance`
ADD_TASK_TO_TRACK	POST	`/track/{id}/task/{id}`
UPDATE_TASK_OF_TRACK	PUT	`/track/{id}/task/{id}`
REMOVE_TASK_FROM_TRACK	PUT	`/track/{id}/task/{id}`
LIST_TASK_FROM_TRACK	GET	`/track/{id}/task`
SHARE_TRACK	GET, POST, PUT	`/track/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}`
UNSHARE_TRACK	DELETE	`/track/{id}/share/{sharer-id};{sharer-ns}`

Table 76: API for accessing the track resource.

where {id} is the unique identifier of the track.

The next two sections show an example of the representation of the results.

7.40.2 XML Representation

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ims:direct
3   xmlns:ims="http://ims.dei.unipd.it/"
4   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5   xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
6   <ims:track
7     ims:identifier="trk-1"
8     ims:created="2012-09-13T18:49:42.367+02:00"
9     ims:last-modified="2012-09-13T18:49:42.367+02:00"
10    ims:description="Description of track, e.g. CLEF 2012 Ad-Hoc Track"
11    ims:submission-deadline="2012-09-13"
12    ims:scope="SHARED">
13    <ims:owner>
14      <ims:user
15        ims:identifier="user-1"
16        ims:namespace="http://ims.dei.unipd.it/" />
17    </ims:owner>
18    <ims:sharings>
19      <ims:sharing>
20        <ims:group
21          ims:identifier="group-1"
22          ims:namespace="http://ims.dei.unipd.it/" />
23        <ims:access-permission>DENIED</ims:access-permission>
```

```
24        </ims:sharing>
25        <ims:sharing>
26          <ims:group
27            ims:identifier="group-2"
28            ims:namespace="http://ims.dei.unipd.it/" />
29          <ims:access-permission>READ_ONLY</ims:access-permission>
30        </ims:sharing>
31        <ims:sharing>
32          <ims:group
33            ims:identifier="group-3"
34            ims:namespace="http://ims.dei.unipd.it/" />
35          <ims:access-permission>READ_WRITE</ims:access-permission>
36        </ims:sharing>
37      </ims:sharings>
38      <ims:links>
39        <ims:link>
40          <ims:metadata
41            ims:identifier="md-1"
42            ims:namespace="http://ims.dei.unipd.it/" />
43          <ims:relation>
44            <ims:concept
45              ims:identifier="isDescriptionOf"
46              ims:namespace="http://ims.dei.unipd.it/" />
47          </ims:relation>
48          <ims:track ims:identifier="trk-1" />
49        </ims:link>
50        <ims:link>
51          <ims:metadata
52            ims:identifier="md-2"
53            ims:namespace="http://ims.dei.unipd.it/" />
54          <ims:relation>
55            <ims:concept
56              ims:identifier="isCopyrightOf"
57              ims:namespace="http://ims.dei.unipd.it/" />
58          </ims:relation>
59          <ims:track ims:identifier="trk-1" />
60        </ims:link>
61        <ims:link>
62          <ims:metadata
63            ims:identifier="md-3"
64            ims:namespace="http://ims.dei.unipd.it/" />
65          <ims:relation>
66            <ims:concept
67              ims:identifier="isAdministrationOf"
68              ims:namespace="http://ims.dei.unipd.it/" />
69          </ims:relation>
70          <ims:track ims:identifier="trk-1" />
71        </ims:link>
72      </ims:links>
73      <ims:campaign
74        ims:identifier="ea-1"
75        ims:namespace="http://ims.dei.unipd.it/" />
76    </ims:track>
77  </ims:direct>
```

7.40.3 JSON Representation

```
1  {
2    "direct":{
3      "track":{
```

```
 4        "identifier":"trk-1",
 5        "description":"Description of track, e.g. CLEF 2012 Ad-Hoc Track",
 6        "submission-deadline":"2012-09-13",
 7        "scope":"SHARED",
 8        "created":"2012-09-13T18:49:42.367+02:00",
 9        "last-modified":"2012-09-13T18:49:42.367+02:00",
10        "owner":{
11            "user":{
12                "identifier":"user-1",
13                "namespace":"http://ims.dei.unipd.it/"
14            }
15        },
16        "sharings":[
17            {
18                "sharing":{
19                    "group":{
20                        "identifier":"group-1",
21                        "namespace":"http://ims.dei.unipd.it/"
22                    },
23                    "access-permission":"DENIED"
24                }
25            },
26            {
27                "sharing":{
28                    "group":{
29                        "identifier":"group-2",
30                        "namespace":"http://ims.dei.unipd.it/"
31                    },
32                    "access-permission":"READ_ONLY"
33                }
34            },
35            {
36                "sharing":{
37                    "group":{
38                        "identifier":"group-3",
39                        "namespace":"http://ims.dei.unipd.it/"
40                    },
41                    "access-permission":"READ_WRITE"
42                }
43            }
44        ],
45        "links":[
46            {
47                "link":{
48                    "metadata":{
49                        "identifier":"md-1",
50                        "namespace":"http://ims.dei.unipd.it/"
51                    },
52                    "relation":{
53                        "concept":{
54                            "identifier":"isDescriptionOf",
55                            "namespace":"http://ims.dei.unipd.it/"
56                        }
57                    },
58                    "track":{
59                        "identifier":"trk-1"
60                    }
61                }
62            },
63            {
```

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```
 64                    "link":{
 65                        "metadata":{
 66                            "identifier":"md-2",
 67                            "namespace":"http://ims.dei.unipd.it/"
 68                        },
 69                        "relation":{
 70                            "concept":{
 71                                "identifier":"isCopyrightOf",
 72                                "namespace":"http://ims.dei.unipd.it/"
 73                            }
 74                        },
 75                        "track":{
 76                            "identifier":"trk-1"
 77                        }
 78                    }
 79                },
 80                {
 81                    "link":{
 82                        "metadata":{
 83                            "identifier":"md-3",
 84                            "namespace":"http://ims.dei.unipd.it/"
 85                        },
 86                        "relation":{
 87                            "concept":{
 88                                "identifier":"isAdministrationOf",
 89                                "namespace":"http://ims.dei.unipd.it/"
 90                            }
 91                        },
 92                        "track":{
 93                            "identifier":"trk-1"
 94                        }
 95                    }
 96                }
 97            ],
 98            "campaign":{
 99                "identifier":"ea-1",
100                "namespace":"http://ims.dei.unipd.it/"
101            }
102        }
103    }
104 }
```

7.41 Visualization Resource

Refers to the information used by the infrastructure to store and recover whichever visualization of the data that the users do.

7.41.1 API

Action	HTTP Method	URI
CREATE_VISUALIZATION	POST	/visualization
READ_VISUALIZATION	GET	/visualization/{id}
UPDATE_VISUALIZATION	PUT	/visualization/{id}
DELETE_VISUALIZATION	DELETE	/visualization/{id}

Action	HTTP Method	URI
LIST_VISUALIZATIONS	GET	`/visualization`
LIST_VISUALIZATION_PROVENANCE_EVENTS	DELETE	`/visualization/{id}/` `provenance`

SHARE_VISUALIZATION	GET,
	POST,
	PUT
		`/visualization/{id}/`
		`share/{sharer-id};`
		`{sharer-ns}/`
		`permission/`
		`{access-permission}`

UNSHARE_VISUALIZATION	DELETE	`/visualization/{id}/`
		`share/{sharer-id};`
		`{sharer-ns}`

ADD_SNAPSHOT_TO_VISUALIZATION	POST	`/visualization/{id}/` `snapshot/{id}`
UPDATE_SNAPSHOT_OF_VISUALIZATION	PUT	`/visualization/{id}/` `snapshot/{id}`
REMOVE_SNAPSHOT_FROM_VISUALIZATION	DELETE	`/visualization/{id}/` `snapshot/{id}`
LIST_SNAPSHOT_FROM_VISUALIZATION	GET	`/visualization/{id}/` `snapshot`

Table 77: API for accessing the visualization resource.

where `{id}` is the unique identifier of the visualization.

The next two sections show an example of the representation of the results.

7.41.2 XML Representation

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <ims:direct xmlns:ims="http://ims.dei.unipd.it/" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3    <ims:visualization ims:identifier="v-1" ims:created="2012-09-24T13:33:39.323+02:00" ims:last-modified=
4      <ims:owner>
5        <ims:user ims:identifier="user-1" ims:namespace="http://ims.dei.unipd.it/" />
6      </ims:owner>
7      <ims:sharings>
8        <ims:sharing>
9          <ims:group ims:identifier="group-1" ims:namespace="http://ims.dei.unipd.it/" />
10         <ims:access-permission>DENIED</ims:access-permission>
11       </ims:sharing>
12       <ims:sharing>
13         <ims:group ims:identifier="group-2" ims:namespace="http://ims.dei.unipd.it/" />
14         <ims:access-permission>READ_ONLY</ims:access-permission>
15       </ims:sharing>
16       <ims:sharing>
17         <ims:group ims:identifier="group-3" ims:namespace="http://ims.dei.unipd.it/" />
18         <ims:access-permission>READ_WRITE</ims:access-permission>
19       </ims:sharing>
20     </ims:sharings>
```

```xml
21      <ims:parameters>
22        <ims:parameter>
23          <ims:concept ims:identifier="parameterA" ims:namespace="http://direct.dei.unipd.it/" />
24          <ims:value>value 1</ims:value>
25        </ims:parameter>
26        <ims:parameter>
27          <ims:concept ims:identifier="parameterB" ims:namespace="http://direct.dei.unipd.it/" />
28          <ims:value>value 2</ims:value>
29        </ims:parameter>
30        <ims:parameter>
31          <ims:concept ims:identifier="parameterC" ims:namespace="http://direct.dei.unipd.it/" />
32          <ims:value>value 3</ims:value>
33        </ims:parameter>
34      </ims:parameters>
35      <ims:concept ims:identifier="type-1, e.g. Scatterplot" ims:namespace="http://ims.dei.unipd.it/" />
36      <ims:measures>
37        <ims:measure ims:identifier="m-1">
38          <ims:concept ims:identifier="precision" ims:namespace="http://ims.dei.unipd.it/" />
39          <ims:value>4.0E-1</ims:value>
40        </ims:measure>
41        <ims:measure ims:identifier="m-2">
42          <ims:concept ims:identifier="recall" ims:namespace="http://ims.dei.unipd.it/" />
43          <ims:value>3.0E-1</ims:value>
44        </ims:measure>
45      </ims:measures>
46      <ims:estimates>
47        <ims:estimate ims:identifier="est-1" ims:value="0.0" />
48        <ims:estimate ims:identifier="est-2" ims:value="0.0" />
49        <ims:estimate ims:identifier="est-3" ims:value="0.0" />
50      </ims:estimates>
51      <ims:snapshots>
52        <ims:snapshot ims:identifier="snp-1" />
53        <ims:snapshot ims:identifier="snp-2" />
54        <ims:snapshot ims:identifier="snp-3" />
55      </ims:snapshots>
56      <ims:experiments>
57        <ims:experiment ims:identifier="exp-1" />
58        <ims:experiment ims:identifier="exp-2" />
59        <ims:experiment ims:identifier="exp-3" />
60      </ims:experiments>
61      <ims:ground-truths>
62        <ims:ground-truth ims:identifier="gt-1" />
63        <ims:ground-truth ims:identifier="gt-2" />
64        <ims:ground-truth ims:identifier="gt-3" />
65      </ims:ground-truths>
66      <ims:tasks>
67        <ims:task ims:identifier="tsk-1" />
68        <ims:task ims:identifier="tsk-2" />
69        <ims:task ims:identifier="tsk-3" />
70      </ims:tasks>
71      <ims:statistical-tests>
72        <ims:statistical-test ims:identifier="st-1" />
73        <ims:statistical-test ims:identifier="st-2" />
74        <ims:statistical-test ims:identifier="st-3" />
75      </ims:statistical-tests>
76    </ims:visualization>
77  </ims:direct>
```

7.41.3   JSON Representation

```json
1  {
2      "direct":{
3          "visualization":{
4              "identifier":"v-1",
5              "created":"2012-09-13T18:50:45.531+02:00",
6              "last-modified":"2012-09-13T18:50:45.531+02:00",
7              "parameters":[
8                  {
9                      "parameter":{
10                         "concept":{
11                             "identifier":"parameterA",
12                             "namespace":"http://direct.dei.unipd.it/"
13                         },
14                         "value":"value 1"
15                     }
16                 },
17                 {
18                     "parameter":{
19                         "concept":{
20                             "identifier":"parameterB",
21                             "namespace":"http://direct.dei.unipd.it/"
22                         },
23                         "value":"value 2"
24                     }
25                 },
26                 {
27                     "parameter":{
28                         "concept":{
29                             "identifier":"parameterC",
30                             "namespace":"http://direct.dei.unipd.it/"
31                         },
32                         "value":"value 3"
33                     }
34                 }
35             ],
36             "concept":{
37                 "identifier":"type-1, e.g. Scatterplot",
38                 "namespace":"http://ims.dei.unipd.it/"
39             },
40             "measures":[
41                 {
42                     "measure":{
43                         "identifier":"meas-1"
44                     }
45                 },
46                 {
47                     "measure":{
48                         "identifier":"meas-2"
49                     }
50                 },
51                 {
52                     "measure":{
53                         "identifier":"meas-3"
54                     }
55                 }
56             ],
57             "estimates":[
58                 {
59                     "estimate":{
60                         "identifier":"est-1"
```

```
 61                        }
 62                    },
 63                    {
 64                        "estimate":{
 65                            "identifier":"est-2"
 66                        }
 67                    },
 68                    {
 69                        "estimate":{
 70                            "identifier":"est-3"
 71                        }
 72                    }
 73                ],
 74                "snapshots":[
 75                    {
 76                        "snapshot":{
 77                            "identifier":"snp-1"
 78                        }
 79                    },
 80                    {
 81                        "snapshot":{
 82                            "identifier":"snp-2"
 83                        }
 84                    },
 85                    {
 86                        "snapshot":{
 87                            "identifier":"snp-3"
 88                        }
 89                    }
 90                ],
 91                "experiments":[
 92                    {
 93                        "experiment":{
 94                            "identifier":"exp-1"
 95                        }
 96                    },
 97                    {
 98                        "experiment":{
 99                            "identifier":"exp-2"
100                        }
101                    },
102                    {
103                        "experiment":{
104                            "identifier":"exp-3"
105                        }
106                    }
107                ],
108                "ground-truths":[
109                    {
110                        "ground-truth":{
111                            "identifier":"gt-1"
112                        }
113                    },
114                    {
115                        "ground-truth":{
116                            "identifier":"gt-2"
117                        }
118                    },
119                    {
120                        "ground-truth":{
```

```
121                    "identifier":"gt-3"
122                }
123            }
124        ],
125        "tasks":[
126            {
127                "task":{
128                    "identifier":"tsk-1"
129                }
130            },
131            {
132                "task":{
133                    "identifier":"tsk-2"
134                }
135            },
136            {
137                "task":{
138                    "identifier":"tsk-3"
139                }
140            }
141        ],
142        "statistical-tests":[
143            {
144                "statistical-test":{
145                    "identifier":"st-1"
146                }
147            },
148            {
149                "statistical-test":{
150                    "identifier":"st-2"
151                }
152            },
153            {
154                "statistical-test":{
155                    "identifier":"st-3"
156                }
157            }
158        ]
159    }
160    }
161 }
```

8 The CQL Context Set

The DIRECT Context Set (version 1.0) has been defined in order to provide a uniform query syntax to DIRECT by using the *Contextual Query Language (CQL)* [OASIS Search Web Services Technical Committee, 2012], developed and maintained by the Library of Congress in the context of the Z39.50 Next Generation (ZING) project.

The DIRECT Context Set implements all the search capabilities discussed in Section 4.

DIRECT provides conformance to CQL up to Level 2, since:

- Level 0:
    1. it is able to process a term-only query;
    2. if an unsupported query is supplied, it is able to respond with a diagnostic to say that the query is not supported;

- Level 1:
    1. it supports Level 0;
    2. it is able to parse both:
        (a) search clauses consisting of "index relation searchTerm"; and
        (b) queries where search terms are combined with Boolean operators;
    3. it supports both (a) and (b) above;

- Level 2:
    1. it supports Level 1;
    2. it is able to parse all of CQL and respond with appropriate diagnostics for the parts not supported.

8.1 Indexes

This section describes the indexes available in the DIRECT context set for searching and accessing the different resources managed by the system.

In the following there is a table summarizing all the indexes available for a given resource. The table contains:

- the full index name and an alias that can be used for convenience in writing queries;

- the type of the index – whether exact or best match;

- the relations allowed for the index;

- the wildcards that can be used with the index, if any;

- a short description of the matching criteria of the index.

This is presented in Sections from 8.1.1 to 8.1.6.

8.1.1 Log Event Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
`ici.logEvent.identifier`	`ici.le.id`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches log events with respect to their identifier (a positive integer)
`ici.logEvent.level`	`ici.le.level`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches metadata sets with respect to their level, which is defined as the following enumeration: TRACE, DEBUG, INFO, WARN, ERROR, FATAL
`ici.logEvent.created`	`ici.le.created`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches log events with respect to their creation timestamp
`ici.logEvent.thread`	`ici.le.thread`	Exact Match	=, ==, <>	* and ?	Matches log events with respect to the thread generating them
`ici.logEvent.className`	`ici.le.clsName`	Exact Match	=, ==, <>	* and ?	Matches log events with respect to the name of the class generating them
`ici.logEvent.classFileName`	`ici.le.clsFileName`	Exact Match	=, ==, <>	* and ?	Matches log events with respect to the name of the file of the class generating them

Index Name	Alias	Type	Relations	Wildcards	Description
ici.logEvent.classLine	ici.le.clsLine	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches log events with respect to the line of the file of the class generating them (a positive integer)
ici.logEvent.methodName	ici.le.methodName	Exact Match	=, ==, <>	* and ?	Matches log events with respect to the name of the method generating them
ici.logEvent.ip	ici.le.ip	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches log events with respect to IP address of the client generating them
ici.logEvent.user.identifier	ici.le.u.id	Exact Match	=, ==, <>	* and ?	Matches log events with respect to the identifier of the user generating them
ici.logEvent.user.namespace.identifier	ici.le.u.ns.id	Exact Match	=, ==, <>	* and ?	Matches log events with respect to the identifier of the namespace of the user generating them
ici.logEvent.action	ici.le.action	Exact Match	=, ==, <>	* and ?	Matches log events with respect to the action generating them
ici.logEvent.resource.identifier	ici.le.r.id	Exact Match	=, ==, <>	* and ?	Matches log events with respect to the identifier of the resource involved by them

Index Name	Alias	Type	Relations	Wildcards	Description
ici.logEvent. resource. namespace. identifier	ici.le.r.ns. id	Exact Match	=, ==, <>	* and ?	Matches log events with respect to the identifier of the namespace of the resource involved by them
ici.logEvent. resource.class	ici.le.r.cls	Exact Match	=, ==, <>	* and ?	Matches log events with respect to the class of the resource involved by them
ici.logEvent. message	ici.le.msg	Best Match	=, ==, <>	*	Matches log events with respect to their message
ici.logEvent. exception	ici.le.ex	Best Match	=, ==, <>	*	Matches log events with respect to the exception described in them
ici.logEvent. general	ici.le.gen	Best Match	=, ==, <>	*	Matches log events with respect to the content of all their attributes

Table 78: Indexes for searching the log event resource.

8.1.2 Namespace Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
ici.namespace. identifier	ici.ns.id	Exact Match	=, ==, <>	* and ?	Matches namespaces with respect to their identifier
ici.namespace. prefix	ici.ns. prefix	Exact Match	=, ==, <>	* and ?	Matches namespaces with respect to their prefix

Index Name	Alias	Type	Relations	Wildcards	Description
ici.namespace.description	ici.ns.desc	Best Match	=, ==, <>	*	Matches namespaces with respect to their description
ici.namespace.general	ici.ns.gen	Best Match	=, ==, <>	*	Matches namespaces with respect to the content of all their attributes
ici.namespace.created	ici.ns.created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches namespaces with respect to their creation timestamp
ici.namespace.lastModified	ici.ns.lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches namespaces with respect to their last modification timestamp

Table 79: Indexes for searching the namespace resource.

8.1.3 Concept Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
ici.concept.identifier	ici.c.id	Exact Match	=, ==, <>	* and ?	Matches concepts with respect to their identifier
ici.concept.namespace.identifier	ici.c.ns.id	Exact Match	=, ==, <>	* and ?	Matches concepts with respect to the identifier of their namespace
ici.concept.namespace.prefix	ici.c.ns.prefix	Exact Match	=, ==, <>	* and ?	Matches concepts with respect to the prefix of their namespace
ici.concept.description	ici.c.desc	Best Match	=, ==, <>	*	Matches concepts with respect to their description
ici.concept.general	ici.c.gen	Best Match	=, ==, <>	*	Matches concepts with respect to the content of all their attributes

Index Name	Alias	Type	Relations	Wildcards	Description
`ici.concept.` `created`	`ici.c.` `created`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches concepts with respect to their creation timestamp
`ici.concept.` `lastModified`	`ici.c.` `lastModified`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches concepts with respect to their last modification timestamp
`concept.source.` `identifier`	`ici.c.s.id`	Exact Match	=, ==, <>	* and ?	Matches concepts with respect to the identifier of the concepts that are linking to this concept, i.e. they act as source in a relation with this concept

`ici.concept.`
`source.`
`namespace.`
`identifier`
	`ici.c.s.ns.`
	`id`
		Exact Match	=, ==, <>	* and ?	Matches concepts with respect to the identifier of the namespace of the concepts that are linking to this concept, i.e. they act as source in a relation with this concept

`ici.concept.`
`source.`
`namespace.`
`prefix`
	`ici.c.s.ns.`
	`prefix`
		Exact Match	=, ==, <>	* and ?	Matches concepts with respect to the prefix of the namespace of the concepts that are linking to this concept, i.e. they act as source in a relation with this concept

Index Name	Alias	Type	Relations	Wildcards	Description

`ici.concept.`
`source.`
`relation.`
`identifier`
	`c.s.r.id`	Exact Match	=, ==, <>	* and ?	Matches concepts with respect to the identifier of the relation of the concepts that are linking to this concept, i.e. they act as source in a relation with this concept

`ici.concept.`
`source.`
`relation.`
`namespace.`
`identifier`
	`c.s.r.ns.id`	Exact Match	=, ==, <>	* and ?	Matches concepts with respect to the identifier of the namespace of the relation of the concepts that are linking to this concept, i.e. they act as source in a relation with this concept

`ici.concept.`
`source.`
`relation.`
`namespace.`
`prefix`
	`c.s.r.ns.`
	`prefix`
		Exact Match	=, ==, <>	* and ?	Matches concepts with respect to the identifier of the namespace of the relation of the concepts that are linking to this concept, i.e. they act as source in a relation with this concept

Index Name	Alias	Type	Relations	Wildcards	Description
`ici.concept.target.namespace.identifier`	`ici.c.s.ns.id`	Exact Match	=, ==, <>	* and ?	Matches concepts with respect to the identifier of the namespace of the concepts that are linked by this concept, i.e. they act as target in a relation with this concept
`ici.concept.target.namespace.prefix`	`ici.c.s.ns.prefix`	Exact Match	=, ==, <>	* and ?	Matches concepts with respect to the prefix of the namespace of the concepts that are linked by this concept, i.e. they act as target in a relation with this concept
`ici.concept.target.relation.identifier`	`c.s.r.id`	Exact Match	=, ==, <>	* and ?	Matches concepts with respect to the identifier of the relation of the concepts that are linked by this concept, i.e. they act as target in a relation with this concept

Table 80: Indexes for searching the concept resource.

8.1.4 Group Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
`ici.group.identifier`	`ici.g.id`	Exact Match	=, ==, <>	* and ?	Matches groups with respect to their identifier

Index Name	Alias	Type	Relations	Wildcards	Description
`ici.group.namespace.identifier`	`ici.g.ns.id`	Exact Match	=, ==, <>	* and ?	Matches groups with respect to the identifier of their namespace
`ici.group.namespace.prefix`	`ici.g.ns.prefix`	Exact Match	=, ==, <>	* and ?	Matches groups with respect to the prefix of their namespace
`ici.group.description`	`ici.g.desc`	Best Match	=, ==, <>	*	Matches groups with respect to their description
`ici.group.general`	`ici.g.gen`	Best Match	=, ==, <>	*	Matches groups with respect to the content of all their attributes
`ici.group.user.identifier`	`ici.g.u.id`	Exact Match	=, ==, <>	* and ?	Matches groups with respect to the identifier of the users belonging to them
`ici.group.user.namespace.identifier`	`ici.g.u.ns.id`	Exact Match	=, ==, <>	* and ?	Matches groups with respect to the identifier of the namespace of the users belonging to them
`ici.group.user.namespace.prefix`	`ici.g.u.ns.prefix`	Exact Match	=, ==, <>	* and ?	Matches groups with respect to the prefix of the namespace of the users belonging to them
`ici.group.created`	`ici.g.created`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches groups with respect to their creation timestamp
`ici.group.lastModified`	`ici.g.lastModified`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches groups with respect to their last modification timestamp

Index Name	Alias	Type	Relations	Wildcards	Description
`ici.group.user.identifier`	`ici.g.u.id`	Exact Match	=, ==, <>	* and ?	Matches groups with respect to the identifier of the users belonging to them
`ici.group.user.namespace.identifier`	`ici.g.u.ns.id`	Exact Match	=, ==, <>	* and ?	Matches groups with respect to the identifier of the namespace of the users belonging to them
`ici.group.user.namespace.prefix`	`ici.g.u.ns.prefix`	Exact Match	=, ==, <>	* and ?	Matches groups with respect to the prefix of the namespace of the users belonging to them

Table 81: Indexes for searching the group resource.

8.1.5 Role Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
`ici.role.identifier`	`ici.r.id`	Exact Match	=, ==, <>	* and ?	Matches roles with respect to their identifier
`ici.role.namespace.identifier`	`ici.r.ns.id`	Exact Match	=, ==, <>	* and ?	Matches roles with respect to the identifier of their namespace
`ici.role.namespace.prefix`	`ici.r.ns.prefix`	Exact Match	=, ==, <>	* and ?	Matches roles with respect to the prefix of their namespace
`ici.role.description`	`ici.r.desc`	Best Match	=, ==, <>	*	Matches roles with respect to their description

Index Name	Alias	Type	Relations	Wildcards	Description
ici.role. general	ici.r.gen	Best Match	=, ==, <>	*	Matches roles with respect to the content of all their attributes
ici.role.user. identifier	ici.r.u.id	Exact Match	=, ==, <>	* and ?	Matches roles with respect to the identifier of the users belonging to them
ici.role.user. namespace. identifier	ici.r.u.ns. id	Exact Match	=, ==, <>	* and ?	Matches roles with respect to the identifier of the namespace of the users belonging to them
ici.role.user. namespace. prefix	ici.r.u.ns. prefix	Exact Match	=, ==, <>	* and ?	Matches roles with respect to the prefix of the namespace of the users belonging to them
ici.role. created	ici.r. created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches roles with respect to their creation timestamp
ici.role. lastModified	ici.r. lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches roles with respect to their last modification timestamp
ici.role.user. identifier	ici.r.u.id	Exact Match	=, ==, <>	* and ?	Matches roles with respect to the identifier of the users belonging to them
ici.role.user. namespace. identifier	ici.r.u.ns. id	Exact Match	=, ==, <>	* and ?	Matches roles with respect to the identifier of the namespace of the users belonging to them

Index Name	Alias	Type	Relations	Wildcards	Description
ici.role.user. namespace. prefix	ici.r.u.ns. prefix	Exact Match	=, ==, <>	* and ?	Matches roles with respect to the prefix of the namespace of the users belonging to them

Table 82: Indexes for searching the role resource.

8.1.6 User Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
ici.user. identifier	ici.u.id	Exact Match	=, ==, <>	* and ?	Matches users with respect to their identifier
ici.user. namespace. identifier	ici.u.ns.id	Exact Match	=, ==, <>	* and ?	Matches users with respect to the identifier of their namespace
ici.user. namespace. prefix	ici.u.ns. prefix	Exact Match	=, ==, <>	* and ?	Matches users with respect to the prefix of their namespace
ici.user. lastName	ici.u. lastName	Exact Match	=, ==, <>	* and ?	Matches users with respect to their last/family name
ici.user. firstName	ici.u. firstName	Exact Match	=, ==, <>	* and ?	Matches users with respect to their first name
ici.user. affiliation	ici.u. affiliation	Best Match	=, ==, <>	*	Matches users with respect to their affiliation
ici.user.email	ici.u.email	Exact Match	=, ==, <>	* and ?	Matches users with respect to their email address

Index Name	Alias	Type	Relations	Wildcards	Description
ici.user.country	ici.u.country	Exact Match	=, ==, <>	* and ?	Matches users with respect to their country expressed using ISO 3166-1:2006 three letters codes
ici.user.language	ici.u.lang	Exact Match	=, ==, <>	* and ?	Matches users with respect to their language expressed using ISO 639-2:1998 three letters codes
ici.user.birthDate	ici.u.birthDate	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches users with respect to their birth date
ici.user.gender	ici.u.gender	Exact Match	=, ==, <>	*	Matches users with respect to their gender (MALE or FEMALE).
ici.user.address	ici.u.address	Best Match	=, ==, <>	*	Matches users with respect to their address
ici.user.city	ici.u.city	Exact Match	=, ==, <>	* and ?	Matches users with respect to their city
ici.user.state	ici.u.state	Exact Match	=, ==, <>	* and ?	Matches users with respect to their state/province/region
ici.user.zip	ici.u.zip	Exact Match	=, ==, <>	* and ?	Matches users with respect to their ZIP code
ici.user.phone	ici.u.phone	Exact Match	=, ==, <>	* and ?	Matches users with respect to their telephone number

Index Name	Alias	Type	Relations	Wildcards	Description
ici.user.facsimile	ici.u.facsimile	Exact Match	=, ==, <>	* and ?	Matches users with respect to their facsimile number
ici.user.mobile	ici.u.mobile	Exact Match	=, ==, <>	* and ?	Matches users with respect to their mobile telephone number
ici.user.voipCallerId	ici.u.voip	Exact Match	=, ==, <>	* and ?	Matches users with respect to their VoIP caller identifier
ici.user.homepage	ici.u.homepage	Exact Match	=, ==, <>	* and ?	Matches users with respect to their home page address.
ici.user.general	ici.u.gen	Best Match	=, ==, <>	*	Matches users with respect to the content of all their attributes
ici.user.group.identifier	ici.u.g.id	Exact Match	=, ==, <>	* and ?	Matches users with respect to the identifier of the groups they belong to
ici.user.group.namespace.identifier	ici.u.g.ns.id	Exact Match	=, ==, <>	* and ?	Matches users with respect to the identifier of the namespace of the groups they belong to
ici.user.group.namespace.prefix	ici.u.g.ns.prefix	Exact Match	=, ==, <>	* and ?	Matches users with respect to the prefix of the namespace of the groups they belong to

Index Name	Alias	Type	Relations	Wildcards	Description
ici.user.role.identifier	ici.u.r.id	Exact Match	=, ==, <>	* and ?	Matches users with respect to the identifier of the roles they belong to
ici.user.role.namespace.identifier	ici.u.r.ns.id	Exact Match	=, ==, <>	* and ?	Matches users with respect to the identifier of the namespace of the roles they belong to
ici.user.role.namespace.prefix	ici.u.r.ns.prefix	Exact Match	=, ==, <>	* and ?	Matches users with respect to the prefix of the namespace of the roles they belong to
ici.user.created	ici.u.created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches users with respect to their creation timestamp
ici.user.lastModified	ici.u.lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches users with respect to their last modification timestamp

Table 83: Indexes for searching the user resource.

8.1.7 Metadata Set Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
ici.metadataSet.identifier	ici.ms.id	Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to their identifier
ici.metadataSet.namespace.identifier	ici.ms.ns.id	Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to the identifier of their namespace

Index Name	Alias	Type	Relations	Wildcards	Description

`ici.`
`metadataSet.`
`namespace.`
`prefix`
	`ici.ms.ns.`
	`prefix`
		Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to the prefix of their namespace

`ici.`
`metadataSet.`
`name`
	`ici.ms.name`	Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to their name

`ici.`
`metadataSet.`
`description`
	`ici.ms.desc`	Best Match	=, ==, <>	*	Matches metadata sets with respect to their description

`ici.`
`metadataSet.`
`general`
	`ici.ms.gen`	Best Match	=, ==, <>	*	Matches metadata sets with respect to the content of all their attributes

`ici.`
`metadataSet.`
`superset.`
`identifier`
	`ici.ms.`
	`superset.id`
		Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to the identifier of the supersets they belong to

`ici.`
`metadataSet.`
`superset.name`
	`ici.ms.`
	`superset.`
	`name`
		Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to the identifier of the supersets they belong to

`ici.`
`metadataSet.`
`superset.`
`namespace.`
`identifier`
	`ici.ms.`
	`superset.`
	`ns.id`
		Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to the identifier of the namespace of the supersets they belong to

`ici.`
`metadataSet.`
`superset.`
`namespace.`
`prefix`
	`ici.ms.`
	`superset.`
	`ns.prefix`
		Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to the prefix of the namespace of the supersets they belong to

Index Name	Alias	Type	Relations	Wildcards	Description

`ici.`
`metadataSet.`
`subset.`
`identifier`
	`ici.ms.`
	`subset.id`
		Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to the identifier of the subsets belonging to them

`ici.`
`metadataSet.`
`subset.name`
	`ici.ms.`
	`subset.name`
		Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to the identifier of the subsets belonging to them

`ici.`
`metadataSet.`
`subset.`
`namespace.`
`identifier`
	`ici.ms.`
	`subset.ns.id`
		Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to the identifier of the namespace of the subsets belonging to them

`ici.`
`metadataSet.`
`subset.`
`namespace.`
`prefix`
	`ici.ms.`
	`subset.ns.`
	`prefix`
		Exact Match	=, ==, <>	* and ?	Matches metadata sets with respect to the prefix of the namespace of the subsets belonging to them

`ici.`
`metadataSet.`
`created`
	`ici.ms.`
	`created`
		Exact Match	=, ==, <>,
			>, <, >=,
			<=
				No	Matches metadata sets with respect to their creation timestamp

`ici.`
`metadataSet.`
`lastModified`
	`ici.ms.`
	`lastModified`
		Exact Match	=, ==, <>,
			>, <, >=,
			<=
				No	Matches metadata sets with respect to their last modification timestamp

Table 84: Indexes for searching the metadata set resource.

8.1.8 Metadata Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
`ici.metadata.` `identifier`	`ici.md.id`	Exact Match	=, ==, <>	* and ?	Matches metadata with respect to their identifier

Index Name	Alias	Type	Relations	Wildcards	Description
ici.metadata. namespace. identifier	ici.md.ns.id	Exact Match	=, ==, <>	* and ?	Matches metadata with respect to the identifier of their namespace
ici.metadata. namespace. prefix	ici.md.ns. prefix	Exact Match	=, ==, <>	* and ?	Matches metadata with respect to the prefix of their namespace
ici.metadata. general	ici.md.gen	Best Match	=, ==, <>	*	Matches metadata with respect to their textual content
ici.metadata. metadataSet. identifier	ici.md.ms.id	Exact Match	=, ==, <>	* and ?	Matches metadata with respect to the identifier of the metadata sets they belong to
ici.metadata. metadataSet. name	ici.md.ms. name	Exact Match	=, ==, <>	* and ?	Matches metadata with respect to the name of the metadata sets they belong to
ici.metadata. metadataSet. namespace. identifier	ici.md.ms. ns.id	Exact Match	=, ==, <>	* and ?	Matches metadata with respect to the identifier of the namespace of the metadata sets they belong to
ici.metadata. metadataSet. namespace. prefix	ici.md.ms. ns.prefix	Exact Match	=, ==, <>	* and ?	Matches metadata with respect to the prefix of the namespace of the metadata sets they belong to
ici.metadata. created	ici.md. created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches metadata with respect to their creation timestamp

Index Name	Alias	Type	Relations	Wildcards	Description
`ici.metadata.lastModified`	`ici.md.lastModified`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches metadata with respect to their last modification timestamp

Table 85: Indexes for searching the metadata resource.

The following table summarizes indexes that concern all the metadata resources in the Simple *Dublin Core (DC)* format according to the Dublin Core Context Set [OASIS Search Web Services Technical Committee, 2012].

Index Name	Alias	Type	Relations	Wildcards	Description
`dc.contributor`	`dc.contributor`	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their contributor element
`dc.coverage`	`dc.coverage`	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their coverage element
`dc.creator`	`dc.creator`	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their creator element
`dc.date`	`dc.date`	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their date element
`dc.description`	`dc.description`	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their description element
`dc.format`	`dc.format`	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their format element

Index Name	Alias	Type	Relations	Wildcards	Description
dc.identifier	dc.identifier	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their identifier element
dc.language	dc.language	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their language element
dc.publisher	dc.publisher	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their publisher element
dc.relation	dc.relation	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their relation element
dc.rights	dc.rights	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their rights element
dc.source	dc.source	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their source element
dc.subject	dc.subject	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their subject element
dc.title	dc.title	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their title element

Index Name	Alias	Type	Relations	Wildcards	Description
dc.type	dc.type	Best Match	=, ==, <>	*	Matches Dublin Core metadata with respect to their type element

Table 86: Indexes for searching the metadata resource according to the Dublin Core context set.

8.1.9 Application Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct. applications. identifier	direct.app. id	Exact Match	=, ==, <>	* and ?	Matches applications with respect to their identifier
direct. applications. description	direct.app. desc	Best Match	=, ==, <>	*	Matches applications with respect to their description
direct. applications. name	direct.app. name	Exact Match	=, ==, <>	* and ?	Matches applicationss with respect to their name
direct. applications. general	direct.app. gen	Best Match	=, ==, <>	*	Matches application swith respect to the content of all their attributes
direct. applications. created	direct.app. created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches applications with respect to their creation timestamp
direct. applications. lastModified	direct.app. lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches applications with respect to their last modification timestamp
direct. applications. configuration. identifier	direct.app. conf.id	Exact Match	=, ==, <>	* and ?	Matches applications with respect to the identifier of the configuration which they use.

Table 87: Indexes for searching the application resource.

8.1.10 Component Indexes

Index Name	Alias	Type	Relations	Wildcards	Description

`direct.`
`components.`
`identifier`
	`direct.cmp.`
	`id`
		Exact Match	=, ==, <>	* and ?	Matches components with respect to their identifier

`direct.`
`components.`
`description`
	`direct.cmp.`
	`desc`
		Best Match	=, ==, <>	*	Matches components with respect to their description

`direct.` `components.name`	`direct.cmp.` `name`	Exact Match	=, ==, <>	* and ?	Matches components with respect to their name

`direct.`
`components.`
`general`
	`direct.cmp.`
	`gen`
		Best Match	=, ==, <>	*	Matches components with respect to the content of all their attributes

`direct.`
`components.`
`created`
	`direct.cmp.`
	`created`
		Exact Match	=, ==, <>, >, <, >=, <=	No	Matches components with respect to their creation timestamp

`direct.`
`components.`
`lastModified`
	`direct.cmp.`
	`lastModified`
		Exact Match	=, ==, <>, >, <, >=, <=	No	Matches components with respect to their last modification timestamp

`direct.`
`components.`
`configuration.`
`identifier`
	`direct.cmp.`
	`conf.id`
		Exact Match	=, ==, <>	* and ?	Matches components with respect to the identifier of the configuration which they use.

`ici.components.`
`namespace.`
`identifier`
	`ici.cmp.ns.`
	`id`
		Exact Match	=, ==, <>	* and ?	Matches components with respect to the identifier of their namespace

`ici.components.`
`namespace.`
`prefix`
	`ici.cmp.ns.`
	`prefix`
		Exact Match	=, ==, <>	* and ?	Matches components with respect to the prefix of their namespace

Table 88: Indexes for searching the component resource.

8.1.11 Configuration Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct. configurations. identifier	direct.cnf. id	Exact Match	=, ==, <>	* and ?	Matches configurations with respect to their identifier
direct. configurations. description	direct.cnf. desc	Best Match	=, ==, <>	*	Matches configurations with respect to their description
direct. configurations. general	direct.cnf. gen	Best Match	=, ==, <>	*	Matches configurations with respect to the content of all their attributes

Table 89: Indexes for searching the configuration resource.

8.1.12 Contribution Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct. contributions. identifier	direct.cnt. id	Exact Match	=, ==, <>	* and ?	Matches contributions with respect to their identifier
direct. contributions. description	direct.cnt. desc	Best Match	=, ==, <>	*	Matches contributions with respect to their description
direct. contributions. title	direct.cnt. title	Exact Match	=, ==, <>	* and ?	Matches contributions with respect to their title
direct. contributions. content	direct.cnt. cont	Best Match	=, ==, <>	*	Matches contributions with respect to the content of all their attributes
direct. contributions. general	direct.cnt. gen	Best Match	=, ==, <>	*	Matches contributions with respect to the content of all their attributes

Index Name	Alias	Type	Relations	Wildcards	Description
direct. contributions. created	direct.cnt. created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches components with respect to their creation timestamp
direct. contributions. lastModified	direct.cnt. lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches components with respect to their last modification timestamp
direct. contributions. contributionYear	direct.cnt. cntYear	Exact Match	=, ==, <>	* and ?	Matches contributions with respect to their year
direct. contributions. contributionType	direct.cnt. cntYear	Exact Match	=, ==, <>	* and ?	Matches contributions with respect to their type

Table 90: Indexes for searching the contribution resource.

8.1.13   Corpus Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct.corpora. identifier	direct.crp. id	Exact Match	=, ==, <>	* and ?	Matches corpora with respect to their identifier
direct.corpora. description	direct.crp. desc	Best Match	=, ==, <>	*	Matches corpora with respect to their description
direct.corpora. general	direct.crp. gen	Best Match	=, ==, <>	*	Matches corpora with respect to the content of all their attributes
direct.corpora. created	direct.crp. created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches corpora with respect to their creation timestamp
direct.corpora. lastModified	direct.crp. lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches corpora with respect to their last modification timestamp

Index Name	Alias	Type	Relations	Wildcards	Description
direct.corpora.lang	direct.crp.lang	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches corpora with respect to their language
direct.corpora.mediaType	direct.crp.mediaType	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches corpora with respect to their media Type

Table 91: Indexes for searching the corpus resource.

8.1.14 Estimate Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct.estimates.identifier	direct.est.id	Exact Match	=, ==, <>	* and ?	Matches estimates with respect to their identifier
direct.estimates.value	direct.est.value	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches estimates with respect to their value
direct.estimates.created	direct.est.created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches estimates with respect to their creation timestamp
direct.estimates.lastModified	direct.est.lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches estimates with respect to their last modification timestamp
direct.estimates.metric.identifier	direct.est.mtr.id	Exact Match	=, ==, <>	* and ?	Matches estimates with respect to their concepts (metrics) identifier

Index Name	Alias	Type	Relations	Wildcards	Description
`direct.estimates.metric.namespace.identifier`	`direct.est.mtr.ns`	Exact Match	=, ==, <>	* and ?	Matches estimates with respect to their concepts (metrics) namespace identifier
`direct.estimates.metric.namespace.prefix`	`direct.est.mtr.ns`	Exact Match	=, ==, <>	* and ?	Matches estimates with respect to their concepts (metrics) namespace prefix
`direct.estimates.descriptivestatistic.identifier`	`direct.est.dst.id`	Exact Match	=, ==, <>	* and ?	Matches estimates with respect to their concepts (descriptive statistics) identifier
`direct.estimates.descriptivestatistic.namespace.identifier`	`direct.est.dst.ns`	Exact Match	=, ==, <>	* and ?	Matches estimates with respect to their concepts (descriptive statistics) namespace identifier
`direct.estimates.descriptivestatistic.namespace.prefix`	`direct.est.dst.ns`	Exact Match	=, ==, <>	* and ?	Matches estimates with respect to their concepts (descriptive statistics) namespace prefix
`direct.estimates.task.identifier`	`direct.mtr.tsk.id`	Exact Match	=, ==, <>	* and ?	Matches estimates with respect to their tasks identifier
`direct.estimates.topic.identifier`	`direct.mtr.tpc.id`	Exact Match	=, ==, <>	* and ?	Matches estimates with respect to their topics identifier

Index Name	Alias	Type	Relations	Wildcards	Description
direct.estimates. experiment. identifier	direct.mtr. exp.id	Exact Match	=, ==, <>	* and ?	Matches estimates with respect to their experiments identifier

Table 92: Indexes for searching the estimate resource.

8.1.15 Evaluation Activity Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct. evaluationactivities. identifier	direct.evl. id	Exact Match	=, ==, <>	* and ?	Matches evaluation activities with respect to their identifier
direct. evaluationactivities. namespace.identifier	direct.evl. id	Exact Match	=, ==, <>	* and ?	Matches evaluation activities with respect to their namespace identifier
direct. evaluationactivities. namespace.prefix	direct.evl. id	Exact Match	=, ==, <>	* and ?	Matches evaluation activities with respect to their namespace prefix
direct. evaluationactivities. description	direct.evl. desc	Best Match	=, ==, <>	*	Matches evaluation activities with respect to their description
direct. evaluationactivities. name	direct.evl. name	Exact Match	=, ==, <>	* and ?	Matches evaluation activities with respect to their name
direct. evaluationactivities. general	direct.evl. gen	Best Match	=, ==, <>	*	Matches evaluation activities with respect to the content of all their attributes

Index Name	Alias	Type	Relations	Wildcards	Description
direct. evaluationactivities. created	direct.evl. created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches evaluation activities with respect to their creation timestamp
direct. evaluationactivities. lastModified	direct.evl. lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches evaluation activities with respect to their last modification timestamp
direct. evaluationactivities. type	direct.evl. type	Exact Match	=, ==, <>	* and ?	Matches evaluation activities with respect to their type
direct. evaluationactivities. status	direct.evl. status	Exact Match	=, ==, <>	* and ?	Matches evaluation activities with respect to their status

Table 93: Indexes for searching the evaluation activity resource.

8.1.16 Experimental Collection Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct. experimentalcollections. identifier	direct. expcl.id	Exact Match	=, ==, <>	* and ?	Matches experimental collections with respect to their identifier
direct. experimentalcollections. description	direct. expcl.desc	Best Match	=, ==, <>	*	Matches experimental collections with respect to their description
direct. experimentalcollections. general	direct. expcl.gen	Best Match	=, ==, <>	*	Matches experimental collections with respect to the content of all their attributes

Index Name	Alias	Type	Relations	Wildcards	Description
`direct. experimentalcollections. created`	`direct. expcl. created`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches experimental collections with respect to their creation timestamp
`direct. experimentalcollections. lastModified`	`direct. expcl. lastModified`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches experimental collections with respect to their last modification timestamp
`direct. experimentalcollections. groundtruth.identifier`	`direct. expcl. grdtrt.id`	Exact Match	=, ==, <>	* and ?	Matches experimental collections with respect to their ground truth identifier
`direct. experimentalcollections. topicgroup.identifier`	`direct. expcl. tpcgrp.id`	Exact Match	=, ==, <>	* and ?	Matches experimental collections with respect to their topic group identifier

Table 94: Indexes for searching the experimental collection resource.

8.1.17 Experiment Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
`direct. experiments. identifier`	`direct.exp. id`	Exact Match	=, ==, <>	* and ?	Matches experiments with respect to their identifier
`direct. experiments. description`	`direct.exp. desc`	Best Match	=, ==, <>	*	Matches experiments with respect to their description
`direct. experiments. general`	`direct.exp. gen`	Best Match	=, ==, <>	*	Matches experiments with respect to the content of all their attributes

Index Name	Alias	Type	Relations	Wildcards	Description
`direct.experiments.created`	`direct.exp.created`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches experiments with respect to their creation timestamp
`direct.experiments.lastModified`	`direct.exp.lastModified`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches experiments with respect to their last modification timestamp
`direct.experiments.configuration.identifier`	`direct.exp.cnf.id`	Exact Match	=, ==, <>	* and ?	Matches experiments with respect to their configuration identifier
`direct.experiments.task.identifier`	`direct.exp.tsk.id`	Exact Match	=, ==, <>	* and ?	Matches experiments with respect to their task identifier
`direct.experiments.experimentType.identifier`	`direct.exp.exp.type.id`	Exact Match	=, ==, <>	* and ?	Matches experiments with respect to their experiment type identifier
`direct.experiments.experimentType.namespace.identifier`	`direct.exp.exp.type.ns.id`	Exact Match	=, ==, <>	* and ?	Matches experiments with respect to their experiment type namespace identifier
`direct.experiments.experimentType.namespace.prefix`	`direct.exp.exp.type.ns.prefix`	Exact Match	=, ==, <>	* and ?	Matches experiments with respect to their experiment type namespace prefix

Table 95: Indexes for searching the experiment resource.

8.1.18 Ground Truth Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct. groundTruth. identifier	direct.grt. id	Exact Match	=, ==, <>	* and ?	Matches groundTruth with respect to their identifier
direct. groundTruth. description	direct.grt. desc	Best Match	=, ==, <>	*	Matches ground truths with respect to their description
direct. groundTruth. general	direct.grt. gen	Best Match	=, ==, <>	*	Matches ground truths with respect to the content of all their attributes
direct. groundTruth. created	direct.grt. created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches ground truth with respect to their creation timestamp
direct. groundTruth. lastModified	direct.grt. lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches ground truth with respect to their last modification timestamp

Table 96: Indexes for searching the ground truth resource.

8.1.19 Pool Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct.pool. identifier	direct.p.id	Exact Match	=, ==, <>	* and ?	Matches pools with respect to their identifier
direct.pool. description	direct.p. desc	Best Match	=, ==, <>	*	Matches pools with respect to their description
direct.pool.general	direct.p.gen	Best Match	=, ==, <>	*	Matches pools with respect to the content of all their attributes
direct.pool.created	direct.p. created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches pools with respect to their creation timestamp

Index Name	Alias	Type	Relations	Wildcards	Description
`direct.pool.lastModified`	`direct.p.lastModified`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches pools with respect to their last modification timestamp
`direct.pool.experimentalcollectionidentifier`	`direct.p.expc.id`	Exact Match	=, ==, <>	* and ?	Matches pools with respect to their experimental collection identifier

Table 97: Indexes for searching the pool resource.

8.1.20 Information Unit Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
`direct.informationUnit.identifier`	`direct.iu.id`	Exact Match	=, ==, <>	* and ?	Matches Information Units with respect to their identifier
`direct.informationUnit.description`	`direct.iu.desc`	Best Match	=, ==, <>	*	Matches Information Units with respect to their description
`direct.informationUnit.general`	`direct.iu.gen`	Best Match	=, ==, <>	*	Matches Information Units with respect to the content of all their attributes
`direct.informationUnit.created`	`direct.iu.created`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches Information Units with respect to their creation timestamp
`direct.informationUnit.lastModified`	`direct.iu.lastModified`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches Information Units with respect to their last modification timestamp
`direct.informationUnit.corpus.identifier`	`direct.iu.crp.id`	Exact Match	=, ==, <>	* and ?	Matches Information Units with respect to their corpus identifier

Index Name	Alias	Type	Relations	Wildcards	Description

Table 98: Indexes for searching the Information Unit resource.

8.1.21 Measure Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
`direct.measures.identifier`	`direct.msr.id`	Exact Match	=, ==, <>	* and ?	Matches measures with respect to their identifier
`direct.measures.value`	`direct.msr.value`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches measures with respect to their value
`direct.measures.created`	`direct.msr.created`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches measures with respect to their creation timestamp
`direct.measures.lastModified`	`direct.msr.lastModified`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches measures with respect to their last modification timestamp
`direct.measures.metric.identifier`	`direct.msr.mtr.id`	Exact Match	=, ==, <>	* and ?	Matches measures with respect to their concepts (metrics) identifier
`direct.measures.metric.namespace.identifier`	`direct.msr.mtr.ns`	Exact Match	=, ==, <>	* and ?	Matches measures with respect to their concepts (metrics) namespace identifier
`direct.measures.metric.namespace.prefix`	`direct.msr.mtr.ns`	Exact Match	=, ==, <>	* and ?	Matches measures with respect to their concepts (metrics) namespace prefix
`direct.measures.topic.identifier`	`direct.msr.tpc.id`	Exact Match	=, ==, <>	* and ?	Matches measures with respect to their topics identifier

Index Name	Alias	Type	Relations	Wildcards	Description
direct.measures. experiment. identifier	direct.msr. exp.id	Exact Match	=, ==, <>	* and ?	Matches measures with respect to their experiments identifier

Table 99: Indexes for searching the measure resource.

8.1.22 Run Item Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct.runItem. identifier	direct.rni. id	Exact Match	=, ==, <>	* and ?	Matches run items with respect to their identifier
direct.runItem. rank	direct.rni. rank	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches run items with respect to their rank
direct.runItem. score	direct.rni. score	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches run items with respect to their score
direct.runItem. topic.identifier	direct.rni. tpc.id	Exact Match	=, ==, <>	* and ?	Matches run items with respect to their topics identifier
direct.runItem. experiment. identifier	direct.rni. exp.id	Exact Match	=, ==, <>	* and ?	Matches run items with respect to their experiments identifier
direct.runItem. informationunit. identifier	direct.rni. iu.id	Exact Match	=, ==, <>	* and ?	Matches run items with respect to their information units identifier

Table 100: Indexes for searching the run item resource.

8.1.23 Snapshot Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct.snapshots.identifier	direct.snp.id	Exact Match	=, ==, <>	* and ?	Matches snapshots with respect to their identifier
direct.snapshots.created	direct.snp.created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches snapshots with respect to their creation timestamp
direct.snapshots.lastModified	direct.snp.lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches snapshots with respect to their last modification timestamp
direct.snapshots.visualization.identifier	direct.snp.vsl.id	Exact Match	=, ==, <>	* and ?	Matches snapshots with respect to their visualization identifier

Table 101: Indexes for searching the snapshot resource.

8.1.24 Statistical Test Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct.statisticalTests.identifier	direct.stt.id	Exact Match	=, ==, <>	* and ?	Matches statistical tests with respect to their identifier
direct.statisticalTests.created	direct.stt.created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches statistical tests with respect to their creation timestamp
direct.statisticalTests.lastModified	direct.stt.lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches statistical tests with respect to their last modification timestamp
direct.statisticalTests.visualization.identifier	direct.stt.vsl.id	Exact Match	=, ==, <>	* and ?	Matches statistical tests with respect to their visualization identifier
direct.statisticalTests.statisticalAnalysis.identifier	direct.stt.vsl.id	Exact Match	=, ==, <>	* and ?	Matches statistical tests with respect to their statistical analysis identifier

Index Name	Alias	Type	Relations	Wildcards	Description
direct.statisticalTests.statisticalAnalysis.namespace.identifier	direct.stt.vsl.id	Exact Match	=, ==, <>	* and ?	Matches statistical tests with respect to their statistical analysis namespace identifier
direct.statisticalTests.statisticalAnalysis.namespace.prefix	direct.stt.vsl.id	Exact Match	=, ==, <>	* and ?	Matches statistical tests with respect to their statistical analysis namespace prefix

Table 102: Indexes for searching the statistical test resource.

8.1.25 System Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct.systems.identifier	direct.sys.id	Exact Match	=, ==, <>	* and ?	Matches systems with respect to their identifier
direct.systems.name	direct.sys.name	Exact Match	=, ==, <>	* and ?	Matches systems with respect to their name
direct.systems.description	direct.sys.desc	Best Match	=, ==, <>	*	Matches systems with respect to their description
direct.systems.created	direct.sys.created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches systems with respect to their creation timestamp
direct.systems.lastModified	direct.sys.lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches systems with respect to their last modification timestamp
direct.statisticalTests.configuration.identifier	direct.sys.cnf.id	Exact Match	=, ==, <>	* and ?	Matches systems with respect to their configuration identifier

Table 103: Indexes for searching the system resource.

8.1.26 Task Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
`direct.tasks.identifier`	`direct.tsk.id`	Exact Match	=, ==, <>	* and ?	Matches tasks with respect to their identifier
`direct.tasks.description`	`direct.tsk.desc`	Best Match	=, ==, <>	*	Matches tasks with respect to their description
`direct.tasks.created`	`direct.tsk.created`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches tasks with respect to their creation timestamp
`direct.tasks.lastModified`	`direct.tsk.lastModified`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches tasks with respect to their last modification timestamp
`direct.tasks.type`	`direct.tsk.type`	Exact Match	=, ==, <>	* and ?	Matches tasks with respect to their type
`direct.tasks.evaluationActivity.identifier`	`direct.tsk.eva.id`	Exact Match	=, ==, <>	* and ?	Matches systems with respect to their evaluation activity identifier
`direct.tasks.evaluationActivity.namespace.identifier`	`direct.tsk.eva.ns.id`	Exact Match	=, ==, <>	* and ?	Matches systems with respect to their evaluation activity namespace identifier
`direct.tasks.evaluationActivity.namespace.prefix`	`direct.tsk.eva.ns.prefix`	Exact Match	=, ==, <>	* and ?	Matches systems with respect to their evaluation activity namespace prefix
`direct.tasks.track.identifier`	`direct.tsk.trk.id`	Exact Match	=, ==, <>	* and ?	Matches systems with respect to their track identifier

Index Name	Alias	Type	Relations	Wildcards	Description
`direct.tasks.experimentalCollection identifier`	`direct.tsk. expc.id`	Exact Match	=, ==, <>	* and ?	Matches systems with respect to their experimental collection identifier

Table 104: Indexes for searching the task resource.

8.1.27 Topic Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
`direct.topics. identifier`	`direct.tpc. id`	Exact Match	=, ==, <>	* and ?	Matches topics with respect to their identifier
`direct.topics. created`	`direct.tpc. created`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches topics with respect to their creation timestamp
`direct.topics. lastModified`	`direct.tpc. lastModified`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches topics with respect to their last modification timestamp
`direct.topics. content`	`direct.tpc. content`	Best Match	=, ==, <>	*	Matches topics with respect to their content
`direct.topics. general`	`direct.tpc. general`	Best Match	=, ==, <>	*	Matches topics with respect to their content

Table 105: Indexes for searching the topic resource.

8.1.28 Topic Group Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
`direct. topicGroups. identifier`	`direct.tpcg. id`	Exact Match	=, ==, <>	* and ?	Matches topic groups with respect to their identifier

Index Name	Alias	Type	Relations	Wildcards	Description
direct. topicGroups. description	direct.tpcg. desc	Best Match	=, ==, <>	*	Matches topic groups with respect to their description
direct. topicGroups. general	direct.tpcg. gen	Best Match	=, ==, <>	*	Matches topic groups with respect to the content of all their attributes
direct. topicGroups. created	direct.tpcg. created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches topic groups with respect to their creation timestamp
direct. topicGroups. lastModified	direct.tpcg. lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches topic groups with respect to their last modification timestamp

Table 106: Indexes for searching the topic group resource.

8.1.29 Track Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
direct.tracks. identifier	direct.trk. id	Exact Match	=, ==, <>	* and ?	Matches tracks with respect to their identifier
direct.tracks. description	direct.trk. desc	Best Match	=, ==, <>	*	Matches tracks with respect to their description
direct.tracks. created	direct.trk. created	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches tracks with respect to their creation timestamp
direct.tracks. lastModified	direct.trk. lastModified	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches tracks with respect to their last modification timestamp

Index Name	Alias	Type	Relations	Wildcards	Description
`direct.tracks.submissionDeadline`	`direct.trk.subddl`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches tracks with respect to their submission deadline
`direct.tracks.evalact.identifier`	`direct.trk.evalact.id`	Exact Match	=, ==, <>	* and ?	Matches tracks with respect to their evaluation activity identifier
`direct.tracks.evalact.namespace.identifier`	`direct.trk.evalact.namespace.id`	Exact Match	=, ==, <>	* and ?	Matches tracks with respect to their evaluation activity namespace identifier
`direct.tracks.evalact.namespace.prefix`	`direct.trk.evalact.namespace.prefix`	Exact Match	=, ==, <>	* and ?	Matches tracks with respect to their evaluation activity namespace prefix

Table 107: Indexes for searching the track resource.

8.1.30 Visualization Indexes

Index Name	Alias	Type	Relations	Wildcards	Description
`direct.visualizations.identifier`	`direct.vsl.id`	Exact Match	=, ==, <>	* and ?	Matches visualizations with respect to their identifier
`direct.visualizations.description`	`direct.vsl.desc`	Best Match	=, ==, <>	*	Matches visualizations with respect to their description
`direct.visualizations.created`	`direct.vsl.created`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches visualizations with respect to their creation timestamp
`direct.visualizations.lastModified`	`direct.vsl.lastModified`	Exact Match	=, ==, <>, >, <, >=, <=	No	Matches visualizations with respect to their last modification timestamp

Index Name	Alias	Type	Relations	Wildcards	Description
`direct. visualizations. type.identifier`	`direct.vsl. type.id`	Exact Match	=, ==, <>	* and ?	Matches visualizations with respect to their type identifier
`direct. visualizations. type.namespace. identifier`	`direct. vsl.type. namespace.id`	Exact Match	=, ==, <>	* and ?	Matches visualizations with respect to their type namespace identifier
`direct. visualizations. type.namespace. prefix`	`direct. vsl.type. namespace. prefix`	Exact Match	=, ==, <>	* and ?	Matches visualizations with respect to their type namespace prefix

Table 108: Indexes for searching the visualization resource.

8.2 Relations

The DIRECT context set does not define relations but relies on those defined in the grammar of CQL. Anyway, it gives the semantics of the relations defined:

- =
  This is the default relation and it is treated as equivalent to ==.

- ==
  This relation is used for exact equality matching. The term in the data is exactly equal to the term in the search.

- <>
  This relation means "not equal to" and matches anything which is not exactly equal to the search term.

- <, >, <=, >=
  These relations retain their regular meanings as pertaining to ordered terms (less than, greater than, less than or equal to, greater than or equal to).

8.3 Relation Modifiers

The following relation modifiers are defined for the DIRECT context set:

- `limit=value`
  Specifies the maximum number of items to return.
  `value` can assume a positive integer numerical value.

- `offset=value`
  Specifies the number of items to skip before starting to return items.
  `value` can assume a positive integer numerical value.

As far as masking rules are concerned, the following wildcards characters apply to relations:

- a **single asterisk (∗)** is used to mask zero or more characters. This can be applied with both exact and best match indexes.

- a **single question mark (?)** is used to mask a single character, thus N consecutive question-marks means mask N characters. This can be applied only with exact match indexes.

8.4 Boolean Operators

The DIRECT context set does not define Boolean operators, as these can only be defined by the CQL grammar. Anyway, it gives the semantics of the Boolean operators defined:

- `AND`
  The combination of two sets of records with `AND` will result in the set of records that appear in both of the sets. Therefore, it is the intersection of the two sets.

- `OR`
  The combination of two sets of records with `OR` will result in the set of records that appear in either or both of the sets. Therefore, it is the union of the two sets.

- `NOT`
  The combination of two sets of records with `NOT` will result in the set of records that appear in the left set, but not in the right hand set. Therefore, it is the difference of the two sets. It cannot be used as a unary operator.

- `PROX`
  The `PROX` operator is not supported but it is parsed and appropriate diagnostic is provided in case of incorrect queries using it.

Note that only indexes with the same target resource can be combined by Boolean operators, since the records in each set must be of the same type, i.e. namespaces can be combined with namespaces and users can be combined with users while combining namespaces and users is not allowed.

8.5 Boolean Modifiers

The following Boolean modifiers are defined for the DIRECT context set:

- `match=value`
  The kind of matching to be applied when computing the Boolean expression, according to the different match strategies discussed in Section 4. This modifier can be used only with the `AND`,

`OR`, and `NOT` boolean operators.

`value` can assume one of the following values:

- **best**: a best matching has to be performed;
- **loose**: a very approximate matching has to be performed;
- **fuzzy**: a fuzzy matching has to be performed;
- **exact**: a strict boolean matching has to be performed.

8.6 Examples

- `fast.annotation.general == giotto`
  Searches for annotations about Giotto.

- `fast.annotation.general ==/thread==half giotto`
  Searches for annotations about Giotto, taking into consideration also the annotations annotating them.

- `fast.annotation.general ==/limit==100 giotto`
  Searches for annotations about Giotto and returns only the first 100 items

- `ici.user.email == ''ferro@dei.unipd.it"`
  Searches for users whose e-mail address is `ferro@dei.unipd.it`.

- `ici.user.email == *ferro*`
  Searches for users whose e-mail address contains the substring `ferro`, e.g. (`nicola.ferro`, `ferro.nicola`).

- `ici.user.group.identifier == admin*`
  Searches for users who belong to groups whose identifier starts with `admin`.

- `ici.user.country == ITA`
  Searches for Italian users.

- `(ici.user.email == *ferro*) and/match==fuzzy`
  `(ici.user.country == ITA)`
  Searches for users whose e-mail address contains the substring `ferro` and may be Italian.

- `ici.logEvent.created >/limit==100 2011-05-01`
  Searches for last 100 log events created after 1st May 2011.

- `ici.logEvent.identifier >/limit==100 1`
  Searches for last 100 log events.

9 Use Case: Guerrilla Experiments

This section describes the possible use of the evaluation infrastructure for carrying Guerrilla experiments. A Guerrilla experiment can also be defined as "evaluation in the wild" because it is carried on in "the real world" – i.e. outside the laboratory environment as it happens with traditional run experiments. In D4.2 [Reitberger et al., 2012] evaluation in wild is explained in details. It represents an innovative step in the experimental evaluation panorama. The main purpose is to perform application-centric evaluation by estimating a wide range of criteria covering four main quality categories.

The DIRECT system is specifically tailored to handle this new kind of experimental evaluation. In Figure 6 at page 23 we can see that the `Guerrilla` entity is in relationship with the `Application` entity. This allows us to relate every Guerrilla experiment with the application it is evaluating.

In Figure 37 we can see the evaluation grid of the guerrilla experiments. There are four main "Criteria", which are (i) the "Index Criteria"; (ii) the "Matching Criteria"; (iii) the "User Interface Criteria"; (iv) the "Search Result Criteria". All these criteria and their tests are visible in the XML example reported in Section 9.2. For instance the index criteria has tests like "Freshness" (row 57 of the XML reported in Section 9.2) or "Completeness" (row 62 of the XML reported in Section 9.2).
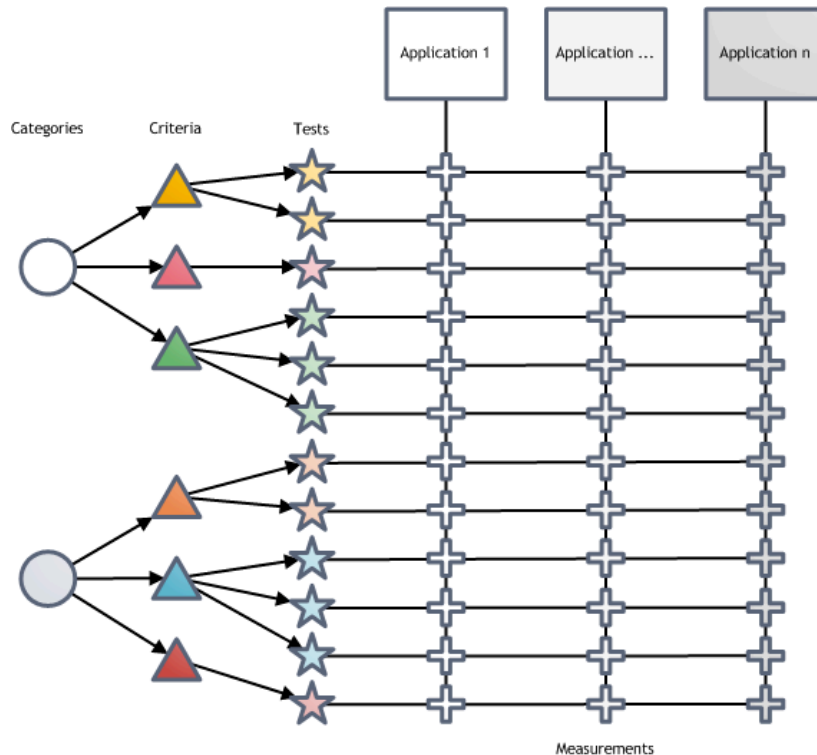
Figure 37: Guerilla experiments: Evaluation Grid for Multiple Applications [Reitberger et al., 2012].

The guerrilla experiments have been conducted on Web-applications and in this section we use

the Website: `https://www.ige.ch/` as a use case to show how DIRECT handles the data produced by the Guerrilla experiments (please see Section 9.2 for an XML representation of a sample Guerrilla experiment and Section 9.3 for a JSON representation). For these example we use the actual data derived from the Guerrilla experiments described in D4.2 [Reitberger et al., 2012].

In Figure 12 at page 29 we can see that a `Guerrilla` entity is in a relationship with the `Measure` and the `Concept` entities. This allows us to specify metrics (i.e. Concepts) and measures to an experiment.

The Guerrilla experiment is a specialization of the general `Experiment` entity as we can see in Figure 6 at page 23 and thus, it inherits all the methods applicable to a general Experiment. The specific API for the Guerrilla experiments is reported in the next section.

9.1 API

Action	HTTP Method	URI
CREATE_GUERRILLA	POST	/guerrilla
READ_GUERRILLA	GET	/guerrilla/{id}
UPDATE_GUERRILLA	PUT	/guerrilla/{id}
DELETE_GUERRILLA	DELETE	/guerrilla/{id}
LIST_GUERRILLAS	GET	/guerrilla
LIST_GUERRILLA_PROVENANCE_EVENTS	GET	/guerrilla/{id}/ provenance
ADD_MEASURE_TO_GUERRILLA	POST	/guerrilla/{id}/ metric/{id};{ns}/ measure/{id}
REMOVE_MEASURE_FROM_GUERRILLA	DELETE	/guerrilla/{id}/ metric/{id};{ns}/ measure/{id}
LIST_MEASURE_FROM_GUERRILLA	GET	/guerrilla/{id}/ measure

Table 109: API for accessing the guerrilla resource.

9.2 XML Representation

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <ims:direct xmlns:ims="http://ims.dei.unipd.it/"
3    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4    xsi:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
5    <ims:guerrilla ims:identifier="exp-1"
6      ims:description="Description of experiment, g.g. experiment submitted to TREC7"
7      ims:scope="SHARED" ims:created="2012-09-20T14:21:46.781+02:00"
8      ims:last-modified="2012-09-20T14:21:46.781+02:00">
9      <ims:owner>
10       <ims:user ims:identifier="user-1" ims:namespace="http://ims.dei.unipd.it/" />
```

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Network of Excellence co-funded by the 7th Framework Programme of the European Commission, grant agreement n. 258191

```xml
11      </ims:owner>
12      <ims:sharings>
13        <ims:sharing>
14          <ims:group ims:identifier="group-1" ims:namespace="http://ims.dei.unipd.it/" />
15          <ims:access-permission>DENIED</ims:access-permission>
16        </ims:sharing>
17        <ims:sharing>
18          <ims:group ims:identifier="group-2" ims:namespace="http://ims.dei.unipd.it/" />
19          <ims:access-permission>READ_ONLY</ims:access-permission>
20        </ims:sharing>
21        <ims:sharing>
22          <ims:group ims:identifier="group-3" ims:namespace="http://ims.dei.unipd.it/" />
23          <ims:access-permission>READ_WRITE</ims:access-permission>
24        </ims:sharing>
25      </ims:sharings>
26      <ims:links>
27        <ims:link>
28          <ims:metadata ims:identifier="md-1" ims:namespace="http://ims.dei.unipd.it/" />
29          <ims:relation>
30            <ims:concept ims:identifier="isDescriptionOf"
31              ims:namespace="http://ims.dei.unipd.it/" />
32          </ims:relation>
33          <ims:guerrilla ims:identifier="exp-1" />
34        </ims:link>
35        <ims:link>
36          <ims:metadata ims:identifier="md-2" ims:namespace="http://ims.dei.unipd.it/" />
37          <ims:relation>
38            <ims:concept ims:identifier="isCopyrightOf"
39              ims:namespace="http://ims.dei.unipd.it/" />
40          </ims:relation>
41          <ims:guerrilla ims:identifier="exp-1" />
42        </ims:link>
43        <ims:link>
44          <ims:metadata ims:identifier="md-3" ims:namespace="http://ims.dei.unipd.it/" />
45          <ims:relation>
46            <ims:concept ims:identifier="isAdministrationOf"
47              ims:namespace="http://ims.dei.unipd.it/" />
48          </ims:relation>
49          <ims:guerrilla ims:identifier="exp-1" />
50        </ims:link>
51      </ims:links>
52      <ims:task ims:identifier="task-1" />
53      <ims:configuration ims:identifier="configuration-1" />
54      <ims:application ims:identifier="https://www.ige.ch/" />
55      <ims:metrics>
56        <ims:metric>
57          <ims:concept ims:identifier="Completeness"
58            ims:namespace="http://www.ns1.com/" />
59          <ims:value>1.0E0</ims:value>
60        </ims:metric>
61        <ims:metric>
62          <ims:concept ims:identifier="Freshness" ims:namespace="http://www.ns1.com/" />
63          <ims:value>5.0E-1</ims:value>
64        </ims:metric>
65        <ims:metric>
66          <ims:concept ims:identifier="Binary Document Handling"
67            ims:namespace="http://www.ns1.com/" />
68          <ims:value>3.33333333E-1</ims:value>
69        </ims:metric>
70        <ims:metric>
```

```
 71        <ims:concept ims:identifier="Separation of Actual Content and Representations"
 72          ims:namespace="http://www.ns1.com/" />
 73        <ims:value>0.0E0</ims:value>
 74      </ims:metric>
 75      <ims:metric>
 76        <ims:concept ims:identifier="Special Characters"
 77          ims:namespace="http://www.ns1.com/" />
 78        <ims:value>0.0E0</ims:value>
 79      </ims:metric>
 80      <ims:metric>
 81        <ims:concept ims:identifier="Synonyms or Domain Specific Terminology"
 82          ims:namespace="http://www.ns1.com/" />
 83        <ims:value>0.0E0</ims:value>
 84      </ims:metric>
 85      <ims:metric>
 86        <ims:concept ims:identifier="Duplicate Documents"
 87          ims:namespace="http://www.ns1.com/" />
 88        <ims:value>0.0E0</ims:value>
 89      </ims:metric>
 90      <ims:metric>
 91        <ims:concept ims:identifier="Meta Data Quality"
 92          ims:namespace="http://www.ns1.com/" />
 93        <ims:value>0.0E0</ims:value>
 94      </ims:metric>
 95      <ims:metric>
 96        <ims:concept ims:identifier="Tokenization"
 97          ims:namespace="http://www.ns1.com/" />
 98        <ims:value>6.66666667E-1</ims:value>
 99      </ims:metric>
100      <ims:metric>
101        <ims:concept ims:identifier="Core Business Entities"
102          ims:namespace="http://www.ns1.com/" />
103        <ims:value>8.0E-1</ims:value>
104      </ims:metric>
105      <ims:metric>
106        <ims:concept ims:identifier="Stemming" ims:namespace="http://www.ns1.com/" />
107        <ims:value>0.0E0</ims:value>
108      </ims:metric>
109      <ims:metric>
110        <ims:concept ims:identifier="Average Index Metrics"
111          ims:namespace="http://www.ns1.com/" />
112        <ims:value>3.3E-1</ims:value>
113      </ims:metric>
114      <ims:metric>
115        <ims:concept ims:identifier="Phrasal Queries"
116          ims:namespace="http://www.ns1.com/" />
117        <ims:value>1.0E0</ims:value>
118      </ims:metric>
119      <ims:metric>
120        <ims:concept ims:identifier="Query Syntax"
121          ims:namespace="http://www.ns1.com/" />
122        <ims:value>8.0E-1</ims:value>
123      </ims:metric>
124      <ims:metric>
125        <ims:concept ims:identifier="Over- and Under-Specified Queries"
126          ims:namespace="http://www.ns1.com/" />
127        <ims:value>0.0E0</ims:value>
128      </ims:metric>
129      <ims:metric>
130        <ims:concept ims:identifier="Feedback" ims:namespace="http://www.ns1.com/" />
```

```
131          <ims:value>0.0E0</ims:value>
132       </ims:metric>
133       <ims:metric>
134         <ims:concept ims:identifier="Multimedia" ims:namespace="http://www.ns1.com/" />
135         <ims:value>0.0E0</ims:value>
136       </ims:metric>
137       <ims:metric>
138         <ims:concept ims:identifier="Cross-Language Information Retrieval"
139           ims:namespace="http://www.ns1.com/" />
140         <ims:value>1.0E0</ims:value>
141       </ims:metric>
142       <ims:metric>
143         <ims:concept ims:identifier="Average Matching Metrics"
144           ims:namespace="http://www.ns1.com/" />
145         <ims:value>4.66666667E-1</ims:value>
146       </ims:metric>
147       <ims:metric>
148         <ims:concept ims:identifier="Performance / Responsiveness"
149           ims:namespace="http://www.ns1.com/" />
150         <ims:value>1.0E0</ims:value>
151       </ims:metric>
152       <ims:metric>
153         <ims:concept ims:identifier="User Guidance"
154           ims:namespace="http://www.ns1.com/" />
155         <ims:value>0.0E0</ims:value>
156       </ims:metric>
157       <ims:metric>
158         <ims:concept ims:identifier="Browsing" ims:namespace="http://www.ns1.com/" />
159         <ims:value>1.0E0</ims:value>
160       </ims:metric>
161       <ims:metric>
162         <ims:concept ims:identifier="Personalization"
163           ims:namespace="http://www.ns1.com/" />
164         <ims:value>0.0E0</ims:value>
165       </ims:metric>
166       <ims:metric>
167         <ims:concept ims:identifier="Social Aspects"
168           ims:namespace="http://www.ns1.com/" />
169         <ims:value>0.0E0</ims:value>
170       </ims:metric>
171       <ims:metric>
172         <ims:concept ims:identifier="Exception Handling"
173           ims:namespace="http://www.ns1.com/" />
174         <ims:value>0.0E0</ims:value>
175       </ims:metric>
176       <ims:metric>
177         <ims:concept ims:identifier="Result List Presentation"
178           ims:namespace="http://www.ns1.com/" />
179         <ims:value>1.0E0</ims:value>
180       </ims:metric>
181       <ims:metric>
182         <ims:concept ims:identifier="Entertainment"
183           ims:namespace="http://www.ns1.com/" />
184         <ims:value>5.0E-1</ims:value>
185       </ims:metric>
186       <ims:metric>
187         <ims:concept ims:identifier="Localization"
188           ims:namespace="http://www.ns1.com/" />
189         <ims:value>1.0E0</ims:value>
190       </ims:metric>
```

```
191     <ims:metric>
192       <ims:concept ims:identifier="Facets" ims:namespace="http://www.ns1.com/" />
193       <ims:value>1.0E0</ims:value>
194     </ims:metric>
195     <ims:metric>
196       <ims:concept ims:identifier="Result List Import / Export"
197         ims:namespace="http://www.ns1.com/" />
198       <ims:value>0.0E0</ims:value>
199     </ims:metric>
200     <ims:metric>
201       <ims:concept ims:identifier="Sorting of Result List"
202         ims:namespace="http://www.ns1.com/" />
203       <ims:value>1.0E0</ims:value>
204     </ims:metric>
205     <ims:metric>
206       <ims:concept ims:identifier="Justification of Results"
207         ims:namespace="http://www.ns1.com/" />
208       <ims:value>3.33333E-1</ims:value>
209     </ims:metric>
210     <ims:metric>
211       <ims:concept ims:identifier="System Override / User Control"
212         ims:namespace="http://www.ns1.com/" />
213       <ims:value>0.0E0</ims:value>
214     </ims:metric>
215     <ims:metric>
216       <ims:concept ims:identifier="Related Content"
217         ims:namespace="http://www.ns1.com/" />
218       <ims:value>0.0E0</ims:value>
219     </ims:metric>
220     <ims:metric>
221       <ims:concept ims:identifier="Context Information"
222         ims:namespace="http://www.ns1.com/" />
223       <ims:value>0.0E0</ims:value>
224     </ims:metric>
225     <ims:metric>
226       <ims:concept ims:identifier="Navigational Aids"
227         ims:namespace="http://www.ns1.com/" />
228       <ims:value>0.0E0</ims:value>
229     </ims:metric>
230     <ims:metric>
231       <ims:concept ims:identifier="Mobile Access"
232         ims:namespace="http://www.ns1.com/" />
233       <ims:value>0.0E0</ims:value>
234     </ims:metric>
235     <ims:metric>
236       <ims:concept ims:identifier="Average User Interface Metrics"
237         ims:namespace="http://www.ns1.com/" />
238       <ims:value>4.12280702E-1</ims:value>
239     </ims:metric>
240     <ims:metric>
241       <ims:concept ims:identifier="Navigational Queries"
242         ims:namespace="http://www.ns1.com/" />
243       <ims:value>1.0E0</ims:value>
244     </ims:metric>
245     <ims:metric>
246       <ims:concept ims:identifier="Factual Queries"
247         ims:namespace="http://www.ns1.com/" />
248       <ims:value>8.0E-1</ims:value>
249     </ims:metric>
250     <ims:metric>
```

```
251        <ims:concept ims:identifier="Known / Suspected Item Retrieval"
252          ims:namespace="http://www.ns1.com/" />
253        <ims:value>4.0E-1</ims:value>
254      </ims:metric>
255      <ims:metric>
256        <ims:concept ims:identifier="Diversity" ims:namespace="http://www.ns1.com/" />
257        <ims:value>0.0E0</ims:value>
258      </ims:metric>
259      <ims:metric>
260        <ims:concept ims:identifier="Geo-Location"
261          ims:namespace="http://www.ns1.com/" />
262        <ims:value>0.0E0</ims:value>
263      </ims:metric>
264      <ims:metric>
265        <ims:concept ims:identifier="Average Search Results Metrics"
266          ims:namespace="http://www.ns1.com/" />
267        <ims:value>4.4E-1</ims:value>
268      </ims:metric>
269    </ims:metrics>
270  </ims:guerrilla>
271 </ims:direct>
```

9.3   JSON Representation

```
1  {
2    "direct":{
3      "guerrilla":{
4        "identifier":"exp-1",
5        "description":"Description of experiment, g.g. experiment submitted to TREC7",
6        "scope":"SHARED",
7        "created":"2012-09-22T16:24:37.143+02:00",
8        "last-modified":"2012-09-22T16:24:37.143+02:00",
9        "owner":{
10          "user":{
11            "identifier":"user-1",
12            "namespace":"http://ims.dei.unipd.it/"
13          }
14        },
15        "sharings":[
16          {
17            "sharing":{
18              "group":{
19                "identifier":"group-1",
20                "namespace":"http://ims.dei.unipd.it/"
21              },
22              "access-permission":"DENIED"
23            }
24          },
25          {
26            "sharing":{
27              "group":{
28                "identifier":"group-2",
29                "namespace":"http://ims.dei.unipd.it/"
30              },
31              "access-permission":"READ_ONLY"
32            }
33          },
34          {
35            "sharing":{
36              "group":{
```

```
37                       "identifier":"group-3",
38                       "namespace":"http://ims.dei.unipd.it/"
39                   },
40                   "access-permission":"READ_WRITE"
41               }
42           }
43       ],
44       "links":[
45           {
46               "link":{
47                   "metadata":{
48                       "identifier":"md-1",
49                       "namespace":"http://ims.dei.unipd.it/"
50                   },
51                   "relation":{
52                       "concept":{
53                           "identifier":"isDescriptionOf",
54                           "namespace":"http://ims.dei.unipd.it/"
55                       }
56                   },
57                   "guerrilla":{
58                       "identifier":"exp-1"
59                   }
60               }
61           },
62           {
63               "link":{
64                   "metadata":{
65                       "identifier":"md-2",
66                       "namespace":"http://ims.dei.unipd.it/"
67                   },
68                   "relation":{
69                       "concept":{
70                           "identifier":"isCopyrightOf",
71                           "namespace":"http://ims.dei.unipd.it/"
72                       }
73                   },
74                   "guerrilla":{
75                       "identifier":"exp-1"
76                   }
77               }
78           },
79           {
80               "link":{
81                   "metadata":{
82                       "identifier":"md-3",
83                       "namespace":"http://ims.dei.unipd.it/"
84                   },
85                   "relation":{
86                       "concept":{
87                           "identifier":"isAdministrationOf",
88                           "namespace":"http://ims.dei.unipd.it/"
89                       }
90                   },
91                   "guerrilla":{
92                       "identifier":"exp-1"
93                   }
94               }
95           }
96       ],
```

```
 97          "task":{
 98              "identifier":"task-1"
 99          },
100          "configuration":{
101              "identifier":"configuration-1"
102          },
103          "application":{
104              "identifier":"https://www.ige.ch/"
105          },
106          "metrics":[
107              {
108                  "metric":{
109                      "concept":{
110                          "identifier":"Completeness",
111                          "namespace":"http://www.ns1.com/"
112                      },
113                      "value":"1.0E0"
114                  }
115              },
116              {
117                  "metric":{
118                      "concept":{
119                          "identifier":"Freshness",
120                          "namespace":"http://www.ns1.com/"
121                      },
122                      "value":"5.0E-1"
123                  }
124              },
125              {
126                  "metric":{
127                      "concept":{
128                          "identifier":"Binary Document Handling",
129                          "namespace":"http://www.ns1.com/"
130                      },
131                      "value":"3.33333333E-1"
132                  }
133              },
134              {
135                  "metric":{
136                      "concept":{
137                          "identifier":"Separation of Actual Content and Representations",
138                          "namespace":"http://www.ns1.com/"
139                      },
140                      "value":"0.0E0"
141                  }
142              },
143              {
144                  "metric":{
145                      "concept":{
146                          "identifier":"Special Characters",
147                          "namespace":"http://www.ns1.com/"
148                      },
149                      "value":"0.0E0"
150                  }
151              },
152              {
153                  "metric":{
154                      "concept":{
155                          "identifier":"Synonyms or Domain Specific Terminology",
156                          "namespace":"http://www.ns1.com/"
```

D3.3: Prototype of the Evaluation Infrastructure

```
157                 },
158                 "value":"0.0E0"
159             }
160         },
161         {
162             "metric":{
163                 "concept":{
164                     "identifier":"Duplicate Documents",
165                     "namespace":"http://www.ns1.com/"
166                 },
167                 "value":"0.0E0"
168             }
169         },
170         {
171             "metric":{
172                 "concept":{
173                     "identifier":"Meta Data Quality",
174                     "namespace":"http://www.ns1.com/"
175                 },
176                 "value":"0.0E0"
177             }
178         },
179         {
180             "metric":{
181                 "concept":{
182                     "identifier":"Tokenization",
183                     "namespace":"http://www.ns1.com/"
184                 },
185                 "value":"6.66666667E-1"
186             }
187         },
188         {
189             "metric":{
190                 "concept":{
191                     "identifier":"Core Business Entities",
192                     "namespace":"http://www.ns1.com/"
193                 },
194                 "value":"8.0E-1"
195             }
196         },
197         {
198             "metric":{
199                 "concept":{
200                     "identifier":"Stemming",
201                     "namespace":"http://www.ns1.com/"
202                 },
203                 "value":"0.0E0"
204             }
205         },
206         {
207             "metric":{
208                 "concept":{
209                     "identifier":"Average Index Metrics",
210                     "namespace":"http://www.ns1.com/"
211                 },
212                 "value":"3.3E-1"
213             }
214         },
215         {
216             "metric":{
```

```
217                    "concept":{
218                        "identifier":"Phrasal Queries",
219                        "namespace":"http://www.ns1.com/"
220                    },
221                    "value":"1.0E0"
222                }
223            },
224            {
225                "metric":{
226                    "concept":{
227                        "identifier":"Query Syntax",
228                        "namespace":"http://www.ns1.com/"
229                    },
230                    "value":"8.0E-1"
231                }
232            },
233            {
234                "metric":{
235                    "concept":{
236                        "identifier":"Over- and Under-Specified Queries",
237                        "namespace":"http://www.ns1.com/"
238                    },
239                    "value":"0.0E0"
240                }
241            },
242            {
243                "metric":{
244                    "concept":{
245                        "identifier":"Feedback",
246                        "namespace":"http://www.ns1.com/"
247                    },
248                    "value":"0.0E0"
249                }
250            },
251            {
252                "metric":{
253                    "concept":{
254                        "identifier":"Multimedia",
255                        "namespace":"http://www.ns1.com/"
256                    },
257                    "value":"0.0E0"
258                }
259            },
260            {
261                "metric":{
262                    "concept":{
263                        "identifier":"Cross-Language Information Retrieval",
264                        "namespace":"http://www.ns1.com/"
265                    },
266                    "value":"1.0E0"
267                }
268            },
269            {
270                "metric":{
271                    "concept":{
272                        "identifier":"Average Matching Metrics",
273                        "namespace":"http://www.ns1.com/"
274                    },
275                    "value":"4.66666667E-1"
276                }
```

```
277                    },
278                    {
279                        "metric":{
280                            "concept":{
281                                "identifier":"Performance / Responsiveness",
282                                "namespace":"http://www.ns1.com/"
283                            },
284                            "value":"1.0E0"
285                        }
286                    },
287                    {
288                        "metric":{
289                            "concept":{
290                                "identifier":"User Guidance",
291                                "namespace":"http://www.ns1.com/"
292                            },
293                            "value":"0.0E0"
294                        }
295                    },
296                    {
297                        "metric":{
298                            "concept":{
299                                "identifier":"Browsing",
300                                "namespace":"http://www.ns1.com/"
301                            },
302                            "value":"1.0E0"
303                        }
304                    },
305                    {
306                        "metric":{
307                            "concept":{
308                                "identifier":"Personalization",
309                                "namespace":"http://www.ns1.com/"
310                            },
311                            "value":"0.0E0"
312                        }
313                    },
314                    {
315                        "metric":{
316                            "concept":{
317                                "identifier":"Social Aspects",
318                                "namespace":"http://www.ns1.com/"
319                            },
320                            "value":"0.0E0"
321                        }
322                    },
323                    {
324                        "metric":{
325                            "concept":{
326                                "identifier":"Exception Handling",
327                                "namespace":"http://www.ns1.com/"
328                            },
329                            "value":"0.0E0"
330                        }
331                    },
332                    {
333                        "metric":{
334                            "concept":{
335                                "identifier":"Result List Presentation",
336                                "namespace":"http://www.ns1.com/"
```

```
337                     },
338                     "value":"1.0E0"
339                 }
340             },
341             {
342                 "metric":{
343                     "concept":{
344                         "identifier":"Entertainment",
345                         "namespace":"http://www.ns1.com/"
346                     },
347                     "value":"5.0E-1"
348                 }
349             },
350             {
351                 "metric":{
352                     "concept":{
353                         "identifier":"Localization",
354                         "namespace":"http://www.ns1.com/"
355                     },
356                     "value":"1.0E0"
357                 }
358             },
359             {
360                 "metric":{
361                     "concept":{
362                         "identifier":"Facets",
363                         "namespace":"http://www.ns1.com/"
364                     },
365                     "value":"1.0E0"
366                 }
367             },
368             {
369                 "metric":{
370                     "concept":{
371                         "identifier":"Result List Import / Export",
372                         "namespace":"http://www.ns1.com/"
373                     },
374                     "value":"0.0E0"
375                 }
376             },
377             {
378                 "metric":{
379                     "concept":{
380                         "identifier":"Sorting of Result List",
381                         "namespace":"http://www.ns1.com/"
382                     },
383                     "value":"1.0E0"
384                 }
385             },
386             {
387                 "metric":{
388                     "concept":{
389                         "identifier":"Justification of Results",
390                         "namespace":"http://www.ns1.com/"
391                     },
392                     "value":"3.33333E-1"
393                 }
394             },
395             {
396                 "metric":{
```

```
397                    "concept":{
398                        "identifier":"System Override / User Control",
399                        "namespace":"http://www.ns1.com/"
400                    },
401                    "value":"0.0E0"
402                }
403            },
404            {
405                "metric":{
406                    "concept":{
407                        "identifier":"Related Content",
408                        "namespace":"http://www.ns1.com/"
409                    },
410                    "value":"0.0E0"
411                }
412            },
413            {
414                "metric":{
415                    "concept":{
416                        "identifier":"Context Information",
417                        "namespace":"http://www.ns1.com/"
418                    },
419                    "value":"0.0E0"
420                }
421            },
422            {
423                "metric":{
424                    "concept":{
425                        "identifier":"Navigational Aids",
426                        "namespace":"http://www.ns1.com/"
427                    },
428                    "value":"0.0E0"
429                }
430            },
431            {
432                "metric":{
433                    "concept":{
434                        "identifier":"Mobile Access",
435                        "namespace":"http://www.ns1.com/"
436                    },
437                    "value":"0.0E0"
438                }
439            },
440            {
441                "metric":{
442                    "concept":{
443                        "identifier":"Average User Interface Metrics",
444                        "namespace":"http://www.ns1.com/"
445                    },
446                    "value":"4.12280702E-1"
447                }
448            },
449            {
450                "metric":{
451                    "concept":{
452                        "identifier":"Navigational Queries",
453                        "namespace":"http://www.ns1.com/"
454                    },
455                    "value":"1.0E0"
456                }
```

```
457                 },
458                 {
459                     "metric":{
460                         "concept":{
461                             "identifier":"Factual Queries",
462                             "namespace":"http://www.ns1.com/"
463                         },
464                         "value":"8.0E-1"
465                     }
466                 },
467                 {
468                     "metric":{
469                         "concept":{
470                             "identifier":"Known / Suspected Item Retrieval",
471                             "namespace":"http://www.ns1.com/"
472                         },
473                         "value":"4.0E-1"
474                     }
475                 },
476                 {
477                     "metric":{
478                         "concept":{
479                             "identifier":"Diversity",
480                             "namespace":"http://www.ns1.com/"
481                         },
482                         "value":"0.0E0"
483                     }
484                 },
485                 {
486                     "metric":{
487                         "concept":{
488                             "identifier":"Geo-Location",
489                             "namespace":"http://www.ns1.com/"
490                         },
491                         "value":"0.0E0"
492                     }
493                 },
494                 {
495                     "metric":{
496                         "concept":{
497                             "identifier":"Average Search Results Metrics",
498                             "namespace":"http://www.ns1.com/"
499                         },
500                         "value":"4.4E-1"
501                     }
502                 }
503             ]
504         }
505     }
506 }
```

10 Use Case: The CLEF Initiative Portal

The first step for the website design was to perform a qualitative analysis on the previous version of the CLEF website. The objective was to gain indications on the way heterogeneous types of users, i.e., users with different levels and fields of expertise, perceive the website. The outcomes of the analysis have been used in redesigning the CLEF website to make it more responsive to user requirements. The analysis was based on the website quality model proposed by Roberto Polillo and presented in a summarized version in [Polillo, 2005] and in a more detailed version in [Polillo, 2004]. The model concerns the external quality of the website, i.e., the quality perceived by the user. The results of the analysis have been reported in D6.1 [Tsikrika et al., 2011b].

The CLEF Campaign website provides access to CLEF-related resources on a per edition basis. In order to provide diverse navigation paths to reach these resources, we exploit the diverse entities involved in an evaluation campaign or that are results of activities carried out within the campaign, e.g. publications. The main entities are:

- **editions** of the evaluation activities carried out in CLEF;

- **tracks** carried out within the diverse CLEF editions;

- **publications** resulting from the evaluation activities carried out in CLEF or from the resources made available by the CLEF activites, e.g. test collections;

- **resources** useful to the CLEF organizers and participants to carry out the evaluation activities.

These entities have been adopted as entries of a navigation bar (hereafter named "main navigation bar") displayed on the top of the website. A screenshot of the homepage is reported in Figure 38. The resource entry is not visible in the navigation bar because it provides access to a restricted area; Figure 39 reports a screenshot of the homepage when the user is a member of the CLEF Initiative Consortium and is logged in; members have access to the "Resources" page. Indeed, we can distinguish three types of users:

- *guest*: users who can access only public pages of the website — the website visualization for these users is that reported in Figure 38.

- *CLEF Initiative consortium*: users who can access both public pages and the resource page — the website visualization for these users is that reported in Figure 39 and a screenshot of the "Resources" page is reported in Figure 49.

- *CLEF Initiative Steering Committee*: users who are part of the Steering Committee of the CLEF Initiative[10]; those users are consortium members who can access also the folder "Steering Committee" in the page resource.

The "Resources" page provides access to the Liferay Document Library. The Document Library can be structured in a set of folders, where each folder (including the root folder) can contain both

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[10] http://www.clef-initiative.eu/about/steering-committee

(sub)folders and documents of different media. The Document Library in the CLEF Initiative Website is used both as a repository for files useful to display website content (e.g. images) and for CLEF evaluation activities resources (e.g. working notes papers, slides, or other documents).
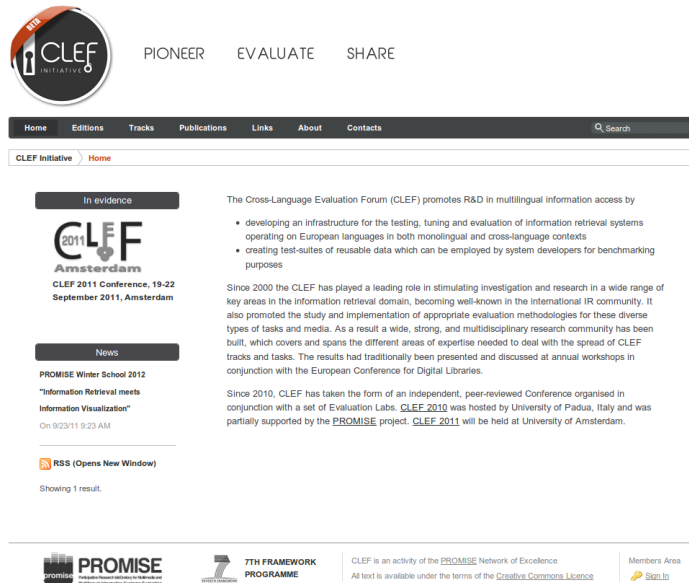
Figure 38: A screenshot of the clef-initiative/home page.
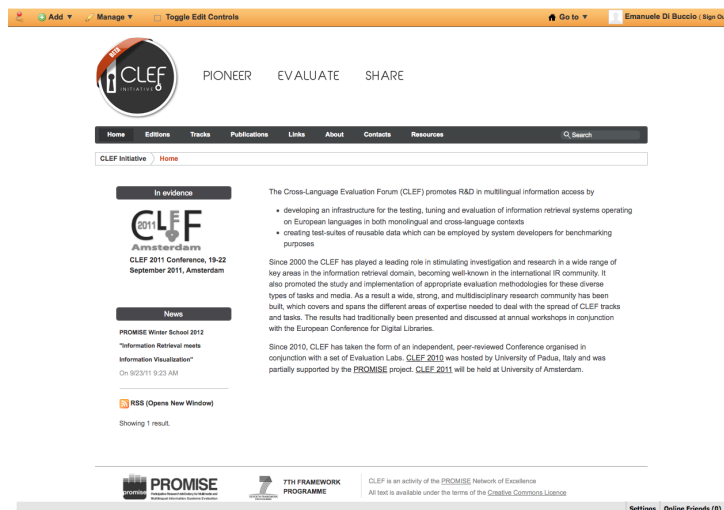
Figure 39: A screenshot of the clef-initiative/home page for the (logged-in) consortium members

As shown in Figure 38 a search box was added to the main navigation bar. That allows the

user to access the website content through full-text search: both the content of the pages and of the documents in the website are indexed. Moreover, a *breadcrumb trail* is displayed below the navigation bar; that can help the user understand his current location within the website.

Besides the four entries mentioned above, additional entries are available in the navigation bar:

- **Links**: this page reports links to resources that are related to the CLEF Initiative activities or concern other evaluation initiatives (e.g. TREC, NTCIR, INEX, FIRE), or tools to support research.

- **About**: this page reports information on the objective of the CLEF Initiative consortium, how it is structured and on the procedures to proposed CLEF evaluation activities or conferences.

- **Contacts**: this page provides a form to contact the CLEF Initiative responsible and ask for information or provide feedback.

Each of the above entries will be discussed in details in the following sections. The remainder of this section will describe how the CLEF Initiative Website is ready to be interfaced with the PROMISE Infrastructure.

In the CLEF Campaign Website URLs do not change during the navigation. This behaviour has two drawbacks: (i) we cannot provide link to specific pages of the website and (ii) the user cannot exploit URL depths to understand his current position within the website. Therefore, in the CLEF Initiative Website we assign a URL to each page. The assignment of URLs follows the approach adopted in the DIRECT RESTful Web Service described in D3.2 [Agosti et al., 2011a] and in the present deliverable. In the infrastructure each entity is represented by a resource. The DIRECT RESTful Web Service API provides a set of URIs and methods to access resources retained in the infrastructure. For instance, in order to obtain a list of all the evaluation activities retained in the infrastructure, the following request can be performed:

<div align="center">

`/evaluation-activity`

</div>

using the HTTP method GET. In order to obtain information on a specific instance of the evaluation activity resource, the request will be

<div align="center">

`/evaluation-activity/{id};{ns}`

</div>

using the HTTP method GET. In other words, when the URI ends with the name of the resource, the list of instances of that resource are provided. When the name of the resource is followed by an identifier, information on the specific instance is returned. The same approach will be adopted in the website. For instance, in order to get all the editions in the CLEF evaluation initiatives, the URL of the page for the editions will be

<div align="center">

clef-initiative/edition

</div>

In order to access a specific CLEF edition, e.g. CLEF 2009, the URL of the page will be

<div align="center">

clef-initiative/edition/clef2009

</div>

The API are not adopted only to support the URLs definition. The information required by the portlets developed for the website will be obtained by performing a request to the infrastructure. For instance, in order to get (information on) all the CLEF editions, the request could be: return all the evaluation activities for which the value of the series field is "clef". The portlets in the CLEF Initiative Website need responses in json format. Since the infrastructure is under development, we created files which contain the response that the infrastructure should provide to the website. All the requests are restricted to the case where the (edition) series is "clef".

10.1 Editions

The second entry of the main navigation bar is a link to the editions page; a screenshot is reported in Figure 40. This page provides links to the distinct editions of the CLEF Evaluation Campaign and the CLEF Conference — since 2010 CLEF was organized as an independent event consisting of a peer-reviewed conference and a series of laboratories and workshops. Access to the CLEF editions is provided through a Carousel Slideshow implemented in the *Editions* portlet available in the CLEF Initiative category. Each entry of the Carousel Slideshow is the logo of an edition. Editions are ordered starting from the most recent one, e.g. CLEF2011 at the time of writing. When the user clicks on the logo of an edition, he is redirected to the page of that edition. The page of a CLEF edition can be part of the CLEF Initiative website or be an external website. The former is the case of CLEF edition from 2000 to 2009; the latter is the case of the CLEF Conference — see CLEF2010 and CLEF2011.
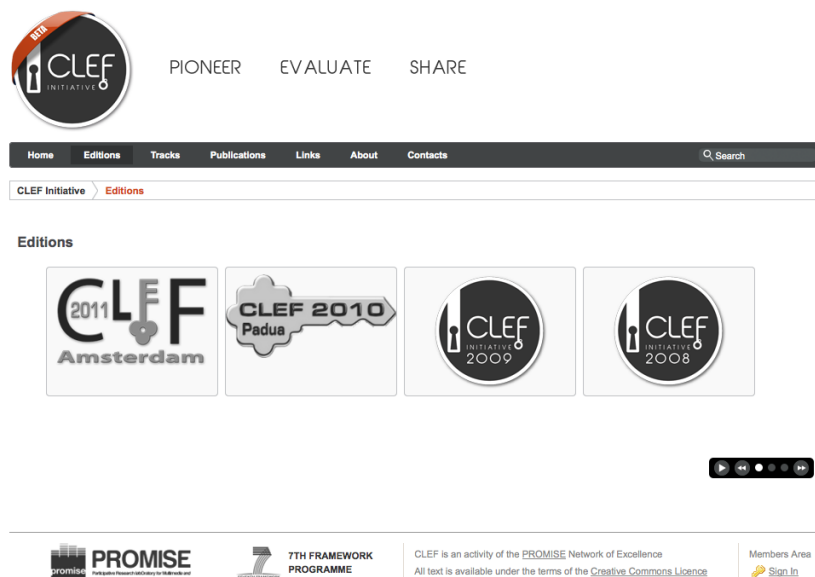
Figure 40: A screenshot of the clef-initiative/edition page.

When the user clicks on a specific edition, the landing page can be (i) and external website in

page [274] of [328]

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the event of the most recent editions, or (ii) an internal page; in the following we will focus on the latter case because it concerns pages of the CLEF Initiative Website. Let us consider, for instance, the case of the CLEF 2009 Edition. The url in this case is

<div align="center">clef-initiative/edition/clef2009</div>

that identifies the page reported in Figure 41. The basic rationale behind this URL is to access the resource "edition" with identifier "clef2009". Similarly, all the other editions can be accessed by using the same scheme: **clef-initiative/edition/**$\{edition - id\}$.
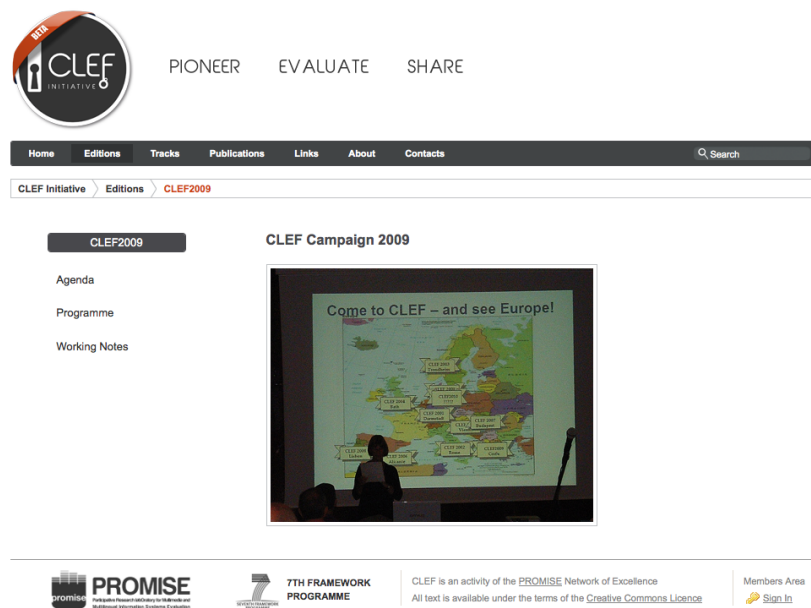
Figure 41: A screenshot of the clef-initiative/edition/clef2009 page.

The page is constituted by two portlets: a web content display on the right and a navigation portlet on the left. The web content display portlet contains a slideshow with photos of the workshop, if any. Otherwise a semi-transparent version of the CLEF Initiative logo is displayed — see Figure 42. The photos displayed by the slideshow are stored in the Editions/CLEF2009/Photos folder of the Document Library.

The navigation bar on the left allows three (sub)pages concerning the considered edition to be accessed: the edition agenda, the workshop programme, and the working notes papers.

10.2 Tracks

This section concerns with information on tracks carried out within the CLEF evaluation activities. In the CLEF Campaign Website this information was only adopted to access the part of the working notes page corresponding to a specific track — tracks in the edition were displayed in the navigation
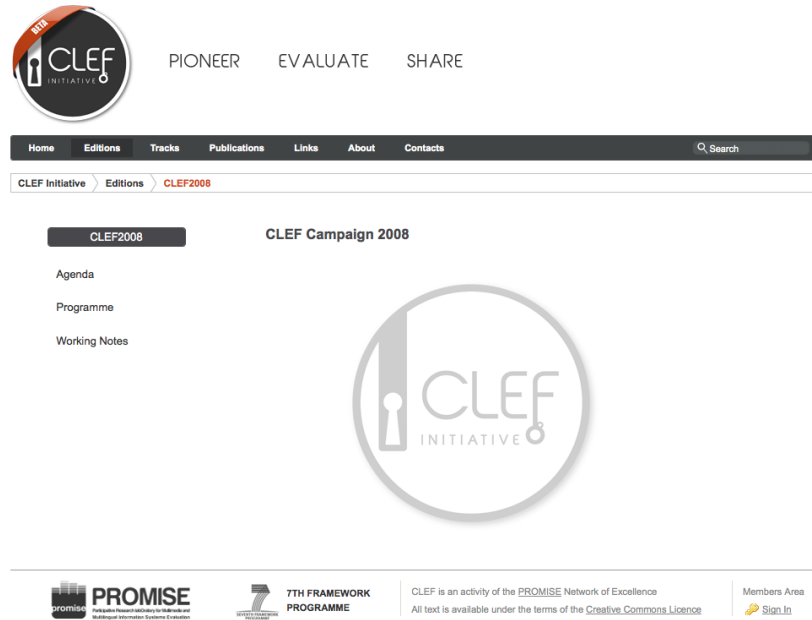
Figure 42: A screenshot of the clef-initiative/edition/clef2008 page where there are no wokshop photos

bar on the left. In the CLEF Initiative Website we exploited track information to provide additional navigation paths to access information retained in the website. The remainder of this section will discuss how track information has been used.

10.2.1 Track Series

Track Series Timeline

Page clef-initiative/track provides information on the track series. When the user accesses this page, he is redirected to page clef-initiative/track/series; indeed, the request **clef-initiative/track** is interpreted as "list all the track (series) carried out in CLEF". Track series information is displayed using a timeline; it is implemented in the *Track Timeline* portlet available in the CLEF Initiative category; this portlet uses the library timeglider to implement the timeline. A screenshot of the page is reported in Figure 43.

Track Series Pages

When a user clicks on a track entry a pop-up appears; a link to the track series homepage is reported in the pop-up. For instance, Figure 44 reports a screenshot of the page that visualizes all the adhoc track editions.

The list of track editions is a series are automatically generated by the *Track Series* portlet in the CLEF Initiative category. The portlet automatically parses the URL of the current page that is
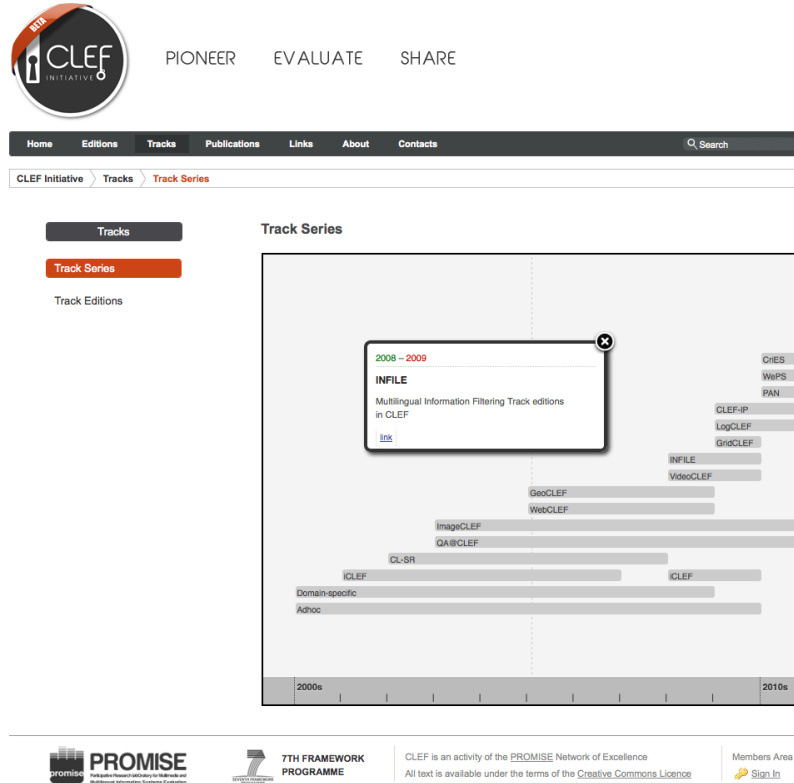
Figure 43: A screenshot of the clef-initiative/track page.

expected to be in the following format:

$$\text{track/series/}\{series-id\}$$
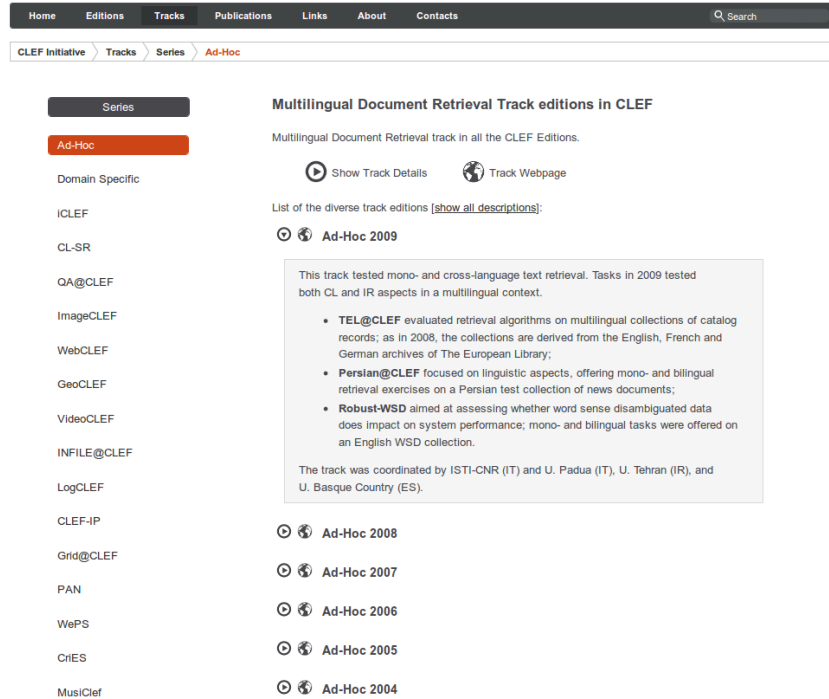
and extracts the requested series identifier; the URL above could be also the URI for the request to the infrastructure.

10.2.2 Track Editions

Besides providing a visualization to access information on the track series, we developed a timeline to access each track edition. The portlet is that described in Section 10.2.1, namely the *Track Timeline* portlet. The portlet loads the correct json according to the URL of the current page; in order to display the timeline for track editions, the page URL should ends with

$$\text{track/edition}$$

A screenshot of the resulting page is reported in Figure 45. When the user clicks on a specific track edition, a pop-up is displayed; the pop-up provides information on the track edition and a link to its homepage, if any.

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Figure 44: A screenshot of the clef-initiative/track/adhoc page.

10.3 Publications

One of the outcomes of the CLEF evaluation activities is publications. When considering a series of evaluation activities, e.g. CLEF, publications are important also because they can allow the impact of the activity on the research community to be measured; this is, for instance, the approach adopted in [Tsikrika et al., 2011a].

We modified the publication section of the CLEF Campaign website by splitting it in a number of pages, one for each type of contribution. The types of contributions are:

1. Proceedings

2. Working Notes

3. Books

4. Journal Issues

5. Theses

6. Miscellanea

7. Papers

Figure 45: A screenshot of the clef-initiative/track/edition page.

The portlet adopted to display all the contribution types, except for the papers, is the *Publication* portlet in the CLEF Initiative category. The type of contribution to display is automatically identified on the basis of the current page URL. The portlet requires an URL of the following format:

$$\text{clef-initiative/publication/}\{publication-type\}$$

when the publication type is one of the entries $\{1,\ldots,7\}$ of the enumeration above. All the entries are organized in an HTML table that is paginated by the YUI[11] Paginator.

10.4 Links

This section provides links to other initiatives for the evaluation of information access and retrieval systems, along with links to related research programmes and resources that can be useful to carry

---

[11] http://developer.yahoo.com/yui/

out evaluation activities. The "Links" section was already present in the CLEF Campaign website, but all the entries were reported in a single page. We split the "Links" page in multiple pages according to the diverse categories of links ("evaluation forums", "research programmes", and "resources") adopted in the CLEF Campaign website. The content of each page in the "Links" section is in a web content display portlet; publishers in the consortium can therefore add or modify content of this section by editing the corresponding web content display portlets. A screenshot of the initial page of the "Links" section is reported in Figure 46. The first page displayed when accessing this section is that concerning other evaluation forums. The other pages can be accessed by the vertical navigation bar on the left.
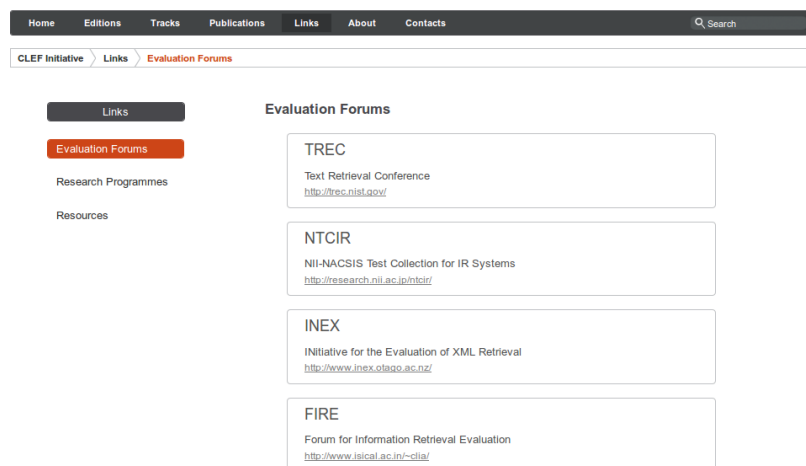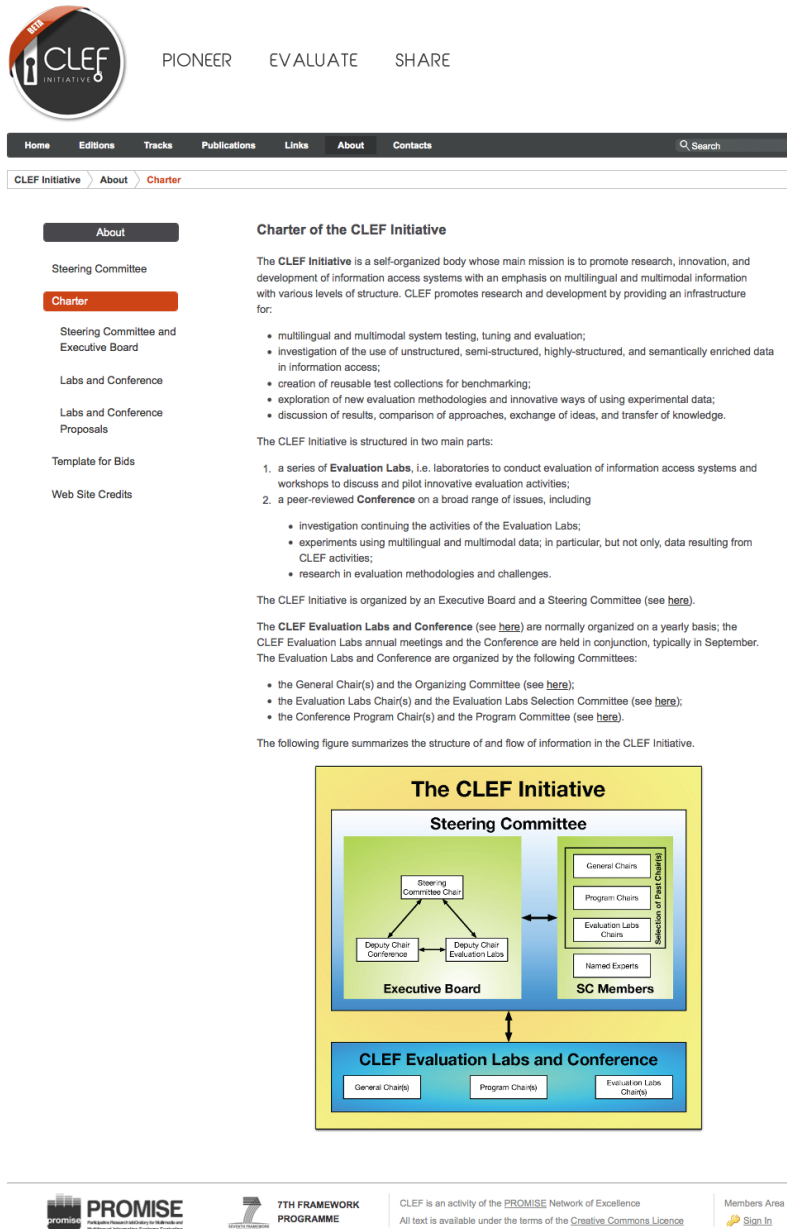
Figure 46: A screenshot of the clef-initiative/link section.

10.5   About

One of the results of the qualitative analysis concerns with communication of the CLEF objectives. Therefore, we added a dedicated section that provides users with information on CLEF Initiative, how the CLEF Initiative Consortium is organized, and on the procedures to propose new evaluation activities, e.g. tracks (now named "labs") and constituting tasks. The content of the pages in the "About" section is published within a web content display portlet; the publisher can therefore modify the data by logging in and access the web content display portlet in "edit" mode.

When the user clicks on the "About" link in the main navigation bar, the "Steering Committee" page is displayed. The images of the steering committee members are stored in the "Steering Committee Images" folder of liferay document library that is available in the "Resource" section accessible by the consortium members — see Section 10.7. The other subsections are listed in the navigation bar on the left; they are: "Charter", "Template for Bids", and "Web site Credits". The "Charter" section is an online version of the document "Charter of the CLEF Initiative: The Evaluation Labs and Conference on Multilingual and Multimodal Information Access Evaluation",

Version 1.0, Approved 20th September 2011. Images required by the "Charter" section are stored in the "Website" document library folder — this is the case of image mgmt-stricture.png display in the first page of the Charter subsection.

Figure 47: A screenshot of the clef-initiative/about page.

10.6 Contacts

The contact page consists in a form where the user can provide feedback on the website by the "message" field or ask for information. Name and email are required. Moreover, CAPTCHA is adopted to ensure the form is adopted by a person. A screenshot of the contact page is reported in Figure 48.

Figure 48: A screenshot of the clef-initiative/contacts page.

10.7 Resources

The "Resource" section allows guest users, consortium members, and steering committee members to load documents useful for the website (e.g. images, slides, working notes paper, or other documents related to the CLEF activities). Figure 49 reports a screenshot of the resource page. The resource page provides access to the Liferay document library portlet; the document library is organized in a set of folders, each of which can contains both (sub)folders and documents. The folders currently available in the CLEF Initiative website are:

- **Documents**: This folder stores documents made available on the website and that can be accessed by guest users, e.g. the "CLEF-Initiative-Template_for_bids.docx" file that is linked by the Template for Bids page.

- **Editions**: This folder stores documents concerning the diverse CLEF editions. The "Editions" folder contains a set of subfolders, one folder for each CLEF edition (CLEF2000, CLEF2001,
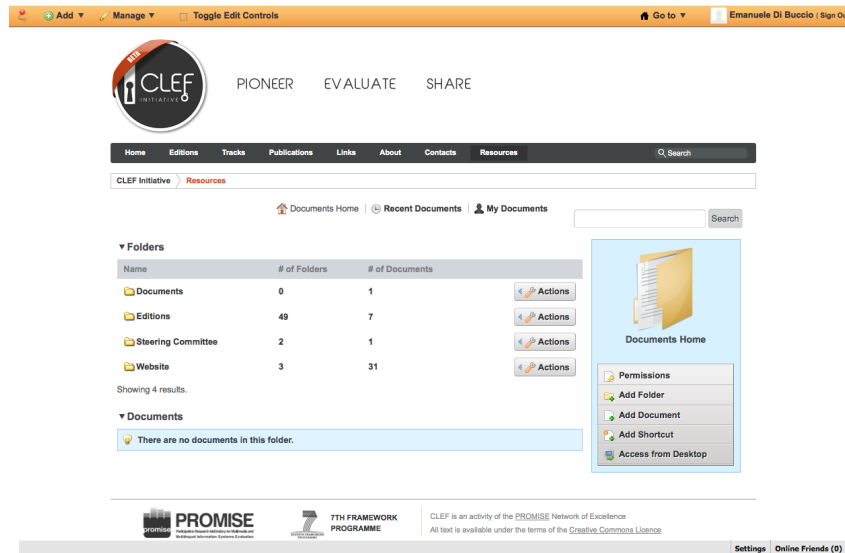
page [282] of [328]

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Figure 49: A screenshot of the clef-initiative/resources page.

..., CLEF2011, ...). Each edition folder contains three subfolders: "Photos", "Slides" and "Working Notes". The first subfolder contains photos, if any, of workshop (or conference) carried out for the corresponding CLEF edition. The last two folders contains slides and working notes papers of the contributions presented at CLEF; slides and papers are those made available respectively on the "Programme" page and the "Working Notes" page of the considered CLEF edition.

- **Steering Committee**: This folder stores documents that are useful to the steering committee; access to this folder is limited to steering committee members.

- **Website**: This folder is adopted to load images or documents adopted in the websites, e.g. images of the proceedings or the diverse CLEF editions. The "Website" folder contains three subfolders: "Editions Images", "Proceedings Images" and "Steering Committee Images". The "Editions Images" folder stores the logos of the distinct CLEF editions; these images are adopted in the portlet for the clef-initiative/edition page — see Section 10.1. The "Proceedings Images" folder stores images of the CLEF proceedings covers; these images are adopted in the *Publication* portlet in the clef-initiative/publication/proceedings page. Finally, folder "Steering Committee Images" stores images of the steering committee members; these images are displayed in the clef-initiative/about/steering-committee page of the "Charter" section. The adoption of the Liferay Document Library to load website contents was intended to make content publishing and website content organization easier (by means of the categorization determined by the folders).
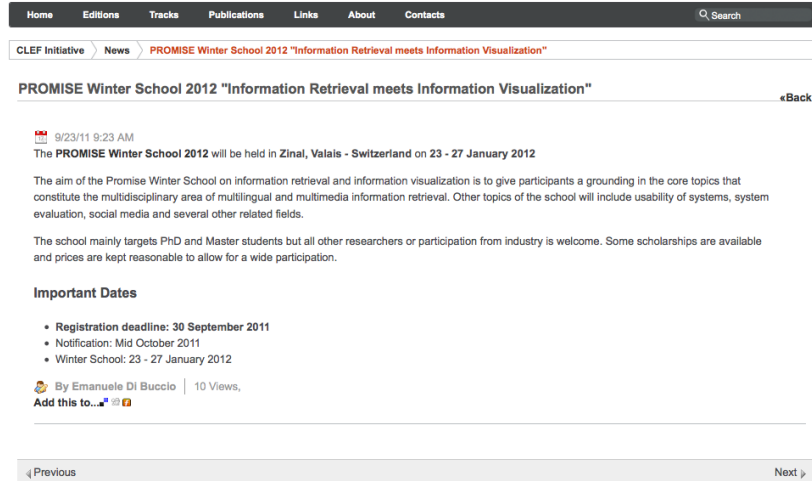
Figure 50: A screenshot of the clef-initiative/news page.

10.8   News

The news page was introduced in order to facilitate the procedure to publish information on CLEF-related events. There is no need to edit the homepage to publish news. Members of the consortium can add entries to the news page — see Figure 50. The title of the news along with its publication date will be automatically displayed in the news section of the homepage. The introduction of this page aims also at addressing the issue of the website update discussed in the qualitative analysis: the news section in the homepage strengthens the perception of the user that the website is constantly updated.

A   XML Schemas

This appendix reports the XML schemas of the different managed resources.

The XML schema of DIRECT[12], reported in Section A.1, relies on the XML schema of the ICI[13] library, reported in Section A.2, for the definition of some common resources.

A.1   DIRECT XML Schema

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <!-- edited with XMLSpy v2011 (x64) (http://www.altova.com) by Universitã degli Studi di
        Padova (Universitã degli Studi di Padova) -->
3  <xs:schema xmlns:ims="http://ims.dei.unipd.it/" xmlns:xs="http://www.w3.org/2001/
        XMLSchema" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:xcql="http://docs.oasis-
        open.org/ns/search-ws/xcql" targetNamespace="http://ims.dei.unipd.it/"
        elementFormDefault="qualified" attributeFormDefault="qualified" version="3.00" xml:
        lang="en">
4    <xs:annotation>
5      <xs:documentation xml:lang="en">This schema provides the base elements and types used
            by the Distributed Information Retrieval Evaluation Campaign Tool (DIRECT).</xs:
            documentation>
6      <xs:documentation xml:lang="en">Version 3.00.</xs:documentation>
7      <xs:documentation xml:lang="en">Created on 2005-10-05</xs:documentation>
8      <xs:documentation xml:lang="en">Last modified on 2012-08-30</xs:documentation>
9      <xs:documentation xml:lang="en">Authored by Nicola Ferro (ferro@dei.unipd.it)</xs:
            documentation>
10     <xs:documentation xml:lang="en">Copyright (c) 2005-2012 - Information Management
            Systems (IMS) Research Group (http://ims.dei.unipd.it/) - Department of
            Information Engineering (http://www.dei.unipd.it/) - University of Padua (http://
            www.unipd.it/)</xs:documentation>
11   </xs:annotation>
12   <xs:include schemaLocation="http://ims.dei.unipd.it/data/xml/ici.3.00.xsd">
13     <xs:annotation>
14       <xs:documentation xml:lang="en">Imports the schema for the IMS Component Integrator
              (ICI) library.</xs:documentation>
15     </xs:annotation>
16   </xs:include>
17   <xs:include schemaLocation="http://ims.dei.unipd.it/data/xml/fast.3.00.xsd">
18     <xs:annotation>
19       <xs:documentation xml:lang="en">Imports the schema for the Flexible Annotation
              Semantic Tool (FAST) service.</xs:documentation>
20     </xs:annotation>
21   </xs:include>
22   <xs:import/>
23   <xs:import/>
24   <xs:element name="task" substitutionGroup="ims:resource">
25     <xs:annotation>
26       <xs:documentation xml:lang="en">Represents apiece of work that is undertaken within
              an evaluation activity and aims at testing a specific (research) hypothesis.</
              xs:documentation>
27     </xs:annotation>
28     <xs:complexType>
29       <xs:complexContent>
30         <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                resource-type">
```

---

[12]http://ims.dei.unipd.it/data/xml/direct.3.00.xsd
[13]http://ims.dei.unipd.it/data/xml/ici.3.00.xsd

```
31                <xs:sequence>
32                  <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
33                  <xs:element ref="ims:campaign" minOccurs="0"/>
34                  <xs:element ref="ims:education" minOccurs="0"/>
35                  <xs:element ref="ims:trial" minOccurs="0"/>
36                  <xs:element ref="ims:track" minOccurs="0"/>
37                  <xs:element ref="ims:experimental-collection" minOccurs="0"/>
38                </xs:sequence>
39                <xs:attribute ref="ims:description"/>
40                <xs:attribute name="maximum-experiments-allowed" type="xs:int">
41                  <xs:annotation>
42                    <xs:documentation>The maximum number of experiments that can be submitted
                           per participant for this task.</xs:documentation>
43                  </xs:annotation>
44                </xs:attribute>
45              </xs:extension>
46            </xs:complexContent>
47          </xs:complexType>
48        </xs:element>
49        <xs:element name="education" substitutionGroup="ims:resource">
50          <xs:annotation>
51            <xs:documentation xml:lang="en">Represents an activity which is carried out for
                   educational purposes.</xs:documentation>
52          </xs:annotation>
53          <xs:complexType>
54            <xs:complexContent>
55              <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-
                     controllable-resource-type">
56                <xs:sequence>
57                  <xs:element ref="ims:links" minOccurs="0"/>
58                  <xs:element name="tasks" minOccurs="0">
59                    <xs:annotation>
60                      <xs:documentation xml:lang="en">The list of tasks for this evaluation
                             activity.</xs:documentation>
61                    </xs:annotation>
62                    <xs:complexType>
63                      <xs:sequence>
64                        <xs:element ref="ims:task" minOccurs="0" maxOccurs="unbounded"/>
65                      </xs:sequence>
66                    </xs:complexType>
67                  </xs:element>
68                </xs:sequence>
69                <xs:attribute name="name">
70                  <xs:annotation>
71                    <xs:documentation xml:lang="en">The name of the evaluation activity.</xs:
                           documentation>
72                  </xs:annotation>
73                </xs:attribute>
74                <xs:attribute ref="ims:description"/>
75                <xs:attribute name="status" type="ims:status-type">
76                  <xs:annotation>
77                    <xs:documentation xml:lang="en">The status of the evaluation activity.</xs:
                           documentation>
78                  </xs:annotation>
79                </xs:attribute>
80              </xs:extension>
81            </xs:complexContent>
82          </xs:complexType>
83        </xs:element>
84        <xs:element name="trial" substitutionGroup="ims:resource">
```

```
85     <xs:annotation>
86       <xs:documentation xml:lang="en">Represents an activity run by a person, a research
             group, or a corporate body for their own interests and not necessarily public
             or shared.</xs:documentation>
87     </xs:annotation>
88     <xs:complexType>
89       <xs:complexContent>
90         <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-
               controllable-resource-type">
91           <xs:sequence>
92             <xs:element ref="ims:links" minOccurs="0"/>
93             <xs:element name="tasks" minOccurs="0">
94               <xs:annotation>
95                 <xs:documentation xml:lang="en">The list of tasks for this evaluation
                       activity.</xs:documentation>
96               </xs:annotation>
97               <xs:complexType>
98                 <xs:sequence>
99                   <xs:element ref="ims:task" minOccurs="0" maxOccurs="unbounded"/>
100                </xs:sequence>
101              </xs:complexType>
102            </xs:element>
103          </xs:sequence>
104          <xs:attribute name="name">
105            <xs:annotation>
106              <xs:documentation xml:lang="en">The name of the evaluation activity.</xs:
                     documentation>
107            </xs:annotation>
108          </xs:attribute>
109          <xs:attribute ref="ims:description"/>
110          <xs:attribute name="status" type="ims:status-type">
111            <xs:annotation>
112              <xs:documentation xml:lang="en">The status of the evaluation activity.</xs:
                     documentation>
113            </xs:annotation>
114          </xs:attribute>
115        </xs:extension>
116      </xs:complexContent>
117    </xs:complexType>
118  </xs:element>
119  <xs:element name="campaign" substitutionGroup="ims:resource">
120    <xs:annotation>
121      <xs:documentation xml:lang="en">Represents a public and shared activity conducted
             in an evaluation forum, such as TREC or CLEF.</xs:documentation>
122    </xs:annotation>
123    <xs:complexType>
124      <xs:complexContent>
125        <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-
               controllable-resource-type">
126          <xs:sequence>
127            <xs:element ref="ims:links" minOccurs="0"/>
128            <xs:element name="tracks" minOccurs="0">
129              <xs:annotation>
130                <xs:documentation xml:lang="en">The list of tracks for this evaluation
                       activity.</xs:documentation>
131              </xs:annotation>
132              <xs:complexType>
133                <xs:sequence>
134                  <xs:element ref="ims:track" minOccurs="0" maxOccurs="unbounded"/>
135                </xs:sequence>
```

```
136              </xs:complexType>
137            </xs:element>
138            <xs:element name="tasks" minOccurs="0">
139              <xs:annotation>
140                <xs:documentation xml:lang="en">The list of tasks for this evaluation
                      activity.</xs:documentation>
141              </xs:annotation>
142              <xs:complexType>
143                <xs:sequence>
144                  <xs:element ref="ims:task" minOccurs="0" maxOccurs="unbounded"/>
145                </xs:sequence>
146              </xs:complexType>
147            </xs:element>
148          </xs:sequence>
149          <xs:attribute name="name">
150            <xs:annotation>
151              <xs:documentation xml:lang="en">The name of the evaluation activity.</xs:
                    documentation>
152            </xs:annotation>
153          </xs:attribute>
154          <xs:attribute ref="ims:description"/>
155          <xs:attribute name="status" type="ims:status-type">
156            <xs:annotation>
157              <xs:documentation xml:lang="en">The status of the evaluation activity.</xs:
                    documentation>
158            </xs:annotation>
159          </xs:attribute>
160        </xs:extension>
161      </xs:complexContent>
162    </xs:complexType>
163  </xs:element>
164  <xs:element name="evaluation-activity" substitutionGroup="ims:resource">
165    <xs:annotation>
166      <xs:documentation xml:lang="en">Represents any type of activity aiming at the
            evaluation of applications, systems, or methodologies for information access.</
            xs:documentation>
167    </xs:annotation>
168    <xs:complexType>
169      <xs:complexContent>
170        <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-
              controllable-resource-type">
171          <xs:sequence>
172            <xs:element ref="ims:links" minOccurs="0"/>
173          </xs:sequence>
174          <xs:attribute name="name">
175            <xs:annotation>
176              <xs:documentation xml:lang="en">The name of the evaluation activity.</xs:
                    documentation>
177            </xs:annotation>
178          </xs:attribute>
179          <xs:attribute ref="ims:description"/>
180          <xs:attribute name="type">
181            <xs:annotation>
182              <xs:documentation xml:lang="en">The type of the evaluation activity.</xs:
                    documentation>
183            </xs:annotation>
184            <xs:simpleType>
185              <xs:restriction base="xs:token">
186                <xs:enumeration value="CAMPAIGN">
187                  <xs:annotation>
```

```
188              <xs:documentation xml:lang="en">Represents a public and shared
                     activity conducted in an evaluation forum, such as TREC or CLEF.<
                     /xs:documentation>
189           </xs:annotation>
190         </xs:enumeration>
191         <xs:enumeration value="TRIAL">
192           <xs:annotation>
193              <xs:documentation xml:lang="en">Represents an activity run by a
                     person, a research group, or a corporate body for their own
                     interests and not necessarily public or shared.</xs:documentation
                     >
194           </xs:annotation>
195         </xs:enumeration>
196         <xs:enumeration value="EDUCATION">
197           <xs:annotation>
198              <xs:documentation xml:lang="en">Represents an activity which is
                     carried out for educational purposes.</xs:documentation>
199           </xs:annotation>
200         </xs:enumeration>
201        </xs:restriction>
202       </xs:simpleType>
203      </xs:attribute>
204      <xs:attribute name="status" type="ims:status-type">
205        <xs:annotation>
206           <xs:documentation xml:lang="en">The status of the evaluation activity.</xs:
                   documentation>
207        </xs:annotation>
208      </xs:attribute>
209     </xs:extension>
210    </xs:complexContent>
211   </xs:complexType>
212  </xs:element>
213  <xs:element name="track" substitutionGroup="ims:resource">
214   <xs:annotation>
215     <xs:documentation xml:lang="en">Represents a group of tasks carried within an
             evaluation activity of type campaign.</xs:documentation>
216   </xs:annotation>
217   <xs:complexType>
218     <xs:complexContent>
219       <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
               resource-type">
220        <xs:sequence>
221          <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
222          <xs:element ref="ims:campaign" minOccurs="0"/>
223        </xs:sequence>
224        <xs:attribute ref="ims:description"/>
225        <xs:attribute name="submission-deadline" type="xs:date">
226          <xs:annotation>
227             <xs:documentation>The deadline of the submissions for the track.</xs:
                     documentation>
228          </xs:annotation>
229        </xs:attribute>
230       </xs:extension>
231     </xs:complexContent>
232   </xs:complexType>
233  </xs:element>
234  <xs:element name="direct" type="ims:ici-type">
235   <xs:annotation>
236     <xs:documentation xml:lang="en">Provides information about one or more resources of
             the DIRECT system.</xs:documentation>
```

```
237       </xs:annotation>
238    </xs:element>
239    <xs:simpleType name="status-type">
240       <xs:annotation>
241          <xs:documentation xml:lang="en">Represents the status of some kind of activity.</xs
                 :documentation>
242       </xs:annotation>
243       <xs:restriction base="xs:token">
244          <xs:enumeration value="NOT_STARTED_YET">
245             <xs:annotation>
246                <xs:documentation xml:lang="en">The activity has not been started yet.</xs:
                      documentation>
247             </xs:annotation>
248          </xs:enumeration>
249          <xs:enumeration value="ONGOING">
250             <xs:annotation>
251                <xs:documentation xml:lang="en">The activity is ongoing.</xs:documentation>
252             </xs:annotation>
253          </xs:enumeration>
254          <xs:enumeration value="COMPLETED">
255             <xs:annotation>
256                <xs:documentation xml:lang="en">The activity is completed.</xs:documentation>
257             </xs:annotation>
258          </xs:enumeration>
259          <xs:enumeration value="AVAILABLE">
260             <xs:annotation>
261                <xs:documentation xml:lang="en">The outcomes, if any, of the activity are
                      available.</xs:documentation>
262             </xs:annotation>
263          </xs:enumeration>
264       </xs:restriction>
265    </xs:simpleType>
266    <xs:element name="application" substitutionGroup="ims:resource">
267       <xs:annotation>
268          <xs:documentation>Represents a running software application evalueted during a
                 Guerrilla experiment</xs:documentation>
269       </xs:annotation>
270       <xs:complexType>
271          <xs:complexContent>
272             <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                   resource-type">
273                <xs:sequence>
274                   <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
275                   <xs:element ref="ims:configuration" minOccurs="0" maxOccurs="unbounded"/>
276                </xs:sequence>
277                <xs:attribute ref="ims:name"/>
278                <xs:attribute ref="ims:description"/>
279             </xs:extension>
280          </xs:complexContent>
281       </xs:complexType>
282    </xs:element>
283    <xs:element name="configuration" substitutionGroup="ims:resource">
284       <xs:annotation>
285          <xs:documentation>Represents the configuration of a component, a system or an
                 application under evaluation.</xs:documentation>
286       </xs:annotation>
287       <xs:complexType>
288          <xs:complexContent>
289             <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
290                <xs:sequence>
```

D3.3: Prototype of the Evaluation Infrastructure

```
291              <xs:element name="parameters" minOccurs="0">
292                <xs:annotation>
293                  <xs:documentation>The list of parameters associated to this configuration
                        .</xs:documentation>
294                </xs:annotation>
295                <xs:complexType>
296                  <xs:sequence maxOccurs="unbounded">
297                    <xs:element ref="ims:parameter"/>
298                  </xs:sequence>
299                </xs:complexType>
300              </xs:element>
301            </xs:sequence>
302            <xs:attribute ref="ims:description"/>
303          </xs:extension>
304        </xs:complexContent>
305      </xs:complexType>
306    </xs:element>
307    <xs:element name="component" substitutionGroup="ims:resource">
308      <xs:annotation>
309        <xs:documentation>Represents a building block of a running system.</xs:
                documentation>
310      </xs:annotation>
311      <xs:complexType>
312        <xs:complexContent>
313          <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                resource-type">
314          <xs:sequence>
315            <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
316            <xs:element ref="ims:concept" minOccurs="0"/>
317            <xs:element ref="ims:configuration" minOccurs="0"/>
318          </xs:sequence>
319          <xs:attribute ref="ims:name"/>
320          <xs:attribute ref="ims:description"/>
321          </xs:extension>
322        </xs:complexContent>
323      </xs:complexType>
324    </xs:element>
325    <xs:element name="system" substitutionGroup="ims:resource">
326      <xs:annotation>
327        <xs:documentation>Represents a running software engine, which is under evaluation.<
                /xs:documentation>
328      </xs:annotation>
329      <xs:complexType>
330        <xs:complexContent>
331          <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                resource-type">
332          <xs:sequence>
333            <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
334            <xs:element ref="ims:configuration" minOccurs="0"/>
335          </xs:sequence>
336          <xs:attribute ref="ims:name"/>
337          <xs:attribute ref="ims:description"/>
338          </xs:extension>
339        </xs:complexContent>
340      </xs:complexType>
341    </xs:element>
342    <xs:element name="experiment" substitutionGroup="ims:resource">
343      <xs:annotation>
344        <xs:documentation>Represents part of the data produced by a system under evaluation
                .</xs:documentation>
```

```
345        </xs:annotation>
346      <xs:complexType>
347        <xs:complexContent>
348          <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                  resource-type">
349          <xs:sequence>
350            <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
351            <xs:element ref="ims:task" minOccurs="0"/>
352            <xs:element ref="ims:configuration" minOccurs="0"/>
353          </xs:sequence>
354          <xs:attribute ref="ims:description"/>
355          </xs:extension>
356        </xs:complexContent>
357      </xs:complexType>
358    </xs:element>
359    <xs:element name="run" substitutionGroup="ims:resource">
360      <xs:annotation>
361        <xs:documentation>Represents a ranked list of documents for each topic in the
                  experimental collection.</xs:documentation>
362      </xs:annotation>
363      <xs:complexType>
364        <xs:complexContent>
365          <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                  resource-type">
366          <xs:sequence>
367            <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
368            <xs:element ref="ims:task" minOccurs="0"/>
369            <xs:element ref="ims:configuration" minOccurs="0"/>
370            <xs:element name="topic-fields" minOccurs="0">
371              <xs:annotation>
372                <xs:documentation>The list of topic fields employed by this run.</xs:
                      documentation>
373              </xs:annotation>
374              <xs:complexType>
375                <xs:sequence maxOccurs="unbounded">
376                  <xs:element ref="ims:concept"/>
377                </xs:sequence>
378              </xs:complexType>
379            </xs:element>
380            <xs:element ref="ims:system" minOccurs="0"/>
381          </xs:sequence>
382          <xs:attribute ref="ims:description"/>
383          <xs:attribute name="query-construction"/>
384          </xs:extension>
385        </xs:complexContent>
386      </xs:complexType>
387    </xs:element>
388    <xs:element name="guerrilla" substitutionGroup="ims:resource">
389      <xs:annotation>
390        <xs:documentation>Represents an evaluation activity performed on corporare IR
                  systems.</xs:documentation>
391      </xs:annotation>
392      <xs:complexType>
393        <xs:complexContent>
394          <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                  resource-type">
395          <xs:sequence>
396            <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
397            <xs:element ref="ims:task" minOccurs="0"/>
398            <xs:element ref="ims:configuration" minOccurs="0"/>
```

```
399                <xs:element ref="ims:application" minOccurs="0"/>
400                <xs:element name="metrics" minOccurs="0">
401                  <xs:annotation>
402                    <xs:documentation>The list of metrics and the values associated with this
                            guerrilla.</xs:documentation>
403                  </xs:annotation>
404                  <xs:complexType>
405                    <xs:sequence minOccurs="0" maxOccurs="unbounded">
406                      <xs:element name="metric">
407                        <xs:annotation>
408                          <xs:documentation>A metric and the value associated with this
                                guerrilla.</xs:documentation>
409                        </xs:annotation>
410                        <xs:complexType>
411                          <xs:sequence>
412                            <xs:element ref="ims:concept"/>
413                            <xs:element name="value" type="xs:double">
414                              <xs:annotation>
415                                <xs:documentation>The value of the metric.</xs:documentation>
416                              </xs:annotation>
417                            </xs:element>
418                          </xs:sequence>
419                        </xs:complexType>
420                      </xs:element>
421                    </xs:sequence>
422                  </xs:complexType>
423                </xs:element>
424              </xs:sequence>
425              <xs:attribute ref="ims:description"/>
426            </xs:extension>
427          </xs:complexContent>
428        </xs:complexType>
429      </xs:element>
430      <xs:element name="living" substitutionGroup="ims:resource">
431        <xs:annotation>
432          <xs:documentation>Represents the specific experimental data resulting from the
                Living Retrieval Laboratories.</xs:documentation>
433        </xs:annotation>
434        <xs:complexType>
435          <xs:complexContent>
436            <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                resource-type">
437              <xs:sequence>
438                <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
439              </xs:sequence>
440            </xs:extension>
441          </xs:complexContent>
442        </xs:complexType>
443      </xs:element>
444      <xs:complexType name="identifiable-timestamp-traceable-parameterizable-resource-type">
445        <xs:annotation>
446          <xs:documentation>Represents an entity which is identified by means of a unique
                identifier,  whose creation, last modification, and its parameters, if any .</
                xs:documentation>
447        </xs:annotation>
448        <xs:complexContent>
449          <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
450            <xs:sequence>
451              <xs:element ref="ims:parameter" minOccurs="0"/>
452            </xs:sequence>
```

```
453        </xs:extension>
454      </xs:complexContent>
455    </xs:complexType>
456    <xs:element name="parameter" substitutionGroup="ims:resource">
457      <xs:annotation>
458        <xs:documentation>Represents a parameter of a configuration.</xs:documentation>
459      </xs:annotation>
460      <xs:complexType>
461        <xs:complexContent>
462          <xs:extension base="ims:identifiable-resource-type">
463            <xs:sequence>
464              <xs:element ref="ims:concept" minOccurs="0"/>
465              <xs:element name="value" type="xs:string" minOccurs="0">
466                <xs:annotation>
467                  <xs:documentation>The value of the parameter.</xs:documentation>
468                </xs:annotation>
469              </xs:element>
470            </xs:sequence>
471          </xs:extension>
472        </xs:complexContent>
473      </xs:complexType>
474    </xs:element>
475    <xs:element name="experiment-item" substitutionGroup="ims:resource">
476      <xs:annotation>
477        <xs:documentation>Represents an item of an experiment.</xs:documentation>
478      </xs:annotation>
479      <xs:complexType>
480        <xs:complexContent>
481          <xs:extension base="ims:identifiable-resource-type">
482            <xs:sequence>
483              <xs:element ref="ims:experiment" minOccurs="0"/>
484            </xs:sequence>
485          </xs:extension>
486        </xs:complexContent>
487      </xs:complexType>
488    </xs:element>
489    <xs:element name="run-item" substitutionGroup="ims:resource">
490      <xs:annotation>
491        <xs:documentation>Represents a component of a Run and relates a run with a document
                retrieved for a given topic.</xs:documentation>
492      </xs:annotation>
493      <xs:complexType>
494        <xs:complexContent>
495          <xs:extension base="ims:identifiable-resource-type">
496            <xs:sequence>
497              <xs:element ref="ims:run" minOccurs="0"/>
498              <xs:element ref="ims:topic" minOccurs="0"/>
499              <xs:element ref="ims:information-unit" minOccurs="0"/>
500            </xs:sequence>
501            <xs:attribute name="rank" type="xs:int">
502              <xs:annotation>
503                <xs:documentation>The rank of the document associated to the run item in
                    the ranked list.</xs:documentation>
504              </xs:annotation>
505            </xs:attribute>
506            <xs:attribute name="score" type="xs:double">
507              <xs:annotation>
508                <xs:documentation>The score provided by the system under evaluation to the
                    document corresponding to the run item.</xs:documentation>
509              </xs:annotation>
```

```
510              </xs:attribute>
511            </xs:extension>
512          </xs:complexContent>
513        </xs:complexType>
514    </xs:element>
515    <xs:element name="corpus" substitutionGroup="ims:resource">
516      <xs:annotation>
517        <xs:documentation>Represents a set of informative units.</xs:documentation>
518      </xs:annotation>
519      <xs:complexType>
520        <xs:complexContent>
521          <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                 resource-type">
522            <xs:sequence>
523              <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
524              <xs:element name="media-types" minOccurs="0" maxOccurs="unbounded">
525                <xs:annotation>
526                  <xs:documentation>The list of media types of the corpus.</xs:
                       documentation>
527                </xs:annotation>
528                <xs:complexType>
529                  <xs:sequence>
530                    <xs:element name="media-type" type="xs:string" minOccurs="0" maxOccurs=
                         "unbounded">
531                      <xs:annotation>
532                        <xs:documentation>The media types of a corpus according to MIME (
                             Multipurpose Internet Mail Extensions) standard.</xs:
                             documentation>
533                      </xs:annotation>
534                    </xs:element>
535                  </xs:sequence>
536                </xs:complexType>
537              </xs:element>
538              <xs:element name="languages" minOccurs="0" maxOccurs="unbounded">
539                <xs:annotation>
540                  <xs:documentation>The list of languages of the corpus.</xs:documentation>
541                </xs:annotation>
542                <xs:complexType>
543                  <xs:sequence>
544                    <xs:element name="language" type="xs:language" minOccurs="0" maxOccurs=
                         "unbounded">
545                      <xs:annotation>
546                        <xs:documentation>The languages of a corpus.</xs:documentation>
547                      </xs:annotation>
548                    </xs:element>
549                  </xs:sequence>
550                </xs:complexType>
551              </xs:element>
552            </xs:sequence>
553            <xs:attribute ref="ims:description"/>
554          </xs:extension>
555        </xs:complexContent>
556      </xs:complexType>
557    </xs:element>
558    <xs:element name="information-unit" substitutionGroup="ims:resource">
559      <xs:annotation>
560        <xs:documentation>Represents the object on which the evaluated system acts, and
             which is retrieved by the system under evaluation.</xs:documentation>
561      </xs:annotation>
562      <xs:complexType>
```

```
563        <xs:complexContent>
564          <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
565            <xs:sequence>
566              <xs:element ref="ims:corpus" minOccurs="0"/>
567              <xs:element ref="ims:content" minOccurs="0"/>
568            </xs:sequence>
569            <xs:attribute ref="ims:language"/>
570            <xs:attribute ref="ims:media-type"/>
571            <xs:attribute name="uri" type="xs:anyURI">
572              <xs:annotation>
573                <xs:documentation>A URI that represents a link to the information unit.</xs
                    :documentation>
574              </xs:annotation>
575            </xs:attribute>
576          </xs:extension>
577        </xs:complexContent>
578      </xs:complexType>
579    </xs:element>
580    <xs:element name="topic" substitutionGroup="ims:resource">
581      <xs:annotation>
582        <xs:documentation>Represents the materialization of an information need.</xs:
                documentation>
583      </xs:annotation>
584      <xs:complexType>
585        <xs:complexContent>
586          <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
587            <xs:sequence>
588              <xs:element name="topic-fields" minOccurs="0" maxOccurs="1">
589                <xs:annotation>
590                  <xs:documentation>The fields used in this topic.</xs:documentation>
591                </xs:annotation>
592                <xs:complexType>
593                  <xs:sequence maxOccurs="unbounded">
594                    <xs:element name="topic-field">
595                      <xs:annotation>
596                        <xs:documentation>A field used in this topic.</xs:documentation>
597                      </xs:annotation>
598                      <xs:complexType>
599                        <xs:sequence minOccurs="0" maxOccurs="unbounded">
600                          <xs:element ref="ims:concept"/>
601                          <xs:element name="topic-field-contents">
602                            <xs:annotation>
603                              <xs:documentation>The list of contents of the topic field. </
                                  xs:documentation>
604                            </xs:annotation>
605                            <xs:complexType>
606                              <xs:sequence minOccurs="0" maxOccurs="unbounded">
607                                <xs:element name="topic-field-content">
608                                  <xs:annotation>
609                                    <xs:documentation>The content of a topic field.</xs:
                                        documentation>
610                                  </xs:annotation>
611                                  <xs:complexType>
612                                    <xs:sequence minOccurs="0">
613                                      <xs:element ref="ims:content"/>
614                                    </xs:sequence>
615                                    <xs:attribute ref="ims:media-type"/>
616                                    <xs:attribute ref="ims:language"/>
617                                  </xs:complexType>
618                                </xs:element>
```

```
619                         </xs:sequence>
620                       </xs:complexType>
621                     </xs:element>
622                   </xs:sequence>
623                 </xs:complexType>
624               </xs:element>
625             </xs:sequence>
626           </xs:complexType>
627         </xs:element>
628       </xs:sequence>
629     </xs:extension>
630   </xs:complexContent>
631 </xs:complexType>
632 </xs:element>
633 <xs:attribute name="name" type="xs:string">
634   <xs:annotation>
635     <xs:documentation>The name of the resource.</xs:documentation>
636   </xs:annotation>
637 </xs:attribute>
638 <xs:element name="topic-group" substitutionGroup="ims:resource">
639   <xs:annotation>
640     <xs:documentation>Represents a set of topic, which are grouped together because
          they are used to address a research task carried out in an evaluation activity.
          </xs:documentation>
641   </xs:annotation>
642   <xs:complexType>
643     <xs:complexContent>
644       <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
            resource-type">
645         <xs:sequence>
646           <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
647           <xs:element name="topics" minOccurs="0">
648             <xs:annotation>
649               <xs:documentation> The list of topics which belongs to the topic group.</
                  xs:documentation>
650             </xs:annotation>
651             <xs:complexType>
652               <xs:sequence maxOccurs="unbounded">
653                 <xs:element ref="ims:topic"/>
654               </xs:sequence>
655             </xs:complexType>
656           </xs:element>
657         </xs:sequence>
658         <xs:attribute ref="ims:description"/>
659       </xs:extension>
660     </xs:complexContent>
661   </xs:complexType>
662 </xs:element>
663 <xs:element name="ground-truth" substitutionGroup="ims:resource">
664   <xs:annotation>
665     <xs:documentation>Represents a component of an evaluation collection.</xs:
          documentation>
666   </xs:annotation>
667   <xs:complexType>
668     <xs:complexContent>
669       <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
            resource-type">
670         <xs:sequence>
671           <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
672         </xs:sequence>
```

```
673                <xs:attribute ref="ims:description"/>
674            </xs:extension>
675          </xs:complexContent>
676        </xs:complexType>
677    </xs:element>
678    <xs:element name="ground-truth-item" substitutionGroup="ims:resource">
679      <xs:annotation>
680        <xs:documentation>Represents an item of a ground truth..</xs:documentation>
681      </xs:annotation>
682      <xs:complexType>
683        <xs:complexContent>
684          <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
685            <xs:sequence>
686              <xs:element ref="ims:ground-truth" minOccurs="0"/>
687              <xs:element ref="ims:user" minOccurs="0"/>
688              <xs:element ref="ims:concept" minOccurs="0"/>
689            </xs:sequence>
690          </xs:extension>
691        </xs:complexContent>
692      </xs:complexType>
693    </xs:element>
694    <xs:element name="experimental-collection" substitutionGroup="ims:resource">
695      <xs:annotation>
696        <xs:documentation>Represents a logical entity that allows us to set up a
                traditional IR evaluation environment.</xs:documentation>
697      </xs:annotation>
698      <xs:complexType>
699        <xs:complexContent>
700          <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                resource-type">
701            <xs:sequence>
702              <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
703              <xs:element ref="ims:topic-group" minOccurs="0"/>
704              <xs:element name="corpora" minOccurs="0">
705                <xs:annotation>
706                  <xs:documentation>The list of corpus that belongs to the experimental
                        collection.</xs:documentation>
707                </xs:annotation>
708                <xs:complexType>
709                  <xs:sequence>
710                    <xs:element ref="ims:corpus" minOccurs="0" maxOccurs="unbounded"/>
711                  </xs:sequence>
712                </xs:complexType>
713              </xs:element>
714              <xs:element ref="ims:ground-truth" minOccurs="0"/>
715            </xs:sequence>
716            <xs:attribute ref="ims:description"/>
717          </xs:extension>
718        </xs:complexContent>
719      </xs:complexType>
720    </xs:element>
721    <xs:element name="measure" substitutionGroup="ims:resource">
722      <xs:annotation>
723        <xs:documentation>Represents the value of a metric calculated on some experiments
                handled by the infrastructure.</xs:documentation>
724      </xs:annotation>
725      <xs:complexType>
726        <xs:complexContent>
727          <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
728            <xs:sequence>
```

```
729          <xs:element ref="ims:concept" minOccurs="0"/>
730          <xs:element name="value" type="xs:double" minOccurs="0">
731            <xs:annotation>
732              <xs:documentation>The numerical value of the measure.</xs:documentation>
733            </xs:annotation>
734          </xs:element>
735          <xs:element ref="ims:experiment" minOccurs="0"/>
736          <xs:element ref="ims:topic" minOccurs="0"/>
737        </xs:sequence>
738      </xs:extension>
739    </xs:complexContent>
740  </xs:complexType>
741 </xs:element>
742 <xs:element name="pool" substitutionGroup="ims:resource">
743   <xs:annotation>
744     <xs:documentation>Represents a container of assessments obtained trough the pooling
           technique.</xs:documentation>
745   </xs:annotation>
746   <xs:complexType>
747     <xs:complexContent>
748       <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
             resource-type">
749         <xs:sequence>
750           <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
751         </xs:sequence>
752         <xs:attribute ref="ims:description"/>
753       </xs:extension>
754     </xs:complexContent>
755   </xs:complexType>
756 </xs:element>
757 <xs:element name="pool-item" substitutionGroup="ims:resource">
758   <xs:annotation>
759     <xs:documentation>Represents a relevance judgment, which is provided on an
           information unit in the pool for a given topic.</xs:documentation>
760   </xs:annotation>
761   <xs:complexType>
762     <xs:complexContent>
763       <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
764         <xs:sequence>
765           <xs:element ref="ims:pool" minOccurs="0"/>
766           <xs:element ref="ims:user" minOccurs="0"/>
767           <xs:element ref="ims:concept" minOccurs="0"/>
768           <xs:element ref="ims:topic" minOccurs="0"/>
769           <xs:element ref="ims:information-unit" minOccurs="0"/>
770         </xs:sequence>
771       </xs:extension>
772     </xs:complexContent>
773   </xs:complexType>
774 </xs:element>
775 <xs:element name="estimate" substitutionGroup="ims:resource">
776   <xs:annotation>
777     <xs:documentation>Represents the estimated numerical value of a descriptive
           statiistic calculated calculated by the infrastructure.</xs:documentation>
778   </xs:annotation>
779   <xs:complexType>
780     <xs:complexContent>
781       <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
782         <xs:sequence>
783           <xs:element name="descriptive-statistic" minOccurs="0" maxOccurs="1">
784             <xs:annotation>
```

```
785                    <xs:documentation>The descriptive statistic for this estimate.</xs:
                           documentation>
786                  </xs:annotation>
787                  <xs:complexType>
788                    <xs:sequence>
789                      <xs:element ref="ims:concept" minOccurs="0"/>
790                    </xs:sequence>
791                  </xs:complexType>
792                </xs:element>
793                <xs:element name="metric" minOccurs="0">
794                  <xs:annotation>
795                    <xs:documentation>The metric for this estimate.</xs:documentation>
796                  </xs:annotation>
797                  <xs:complexType>
798                    <xs:sequence>
799                      <xs:element ref="ims:concept" minOccurs="0"/>
800                    </xs:sequence>
801                  </xs:complexType>
802                </xs:element>
803                <xs:element ref="ims:run" minOccurs="0"/>
804                <xs:element ref="ims:task" minOccurs="0"/>
805                <xs:element ref="ims:topic" minOccurs="0"/>
806              </xs:sequence>
807              <xs:attribute name="value" type="xs:double">
808                <xs:annotation>
809                  <xs:documentation>The numerical value of the estimate.</xs:documentation>
810                </xs:annotation>
811              </xs:attribute>
812            </xs:extension>
813          </xs:complexContent>
814        </xs:complexType>
815      </xs:element>
816      <xs:element name="statistical-test" substitutionGroup="ims:resource">
817        <xs:annotation>
818          <xs:documentation>Represents an example of statistical analysis which can be
                   carried out on the available data.</xs:documentation>
819        </xs:annotation>
820        <xs:complexType>
821          <xs:complexContent>
822            <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                   parameterizable-resource-type">
823              <xs:sequence>
824                <xs:element ref="ims:concept" minOccurs="0"/>
825                <xs:element name="metrics" minOccurs="0">
826                  <xs:annotation>
827                    <xs:documentation>The list of metrics used in the statistical test.</xs:
                           documentation>
828                  </xs:annotation>
829                  <xs:complexType>
830                    <xs:sequence maxOccurs="unbounded">
831                      <xs:element ref="ims:concept"/>
832                    </xs:sequence>
833                  </xs:complexType>
834                </xs:element>
835                <xs:element name="ground-truths" minOccurs="0">
836                  <xs:annotation>
837                    <xs:documentation>The ground truth objects used to compute the metrics
                           used in this test.</xs:documentation>
838                  </xs:annotation>
839                  <xs:complexType>
```

```
840          <xs:sequence maxOccurs="unbounded">
841            <xs:element ref="ims:ground-truth"/>
842          </xs:sequence>
843        </xs:complexType>
844      </xs:element>
845      <xs:element name="tasks" minOccurs="0">
846        <xs:annotation>
847          <xs:documentation>The task objects used to compute the metrics used in
                    this test.</xs:documentation>
848        </xs:annotation>
849        <xs:complexType>
850          <xs:sequence maxOccurs="unbounded">
851            <xs:element ref="ims:task"/>
852          </xs:sequence>
853        </xs:complexType>
854      </xs:element>
855      <xs:element name="measures" minOccurs="0">
856        <xs:annotation>
857          <xs:documentation>The measure objects used to compute the metrics used in
                    this test.</xs:documentation>
858        </xs:annotation>
859        <xs:complexType>
860          <xs:sequence maxOccurs="unbounded">
861            <xs:element ref="ims:measure"/>
862          </xs:sequence>
863        </xs:complexType>
864      </xs:element>
865      <xs:element name="experiments" minOccurs="0">
866        <xs:annotation>
867          <xs:documentation>The experiment objects used to compute the metrics used
                    in this test.</xs:documentation>
868        </xs:annotation>
869        <xs:complexType>
870          <xs:sequence maxOccurs="unbounded">
871            <xs:element ref="ims:experiment"/>
872          </xs:sequence>
873        </xs:complexType>
874      </xs:element>
875      <xs:element name="visualizations" minOccurs="0">
876        <xs:annotation>
877          <xs:documentation>The visualization related to the statistical test.</xs:
                    documentation>
878        </xs:annotation>
879        <xs:complexType>
880          <xs:sequence maxOccurs="unbounded">
881            <xs:element ref="ims:visualization"/>
882          </xs:sequence>
883        </xs:complexType>
884      </xs:element>
885        </xs:sequence>
886      </xs:extension>
887    </xs:complexContent>
888  </xs:complexType>
889 </xs:element>
890 <xs:complexType name="identifiable-timestamp-traceable-access-controllable-
        parameterizable-resource-type">
891   <xs:annotation>
892     <xs:documentation>Represents an entity which is identified by means of a unique
            identifier, whose creation, last modification, last access events can be
            traced, whose access permissions can be checked and its parameters, if any.</xs
```

```
                  :documentation>
893     </xs:annotation>
894     <xs:complexContent>
895       <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                  resource-type">
896         <xs:sequence>
897           <xs:element name="parameters" minOccurs="0">
898             <xs:annotation>
899               <xs:documentation>Represents a list of parameters used in a configuration.<
                      /xs:documentation>
900             </xs:annotation>
901             <xs:complexType>
902               <xs:sequence maxOccurs="unbounded">
903                 <xs:element ref="ims:parameter" minOccurs="0"/>
904               </xs:sequence>
905             </xs:complexType>
906           </xs:element>
907         </xs:sequence>
908       </xs:extension>
909     </xs:complexContent>
910   </xs:complexType>
911   <xs:element name="visualization" substitutionGroup="ims:resource">
912     <xs:annotation>
913       <xs:documentation>Represents the information used by the infrastructure to store
                  and recover whichever visualization of the data that the users do.</xs:
                  documentation>
914     </xs:annotation>
915     <xs:complexType>
916       <xs:complexContent>
917         <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
                  parameterizable-resource-type">
918           <xs:sequence>
919             <xs:element ref="ims:concept" minOccurs="0"/>
920             <xs:element name="measures" minOccurs="0">
921               <xs:annotation>
922                 <xs:documentation>The measure objects used to compute the metrics used in
                          this visualization.</xs:documentation>
923               </xs:annotation>
924               <xs:complexType>
925                 <xs:sequence maxOccurs="unbounded">
926                   <xs:element ref="ims:measure"/>
927                 </xs:sequence>
928               </xs:complexType>
929             </xs:element>
930             <xs:element name="estimates" minOccurs="0">
931               <xs:annotation>
932                 <xs:documentation>The estimate objects used to compute the metrics used
                          in this visualization.</xs:documentation>
933               </xs:annotation>
934               <xs:complexType>
935                 <xs:sequence maxOccurs="unbounded">
936                   <xs:element ref="ims:estimate"/>
937                 </xs:sequence>
938               </xs:complexType>
939             </xs:element>
940             <xs:element name="snapshots" minOccurs="0">
941               <xs:annotation>
942                 <xs:documentation>The list of snapshot to which this visualization refers
                          .</xs:documentation>
943               </xs:annotation>
```

```
944                      <xs:complexType>
945                        <xs:sequence maxOccurs="unbounded">
946                          <xs:element ref="ims:snapshot"/>
947                        </xs:sequence>
948                      </xs:complexType>
949                    </xs:element>
950                    <xs:element name="experiments" minOccurs="0">
951                      <xs:annotation>
952                        <xs:documentation>The list of experiment to which this visualization
                              refers.</xs:documentation>
953                      </xs:annotation>
954                      <xs:complexType>
955                        <xs:sequence maxOccurs="unbounded">
956                          <xs:element ref="ims:experiment"/>
957                        </xs:sequence>
958                      </xs:complexType>
959                    </xs:element>
960                    <xs:element name="ground-truths" minOccurs="0">
961                      <xs:annotation>
962                        <xs:documentation>The list of ground truth to which this visualization
                              refers.</xs:documentation>
963                      </xs:annotation>
964                      <xs:complexType>
965                        <xs:sequence maxOccurs="unbounded">
966                          <xs:element ref="ims:ground-truth"/>
967                        </xs:sequence>
968                      </xs:complexType>
969                    </xs:element>
970                    <xs:element name="tasks" minOccurs="0">
971                      <xs:annotation>
972                        <xs:documentation>The list of task to which this visualization refers.</
                              xs:documentation>
973                      </xs:annotation>
974                      <xs:complexType>
975                        <xs:sequence maxOccurs="unbounded">
976                          <xs:element ref="ims:task"/>
977                        </xs:sequence>
978                      </xs:complexType>
979                    </xs:element>
980                    <xs:element name="statistical-tests" minOccurs="0">
981                      <xs:annotation>
982                        <xs:documentation>The list of statistical test to which this
                              visualization refers.</xs:documentation>
983                      </xs:annotation>
984                      <xs:complexType>
985                        <xs:sequence maxOccurs="unbounded">
986                          <xs:element ref="ims:statistical-test"/>
987                        </xs:sequence>
988                      </xs:complexType>
989                    </xs:element>
990                  </xs:sequence>
991                </xs:extension>
992              </xs:complexContent>
993            </xs:complexType>
994          </xs:element>
995          <xs:element name="snapshot" substitutionGroup="ims:resource">
996            <xs:annotation>
997              <xs:documentation>Represents the information used by the infrastructure to store
                    and recover whichever Snapshot of the data that the users do. </xs:
                    documentation>
```

```
998        </xs:annotation>
999        <xs:complexType>
1000         <xs:complexContent>
1001           <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
1002             <xs:sequence>
1003               <xs:element ref="ims:content" minOccurs="0"/>
1004               <xs:element ref="ims:visualization" minOccurs="0"/>
1005             </xs:sequence>
1006             <xs:attribute ref="ims:media-type"/>
1007             <xs:attribute ref="ims:language"/>
1008           </xs:extension>
1009         </xs:complexContent>
1010       </xs:complexType>
1011     </xs:element>
1012     <xs:element name="contribution" substitutionGroup="ims:resource">
1013       <xs:annotation>
1014         <xs:documentation> Represents a paper (e.g. a conference paper, a working note, a
                  technical
1015   report, a journal paper) which has been published or that is publicly
1016   available and that its related.</xs:documentation>
1017       </xs:annotation>
1018       <xs:complexType>
1019         <xs:complexContent>
1020           <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
1021             <xs:sequence>
1022               <xs:element name="authors" minOccurs="0">
1023                 <xs:annotation>
1024                   <xs:documentation> The list of users that authors the contribution.</xs:
                      documentation>
1025                 </xs:annotation>
1026                 <xs:complexType>
1027                   <xs:sequence maxOccurs="unbounded">
1028                     <xs:element ref="ims:user"/>
1029                   </xs:sequence>
1030                 </xs:complexType>
1031               </xs:element>
1032               <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
1033               <xs:element ref="ims:content" minOccurs="0"/>
1034             </xs:sequence>
1035             <xs:attribute name="title" type="xs:string">
1036               <xs:annotation>
1037                 <xs:documentation>The title of the contribution.</xs:documentation>
1038               </xs:annotation>
1039             </xs:attribute>
1040             <xs:attribute name="year" type="xs:int">
1041               <xs:annotation>
1042                 <xs:documentation>The year of the contribution.</xs:documentation>
1043               </xs:annotation>
1044             </xs:attribute>
1045             <xs:attribute ref="ims:media-type"/>
1046             <xs:attribute ref="ims:language"/>
1047           </xs:extension>
1048         </xs:complexContent>
1049       </xs:complexType>
1050     </xs:element>
1051 </xs:schema>
```

A.2   ICI XML Schema

```
1 <?xml version="1.0" encoding="UTF-8"?>
```

```xml
 2 <!-- edited with XMLSpy v2012 rel. 2 sp1 (x64) (http://www.altova.com) by Università
      degli Studi di Padova (Università degli Studi di Padova) -->
 3 <xs:schema xmlns:ims="http://ims.dei.unipd.it/" xmlns:xs="http://www.w3.org/2001/
      XMLSchema" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:xcql="http://docs.oasis-
      open.org/ns/search-ws/xcql" targetNamespace="http://ims.dei.unipd.it/"
      elementFormDefault="qualified" attributeFormDefault="qualified" version="3.00" xml:
      lang="en">
 4   <xs:annotation>
 5     <xs:documentation xml:lang="en">This schema provides the base elements and types used
           by the IMS Component Integrator (ICI)  library.</xs:documentation>
 6     <xs:documentation xml:lang="en">Version 3.00</xs:documentation>
 7     <xs:documentation xml:lang="en">Created on 2006-08-02</xs:documentation>
 8     <xs:documentation xml:lang="en">Last modified on 2012-07-08</xs:documentation>
 9     <xs:documentation xml:lang="en">Authored by Nicola Ferro (ferro@dei.unipd.it)</xs:
          documentation>
10     <xs:documentation xml:lang="en">Copyright (c) 2006-2012 - Information Management
          Systems (IMS) Research Group (http://ims.dei.unipd.it/) - Department of
          Information Engineering (http://www.dei.unipd.it/) - University of Padua (http://
          www.unipd.it/)</xs:documentation>
11   </xs:annotation>
12   <xs:import namespace="http://purl.org/dc/elements/1.1/" schemaLocation="http://www.
        dublincore.org/schemas/xmls/qdc/dc.xsd">
13     <xs:annotation>
14       <xs:documentation xml:lang="en">Imports the schema for the Simple Dublin Core
            standard.</xs:documentation>
15     </xs:annotation>
16   </xs:import>
17   <xs:import namespace="http://docs.oasis-open.org/ns/search-ws/xcql" schemaLocation="
        xcql.ici.3.00.xsd">
18     <xs:annotation>
19       <xs:documentation xml:lang="en">Imports the schema for modified XCQL.</xs:
            documentation>
20     </xs:annotation>
21   </xs:import>
22   <xs:element name="ici" type="ims:ici-type">
23     <xs:annotation>
24       <xs:documentation xml:lang="en">Provides information about one or more objects of
            the ICI library.</xs:documentation>
25     </xs:annotation>
26   </xs:element>
27   <xs:element name="file-metadata">
28     <xs:annotation>
29       <xs:documentation xml:lang="en">Reports metadata describing the XML document at
            hand.</xs:documentation>
30     </xs:annotation>
31     <xs:complexType>
32       <xs:group ref="dc:elementsGroup"/>
33     </xs:complexType>
34   </xs:element>
35   <xs:element name="resource" type="ims:resource-type">
36     <xs:annotation>
37       <xs:documentation xml:lang="en">Represents a generic entity managed by the system.<
            /xs:documentation>
38     </xs:annotation>
39   </xs:element>
40   <xs:element name="error" substitutionGroup="ims:resource">
41     <xs:annotation>
42       <xs:documentation xml:lang="en">Represents an error occurred in the system.</xs:
            documentation>
43     </xs:annotation>
```

```
44      <xs:complexType>
45        <xs:complexContent>
46          <xs:extension base="ims:resource-type">
47            <xs:sequence>
48              <xs:element name="details" minOccurs="0">
49                <xs:annotation>
50                  <xs:documentation xml:lang="en">Additional details which describe the
                        occurred error.</xs:documentation>
51                </xs:annotation>
52                <xs:complexType mixed="true">
53                  <xs:complexContent>
54                    <xs:restriction base="xs:anyType">
55                      <xs:sequence>
56                        <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
57                      </xs:sequence>
58                      <xs:attribute ref="ims:language"/>
59                    </xs:restriction>
60                  </xs:complexContent>
61                </xs:complexType>
62              </xs:element>
63              <xs:element name="diagnostic" minOccurs="0">
64                <xs:annotation>
65                  <xs:documentation xml:lang="en">Additional diagnostic and debug messages.
                        </xs:documentation>
66                </xs:annotation>
67                <xs:complexType mixed="true">
68                  <xs:complexContent>
69                    <xs:restriction base="xs:anyType">
70                      <xs:sequence>
71                        <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
72                      </xs:sequence>
73                    </xs:restriction>
74                  </xs:complexContent>
75                </xs:complexType>
76              </xs:element>
77            </xs:sequence>
78            <xs:attribute name="code" type="xs:hexBinary" use="required">
79              <xs:annotation>
80                <xs:documentation xml:lang="en">The unique code of the error.</xs:
                      documentation>
81              </xs:annotation>
82            </xs:attribute>
83            <xs:attribute name="type" type="xs:token" use="required">
84              <xs:annotation>
85                <xs:documentation xml:lang="en">The type of the error.</xs:documentation>
86              </xs:annotation>
87            </xs:attribute>
88            <xs:attribute ref="ims:created"/>
89          </xs:extension>
90        </xs:complexContent>
91      </xs:complexType>
92   </xs:element>
93   <xs:element name="namespace" substitutionGroup="ims:resource">
94     <xs:annotation>
95       <xs:documentation xml:lang="en">Represents a namespace.</xs:documentation>
96     </xs:annotation>
97     <xs:complexType>
98       <xs:complexContent>
99         <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
100          <xs:attribute name="prefix">
```

```
101            <xs:annotation>
102              <xs:documentation xml:lang="en">The prefix used for referring to the
                    namespace.</xs:documentation>
103            </xs:annotation>
104          </xs:attribute>
105          <xs:attribute ref="ims:description"/>
106        </xs:extension>
107      </xs:complexContent>
108    </xs:complexType>
109  </xs:element>
110  <xs:element name="user" substitutionGroup="ims:resource">
111    <xs:annotation>
112      <xs:documentation xml:lang="en">Represents a user.</xs:documentation>
113    </xs:annotation>
114    <xs:complexType>
115      <xs:complexContent>
116        <xs:extension base="ims:namespace-identifiable-timestamp-traceable-resource-type"
                >
117          <xs:sequence>
118            <xs:element name="groups" minOccurs="0">
119              <xs:annotation>
120                <xs:documentation xml:lang="en">The groups to which the user belongs.</xs
                      :documentation>
121              </xs:annotation>
122              <xs:complexType>
123                <xs:sequence>
124                  <xs:element ref="ims:group" maxOccurs="unbounded"/>
125                </xs:sequence>
126              </xs:complexType>
127            </xs:element>
128            <xs:element name="roles" minOccurs="0">
129              <xs:annotation>
130                <xs:documentation xml:lang="en">The roles the user is acting in.</xs:
                      documentation>
131              </xs:annotation>
132              <xs:complexType>
133                <xs:sequence>
134                  <xs:element ref="ims:role" maxOccurs="unbounded"/>
135                </xs:sequence>
136              </xs:complexType>
137            </xs:element>
138          </xs:sequence>
139          <xs:attribute name="password" type="xs:string">
140            <xs:annotation>
141              <xs:documentation xml:lang="en">The password of the user.</xs:documentation
                    >
142            </xs:annotation>
143          </xs:attribute>
144          <xs:attribute name="first-name" type="xs:string">
145            <xs:annotation>
146              <xs:documentation xml:lang="en">The first name of the user.</xs:
                    documentation>
147            </xs:annotation>
148          </xs:attribute>
149          <xs:attribute name="last-name" type="xs:string">
150            <xs:annotation>
151              <xs:documentation xml:lang="en">The last/family name of the user.</xs:
                    documentation>
152            </xs:annotation>
153          </xs:attribute>
```

```
154            <xs:attribute name="affiliation" type="xs:string">
155              <xs:annotation>
156                <xs:documentation xml:lang="en">The affiliation of the user.</xs:
                      documentation>
157              </xs:annotation>
158            </xs:attribute>
159            <xs:attribute name="e-mail" type="xs:string">
160              <xs:annotation>
161                <xs:documentation xml:lang="en">The e-mail of the user.</xs:documentation>
162              </xs:annotation>
163            </xs:attribute>
164            <xs:attribute name="birth-date" type="xs:date">
165              <xs:annotation>
166                <xs:documentation xml:lang="en">The birth date of the user.</xs:
                      documentation>
167              </xs:annotation>
168            </xs:attribute>
169            <xs:attribute name="gender">
170              <xs:annotation>
171                <xs:documentation xml:lang="en">The gender of the user.</xs:documentation>
172              </xs:annotation>
173              <xs:simpleType>
174                <xs:restriction base="xs:token">
175                  <xs:enumeration value="MALE">
176                    <xs:annotation>
177                      <xs:documentation xml:lang="en">The male gender.</xs:documentation>
178                    </xs:annotation>
179                  </xs:enumeration>
180                  <xs:enumeration value="FEMALE">
181                    <xs:annotation>
182                      <xs:documentation xml:lang="en">The female gender.</xs:documentation>
183                    </xs:annotation>
184                  </xs:enumeration>
185                </xs:restriction>
186              </xs:simpleType>
187            </xs:attribute>
188            <xs:attribute ref="ims:language"/>
189            <xs:attribute ref="ims:country"/>
190            <xs:attribute name="address" type="xs:string">
191              <xs:annotation>
192                <xs:documentation xml:lang="en">The address of the user.</xs:documentation>
193              </xs:annotation>
194            </xs:attribute>
195            <xs:attribute name="city" type="xs:string">
196              <xs:annotation>
197                <xs:documentation xml:lang="en">The city of the user.</xs:documentation>
198              </xs:annotation>
199            </xs:attribute>
200            <xs:attribute name="state" type="xs:string">
201              <xs:annotation>
202                <xs:documentation xml:lang="en">The state/province/region of the user.</xs:
                      documentation>
203              </xs:annotation>
204            </xs:attribute>
205            <xs:attribute name="zip" type="xs:string">
206              <xs:annotation>
207                <xs:documentation xml:lang="en">The zip code of the user.</xs:documentation
                      >
208              </xs:annotation>
209            </xs:attribute>
```

```
210             <xs:attribute name="phone" type="xs:string">
211               <xs:annotation>
212                 <xs:documentation xml:lang="en">The telephone number of the user.</xs:
                      documentation>
213               </xs:annotation>
214             </xs:attribute>
215             <xs:attribute name="facsimile" type="xs:string">
216               <xs:annotation>
217                 <xs:documentation xml:lang="en">The facsimile number of the user.</xs:
                      documentation>
218               </xs:annotation>
219             </xs:attribute>
220             <xs:attribute name="mobile" type="xs:string">
221               <xs:annotation>
222                 <xs:documentation xml:lang="en">The mobile telephone number of the user.</
                      xs:documentation>
223               </xs:annotation>
224             </xs:attribute>
225             <xs:attribute name="voip-caller-id" type="xs:token">
226               <xs:annotation>
227                 <xs:documentation xml:lang="en">The VoIP caller identifier of the user.</xs
                      :documentation>
228               </xs:annotation>
229             </xs:attribute>
230             <xs:attribute name="homepage" type="xs:anyURI">
231               <xs:annotation>
232                 <xs:documentation xml:lang="en">The home page of the user.</xs:
                      documentation>
233               </xs:annotation>
234             </xs:attribute>
235           </xs:extension>
236         </xs:complexContent>
237       </xs:complexType>
238     </xs:element>
239     <xs:element name="role" substitutionGroup="ims:resource">
240       <xs:annotation>
241         <xs:documentation xml:lang="en">Represents a role of users.</xs:documentation>
242       </xs:annotation>
243       <xs:complexType>
244         <xs:complexContent>
245           <xs:extension base="ims:namespace-identifiable-timestamp-traceable-resource-type"
                  >
246             <xs:sequence>
247               <xs:element name="users" minOccurs="0">
248                 <xs:annotation>
249                   <xs:documentation xml:lang="en">The users acting in this role.</xs:
                        documentation>
250                 </xs:annotation>
251                 <xs:complexType>
252                   <xs:sequence>
253                     <xs:element ref="ims:user" maxOccurs="unbounded"/>
254                   </xs:sequence>
255                 </xs:complexType>
256               </xs:element>
257             </xs:sequence>
258             <xs:attribute ref="ims:description"/>
259           </xs:extension>
260         </xs:complexContent>
261       </xs:complexType>
262     </xs:element>
```

```
263  <xs:element name="binary-object" substitutionGroup="ims:resource">
264    <xs:annotation>
265      <xs:documentation xml:lang="en">Represents a binary object.</xs:documentation>
266    </xs:annotation>
267    <xs:complexType>
268      <xs:complexContent>
269        <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-
                controllable-resource-type">
270          <xs:sequence>
271            <xs:element ref="ims:links" minOccurs="0"/>
272            <xs:element ref="ims:content" minOccurs="0"/>
273          </xs:sequence>
274          <xs:attribute ref="ims:media-type"/>
275          <xs:attribute ref="ims:language"/>
276          <xs:attribute name="link" type="xs:anyURI">
277            <xs:annotation>
278              <xs:documentation xml:lang="en">A URI that represents a link to the binary
                    object.</xs:documentation>
279            </xs:annotation>
280          </xs:attribute>
281        </xs:extension>
282      </xs:complexContent>
283    </xs:complexType>
284  </xs:element>
285  <xs:element name="digital-object" substitutionGroup="ims:resource">
286    <xs:annotation>
287      <xs:documentation xml:lang="en">Represents a digital object.</xs:documentation>
288    </xs:annotation>
289    <xs:complexType>
290      <xs:complexContent>
291        <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-
                controllable-resource-type">
292          <xs:sequence>
293            <xs:element ref="ims:links" minOccurs="0"/>
294          </xs:sequence>
295          <xs:attribute ref="ims:media-type"/>
296          <xs:attribute ref="ims:language"/>
297          <xs:attribute name="link" type="xs:anyURI">
298            <xs:annotation>
299              <xs:documentation xml:lang="en">A URI that represents a link to the digital
                    object.</xs:documentation>
300            </xs:annotation>
301          </xs:attribute>
302        </xs:extension>
303      </xs:complexContent>
304    </xs:complexType>
305  </xs:element>
306  <xs:element name="concept" substitutionGroup="ims:resource">
307    <xs:annotation>
308      <xs:documentation xml:lang="en">Represents a concept "viewed as an idea or notion;
            a unit of thought"</xs:documentation>
309    </xs:annotation>
310    <xs:complexType>
311      <xs:complexContent>
312        <xs:extension base="ims:namespace-identifiable-timestamp-traceable-resource-type"
                >
313          <xs:sequence>
314            <xs:element ref="ims:links" minOccurs="0"/>
315          </xs:sequence>
316          <xs:attribute ref="ims:description"/>
```

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```
317          </xs:extension>
318        </xs:complexContent>
319      </xs:complexType>
320    </xs:element>
321    <xs:element name="group" substitutionGroup="ims:resource">
322      <xs:annotation>
323        <xs:documentation xml:lang="en">Represents a group of users.</xs:documentation>
324      </xs:annotation>
325      <xs:complexType>
326        <xs:complexContent>
327          <xs:extension base="ims:namespace-identifiable-timestamp-traceable-resource-type"
                 >
328            <xs:sequence>
329              <xs:element name="users" minOccurs="0">
330                <xs:annotation>
331                  <xs:documentation xml:lang="en">The users belonging to the group.</xs:
                       documentation>
332                </xs:annotation>
333                <xs:complexType>
334                  <xs:sequence>
335                    <xs:element ref="ims:user" maxOccurs="unbounded"/>
336                  </xs:sequence>
337                </xs:complexType>
338              </xs:element>
339            </xs:sequence>
340            <xs:attribute ref="ims:description"/>
341          </xs:extension>
342        </xs:complexContent>
343      </xs:complexType>
344    </xs:element>
345    <xs:element name="result" substitutionGroup="ims:resource">
346      <xs:annotation>
347        <xs:documentation xml:lang="en">Represent the results of a search.</xs:
             documentation>
348      </xs:annotation>
349      <xs:complexType>
350        <xs:complexContent>
351          <xs:extension base="ims:resource-type">
352            <xs:sequence>
353              <xs:element ref="ims:query" minOccurs="0"/>
354              <xs:element ref="ims:resource-class" minOccurs="0"/>
355              <xs:element name="items" minOccurs="0">
356                <xs:annotation>
357                  <xs:documentation xml:lang="en">The items retrieved in these results.</xs
                       :documentation>
358                </xs:annotation>
359                <xs:complexType>
360                  <xs:sequence>
361                    <xs:element name="item" maxOccurs="unbounded">
362                      <xs:annotation>
363                        <xs:documentation xml:lang="en">An item of the results.</xs:
                             documentation>
364                      </xs:annotation>
365                      <xs:complexType>
366                        <xs:attribute ref="ims:identifier" use="required"/>
367                        <xs:attribute ref="ims:namespace"/>
368                        <xs:attribute name="rank" type="xs:nonNegativeInteger" use="
                             required">
369                          <xs:annotation>
370                            <xs:documentation xml:lang="en">The rank of the item.</xs:
```

```
                              documentation>
371                   </xs:annotation>
372                 </xs:attribute>
373                 <xs:attribute name="score" use="required">
374                   <xs:annotation>
375                     <xs:documentation xml:lang="en">The score of the item. It must
                              be in the [0, 1] interval.</xs:documentation>
376                   </xs:annotation>
377                   <xs:simpleType>
378                     <xs:restriction base="xs:double">
379                       <xs:minInclusive value="0.0"/>
380                       <xs:maxInclusive value="1.0"/>
381                     </xs:restriction>
382                   </xs:simpleType>
383                 </xs:attribute>
384               </xs:complexType>
385             </xs:element>
386           </xs:sequence>
387         </xs:complexType>
388       </xs:element>
389     </xs:sequence>
390     <xs:attribute ref="ims:created"/>
391     <xs:attribute name="size" type="xs:nonNegativeInteger" use="required">
392       <xs:annotation>
393         <xs:documentation xml:lang="en">The size of the results, i.e. the number of
                  items in the results.</xs:documentation>
394       </xs:annotation>
395     </xs:attribute>
396   </xs:extension>
397   </xs:complexContent>
398   </xs:complexType>
399 </xs:element>
400 <xs:element name="query" substitutionGroup="ims:resource">
401   <xs:annotation>
402     <xs:documentation xml:lang="en">Represents a query to be searched for.</xs:
          documentation>
403   </xs:annotation>
404   <xs:complexType>
405     <xs:complexContent>
406       <xs:extension base="ims:resource-type">
407         <xs:sequence>
408           <xs:element name="cql" type="xs:string">
409             <xs:annotation>
410               <xs:documentation xml:lang="en">The CQL representation of the query.</xs:
                      documentation>
411             </xs:annotation>
412           </xs:element>
413           <xs:element ref="ims:resource-class" minOccurs="0"/>
414           <xs:element ref="xcql:xcql" minOccurs="0">
415             <xs:annotation>
416               <xs:documentation xml:lang="en">The XCQL representation of the query
                      toghether with its results, if any.</xs:documentation>
417             </xs:annotation>
418           </xs:element>
419         </xs:sequence>
420         <xs:attribute ref="ims:created"/>
421       </xs:extension>
422     </xs:complexContent>
423   </xs:complexType>
424 </xs:element>
```

```
425  <xs:element name="log-event" substitutionGroup="ims:resource">
426    <xs:annotation>
427      <xs:documentation xml:lang="en">Represents a log event.</xs:documentation>
428    </xs:annotation>
429    <xs:complexType>
430      <xs:complexContent>
431        <xs:extension base="ims:serially-identifiable-resource-type">
432          <xs:sequence>
433            <xs:element name="message" minOccurs="0">
434              <xs:annotation>
435                <xs:documentation xml:lang="en">The message describing this log event.</
                     xs:documentation>
436              </xs:annotation>
437              <xs:complexType mixed="true">
438                <xs:complexContent>
439                  <xs:restriction base="xs:anyType">
440                    <xs:sequence>
441                      <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
442                    </xs:sequence>
443                    <xs:attribute ref="ims:language"/>
444                  </xs:restriction>
445                </xs:complexContent>
446              </xs:complexType>
447            </xs:element>
448            <xs:element ref="ims:user" minOccurs="0"/>
449            <xs:element name="action" type="xs:token" minOccurs="0">
450              <xs:annotation>
451                <xs:documentation xml:lang="en">The action performed by the user when
                     this log event was originated.</xs:documentation>
452              </xs:annotation>
453            </xs:element>
454            <xs:element name="ip" type="xs:string" minOccurs="0">
455              <xs:annotation>
456                <xs:documentation xml:lang="en">The IP address of the host causing this
                     log event.</xs:documentation>
457              </xs:annotation>
458            </xs:element>
459            <xs:element name="resource" minOccurs="0">
460              <xs:annotation>
461                <xs:documentation xml:lang="en">The resource whose access is causing this
                     log event.</xs:documentation>
462              </xs:annotation>
463              <xs:complexType>
464                <xs:complexContent>
465                  <xs:extension base="ims:namespace-identifiable-resource-type">
466                    <xs:sequence>
467                      <xs:element ref="ims:resource-class" minOccurs="0"/>
468                    </xs:sequence>
469                  </xs:extension>
470                </xs:complexContent>
471              </xs:complexType>
472            </xs:element>
473            <xs:element name="thread" type="xs:string" minOccurs="0">
474              <xs:annotation>
475                <xs:documentation xml:lang="en">The name of the thread which generated
                     this log event.</xs:documentation>
476              </xs:annotation>
477            </xs:element>
478            <xs:element name="class-name" type="xs:string" minOccurs="0">
479              <xs:annotation>
```

```
480            <xs:documentation xml:lang="en">The name of the class which generated
                  this log event.</xs:documentation>
481         </xs:annotation>
482      </xs:element>
483      <xs:element name="method" type="xs:string" minOccurs="0">
484        <xs:annotation>
485          <xs:documentation xml:lang="en">The name of the method which generated
                  this log event.</xs:documentation>
486        </xs:annotation>
487      </xs:element>
488      <xs:element name="line-number" type="xs:positiveInteger" minOccurs="0">
489        <xs:annotation>
490          <xs:documentation xml:lang="en">The line number in the source code of the
                  class which generated this log event.</xs:documentation>
491        </xs:annotation>
492      </xs:element>
493      <xs:element name="class-file" type="xs:string" minOccurs="0">
494        <xs:annotation>
495          <xs:documentation xml:lang="en">The name of the file containing the class
                  which generated this log event.</xs:documentation>
496        </xs:annotation>
497      </xs:element>
498      <xs:element name="throwable" minOccurs="0">
499        <xs:annotation>
500          <xs:documentation xml:lang="en">The information about the exception that
                  caused this log event.</xs:documentation>
501        </xs:annotation>
502        <xs:complexType mixed="true">
503          <xs:complexContent>
504            <xs:restriction base="xs:anyType">
505              <xs:sequence>
506                <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
507              </xs:sequence>
508            </xs:restriction>
509          </xs:complexContent>
510        </xs:complexType>
511      </xs:element>
512    </xs:sequence>
513    <xs:attribute ref="ims:created"/>
514    <xs:attribute name="level">
515      <xs:annotation>
516        <xs:documentation xml:lang="en">The level of a log event.</xs:documentation
                  >
517      </xs:annotation>
518      <xs:simpleType>
519        <xs:restriction base="xs:token">
520          <xs:enumeration value="TRACE">
521            <xs:annotation>
522              <xs:documentation xml:lang="en">Designates the finest-grained
                      informational events.</xs:documentation>
523            </xs:annotation>
524          </xs:enumeration>
525          <xs:enumeration value="DEBUG">
526            <xs:annotation>
527              <xs:documentation xml:lang="en">Designates fine-grained informational
                      events that are most useful to debug an application.</xs:
                      documentation>
528            </xs:annotation>
529          </xs:enumeration>
530          <xs:enumeration value="INFO">
```

```
531                     <xs:annotation>
532                       <xs:documentation xml:lang="en">Designates informational messages
                              that highlight the progress of the application at coarse-grained
                              level.</xs:documentation>
533                     </xs:annotation>
534                   </xs:enumeration>
535                   <xs:enumeration value="WARN">
536                     <xs:annotation>
537                       <xs:documentation xml:lang="en">Designates potentially harmful
                              situations.</xs:documentation>
538                     </xs:annotation>
539                   </xs:enumeration>
540                   <xs:enumeration value="ERROR">
541                     <xs:annotation>
542                       <xs:documentation xml:lang="en">Designates error events that might
                              still allow the application to continue running.</xs:
                              documentation>
543                     </xs:annotation>
544                   </xs:enumeration>
545                   <xs:enumeration value="FATAL">
546                     <xs:annotation>
547                       <xs:documentation xml:lang="en">Designates very severe error events
                              that will presumably lead the application to abort.</xs:
                              documentation>
548                     </xs:annotation>
549                   </xs:enumeration>
550                 </xs:restriction>
551               </xs:simpleType>
552             </xs:attribute>
553           </xs:extension>
554         </xs:complexContent>
555       </xs:complexType>
556   </xs:element>
557   <xs:element name="metadata-set" substitutionGroup="ims:resource">
558     <xs:annotation>
559       <xs:documentation xml:lang="en">Represents a set of metadata resources. Metadata
                sets can be nested.</xs:documentation>
560     </xs:annotation>
561     <xs:complexType>
562       <xs:complexContent>
563         <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-
                controllable-resource-type">
564           <xs:sequence>
565             <xs:element name="supersets" minOccurs="0">
566               <xs:annotation>
567                 <xs:documentation xml:lang="en">The super-sets of this metadata set.</xs:
                        documentation>
568               </xs:annotation>
569               <xs:complexType>
570                 <xs:sequence>
571                   <xs:element ref="ims:metadata-set" maxOccurs="unbounded"/>
572                 </xs:sequence>
573               </xs:complexType>
574             </xs:element>
575             <xs:element name="subsets" minOccurs="0">
576               <xs:annotation>
577                 <xs:documentation xml:lang="en">The sub-sets of this metadata set.</xs:
                        documentation>
578               </xs:annotation>
579               <xs:complexType>
```

```
580                      <xs:sequence>
581                        <xs:element ref="ims:metadata-set" maxOccurs="unbounded"/>
582                      </xs:sequence>
583                    </xs:complexType>
584                  </xs:element>
585                </xs:sequence>
586                <xs:attribute name="name" type="xs:token">
587                  <xs:annotation>
588                    <xs:documentation xml:lang="en">The name of the metadata set.</xs:
                          documentation>
589                  </xs:annotation>
590                </xs:attribute>
591                <xs:attribute ref="ims:description"/>
592              </xs:extension>
593            </xs:complexContent>
594          </xs:complexType>
595        </xs:element>
596        <xs:element name="metadata" substitutionGroup="ims:resource">
597          <xs:annotation>
598            <xs:documentation xml:lang="en">Represents a metadata.</xs:documentation>
599          </xs:annotation>
600          <xs:complexType>
601            <xs:complexContent>
602              <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-
                      controllable-resource-type">
603                <xs:sequence>
604                  <xs:element name="metadata-sets" minOccurs="0">
605                    <xs:annotation>
606                      <xs:documentation xml:lang="en">The metadata sets to which this metadata
                            belongs.</xs:documentation>
607                    </xs:annotation>
608                    <xs:complexType>
609                      <xs:sequence>
610                        <xs:element ref="ims:metadata-set" maxOccurs="unbounded"/>
611                      </xs:sequence>
612                    </xs:complexType>
613                  </xs:element>
614                  <xs:element ref="ims:links" minOccurs="0">
615                    <xs:annotation>
616                      <xs:documentation xml:lang="en">The links among this metadata and other
                            metadata resources.</xs:documentation>
617                    </xs:annotation>
618                  </xs:element>
619                  <xs:element name="fields" minOccurs="0">
620                    <xs:annotation>
621                      <xs:documentation xml:lang="en">The fields of this metadata.</xs:
                            documentation>
622                    </xs:annotation>
623                    <xs:complexType mixed="true">
624                      <xs:complexContent>
625                        <xs:restriction base="xs:anyType">
626                          <xs:sequence>
627                            <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
628                          </xs:sequence>
629                        </xs:restriction>
630                      </xs:complexContent>
631                    </xs:complexType>
632                  </xs:element>
633                </xs:sequence>
634                <xs:anyAttribute namespace="##any" processContents="lax">
```

```
635              <xs:annotation>
636                <xs:documentation xml:lang="en">Additional attributes of the metadata
                       record, if any.</xs:documentation>
637              </xs:annotation>
638            </xs:anyAttribute>
639          </xs:extension>
640        </xs:complexContent>
641      </xs:complexType>
642    </xs:element>
643    <xs:element name="provenance-event" substitutionGroup="ims:resource">
644      <xs:annotation>
645        <xs:documentation xml:lang="en">An event describing a fact about the provenance of
               a resource.</xs:documentation>
646      </xs:annotation>
647      <xs:complexType>
648        <xs:complexContent>
649          <xs:extension base="ims:serially-identifiable-resource-type">
650            <xs:sequence>
651              <xs:element name="when" type="xs:dateTime">
652                <xs:annotation>
653                  <xs:documentation xml:lang="en">The timestamp at which the event occurred
                         .</xs:documentation>
654                </xs:annotation>
655              </xs:element>
656              <xs:element name="who">
657                <xs:annotation>
658                  <xs:documentation xml:lang="en">The user who caused the event.</xs:
                         documentation>
659                </xs:annotation>
660                <xs:complexType>
661                  <xs:sequence>
662                    <xs:element ref="ims:user"/>
663                  </xs:sequence>
664                </xs:complexType>
665              </xs:element>
666              <xs:element name="predicate">
667                <xs:annotation>
668                  <xs:documentation xml:lang="en">The action carried out in the event.</xs:
                         documentation>
669                </xs:annotation>
670                <xs:simpleType>
671                  <xs:restriction base="xs:token">
672                    <xs:enumeration value="CREATED">
673                      <xs:annotation>
674                        <xs:documentation xml:lang="en">Indicates the a user created a
                               resource.</xs:documentation>
675                      </xs:annotation>
676                    </xs:enumeration>
677                    <xs:enumeration value="READ">
678                      <xs:annotation>
679                        <xs:documentation xml:lang="en">Indicates the a user read a
                               resource.</xs:documentation>
680                      </xs:annotation>
681                    </xs:enumeration>
682                    <xs:enumeration value="UPDATED">
683                      <xs:annotation>
684                        <xs:documentation xml:lang="en">Indicates the a user updated a
                               resource.</xs:documentation>
685                      </xs:annotation>
686                    </xs:enumeration>
```

```xml
687              <xs:enumeration value="DELETED">
688                <xs:annotation>
689                  <xs:documentation xml:lang="en">Indicates the a user deleted a
                        resource.</xs:documentation>
690                </xs:annotation>
691              </xs:enumeration>
692              <xs:enumeration value="ACCESSED">
693                <xs:annotation>
694                  <xs:documentation xml:lang="en">Indicates the a user accessed a
                        resource.</xs:documentation>
695                </xs:annotation>
696              </xs:enumeration>
697            </xs:restriction>
698          </xs:simpleType>
699        </xs:element>
700        <xs:element name="what">
701          <xs:annotation>
702            <xs:documentation xml:lang="en">The resource originated by the event.</xs
                  :documentation>
703          </xs:annotation>
704          <xs:complexType>
705            <xs:sequence>
706              <xs:element ref="ims:resource"/>
707            </xs:sequence>
708          </xs:complexType>
709        </xs:element>
710        <xs:element name="why" type="xs:token">
711          <xs:annotation>
712            <xs:documentation xml:lang="en">The motivation that originated the event.
                  </xs:documentation>
713          </xs:annotation>
714        </xs:element>
715      </xs:sequence>
716    </xs:extension>
717  </xs:complexContent>
718 </xs:complexType>
719 </xs:element>
720 <xs:element name="resource-class" type="xs:token">
721   <xs:annotation>
722     <xs:documentation xml:lang="en">The type of resource retrieved in a search.</xs:
            documentation>
723   </xs:annotation>
724 </xs:element>
725 <xs:element name="owner">
726   <xs:annotation>
727     <xs:documentation xml:lang="en">The owner of a resource.</xs:documentation>
728   </xs:annotation>
729   <xs:complexType>
730     <xs:sequence>
731       <xs:element ref="ims:user"/>
732     </xs:sequence>
733   </xs:complexType>
734 </xs:element>
735 <xs:element name="access-permission">
736   <xs:annotation>
737     <xs:documentation xml:lang="en">The access permission of a group to a resource.</xs
            :documentation>
738   </xs:annotation>
739   <xs:simpleType>
740     <xs:restriction base="xs:token">
```

```
741        <xs:enumeration value="DENIED">
742          <xs:annotation>
743            <xs:documentation xml:lang="en">Denotes that access is denied.</xs:
                  documentation>
744          </xs:annotation>
745        </xs:enumeration>
746        <xs:enumeration value="READ_ONLY">
747          <xs:annotation>
748            <xs:documentation xml:lang="en">Denotes the read only access.</xs:
                  documentation>
749          </xs:annotation>
750        </xs:enumeration>
751        <xs:enumeration value="READ_WRITE">
752          <xs:annotation>
753            <xs:documentation xml:lang="en">Denotes the read/write access.</xs:
                  documentation>
754          </xs:annotation>
755        </xs:enumeration>
756      </xs:restriction>
757    </xs:simpleType>
758  </xs:element>
759  <xs:element name="links">
760    <xs:annotation>
761      <xs:documentation xml:lang="en">The list of links among two resources.</xs:
                documentation>
762    </xs:annotation>
763    <xs:complexType>
764      <xs:sequence>
765        <xs:element name="link" maxOccurs="unbounded">
766          <xs:annotation>
767            <xs:documentation xml:lang="en">A link among two resources.</xs:documentation
                  >
768          </xs:annotation>
769          <xs:complexType>
770            <xs:sequence>
771              <xs:element ref="ims:resource">
772                <xs:annotation>
773                  <xs:documentation xml:lang="en">The resource which is acting as source
                        of a link.</xs:documentation>
774                </xs:annotation>
775              </xs:element>
776              <xs:element name="relation">
777                <xs:annotation>
778                  <xs:documentation xml:lang="en">The relation among the source and
                        target resources comprising the link.</xs:documentation>
779                </xs:annotation>
780                <xs:complexType>
781                  <xs:sequence>
782                    <xs:element ref="ims:concept"/>
783                  </xs:sequence>
784                </xs:complexType>
785              </xs:element>
786              <xs:element ref="ims:resource">
787                <xs:annotation>
788                  <xs:documentation xml:lang="en">The resource which is acting as target
                        of a link.</xs:documentation>
789                </xs:annotation>
790              </xs:element>
791            </xs:sequence>
792          </xs:complexType>
```

```
793          </xs:element>
794        </xs:sequence>
795      </xs:complexType>
796    </xs:element>
797    <xs:element name="sharings">
798      <xs:annotation>
799        <xs:documentation xml:lang="en">The list of groups which share a resource with
               their access permissions.</xs:documentation>
800      </xs:annotation>
801      <xs:complexType>
802        <xs:sequence>
803          <xs:element name="sharing" maxOccurs="unbounded">
804            <xs:annotation>
805              <xs:documentation xml:lang="en">A sharing of the resource with a group.</xs:
                    documentation>
806            </xs:annotation>
807            <xs:complexType>
808              <xs:sequence>
809                <xs:element ref="ims:group"/>
810                <xs:element ref="ims:access-permission"/>
811              </xs:sequence>
812            </xs:complexType>
813          </xs:element>
814        </xs:sequence>
815      </xs:complexType>
816    </xs:element>
817    <xs:element name="content">
818      <xs:annotation>
819        <xs:documentation xml:lang="en">The content of a resource.</xs:documentation>
820      </xs:annotation>
821      <xs:complexType mixed="true">
822        <xs:complexContent>
823          <xs:restriction base="xs:anyType">
824            <xs:sequence>
825              <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
826            </xs:sequence>
827            <xs:attribute name="content-transfer-encoding">
828              <xs:annotation>
829                <xs:documentation xml:lang="en">It specifies what sort of encoding
                       transformation the body was subjected to and hence what decoding
                       operation must be used to restore it to its original form.</xs:
                       documentation>
830                <xs:documentation source="http://www.ietf.org/rfc/rfc2045.txt" xml:lang="en
                       ">For further information see RFC 2045, "Multipurpose Internet Mail
                       Extensions (MIME) Part One: Format of Internet Message Bodies".</xs:
                       documentation>
831              </xs:annotation>
832              <xs:simpleType>
833                <xs:restriction base="xs:token">
834                  <xs:enumeration value="base64">
835                    <xs:annotation>
836                      <xs:documentation xml:lang="en">The Base64 Content-Transfer-Encoding
                           is designed to represent arbitrary sequences of octets in a form
                           that need not be humanly readable. The encoding and decoding
                           algorithms are simple, but the encoded data are consistently only
                            about 33 percent larger than than unencoded data.</xs:
                           documentation>
837                      <xs:documentation source="http://www.ietf.org/rfc/rfc2045.txt" xml:
                           lang="en">For further information see RFC 2045, "Multipurpose
                           Internet Mail Extensions (MIME) Part One: Format of Internet
```

```xml
                              Message Bodies".</xs:documentation>
838                    </xs:annotation>
839                  </xs:enumeration>
840               </xs:restriction>
841             </xs:simpleType>
842          </xs:attribute>
843        </xs:restriction>
844      </xs:complexContent>
845    </xs:complexType>
846 </xs:element>
847 <xs:attribute name="identifier" type="xs:token">
848    <xs:annotation>
849      <xs:documentation xml:lang="en">The unique identifier of a resource.</xs:
            documentation>
850    </xs:annotation>
851 </xs:attribute>
852 <xs:attribute name="serial-identifier" type="xs:positiveInteger">
853    <xs:annotation>
854      <xs:documentation xml:lang="en">The unique serial identifier of a resource.</xs:
            documentation>
855    </xs:annotation>
856 </xs:attribute>
857 <xs:attribute name="namespace" type="xs:token">
858    <xs:annotation>
859      <xs:documentation xml:lang="en">The namespace of a resource.</xs:documentation>
860    </xs:annotation>
861 </xs:attribute>
862 <xs:attribute name="language">
863    <xs:annotation>
864      <xs:documentation xml:lang="en">The language of a resource.</xs:documentation>
865    </xs:annotation>
866    <xs:simpleType>
867      <xs:restriction base="xs:language">
868        <xs:pattern value="[a-z]{2,3}">
869          <xs:annotation>
870            <xs:documentation xml:lang="en">ISO 639-1:2002 and ISO 639-2:1992 alpha 2 and
                  alpha 3 codes are allowed.</xs:documentation>
871          </xs:annotation>
872        </xs:pattern>
873      </xs:restriction>
874    </xs:simpleType>
875 </xs:attribute>
876 <xs:attribute name="country">
877    <xs:annotation>
878      <xs:documentation xml:lang="en">The country of a resource.</xs:documentation>
879    </xs:annotation>
880    <xs:simpleType>
881      <xs:restriction base="xs:token">
882        <xs:pattern value="[A-Z]{2,3}">
883          <xs:annotation>
884            <xs:documentation xml:lang="en">ISO 3166-1:2066 alpha 2 and alpha 3 codes are
                  allowed.</xs:documentation>
885          </xs:annotation>
886        </xs:pattern>
887      </xs:restriction>
888    </xs:simpleType>
889 </xs:attribute>
890 <xs:attribute name="description" type="xs:string">
891    <xs:annotation>
892      <xs:documentation xml:lang="en">The description of a resource.</xs:documentation>
```

```xml
893      </xs:annotation>
894    </xs:attribute>
895    <xs:attribute name="created" type="xs:dateTime">
896      <xs:annotation>
897        <xs:documentation xml:lang="en">The creation timestamp of a resource.</xs:
             documentation>
898      </xs:annotation>
899    </xs:attribute>
900    <xs:attribute name="last-modified" type="xs:dateTime">
901      <xs:annotation>
902        <xs:documentation xml:lang="en">The last modification timestamp of the resource.</
             xs:documentation>
903      </xs:annotation>
904    </xs:attribute>
905    <xs:attribute name="scope">
906      <xs:annotation>
907        <xs:documentation xml:lang="en">The scope of a resource.</xs:documentation>
908      </xs:annotation>
909      <xs:simpleType>
910        <xs:restriction base="xs:string">
911          <xs:enumeration value="PRIVATE">
912            <xs:annotation>
913              <xs:documentation xml:lang="en">Denotes private resources.</xs:documentation>
914            </xs:annotation>
915          </xs:enumeration>
916          <xs:enumeration value="SHARED">
917            <xs:annotation>
918              <xs:documentation xml:lang="en">Denotes shared resources.</xs:documentation>
919            </xs:annotation>
920          </xs:enumeration>
921          <xs:enumeration value="PUBLIC">
922            <xs:annotation>
923              <xs:documentation xml:lang="en">Denotes public resources.</xs:documentation>
924            </xs:annotation>
925          </xs:enumeration>
926        </xs:restriction>
927      </xs:simpleType>
928    </xs:attribute>
929    <xs:attribute name="media-type">
930      <xs:annotation>
931        <xs:documentation xml:lang="en">The media type of an object according to MIME (
             Multipurpose Internet Mail Extensions) standard.</xs:documentation>
932      </xs:annotation>
933      <xs:simpleType>
934        <xs:restriction base="xs:string">
935          <xs:pattern value="(text|image|audio|video|application|message|multipart)/(\p{L
             }|\.|\-)+(;.*)?"/>
936        </xs:restriction>
937      </xs:simpleType>
938    </xs:attribute>
939    <xs:complexType name="resource-type">
940      <xs:annotation>
941        <xs:documentation xml:lang="en">Represents an entity which has identity.</xs:
             documentation>
942      </xs:annotation>
943      <xs:attribute ref="ims:identifier"/>
944    </xs:complexType>
945    <xs:complexType name="identifiable-resource-type">
946      <xs:annotation>
947        <xs:documentation xml:lang="en">Represents an entity which is identified by means
```

```
                  of a unique identifier.</xs:documentation>
948      </xs:annotation>
949      <xs:complexContent>
950        <xs:extension base="ims:resource-type"/>
951      </xs:complexContent>
952    </xs:complexType>
953    <xs:complexType name="identifiable-timestamp-traceable-resource-type">
954      <xs:annotation>
955        <xs:documentation xml:lang="en">Represents an entity which is identified by means
                  of a unique identifier and  whose creation, last modification, and last access
                  events can be traced.</xs:documentation>
956      </xs:annotation>
957      <xs:complexContent>
958        <xs:extension base="ims:resource-type">
959          <xs:attribute ref="ims:created"/>
960          <xs:attribute ref="ims:last-modified"/>
961        </xs:extension>
962      </xs:complexContent>
963    </xs:complexType>
964    <xs:complexType name="identifiable-timestamp-traceable-access-controllable-resource-
          type">
965      <xs:annotation>
966        <xs:documentation xml:lang="en">Represents an entity which is identified by means
                  of a unique identifier and namespace,  whose creation, last modification, and
                  last access events can be traced, and whose access permissions can be checked.<
                  /xs:documentation>
967      </xs:annotation>
968      <xs:complexContent>
969        <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
970          <xs:sequence>
971            <xs:element ref="ims:owner" minOccurs="0"/>
972            <xs:element ref="ims:sharings" minOccurs="0"/>
973          </xs:sequence>
974          <xs:attribute ref="ims:scope"/>
975        </xs:extension>
976      </xs:complexContent>
977    </xs:complexType>
978    <xs:complexType name="namespace-identifiable-resource-type">
979      <xs:annotation>
980        <xs:documentation xml:lang="en">Represents an entity which is identified by means
                  of a unique identifier and namespace.</xs:documentation>
981      </xs:annotation>
982      <xs:complexContent>
983        <xs:extension base="ims:resource-type">
984          <xs:attribute ref="ims:namespace"/>
985        </xs:extension>
986      </xs:complexContent>
987    </xs:complexType>
988    <xs:complexType name="namespace-identifiable-timestamp-traceable-resource-type">
989      <xs:annotation>
990        <xs:documentation xml:lang="en">Represents an entity which is identified by means
                  of a unique identifier and namespace and  whose creation, last modification,
                  and last access events can be traced.</xs:documentation>
991      </xs:annotation>
992      <xs:complexContent>
993        <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
994          <xs:attribute ref="ims:namespace"/>
995        </xs:extension>
996      </xs:complexContent>
997    </xs:complexType>
```

```
998    <xs:complexType name="namespace-identifiable-timestamp-traceable-access-controllable-
         resource-type">
999      <xs:annotation>
1000       <xs:documentation xml:lang="en">Represents an entity which is identified by means
            of a unique identifier and namespace, whose creation, last modification, and
            last access events can be traced, and whose access permissions can be checked.<
            /xs:documentation>
1001     </xs:annotation>
1002     <xs:complexContent>
1003       <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-
            resource-type">
1004         <xs:attribute ref="ims:namespace"/>
1005       </xs:extension>
1006     </xs:complexContent>
1007   </xs:complexType>
1008   <xs:complexType name="serially-identifiable-resource-type">
1009     <xs:annotation>
1010       <xs:documentation xml:lang="en">Represents an entity which is identified by means
            of a unique identifier and a serial identifier.</xs:documentation>
1011     </xs:annotation>
1012     <xs:complexContent>
1013       <xs:extension base="ims:resource-type">
1014         <xs:attribute ref="ims:serial-identifier"/>
1015       </xs:extension>
1016     </xs:complexContent>
1017   </xs:complexType>
1018   <xs:complexType name="ici-type">
1019     <xs:annotation>
1020       <xs:documentation xml:lang="en">Contains the representation of one or more
            resources.</xs:documentation>
1021     </xs:annotation>
1022     <xs:sequence>
1023       <xs:element ref="ims:file-metadata" minOccurs="0"/>
1024       <xs:element ref="ims:resource" minOccurs="0" maxOccurs="unbounded"/>
1025     </xs:sequence>
1026   </xs:complexType>
1027 </xs:schema>
```

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