Deliverable 3.3
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 been 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.
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](image)

### 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.
• **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**: Tasks carried out within a campaign are grouped into Tracks.

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.
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.

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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.
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.
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](image)

### 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](image)
2.8 Bibliographical Area

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](image)

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...
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, lastModified versus last_Modified).

3.1 Resource Area

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

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the namespace</td>
</tr>
<tr>
<td>description</td>
<td>text</td>
<td></td>
<td>the description of the namespace</td>
</tr>
<tr>
<td>created</td>
<td>timestamp with timezone</td>
<td></td>
<td>the creation time stamp of the namespace</td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp with timezone</td>
<td></td>
<td>the last modification time stamp of the namespace</td>
</tr>
<tr>
<td>prefix</td>
<td>text</td>
<td>NOT NULL</td>
<td>the prefix of the namespace</td>
</tr>
</tbody>
</table>

Table 1: The Namespace relation

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

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the concept</td>
</tr>
<tr>
<td>ns</td>
<td>text</td>
<td>PK, NOT NULL, references Namespace(id)</td>
<td>the namespace of the concept</td>
</tr>
<tr>
<td>created</td>
<td>timestamp with timezone</td>
<td></td>
<td>the creation time stamp of the concept</td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp with timezone</td>
<td></td>
<td>the last modification time stamp of the concept</td>
</tr>
<tr>
<td>description</td>
<td>text</td>
<td></td>
<td>the description of the concept</td>
</tr>
</tbody>
</table>

Table 2: The Concept relation

In the Role relation (Table 3), the namespace created and lastModified attributes were added.
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the role</td>
</tr>
<tr>
<td>ns</td>
<td>text</td>
<td>PK, NOT NULL, references</td>
<td>the namespace of the role</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Namespace(id)</td>
<td></td>
</tr>
<tr>
<td>created</td>
<td>timestamp with timezone</td>
<td>the creation time stamp of the role</td>
<td></td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp with timezone</td>
<td>the last modification time stamp of the role</td>
<td></td>
</tr>
<tr>
<td>description</td>
<td>text</td>
<td></td>
<td>the description of the role</td>
</tr>
</tbody>
</table>

Table 3: The Role relation

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

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the group</td>
</tr>
<tr>
<td>ns</td>
<td>text</td>
<td>PK, NOT NULL, references</td>
<td>the namespace of the group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Namespace(id)</td>
<td></td>
</tr>
<tr>
<td>created</td>
<td>timestamp with timezone</td>
<td>the creation time stamp of the group</td>
<td></td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp with timezone</td>
<td>the last modification time stamp of the group</td>
<td></td>
</tr>
<tr>
<td>description</td>
<td>text</td>
<td></td>
<td>the description of the group</td>
</tr>
</tbody>
</table>

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

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

Table 5: The User relation

The user is associated to the role relation by means of the enroll relationship shown in Table 6.
The user is associated to the group relation by means of the belong relationship shown in Table 7.

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.

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

Table 8: The Metadata relation
### Table 9: The Metadata Set relation

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the metadata set</td>
</tr>
<tr>
<td>ns</td>
<td>text</td>
<td>PK, NOT NULL, references Namespace(id)</td>
<td>the namespace of the metadata set</td>
</tr>
<tr>
<td>created</td>
<td>timestamp with timezone</td>
<td></td>
<td>the creation time stamp of the metadata set</td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp with timezone</td>
<td></td>
<td>the last modification time stamp of the metadata set</td>
</tr>
<tr>
<td>scope</td>
<td>enum</td>
<td></td>
<td>the scope of the metadata set</td>
</tr>
<tr>
<td>ownerID</td>
<td>text</td>
<td>references User(id)</td>
<td>the identifier of the user who owns the metadata set</td>
</tr>
<tr>
<td>ownerNS</td>
<td>text</td>
<td>references User(ns)</td>
<td>the namespace of the user who owns the metadata set</td>
</tr>
<tr>
<td>description</td>
<td>text</td>
<td></td>
<td>the description of the metadata set</td>
</tr>
<tr>
<td>name</td>
<td>text</td>
<td></td>
<td>the name of the metadata set</td>
</tr>
</tbody>
</table>

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

### Table 10: The Own relation

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sourceID</td>
<td>text</td>
<td>PK, NOT NULL, references Metadata Set(id)</td>
<td>The unique identifier of the metadata set owning the metadata.</td>
</tr>
<tr>
<td>sourceNS</td>
<td>text</td>
<td>PK, NOT NULL, references Metadata Set(ns)</td>
<td>The namespace of the metadata set owning the metadata</td>
</tr>
<tr>
<td>sourceID</td>
<td>text</td>
<td>PK, NOT NULL, references Metadata(id)</td>
<td>The unique identifier of the owned metadata</td>
</tr>
<tr>
<td>sourceNS</td>
<td>text</td>
<td>PK, NOT NULL, references Metadata(ns)</td>
<td>The namespace of the owned metadata</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sourceID</td>
<td>text</td>
<td>PK, NOT NULL, references Set(id)</td>
<td>The unique identifier of the superset.</td>
</tr>
<tr>
<td>sourceNS</td>
<td>text</td>
<td>PK, NOT NULL, references Set(ns)</td>
<td>The namespace of the superset.</td>
</tr>
<tr>
<td>targetID</td>
<td>text</td>
<td>PK, NOT NULL, references Set(id)</td>
<td>The unique identifier of the subset.</td>
</tr>
<tr>
<td>targetNS</td>
<td>text</td>
<td>PK, NOT NULL, references Set(ns)</td>
<td>The namespace of the subset.</td>
</tr>
</tbody>
</table>

Table 11: The Include relation

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

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sourceID</td>
<td>text</td>
<td>PK, NOT NULL, references Metadata(id)</td>
<td>The unique identifier of the source metadata.</td>
</tr>
<tr>
<td>sourceNS</td>
<td>text</td>
<td>PK, NOT NULL, references Metadata(ns)</td>
<td>The namespace of the source metadata.</td>
</tr>
<tr>
<td>targetID</td>
<td>text</td>
<td>PK, NOT NULL, references Metadata(id)</td>
<td>The unique identifier of the target metadata.</td>
</tr>
<tr>
<td>targetNS</td>
<td>text</td>
<td>PK, NOT NULL, references Metadata(ns)</td>
<td>The namespace of the target metadata.</td>
</tr>
<tr>
<td>relationID</td>
<td>text</td>
<td>PK, NOT NULL, references Concept(id)</td>
<td>The unique identifier of the concept.</td>
</tr>
<tr>
<td>relationNS</td>
<td>text</td>
<td>PK, NOT NULL, references Concept(ns)</td>
<td>The namespace of the concept.</td>
</tr>
</tbody>
</table>

Table 12: The Relate relation

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

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

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

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

Table 15: The Task relation

Figure 18 shows the interactions between the relations 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

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

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

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

Table 17: The Information Unit relation

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

### CORPUS

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

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.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the topic</td>
</tr>
<tr>
<td>created</td>
<td>timestamp</td>
<td>with timezone</td>
<td>the creation time stamp of the topic</td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp</td>
<td>with timezone</td>
<td>the last modification time stamp of the topic</td>
</tr>
</tbody>
</table>

Table 19: The Topic relation

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the topic content</td>
</tr>
<tr>
<td>mediaType</td>
<td>text</td>
<td>NOT NULL</td>
<td>the MIME media type of the topic content</td>
</tr>
<tr>
<td>lang</td>
<td>char(3)</td>
<td></td>
<td>the language of the topic content</td>
</tr>
<tr>
<td>content</td>
<td>bytea</td>
<td></td>
<td>the content of the topic</td>
</tr>
<tr>
<td>topicID</td>
<td>text</td>
<td>NOT NULL</td>
<td>the unique identifier of the topic with this topic content</td>
</tr>
<tr>
<td>topicConceptID</td>
<td>text</td>
<td>NOT NULL</td>
<td>the creation time stamp of the topic content</td>
</tr>
<tr>
<td>topicConceptNS</td>
<td>text</td>
<td>NOT NULL</td>
<td>the last modification time stamp of the topic content</td>
</tr>
</tbody>
</table>

Table 20: The Topic Content relation

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

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the topic group</td>
</tr>
<tr>
<td>created</td>
<td>timestamp with timezone</td>
<td></td>
<td>the creation time stamp of the topic group</td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp with timezone</td>
<td></td>
<td>the last modification time stamp of the topic group</td>
</tr>
<tr>
<td>scope</td>
<td>enum</td>
<td></td>
<td>the scope of the topic group</td>
</tr>
<tr>
<td>ownerID</td>
<td>text</td>
<td>references User(id)</td>
<td>the identifier of the user who owns the topic group</td>
</tr>
<tr>
<td>ownerNS</td>
<td>text</td>
<td>references User(ns)</td>
<td>the namespace of the user who owns the topic group</td>
</tr>
<tr>
<td>description</td>
<td>text</td>
<td></td>
<td>the description of the topic group</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the topic group</td>
</tr>
<tr>
<td>created</td>
<td>timestamp with timezone</td>
<td></td>
<td>the creation time stamp of the ground truth</td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp with timezone</td>
<td></td>
<td>the last modification time stamp of the ground truth</td>
</tr>
<tr>
<td>scope</td>
<td>enum</td>
<td></td>
<td>the scope of the topic group</td>
</tr>
<tr>
<td>ownerID</td>
<td>text</td>
<td>references User(id)</td>
<td>the identifier of the user who owns the ground truth</td>
</tr>
<tr>
<td>ownerNS</td>
<td>text</td>
<td>references User(ns)</td>
<td>the namespace of the user who owns the ground truth</td>
</tr>
<tr>
<td>description</td>
<td>text</td>
<td></td>
<td>the description of the ground truth</td>
</tr>
</tbody>
</table>

Table 22: The Ground Truth relation

Table 23 shows the attributes of the Pool Item relation. topicID, informationUnitID, groundTruthID, relevanceID and relevanceNS has been added.

page [48] of [328] 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
### POOL ITEM

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

Table 23: The Pool Item relation

Figure 19 depicts the connections that link the relations of this 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 queryConstruciton 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.
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the experiment</td>
</tr>
<tr>
<td>created</td>
<td>timestamp with</td>
<td></td>
<td>the creation time stamp of the experiment</td>
</tr>
<tr>
<td></td>
<td>timezone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp with</td>
<td></td>
<td>the last modification time stamp of the experiment</td>
</tr>
<tr>
<td></td>
<td>timezone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>scope</td>
<td>enum</td>
<td></td>
<td>the scope of the experiment</td>
</tr>
<tr>
<td>ownerID</td>
<td>text</td>
<td>references User(id)</td>
<td>the identifier of the user who owns the experiment</td>
</tr>
<tr>
<td>ownerNS</td>
<td>text</td>
<td>references User(ns)</td>
<td>the namespace of the user who owns the experiment</td>
</tr>
<tr>
<td>description</td>
<td>text</td>
<td></td>
<td>the description of the experiment</td>
</tr>
<tr>
<td>experimentTypeID</td>
<td>text</td>
<td>references Concept(id)</td>
<td>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</td>
</tr>
<tr>
<td>experimentTypeNS</td>
<td>text</td>
<td>references Concept(ns)</td>
<td>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</td>
</tr>
<tr>
<td>configurationID</td>
<td>text</td>
<td>references Configuration(id)</td>
<td>the unique identifier of the configuration used in this experiment</td>
</tr>
<tr>
<td>taskID</td>
<td>text</td>
<td>NOT NULL, references Task(id)</td>
<td>the unique identifier of the task for which the experiment is submitted</td>
</tr>
</tbody>
</table>

Table 24: The Experiment relation
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the experiment</td>
</tr>
<tr>
<td>created</td>
<td>timestamp with timezone</td>
<td></td>
<td>the creation time stamp of the experiment</td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp with timezone</td>
<td></td>
<td>the last modification time stamp of the experiment</td>
</tr>
<tr>
<td>scope</td>
<td>enum</td>
<td>references User(id)</td>
<td>the scope of the experiment</td>
</tr>
<tr>
<td>ownerID</td>
<td>text</td>
<td>references User(id)</td>
<td>the identifier of the user who owns the experiment</td>
</tr>
<tr>
<td>ownerNS</td>
<td>text</td>
<td>references User(ns)</td>
<td>the namespace of the user who owns the experiment</td>
</tr>
<tr>
<td>description</td>
<td>text</td>
<td></td>
<td>the description of the experiment</td>
</tr>
<tr>
<td>experimentTypeID</td>
<td>text</td>
<td>references Concept(id)</td>
<td>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</td>
</tr>
<tr>
<td>experimentTypeNS</td>
<td>text</td>
<td>references Concept(ns)</td>
<td>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</td>
</tr>
<tr>
<td>configurationID</td>
<td>text</td>
<td>references Configuration(id)</td>
<td>the unique identifier of the configuration used in this experiment</td>
</tr>
<tr>
<td>taskID</td>
<td>text</td>
<td>NOT NULL, references Task(id)</td>
<td>the unique identifier of the task for which the experiment is submitted</td>
</tr>
<tr>
<td>queryConstruction</td>
<td>text</td>
<td></td>
<td>describes how the query has been costructed, e.g. automatic,manual, and it is associated to the type &quot;run&quot;</td>
</tr>
</tbody>
</table>

Table 25: The Run relation

Three attributes have been added to the Run Item relation: experimentID, topicID and in-
formationUnitID (see Table 26).

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the run item</td>
</tr>
<tr>
<td>experimentID</td>
<td>text</td>
<td>NOT NULL, references Experiment(id)</td>
<td>the unique identifier of the experiment</td>
</tr>
<tr>
<td>topicID</td>
<td>text</td>
<td>NOT NULL, references Topic(id)</td>
<td>the unique identifier of the topic</td>
</tr>
<tr>
<td>informationUnitID</td>
<td>text</td>
<td>NOT NULL, references InformationUnit(id)</td>
<td>the identifier of the information unit</td>
</tr>
<tr>
<td>rank</td>
<td>integer</td>
<td>NOT NULL</td>
<td>the rank of the run item</td>
</tr>
<tr>
<td>score</td>
<td>real</td>
<td>NOT NULL</td>
<td>the score of the run item</td>
</tr>
</tbody>
</table>

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.

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

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

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

Table 28: The System relation

### APPLICATION

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

Table 29: The Application relation
The usual attributes `scope`, `ownerID` and `ownerNS` were added to the Configuration relation, as shown in Table 30.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the configuration</td>
</tr>
<tr>
<td>scope</td>
<td>enum</td>
<td></td>
<td>the scope of the configuration</td>
</tr>
<tr>
<td>ownerID</td>
<td>text</td>
<td>references User(id)</td>
<td>the identifier of the user who owns the configuration</td>
</tr>
<tr>
<td>ownerNS</td>
<td>text</td>
<td>references User(ns)</td>
<td>the namespace of the user who owns the configuration</td>
</tr>
<tr>
<td>description</td>
<td>text</td>
<td></td>
<td>the description of the configuration</td>
</tr>
<tr>
<td>parameters</td>
<td>xml</td>
<td></td>
<td>the parameters defining the configuration</td>
</tr>
</tbody>
</table>

Table 30: The Configuration relation

Figure 20 depicts the relation interaction 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

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

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.
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the measure</td>
</tr>
<tr>
<td>created</td>
<td>timestamp with</td>
<td></td>
<td>the creation time stamp of the measure</td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp with</td>
<td></td>
<td>the last modification time stamp of the measure</td>
</tr>
<tr>
<td>valueMeasure</td>
<td>decimal</td>
<td></td>
<td>the value of the measure</td>
</tr>
<tr>
<td>metricID</td>
<td>text</td>
<td>NOT NULL, references</td>
<td>the identifier of the Metric</td>
</tr>
<tr>
<td>metricNS</td>
<td>text</td>
<td>NOT NULL, references</td>
<td>the namespace of the Metric</td>
</tr>
<tr>
<td>runID</td>
<td>text</td>
<td>references Run(id)</td>
<td>the unique identifier of the run</td>
</tr>
<tr>
<td>guerrillaID</td>
<td>text</td>
<td>references Guerrilla(id)</td>
<td>the unique identifier of the guerrilla</td>
</tr>
<tr>
<td>livingID</td>
<td>text</td>
<td>references Living(id)</td>
<td>the unique identifier of the living</td>
</tr>
<tr>
<td>topicID</td>
<td>text</td>
<td>references Topic(id)</td>
<td>the unique identifier of the topic</td>
</tr>
</tbody>
</table>

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

Table 33: The Estimate relation

Figure 21 shows the interactions of the Measurement Area relations.
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.

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

Table 34: The Visualization relation

As for the Snapshot relation, its new attributes are: lang, ownerID, ownerNS, scope and visualizationID.
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data Type</th>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>text</td>
<td>PK, NOT NULL</td>
<td>the identifier of the snapshot</td>
</tr>
<tr>
<td>mediaType</td>
<td>text</td>
<td>NOT NULL</td>
<td>the MIME media type of the snapshot</td>
</tr>
<tr>
<td>lang</td>
<td>char(3)</td>
<td></td>
<td>the language of the snapshot</td>
</tr>
<tr>
<td>content</td>
<td>bytea</td>
<td></td>
<td>the content of the snapshot</td>
</tr>
<tr>
<td>created</td>
<td>timestamp with timezone</td>
<td></td>
<td>the creation time stamp of the snapshot</td>
</tr>
<tr>
<td>lastModified</td>
<td>timestamp with timezone</td>
<td></td>
<td>the last modification time stamp of the snapshot</td>
</tr>
<tr>
<td>scope</td>
<td>enum</td>
<td></td>
<td>the scope of the snapshot</td>
</tr>
<tr>
<td>ownerID</td>
<td>text</td>
<td>references User(id)</td>
<td>the identifier of the user who owns the snapshot</td>
</tr>
<tr>
<td>ownerNS</td>
<td>text</td>
<td>references User(ns)</td>
<td>the namespace of the user who owns the snapshot</td>
</tr>
<tr>
<td>visualizationID</td>
<td>text</td>
<td>NOT NULL, references Visualization(id)</td>
<td>the unique identifier of the Visualization related to this snapshot</td>
</tr>
</tbody>
</table>

Table 35: The Snapshot relation

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

---

**Figure 22: Relational schema of the Visual Analytics Area**

<table>
<thead>
<tr>
<th>Visualization</th>
<th>Snapshot</th>
</tr>
</thead>
<tbody>
<tr>
<td>identifier</td>
<td>identifier</td>
</tr>
<tr>
<td>name</td>
<td>visualizationID</td>
</tr>
<tr>
<td>parameters</td>
<td>created</td>
</tr>
<tr>
<td>visualizationTypeID</td>
<td>lastModified</td>
</tr>
<tr>
<td>visualizationTypeNameS</td>
<td>scope</td>
</tr>
<tr>
<td>description</td>
<td>ownerID</td>
</tr>
<tr>
<td>created</td>
<td>ownerNS</td>
</tr>
<tr>
<td>lastModified</td>
<td>mediaType</td>
</tr>
<tr>
<td>scope</td>
<td>lang</td>
</tr>
<tr>
<td>ownerID</td>
<td>content</td>
</tr>
<tr>
<td>ownerNS</td>
<td></td>
</tr>
</tbody>
</table>
### CONTRIBUTION

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

Table 36: The Contribution relation

Figure 23 shows the relational schema of the Bibliographical Area.
3.9 Inter-area Relationships

This subsection contains images depicting relational schemas of inter-area relationships.

Figure 23: Relational schema of the Bibliographical Area

[Diagram showing the relational schema with fields such as identifier, namespace, title, contributionYear, contributionType, created, lastModified, mediaType, lang, content, sourceID, sourceNS, targetID, targetNS]
Figure 24: Relational schema of the interactions that occur between the Resource Management Area, the Evaluation Activity Area and the Experimental Collection Area.

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
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
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 $\text{sim}(r, t_i) \in [0, 1]$ be the similarity score of term $t_i$ with respect to the resource $r = (t_1, t_2, \ldots, t_n)$; $\text{sim}(r, t_i) = 0$ 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:

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

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:

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

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
Increasing and decreasing similarity for and-queries and or-queries.

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 \(v = (v_1, v_2, \ldots, v_n)\), its P-norm is given by \(||v||_p = (v_1^p + v_2^p + \cdots + v_n^p)^{\frac{1}{p}}\) where \(p \geq 1\) is a real number.

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

\[
\begin{align*}
\text{sim}_{p}^{\text{or}} (r, q) &= \left( \frac{\sum_{i=1}^{n} \text{sim}(r, t_i)^p \text{ or}^p \sum_{i=1}^{n} \text{sim}(r, t_i)^p}{n} \right)^{\frac{1}{p}} \\
\text{sim}_{p}^{\text{and}} (r, q) &= 1 - \left( \frac{(1 - \text{sim}(r, t_1))^p + (1 - \text{sim}(r, t_2))^p + \cdots + (1 - \text{sim}(r, t_n))^p}{n} \right)^{\frac{1}{p}}
\end{align*}
\]

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

By varying the value of \(p\) between 1 and \(\infty\), 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].
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 \( \infty \), 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**
  \[
  \text{sim}_{\text{best}}^{\text{or}}(r, q) = \text{sim}_{\text{best}}^{\text{and}}(r, q) = \frac{\text{sim}(r, t_1) + \text{sim}(r, t_2) + \cdots + \text{sim}(r, t_n)}{n}
  \]

- **Loose Match**
  \[
  \begin{align*}
  \text{sim}_{\text{loose}}^{\text{or}}(r, q) &= \sqrt[n]{\text{sim}^5(r, t_1) + \text{sim}^5(r, t_2) + \cdots + \text{sim}^5(r, t_n)} \\
  \text{sim}_{\text{loose}}^{\text{and}}(r, q) &= 1 - \sqrt[n]{\left(1 - \text{sim}(r, t_1)\right)^5 + \left(1 - \text{sim}(r, t_2)\right)^5 + \cdots + \left(1 - \text{sim}(r, t_n)\right)^5}
  \end{align*}
  \]

- **Fuzzy Match**
  \[
  \begin{align*}
  \text{sim}_{\text{fuzzy}}^{\text{or}}(r, q) &= \sqrt[n]{\text{sim}^2(r, t_1) + \text{sim}^2(r, t_2) + \cdots + \text{sim}^2(r, t_n)} \\
  \text{sim}_{\text{fuzzy}}^{\text{and}}(r, q) &= 1 - \sqrt[n]{\left(1 - \text{sim}(r, t_1)\right)^2 + \left(1 - \text{sim}(r, t_2)\right)^2 + \cdots + \left(1 - \text{sim}(r, t_n)\right)^2}
  \end{align*}
  \]

- **Exact Match**
  \[
  \begin{align*}
  \text{sim}_{\text{exact}}^{\text{or}}(r, q) &= \max\left(\text{sim}(r, t_1), \text{sim}(r, t_2), \ldots, \text{sim}(r, t_n)\right) \\
  \text{sim}_{\text{exact}}^{\text{and}}(r, q) &= \min\left(\text{sim}(r, t_1), \text{sim}(r, t_2), \ldots, \text{sim}(r, t_n)\right)
  \end{align*}
  \]

\(^3\)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:
Figure 31: Architecture of the PROMISE infrastructure.
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:

<when> <who> <predicate> <what> <why>

where:

- **when**: is the time stamp at which the event occurred;
**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 been 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
<?xml version="1.0" encoding="UTF-8"?>
<ims:direct xmlns:ims="http://ims.dei.unipd.it/">
  <ims:schemaLocation="http://ims.dei.unipd.it/ http://ims.dei.unipd.it/data/xml/direct.3.00.xsd"> 

  <ims:provenance-event ims:serial-identifier="5382260"> 
    <ims:when>2012-08-31T15:34:39.256+02:00</ims:when>
    <ims:who>
      <ims:user ims:identifier="administrator"
        ims:namespace="http://ims.dei.unipd.it/"/>
    </ims:who>
    <ims:predicate>DELETED</ims:predicate>
    <ims:what>
      <ims:namespace ims:identifier="http://www.ns1.org/" ims:prefix="ns1"
        ims:description="Namespace of Information Retrieval Evaluation Campaign 1.">
        ims:created="2012-08-31T15:33:25.882+02:00"
        ims:last-modified="2012-08-31T15:34:27.130+02:00" />
    </ims:what>
    <ims:why>DELETE_NAMESPACE</ims:why>
  </ims:provenance-event>

  <ims:provenance-event ims:serial-identifier="5372986"> 
    <ims:when>2012-08-31T15:34:39.256+02:00</ims:when>
    <ims:who>
      <ims:user ims:identifier="administrator"
        ims:namespace="http://ims.dei.unipd.it/"/>
    </ims:who>
    <ims:predicate>UPDATED</ims:predicate>
    <ims:what>
      <ims:namespace ims:identifier="http://www.ns1.org/" ims:prefix="ns1"
       IMS:created="2012-08-31T15:33:25.882+02:00"
      </ims:what>
    </ims:provenance-event>
  </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 software 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.](image)

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 User 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 role-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 content-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* PostgreSQL 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 defined;

- `public`, which stores the tables and function defined by the PostgresSQL `dblink` 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.

![Database configuration diagram](image)
<table>
<thead>
<tr>
<th>Trigger function</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>usertriggerinsert()</td>
<td>Creates a new User.</td>
</tr>
<tr>
<td>usertriggerdelete()</td>
<td>Deletes an existing User.</td>
</tr>
<tr>
<td>usertriggerupdate()</td>
<td>Updates an existing user.</td>
</tr>
<tr>
<td>grouptriggerinsert()</td>
<td>Creates a new Group.</td>
</tr>
<tr>
<td>grouptriggerupdate()</td>
<td>Updates the information of an existing Group.</td>
</tr>
<tr>
<td>grouptriggerdelete()</td>
<td>Deletes an existing Group.</td>
</tr>
<tr>
<td>roletriggerinsert()</td>
<td>Creates a new role.</td>
</tr>
<tr>
<td>roletriggerdelete()</td>
<td>Deletes an existing role.</td>
</tr>
<tr>
<td>roletriggerupdate()</td>
<td>Updates the information of an existing role.</td>
</tr>
<tr>
<td>usergrouptriggerinsert()</td>
<td>Assigns a user to a Group.</td>
</tr>
<tr>
<td>usergrouptriggerdelete()</td>
<td>Remove a user from a Group.</td>
</tr>
<tr>
<td>usergrouptriggerdelete()</td>
<td>Removes a user from a Group.</td>
</tr>
<tr>
<td>userpasswordtriggerupdate()</td>
<td>Changes the password of an existing user.</td>
</tr>
<tr>
<td>roletriggerinsert()</td>
<td>Assigns a user to a Role.</td>
</tr>
<tr>
<td>roletriggerdelete()</td>
<td>Removes a user from a Role.</td>
</tr>
</tbody>
</table>

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 depicts the inter-connections between the two systems. 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 corresponding 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.

```
<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:group ims:created="2012-09-22T08:22.899+02:00"
ims:description="Description for user group 1."
ims:identifier="User group 1"/>
<ims:group ims:created="2012-09-22T08:22.899+02:00"
ims:description="Description for user group 2."
ims:identifier="User group 2"
ims:last-modified="2012-09-22T08:22.899+02:00"
ims:namespace="http://direct.dei.unipd.it/"/>
<ims:group ims:created="2012-09-22T08:36.546+02:00"
ims:description="Description for user group 3."
ims:identifier="User group 3"
ims:last-modified="2012-09-22T08:36.546+02:00"
ims:namespace="http://direct.dei.unipd.it/"/>
<ims:group ims:created="2012-09-22T08:48.280+02:00"
ims:description="Description for user group 4."
ims:identifier="User group 4"
ims:last-modified="2012-09-22T08:48.280+02:00"
ims:namespace="http://direct.dei.unipd.it/"/>
<ims:group ims:created="2012-09-22T09:01.173+02:00"
ims:description="Description for user group 5."
ims:identifier="User group 5"
ims:last-modified="2012-09-22T09:01.173+02:00"
ims:namespace="http://direct.dei.unipd.it/"/>
</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;
• **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 username 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:

\[\text{user-identifier};\text{namespace}\]

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:

\[\text{direct;http%3A%2F%2Fdirect%2Edei%2Eunipd%2Eit%2F}\]

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 messages further explaining it.

<table>
<thead>
<tr>
<th>HTTP Status Code</th>
<th>Error Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 – Bad Request</td>
<td>C2002 – INVALID_PARAMETER</td>
<td>An invalid parameter (null, empty, missing, ...) has been provided</td>
</tr>
<tr>
<td>400 – Bad Request</td>
<td>C2003 – MALFORMED_REPRESENTATION</td>
<td>A malformed representation of a resource (not well-formed, not valid, ...) has been provided</td>
</tr>
<tr>
<td>401 – Unauthorized</td>
<td>C3000 – AUTHENTICATION_REQUIRED</td>
<td>An attempt to access a resource without the required authentication has been performed</td>
</tr>
<tr>
<td>403 – Forbidden</td>
<td>C3001 – INSUFFICIENT_ACCESS_RIGHTS</td>
<td>An attempt to access a resource with insufficient access rights has been performed</td>
</tr>
<tr>
<td>404 – Not Found</td>
<td>C4003 – NOT_FOUND_RESOURCE</td>
<td>An attempt to refer to an inexistent resource has been performed</td>
</tr>
<tr>
<td>405 – Method Not Allowed</td>
<td>C1001 – UNSUPPORTED_OPERATION</td>
<td>An unsupported operation has been requested</td>
</tr>
<tr>
<td>406 – Not Acceptable</td>
<td>C2000 – UNSUPPORTED_OUTPUT_FORMAT</td>
<td>An unsupported output format has been requested</td>
</tr>
<tr>
<td>HTTP Status Code</td>
<td>Error Code</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>------------</td>
<td>-------------</td>
</tr>
<tr>
<td>409 – Conflict</td>
<td>C4002 – DUPLICATED_RESOURCE</td>
<td>An attempt to create an already existing resource has been performed</td>
</tr>
<tr>
<td>409 – Conflict</td>
<td>C4004 – NOT_MODIFIABLE_Resource</td>
<td>An attempt to update or delete a resource that cannot be modified has been performed</td>
</tr>
<tr>
<td>409 – Conflict</td>
<td>C4005 – CONCURRENT_RESOURCE_MODIFICATION</td>
<td>An attempt to update a resource that has been concurrently updated has been performed</td>
</tr>
<tr>
<td>415 – Unsupported Media Type</td>
<td>C2001 – UNSUPPORTED_INPUT_FORMAT</td>
<td>An unsupported input format has been provided</td>
</tr>
<tr>
<td>500 – Internal Server Error</td>
<td>C1000 – INTERNAL_ERROR</td>
<td>An error internal to the system has occurred</td>
</tr>
</tbody>
</table>

Table 38: Error messages and status codes.

7.1.1 XML Representation

```xml
<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:details language="eng">
invalid resource
</ims:details>
</ims:direct>
```

java.langIllegalArgumentException: Invalid resource.
setStateBeforeClass(ErrorRepresentation.java:45)
at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
at sun.reflect.NativeMethodAccessorImpl.
invoke(NativeMethodAccessorImpl.java:39)
at sun.reflect.DelegatingMethodAccessorImpl.
invoke(DelegatingMethodAccessorImpl.java:25)
at java.lang.reflect.Method.invoke(Method.java:597)
runReflectiveCall(FrameworkMethod.java:45)
run(ReflectiveCallable.java:15)
invokeExplosively(FrameworkMethod.java:42)
at org.junit.runnersẫstatements.RunBeforees.
evaluate(RunBefores.java:27)
at org.junit.runners.ParentRunner.run(ParentRunner.java:300)
at org.eclipse.jdt.internal.junit4.runner.JUnit4TestReference.
runJUnit4TestReference.java:50)
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)
36 runTests(RemoteTestRunner.java:683)
37 at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.
38 run(RemoteTestRunner.java:390)
40 main(RemoteTestRunner.java:197)
</ims:diagnostic>
42 </ims:error>
43 </ims:direct>

7.1.2 JSON Representation

```json
1 {
2   "direct":{
3     "error":{
4       "identifier":"7d50ee98-9bb4-4952-a6f4-141e4fada891",
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     },
13     "diagnostic":"java.lang.IllegalArgumentException: Invalid resource.
14     at it.unipd.dei.ims.iici.resource.representation.ErrorRepresentation.setupBeforeClass
15     at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
16     at sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorImpl.java:39)
17     at sun.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAccessorImpl.java:25)
18     at org.junit.runners.model.FrameworkMethod.invokeReflectiveCall
19     at org.junit.runners.model.FrameworkMethod.invokeExplosively
20     at org.junit.runners.ParentRunner.run
21     at org.eclipse.jdt.internal.junit4.runner.JUnit4TestReference.run
22     at org.eclipse.jdt.internal.junit.runner.TestExecution.run
23     at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.runTests
24     at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.runTests
25     at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.run
26     at org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.main
27     main(RemoteTestRunner.java:197)"
28  }
29 }
```

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
7.2 Log Event Resource

7.2.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>READ_LOG_EVENT</td>
<td>GET</td>
<td>/log-event/{id}</td>
</tr>
<tr>
<td>LIST_LOG_EVENTS</td>
<td>GET</td>
<td>/log-event/last/{n}</td>
</tr>
</tbody>
</table>

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

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ims:direct xmlns:ims="http://ims.dei.unipd.it/"
xsi:schemaLocation="http://ims.dei.unipd.it/data/xml/direct.3.00.xsd">
<ims:log-event ims:serial-identifier="1000" ims:level="INFO"
ims:created="2012-08-01T19:04:987+02:00">
<ims:message>
message
</ims:message>
<ims:user ims:identifier="user-1" ims:namespace="http://ims.dei.unipd.it/"/>
<ims:action>
AUTHENTICATE_USER
</ims:action>
<ims:ip>127.0.2.1</ims:ip>
<ims:resource ims:identifier="resource 1"
ims:namespace="http://www.openarchives.org/OAI/2.0/oai_dc/"
ims:resource-class>
resource class 1
</ims:resource-class>
<ims:thread>thread 1</ims:thread>
<ims:method>
method 1
</ims:method>
<ims:line-number>37</ims:line-number>
<ims:class-file>
file 1
</ims:class-file>
<ims:throwable>
java.lang.IllegalArgumentException: Invalid resource.
at it.unipd.dei.ims.ici.resource.representation.ErrorRepresentation.
</ims:throwable>
</ims:log-event>
</ims:direct>
```
```java
setUpBeforeClass (ErrorRepresentation.java:45)
at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
at sun.reflect.NativeMethodAccessorImpl.
invoke(NativeMethodAccessorImpl.java:39)
at sun.reflect.DelegatingMethodAccessorImpl.
invoke(DelegatingMethodAccessorImpl.java:25)
at java.lang.reflect.Method.invoke(Method.java:597)
at org.junit.runners.model.FrameworkMethod$1.runReflectiveCall(FrameworkMethod.java:45)
at org.junit.internal.runners.model.ReflectiveCallable.
run(ReflectiveCallable.java:15)
evaluate(FrameworkMethod.java:27)
at org.junit.runners.ParentRunner.run(ParentRunner.java:300)
at org.eclipse.jdt.junit.internal.junit4.runner.JUnit4TestReference.
run(JUnit4TestReference.java:50)
at org.eclipse.jdt.internal.junit.junit.runner.TestExecution.
run(TestExecution.java:38)
runTests(RemoteTestRunner.java:467)
runTests(RemoteTestRunner.java:683)
run(RemoteTestRunner.java:390)
main(RemoteTestRunner.java:197)
</ ims : throwable >
</ ims : log - event >
</ ims : direct >

7.2.3 JSON Representation

```
7.3 Namespace Resource

7.3.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_NAMESPACE</td>
<td>POST</td>
<td>/namespace</td>
</tr>
<tr>
<td>READ_NAMESPACE</td>
<td>GET</td>
<td>/namespace/{id}</td>
</tr>
<tr>
<td>UPDATE_NAMESPACE</td>
<td>PUT</td>
<td>/namespace/{id}</td>
</tr>
<tr>
<td>DELETE_NAMESPACE</td>
<td>DELETE</td>
<td>/namespace/{id}</td>
</tr>
<tr>
<td>LIST_NAMESPACES</td>
<td>GET</td>
<td>/namespace</td>
</tr>
<tr>
<td>LIST_NAMESPACE_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/namespace/{id}/provenance</td>
</tr>
</tbody>
</table>

Table 40: API for accessing the namespace resource.

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

7.3.2 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"
```
7.3.3 JSON Representation

```json
{
  "direct": {
    "namespace": {
      "identifier": "http://www.ns1.com/",
      "prefix": "ns1",
      "description": "namespace 1",
      "created": "2012-08-01T18:52:28.193+02:00",
      "last-modified": "2012-08-01T18:52:28.193+02:00"
    }
  }
}
```

7.4 Concept Resource

7.4.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_CONCEPT</td>
<td>POST</td>
<td>/concept</td>
</tr>
<tr>
<td>READ_CONCEPT</td>
<td>GET</td>
<td>/concept/{id};{ns}</td>
</tr>
<tr>
<td>UPDATE_CONCEPT</td>
<td>PUT</td>
<td>/concept/{id};{ns}</td>
</tr>
<tr>
<td>DELETE_CONCEPT</td>
<td>DELETE</td>
<td>/concept/{id};{ns}</td>
</tr>
<tr>
<td>LIST_CONCEPTS</td>
<td>GET</td>
<td>/concept</td>
</tr>
</tbody>
</table>
| 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

```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:concept ims:identifier="c1" ims:namespace="http://ims.dei.unipd.it/
ims:description="concept 1"
ims:created="2012-08-01T19:01:34.064+02:00"
ims:last-modified="2012-08-01T19:01:34.064+02:00">
<ims:links>
<ims:link>
<ims:concept ims:identifier="author"
ims:namespace="http://ims.dei.unipd.it/
<ims:relation>
<ims:concept ims:identifier="IS_A"
ims:namespace="http://ims.dei.unipd.it/"
</ims:relation>
<ims:concept ims:identifier="c1"
ims:namespace="http://ims.dei.unipd.it/"
</ims:link>
<ims:link>
<ims:concept ims:identifier="reviewer"
ims:namespace="http://ims.dei.unipd.it/
<ims:relation>
<ims:concept ims:identifier="OWNS_A"
ims:namespace="http://ims.dei.unipd.it/"
</ims:relation>
<ims:concept ims:identifier="c1"
ims:namespace="http://ims.dei.unipd.it/"
</ims:link>
<ims:link>
<ims:concept ims:identifier="c1"
ims:namespace="http://ims.dei.unipd.it/
<ims:relation>
<ims:concept ims:identifier="HAS_A"
ims:namespace="http://ims.dei.unipd.it/"
</ims:relation>
<ims:concept ims:identifier="publisher"
ims:namespace="http://ims.dei.unipd.it/
</ims:link>
<ims:link>
<ims:concept ims:identifier="c1"
ims:namespace="http://ims.dei.unipd.it/
<ims:relation>
<ims:concept ims:identifier="LIKES"
ims:namespace="http://ims.dei.unipd.it/
</ims:relation>
<ims:concept ims:identifier="curator"
ims:namespace="http://ims.dei.unipd.it/"
</ims:link>
</ims:links>
</ims:concept>
</ims:direct>
```

7.4.3 JSON Representation

```json
{
  "direct":{
```

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"concept":{
    "identifier":"c1",
    "namespace":"http://ims.dei.unipd.it/",
    "description":"concept 1",
    "created":"2012-08-01T19:01:34.064+02:00",
    "last-modified":"2012-08-01T19:01:34.064+02:00",
    "links":{
        "link":{
            "concept":{
                "identifier":"author",
                "namespace":"http://ims.dei.unipd.it/"
            },
            "relation":{
                "concept":{
                    "identifier":"IS_A",
                    "namespace":"http://ims.dei.unipd.it/"
                },
                "concept":{
                    "identifier":"c1",
                    "namespace":"http://ims.dei.unipd.it/"
                }
            }
        },
        "link":{
            "concept":{
                "identifier":"reviewer",
                "namespace":"http://ims.dei.unipd.it/"
            },
            "relation":{
                "concept":{
                    "identifier":"OWNS_A",
                    "namespace":"http://ims.dei.unipd.it/"
                },
                "concept":{
                    "identifier":"c1",
                    "namespace":"http://ims.dei.unipd.it/"
                }
            }
        },
        "link":{
            "concept":{
                "identifier":"publisher",
                "namespace":"http://ims.dei.unipd.it/"
            }
        }
    }
}
7.5 Group Resource

7.5.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_GROUP</td>
<td>POST</td>
<td>/group</td>
</tr>
<tr>
<td>READ_GROUP</td>
<td>GET</td>
<td>/group/{id};{ns}</td>
</tr>
<tr>
<td>UPDATE_GROUP</td>
<td>PUT</td>
<td>/group/{id};{ns}</td>
</tr>
<tr>
<td>DELETE_GROUP</td>
<td>DELETE</td>
<td>/group/{id};{ns}</td>
</tr>
<tr>
<td>LIST_GROUPS</td>
<td>GET</td>
<td>/group</td>
</tr>
<tr>
<td>LIST_GROUP_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/group/{id};{ns}/provenance</td>
</tr>
</tbody>
</table>

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

```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:group ims:identifier="g1" ims:namespace="http://ims.dei.unipd.it/"
        ims:created="2012-08-01T19:24:40.991+02:00"
        ims:last-modified="2012-08-01T19:24:40.991+02:00">
        <ims:users>
            ...
        </ims:users>
    </ims:group>
</ims:direct>
```
7.5.3 JSON Representation

```
7.5.3 JSON Representation

```

7.6 Role Resource

7.6.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_ROLE</td>
<td>POST</td>
<td>/role</td>
</tr>
<tr>
<td>READ_ROLE</td>
<td>GET</td>
<td>/role/{id};{ns}</td>
</tr>
<tr>
<td>UPDATE_ROLE</td>
<td>PUT</td>
<td>/role/{id};{ns}</td>
</tr>
<tr>
<td>DELETE_ROLE</td>
<td>DELETE</td>
<td>/role/{id};{ns}</td>
</tr>
<tr>
<td>LIST_ROLES</td>
<td>GET</td>
<td>/role</td>
</tr>
<tr>
<td>LIST_ROLE_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/role/{id};{ns}/provenance</td>
</tr>
</tbody>
</table>

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
<?xml version="1.0" encoding="UTF-8"?>
<ims:direct xmlns:ims="http://ims.dei.unipd.it/">
  <xsi:schemaLocation="http://ims.dei.unipd.it/ data/xml/direct.3.00.xsd">
    <ims:role ims:identifier="r1" ims:namespace="http://ims.dei.unipd.it/"
      ims:description="role 1"
      ims:created="2012-08-01T19:24:40.991+02:00"
      ims:last-modified="2012-08-01T19:24:40.991+02:00">
      <ims:users>
        <ims:user ims:identifier="user-1" ims:namespace="http://ims.dei.unipd.it/" />
        <ims:user ims:identifier="user-2" ims:namespace="http://ims.dei.unipd.it/" />
        <ims:user ims:identifier="user-3" ims:namespace="http://ims.dei.unipd.it/" />
      </ims:users>
    </ims:role>
  </xsi:schemaLocation="http://ims.dei.unipd.it/">
</ims:direct>
```

### 7.6.3 JSON Representation

```json
{
  "direct":{
    "role":{
      "identifier":"r1",
      "namespace":"http://ims.dei.unipd.it/",
      "description":"role 1",
      "created":"2012-08-01T19:24:40.991+02:00",
      "last-modified":"2012-08-01T19:24:40.991+02:00",
      "users":{
        "user":{
          "identifier":"user-1",
          "namespace":"http://ims.dei.unipd.it/"
        },
        "user":{
          "identifier":"user-2",
          "namespace":"http://ims.dei.unipd.it/"
        },
        "user":{
          "identifier":"user-3",
          "namespace":"http://ims.dei.unipd.it/"
        }
      }
    }
  }
}
```

### 7.7 User Resource

#### 7.7.1 API
<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_USER</td>
<td>POST</td>
<td>/user</td>
</tr>
<tr>
<td>READ_USER</td>
<td>GET</td>
<td>/user/{id};{ns}</td>
</tr>
<tr>
<td>UPDATE_USER</td>
<td>PUT</td>
<td>/user/{id};{ns}</td>
</tr>
<tr>
<td>DELETE_USER</td>
<td>DELETE</td>
<td>/user/{id};{ns}</td>
</tr>
<tr>
<td>CHANGE_USER_PASSWORD</td>
<td>GET, PUT,</td>
<td>/user/{id};{ns}/changePassword</td>
</tr>
<tr>
<td>AUTHENTICATE_USER</td>
<td>GET, PUT,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>POST, DELETE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OPTIONS,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HEAD</td>
<td></td>
</tr>
<tr>
<td>ADD_USER_TO_GROUP</td>
<td>GET, PUT,</td>
<td>/user/{id};{ns}/member/</td>
</tr>
<tr>
<td></td>
<td>POST</td>
<td>{owner-id};{owner-ns}</td>
</tr>
<tr>
<td>REMOVE_USER_FROM_GROUP</td>
<td>DELETE</td>
<td>/user/{id};{ns}/member/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>{owner-id};{owner-ns}</td>
</tr>
<tr>
<td>ADD_USER_TO_ROLE</td>
<td>GET, PUT,</td>
<td>/user/{id};{ns}/subscriber/</td>
</tr>
<tr>
<td></td>
<td>POST</td>
<td>{owner-id};{owner-ns}</td>
</tr>
<tr>
<td>REMOVE_USER_FROM_ROLE</td>
<td>DELETE</td>
<td>/user/{id};{ns}/subscriber/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>{owner-id};{owner-ns}</td>
</tr>
<tr>
<td>LIST_USERS</td>
<td>GET</td>
<td>/user</td>
</tr>
<tr>
<td>LIST_USER_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/user/{id};{ns}/provenance</td>
</tr>
</tbody>
</table>

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

```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:user xmlns:ims="http://ims.dei.unipd.it/"
ims:identifier="u1" 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:firstName>firstName</ims:firstName>
<ims:lastName>lastName</ims:lastName>
<ims:affiliation>affiliation</ims:affiliation>
<ims:e-mail>email@email.org</ims:e-mail>
<ims:gender>MALE</ims:gender>
<ims:address>address</ims:address>
<ims:city>city</ims:city>
<ims:state>state</ims:state>
<ims:zip>zip</ims:zip>
<ims:country>ITA</ims:country>
<ims:language>ita</ims:language>
<ims:phone>123456</ims:phone>
<ims:facsimile>123456</ims:facsimile>
<ims:mobile>123456</ims:mobile>
<ims:voip-caller-id>voipCallerId</ims:voip-caller-id>
<ims:homepage>www.homepage.com</ims:homepage>
<ims:created>2012-08-01T19:33:41.893+02:00</ims:created>
<ims:last-modified>2012-08-01T19:33:41.893+02:00</ims:last-modified>
<ims:groups>
<ims:group xmlns:ims="http://ims.dei.unipd.it/"
ims:identifier="group-1">
<ims:namespace>http://ims.dei.unipd.it/</ims:namespace>
</ims:group>
<ims:group xmlns:ims="http://ims.dei.unipd.it/"
ims:identifier="group-2">
<ims:namespace>http://ims.dei.unipd.it/</ims:namespace>
</ims:group>
</ims:groups>
</ims:user>
</ims:direct>
```
7.7.3 JSON Representation

```json
{
  "direct": {
    "user": {
      "identifier": "u1",
      "namespace": "http://ims.dei.unipd.it/",
      "first-name": "firstName",
      "last-name": "lastName",
      "affiliation": "affiliation",
      "e-mail": "email@email.org",
      "birth-date": "2012-08-01",
      "gender": "MALE",
      "address": "address",
      "city": "city",
      "state": "state",
      "zip": "zip",
      "country": "ITA",
      "language": "ita",
      "phone": "123456",
      "facsimile": "123456",
      "mobile": "123456",
      "voip-caller-id": "voipCallerId",
      "homepage": "www.homepage.com",
      "created": "2012-08-01T19:33:41.893+02:00",
      "last-modified": "2012-08-01T19:33:41.893+02:00",
      "groups": [
        {
          "group": {
            "identifier": "group-1",
            "namespace": "http://ims.dei.unipd.it/
          }
        },
        {
          "group": {
            "identifier": "group-2",
            "namespace": "http://ims.dei.unipd.it/
          }
        },
        {
          "group": {
            "identifier": "group-3",
            "namespace": "http://ims.dei.unipd.it/
          }
        }
      ],
      "roles": [
        {
          "role": {
            "identifier": "role-1",
            "namespace": "http://ims.dei.unipd.it/
          }
        },
        {
          "role": {
            "identifier": "role-2",
            "namespace": "http://ims.dei.unipd.it/
          }
        },
        {
          "role": {
            "identifier": "role-3",
            "namespace": "http://ims.dei.unipd.it/
          }
        }
      ]
    }
  }
}
```
"namespace":"http://ims.dei.unipd.it/"
}
},
{
"role":{
"identifier":"role-2",
"namespace":"http://ims.dei.unipd.it/"
}
},
{
"role":{
"identifier":"role-3",
"namespace":"http://ims.dei.unipd.it/"
}
}
]
}
]

7.8 Metadata Set Resource

7.8.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_METADATA_SET</td>
<td>POST</td>
<td>/metadata-set</td>
</tr>
<tr>
<td>READ_METADATA_SET</td>
<td>GET</td>
<td>/metadata-set/{id};{ns}</td>
</tr>
<tr>
<td>UPDATE_METADATA_SET</td>
<td>PUT</td>
<td>/metadata-set/{id};{ns}</td>
</tr>
<tr>
<td>DELETE_METADATA_SET</td>
<td>DELETE</td>
<td>/metadata-set/{id};{ns}</td>
</tr>
<tr>
<td>INCLUDE_SUBSET INTO SUPERSET</td>
<td>GET, PUT, POST</td>
<td>/metadata-set/{id};{ns}/member/{owner-id};{owner-ns}</td>
</tr>
<tr>
<td>EXCLUDE_SUBSET FROM SUPERSET</td>
<td>DELETE</td>
<td>/metadata-set/{id};{ns}/member/{owner-id};{owner-ns}</td>
</tr>
<tr>
<td>LIST_METADATA_SETS</td>
<td>GET</td>
<td>/metadata-set</td>
</tr>
<tr>
<td>LIST_METADATA_SET_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/metadata-set/{id};{ns}/provenance</td>
</tr>
<tr>
<td>SHARE_METADATA_SET</td>
<td>GET, POST, PUT</td>
<td>/metadata-set/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_METADATA_SET</td>
<td>DELETE</td>
<td>/metadata-set/{id}/share/{sharer-id};{sharer-ns}</td>
</tr>
</tbody>
</table>

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
<?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/data/xml/direct.3.00.xsd">
<ims:metadata-set ims:identifier="ms1" ims:namespace="http://ims.dei.unipd.it/"
ims:name="set1" ims:description="metadata set 1"
ims:scope="PUBLIC" ims:created="2012-08-02T13:50:29.143+02:00"
ims:last-modified="2012-08-02T13:50:29.143+02:00">
<ims:supersets>
<ims:metadata-set ims:identifier="superset-1"
ims:namespace="http://ims.dei.unipd.it/"/>
<ims:metadata-set ims:identifier="superset-2"
ims:namespace="http://ims.dei.unipd.it/"/>
</ims:supersets>
<ims:subsets>
<ims:metadata-set ims:identifier="subset-1"
ims:namespace="http://ims.dei.unipd.it/"/>
<ims:metadata-set ims:identifier="subset-2"
ims:namespace="http://ims.dei.unipd.it/"/>
</ims:subsets>
</ims:metadata-set>
</ims:direct>
```

### 7.8.3 JSON Representation

```json
{
"direct":{
"metadata-set":{
"identifier":"ms1",
"namespace":"http://ims.dei.unipd.it/",
"name":"set1",
"description":"metadata set 1",
"scope":"PUBLIC",
"created":"2012-08-02T13:50:29.143+02:00",
"last-modified":"2012-08-02T13:50:29.143+02:00",
"supersets":[
{
"metadata-set":{
"identifier":"superset-1",
"namespace":"http://ims.dei.unipd.it/"
}
],
"subsets":[
{
"metadata-set":{
"identifier":"superset-2",
"namespace":"http://ims.dei.unipd.it/"
}
]
}
```

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
7.9 Metadata Resource

7.9.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_METADATA</td>
<td>POST</td>
<td>/metadata</td>
</tr>
<tr>
<td>READ_METADATA</td>
<td>GET</td>
<td>/metadata/{id};{ns}</td>
</tr>
<tr>
<td>UPDATE_METADATA</td>
<td>PUT</td>
<td>/metadata/{id};{ns}</td>
</tr>
<tr>
<td>DELETE_METADATA</td>
<td>DELETE</td>
<td>/metadata/{id};{ns}</td>
</tr>
<tr>
<td>ADD_METADATA_TO_METADATA_SET</td>
<td>GET, PUT, POST</td>
<td>/metadata/{id};{ns}/member/{owner-id};{owner-ns}</td>
</tr>
<tr>
<td>REMOVE_METADATA_FROM_METADATA_SET</td>
<td>DELETE</td>
<td>/metadata/{id};{ns}/member/{owner-id};{owner-ns}</td>
</tr>
<tr>
<td>LIST_METADATA_BELONGING_TO_METADATA_SET</td>
<td>GET</td>
<td>/metadata/member/{owner-id};{owner-ns}</td>
</tr>
<tr>
<td>LIST_METADATA</td>
<td>GET</td>
<td>/metadata</td>
</tr>
<tr>
<td>LIST_METADATA_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/metadata/{id};{ns}/provenance</td>
</tr>
<tr>
<td>SHARE_METADATA</td>
<td>GET, POST, PUT</td>
<td>/metadata/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_METADATA</td>
<td>DELETE</td>
<td>/metadata/{id}/share/{sharer-id};{sharer-ns}</td>
</tr>
</tbody>
</table>

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

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ims:direct xmlns:ims="http://ims.dei.unipd.it/
xsil:nsmapLocation="http://ims.dei.unipd.it/ ims:direct.3.00.xsd">
xmlns:dmy="http://www.dummy.org/
ims:identifier="md1" ims:namespace="http://ims.dei.unipd.it/"
ims:language="eng" ims:scope="PUBLIC"
ims:created="2012-08-02T14:04:33.995+02:00"
ims:last-modified="2012-08-02T14:04:33.995+02:00"
dc:subject="a subject attribute"
dc:contributor="a contributor attribute"
<ims:metadata-sets>
<ims:metadata-set ims:identifier="metadata-set-1"
ims:namespace="http://ims.dei.unipd.it/"
</ims:metadata-set>
<ims:metadata-set ims:identifier="metadata-set-2"
ims:namespace="http://ims.dei.unipd.it/"
</ims:metadata-set>
</ims:metadata-sets>
<ims:fields>
<dc:type>
a type field
</dc:type>
<dc:type>
another type field
</dc:type>
<dc:type>
a type field
</dc:type>
<dc:type>
another type field
</dc:type>
<dc:identifier>
an identifier field
</dc:identifier>
<dc:coverage>
a coverage field
</dc:coverage>
<dc:title>
a title field
</dc:title>
<dc:title>
another title field
</dc:title>
<dc:publisher>
a publisher field
</dc:publisher>
<dc:contributor>
a contributor field
</dc:contributor>
<dmy:accessCondition dc:date="2010-01-01" dc:relation="a relation">
<dc:contributor>
a contributor
</dc:contributor>
<dc:creator>
a creator
</dc:creator>
</dmy:accessCondition>
</ims:fields>
</ims:direct>
```
7.9.3 JSON Representation

```json
{
    "direct":{
        "metadata":{
            "identifier":"md1",
            "namespace":"http://ims.dei.unipd.it/",
            "language":"aar",
            "created":"2012-08-02T14:04:33.995+02:00",
            "last-modified":"2012-08-02T14:04:33.995+02:00",
            "scope":"PUBLIC",
            "schemas":[
                {
                    "dc":"http://purl.org/dc/elements/1.1/"
                },
                {
                    "dmy":"http://www.dummy.org/
                }
            ],
            "attributes":[
                {
                    "subject":{
                        "schema":"dc",
                        "value":"a subject attribute"
                    }
                },
                {
                    "contributor":{
                        "schema":"dc",
                        "value":"a contributor attribute"
                    }
                }
            ],
            "metadata-sets":[
                {
                    "metadata-set":{
                        "identifier":"metadata-set-1",
                        "namespace":"http://ims.dei.unipd.it/"
                    }
                },
                {
                    "metadata-set":{
                        "identifier":"metadata-set-2",
                        "namespace":null
                    }
                }
            ]
        }
    }
}
```
"namespace":"http://ims.dei.unipd.it/"
{
    "fields": [ 
        { "type": { 
            "schema": "dc",
            "value": "a type field"
        } },
        { "type": { 
            "schema": "dc",
            "value": "another type field"
        } },
        { "type": { 
            "schema": "dc",
            "value": "a type field"
        } },
        { "type": { 
            "schema": "dc",
            "value": "another type field"
        } },
        { "identifier": { 
            "schema": "dc",
            "value": "an identifier field"
        } },
        { "coverage": { 
            "schema": "dc",
            "value": "a coverage field"
        } },
        { "title": { 
            "schema": "dc",
            "value": "a title field"
        } },
        { "title": { 
            "schema": "dc",
            "value": "another title field"
        } },
        { "publisher": { 
            "schema": "dc",
            "value": "a publisher field"
        } }
    ]
}
"contributor":{
   "schema":"dc",
   "value":"a contributor field"
 },

"accessCondition":{
   "schema":"dmy",
   "attributes":[
      {
         "date":{
            "schema":"dc",
            "value":"2010-01-01"
         },
      },
      {
         "relation":{
            "schema":"dc",
            "value":"a relation"
         }
      }
   ],
   "sub-fields":[
      {
         "contributor":{
            "schema":"dc",
            "value":"a contributor"
         },
      },
      {
         "creator":{
            "schema":"dc",
            "value":"a locator"
         }
      }
   ]
 },

"shelfLocator":{
   "schema":"dmy",
   "attributes":[
      {
         "date":{
            "schema":"dc",
            "value":"2010-01-01"
         },
      },
      {
         "relation":{
            "schema":"dc",
            "value":"a relation"
         }
      }
   ],
   "value":"a format field with attributes"
 },

"holdingSimple":{
7.10 Search Resource

7.10.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEARCH</td>
<td>POST</td>
<td>/search</td>
</tr>
<tr>
<td>SEARCH</td>
<td>GET</td>
<td>/search?query={query}</td>
</tr>
<tr>
<td>SEARCH</td>
<td>GET</td>
<td>/search/{query}</td>
</tr>
</tbody>
</table>

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
7.10.3 JSON Representation

```json
{
  "direct": {
    "result": {
      "identifier": "dea70afa-9897-4acc-a96c-4e70cddf256e",
      "created": "2012-08-02T10:26:48.482+02:00",
      "size": 3,
      "query": {
        "identifier": "63a49b47-74a4-4eab-b24d-e77d1ab68102",
        "created": "2012-08-02T10:26:48.482+02:00",
        "cql": "ici.namespace.created > 1970-01-01"
      },
      "resource-class": "it.unipd.dei.ims.ici.resource.Namespace",
      "items": [
        {
          "item": {
            "identifier": "3a8dd857-ca03-437f-869b-711a0839f0d2",
            "rank": 0,
            "score": 1.0
          }
        },
        {
          "item": {
            "identifier": "e98045ff-fabf-499b-97e8-dc5f0eabfd5",
            "rank": 1,
            "score": 0.9
          }
        },
        {
          "item": {
            "identifier": "f97a5456-ccfe-4523-aec3-67bc3c9f9b71",
            "rank": 2,
            "score": 0.8
          }
        }
      ]
    }
  }
}
```

7.11 List Resource

7.11.1 API
Table 48: API for accessing the list resource.

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEARCH</td>
<td>POST</td>
<td>/list</td>
</tr>
<tr>
<td>SEARCH</td>
<td>GET</td>
<td>/list?query={query}</td>
</tr>
<tr>
<td>SEARCH</td>
<td>GET</td>
<td>/list/{query}</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_APPLICATION</td>
<td>POST</td>
<td>/application</td>
</tr>
<tr>
<td>READ_APPLICATION</td>
<td>GET</td>
<td>/application/{id}</td>
</tr>
<tr>
<td>UPDATE_APPLICATION</td>
<td>PUT</td>
<td>/application/{id}</td>
</tr>
<tr>
<td>DELETE_APPLICATION</td>
<td>DELETE</td>
<td>/application/{id}</td>
</tr>
<tr>
<td>LIST_APPLICATIONS</td>
<td>GET</td>
<td>/application</td>
</tr>
<tr>
<td>LIST_APPLICATIONS_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/application/{id}/provenance</td>
</tr>
<tr>
<td>ADD_COMPONENT_TO_APPLICATION</td>
<td>POST</td>
<td>/application/{id}/component/{id}</td>
</tr>
<tr>
<td>REMOVE_COMPONENT_FROM_APPLICATION</td>
<td>DELETE</td>
<td>/application/{id}/component/{id}</td>
</tr>
<tr>
<td>LIST_COMPONENT_FROM_APPLICATION</td>
<td>GET</td>
<td>/application/{id}/component</td>
</tr>
<tr>
<td>ADD_CONFIGURATION_TO_APPLICATION</td>
<td>POST</td>
<td>/application/{id}/configuration/{id}</td>
</tr>
<tr>
<td>REMOVE_CONFIGURATION_FROM_APPLICATION</td>
<td>DELETE</td>
<td>/application/{id}/configuration</td>
</tr>
<tr>
<td>READ_CONFIGURATION_FROM_APPLICATION</td>
<td>GET</td>
<td>/application/{id}/configuration</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>ADD_SYSTEM_TO_APPLICATION</td>
<td>POST</td>
<td>/application/{id}/system/{id}</td>
</tr>
<tr>
<td>REMOVE_SYSTEM_FROM_APPLICATION</td>
<td>DELETE</td>
<td>/application/{id}/system/{id}</td>
</tr>
<tr>
<td>LIST_SYSTEM_FROM_APPLICATION</td>
<td>GET</td>
<td>/application/{id}/system</td>
</tr>
<tr>
<td>SHARE_APPLICATION</td>
<td>GET, POST, PUT</td>
<td>/application/{id}/share/{sharer-id}; {sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_APPLICATION</td>
<td>DELETE</td>
<td>/application/{id}/share/{sharer-id}; {sharer-ns}</td>
</tr>
</tbody>
</table>

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

```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:application
 ims:identifier="app-1"
 ims:description="Description of app 1"
 ims:name="Name of app 1"
 ims:scope="SHARED"
 ims:created="2012-09-13T17:17:25.378+02:00"
 ims:last-modified="2012-09-13T17:17:25.378+02:00">
<ims:owner
 ims:identifier="user-1"
 ims:namespace="http://ims.dei.unipd.it/" />
<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"
```
7.12.3 JSON Representation

```json
{
  "direct": {
    "application": {
      "identifier": "app-1",
      "name": "Name of app 1",
      "description": "Description of app 1",
      "scope": "SHARED",
      "created": "2012-09-14T10:04:05.310+02:00",
      "last-modified": "2012-09-14T10:04:05.310+02:00"
    }
  }
}
```
"owner": {
  "user": {
    "identifier": "user-1",
    "namespace": "http://ims.dei.unipd.it/
  }
},
"sharings": [
  {
    "sharing": {
      "group": {
        "identifier": "group-1",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "access-permission": "DENIED"
    }
  },
  {
    "sharing": {
      "group": {
        "identifier": "group-2",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "access-permission": "READ_ONLY"
    }
  },
  {
    "sharing": {
      "group": {
        "identifier": "group-3",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "access-permission": "READ_WRITE"
    }
  }
],
"links": [
  {
    "link": {
      "metadata": {
        "identifier": "md-1",
        "namespace": "http://ims.dei.unipd.it/
      },
      "relation": {
        "concept": {
          "identifier": "isPartOf",
          "namespace": "http://ims.dei.unipd.it/"
        },
        "application": {
          "identifier": "app-1"
        }
      }
    }
  },
  {
    "link": {
      "metadata": {
        "identifier": "md-2",
        "namespace": "http://ims.dei.unipd.it/
      },
      "relation": {
      
    }\]
7.13 Component Resource

Represents a building block of a running System.

7.13.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_COMPONENT</td>
<td>POST</td>
<td>/component</td>
</tr>
<tr>
<td>READ_COMPONENT</td>
<td>GET</td>
<td>/component/{id}</td>
</tr>
<tr>
<td>UPDATE_COMPONENT</td>
<td>PUT</td>
<td>/component/{id}</td>
</tr>
<tr>
<td>DELETE_COMPONENT</td>
<td>DELETE</td>
<td>/component/{id}</td>
</tr>
<tr>
<td>LIST_COMPONENTS</td>
<td>GET</td>
<td>/component</td>
</tr>
<tr>
<td>LIST_COMPONENTS_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/component/{id}/provenance</td>
</tr>
<tr>
<td>ADD_CONFIGURATION_TO_COMPONENT</td>
<td>POST</td>
<td>/component/{id}/configuration/{id}</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>REMOVE_CONFIGURATION_FROM_COMPONENT</td>
<td>DELETE</td>
<td>/component/{id}/configuration</td>
</tr>
<tr>
<td>READ_CONFIGURATION_FROM_COMPONENT</td>
<td>GET</td>
<td>/component/{id}/configuration</td>
</tr>
<tr>
<td>SHARE_COMPONENT</td>
<td>GET, POST, PUT</td>
<td>/component/{id}/share/{sharer-id}; {sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_COMPONENT</td>
<td>DELETE</td>
<td>/component/{id}/share/{sharer-id}; {sharer-ns}</td>
</tr>
</tbody>
</table>

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

```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:component>
  <ims:identifier="cmp-1"
  ims:created="2012-09-13T17:32:16.787+02:00"
  ims:modified="2012-09-13T17:32:16.787+02:00"
  ims:name="Name of component"
  ims:description="Description of the component"
  ims:scope="SHARED">
    <ims:owner>
      <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:group>
        <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:group>
        <ims:access-permission>READ_ONLY</ims:access-permission>
      </ims:sharing>
    </ims:sharings>
  </ims:component>
</ims:direct>
```
<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>
<ims:links>
  <ims:link>
    <ims:metadata
      ims:identifier="md-1"
      ims:namespace="http://ims.dei.unipd.it/" />
    <ims:relation>
      <ims:concept
        ims:identifier="isDescriptionOf"
        ims:namespace="http://ims.dei.unipd.it/" />
    </ims:relation>
    <ims:component ims:identifier="cmp-1" />
  </ims:link>
  <ims:link>
    <ims:metadata
      ims:identifier="md-2"
      ims:namespace="http://ims.dei.unipd.it/" />
    <ims:relation>
      <ims:concept
        ims:identifier="isCopyrightOf"
        ims:namespace="http://ims.dei.unipd.it/" />
    </ims:relation>
    <ims:component ims:identifier="cmp-1" />
  </ims:link>
  <ims:link>
    <ims:metadata
      ims:identifier="md-3"
      ims:namespace="http://ims.dei.unipd.it/" />
    <ims:relation>
      <ims:concept
        ims:identifier="isAdministrationOf"
        ims:namespace="http://ims.dei.unipd.it/" />
    </ims:relation>
    <ims:component ims:identifier="cmp-1" />
  </ims:link>
</ims:links>
<ims:concept
  ims:identifier="cnc-1"
  ims:namespace="http://ims.dei.unipd.it/" />
<ims:configuration ims:identifier="cnf-1" />
</ims:component>

7.13.3 JSON Representation

```json
{
  "direct": {
    "component": {
      "identifier": "cmp-1",
      "name": "Name of component",
      "description": "Description of the component",
      "scope": "SHARED",
      "created": "2012-09-13T17:32:16.787+02:00",
      "last-modified": "2012-09-13T17:32:16.787+02:00"
    }
  }
}
```

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
"owner": {
  "user": {
    "identifier": "user-1",
    "namespace": "http://ims.dei.unipd.it/
  }
},
"sharings": [
  {
    "sharing": {
      "group": {
        "identifier": "group-1",
        "namespace": "http://ims.dei.unipd.it/
      },
      "access-permission": "DENIED"
    }
  },
  {
    "sharing": {
      "group": {
        "identifier": "group-2",
        "namespace": "http://ims.dei.unipd.it/
      },
      "access-permission": "READ_ONLY"
    }
  },
  {
    "sharing": {
      "group": {
        "identifier": "group-3",
        "namespace": "http://ims.dei.unipd.it/
      },
      "access-permission": "READ_WRITE"
    }
  }
],
"links": [
  {
    "link": {
      "metadata": {
        "identifier": "md-1",
        "namespace": "http://ims.dei.unipd.it/
      },
      "relation": {
        "concept": {
          "identifier": "isDescriptionOf",
          "namespace": "http://ims.dei.unipd.it/
        }
      },
      "component": {
        "identifier": "cmp-1"
      }
    }
  },
  {
    "link": {
      "metadata": {
        "identifier": "md-2",
        "namespace": "http://ims.dei.unipd.it/
      },
      "relation": {
        "concept": {
          "identifier": "isDependentOf",
          "namespace": "http://ims.dei.unipd.it/
        }
      },
      "component": {
        "identifier": "cmp-2"
      }
    }
  }
]
### 7.14 Configuration Resource

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

#### 7.14.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_CONFIGURATION</td>
<td>POST</td>
<td>/configuration</td>
</tr>
<tr>
<td>READ_CONFIGURATION</td>
<td>GET</td>
<td>/configuration/{id}</td>
</tr>
<tr>
<td>UPDATE_CONFIGURATION</td>
<td>PUT</td>
<td>/configuration/{id}</td>
</tr>
<tr>
<td>DELETE_CONFIGURATION</td>
<td>DELETE</td>
<td>/configuration/{id}</td>
</tr>
<tr>
<td>LIST_CONFIGURATIONS</td>
<td>GET</td>
<td>/configuration</td>
</tr>
<tr>
<td>LIST_CONFIGURATION_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/configuration/{id}/provenance</td>
</tr>
</tbody>
</table>

D3.3: Prototype of the Evaluation Infrastructure

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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
<?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:configuration ims:identifier="c1"
                   ims:description="description of the configuration"
                   ims:created="2012-09-13T17:59:35.603+02:00"
                   ims:last-modified="2012-09-13T17:59:35.603+02:00">
    <ims:parameters>
      <ims:parameter>
        <ims:concept ims:identifier="parameterA"
                     ims:namespace="http://direct.dei.unipd.it/" />
        <ims:value>value A</ims:value>
      </ims:parameter>
      <ims:parameter>
        <ims:concept ims:identifier="parameterB"
                     ims:namespace="http://direct.dei.unipd.it/" />
        <ims:value>value B</ims:value>
      </ims:parameter>
      <ims:parameter>
        <ims:concept ims:identifier="parameterC"
                     ims:namespace="http://direct.dei.unipd.it/" />
        <ims:value>value C</ims:value>
      </ims:parameter>
    </ims:parameters>
  </ims:configuration>
</ims:direct>
```

7.14.3 JSON Representation

```json
{
  "direct":{
    "configuration":{
      "identifier":"c1",
      "created":"2012-09-13T17:59:35.603+02:00",
      "last-modified":"2012-09-13T17:59:35.603+02:00",
      "description":"description of the configuration",
      "parameters":{
        "parameter":{
          "concept":{
            "identifier":"parameterA",
```
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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_CONTRIBUTION</td>
<td>POST</td>
<td>/contribution</td>
</tr>
<tr>
<td>READ_CONTRIBUTION</td>
<td>GET</td>
<td>/contribution/{id}</td>
</tr>
<tr>
<td>UPDATE_CONTRIBUTION</td>
<td>PUT</td>
<td>/contribution/{id}</td>
</tr>
<tr>
<td>DELETE_CONTRIBUTION</td>
<td>DELETE</td>
<td>/contribution/{id}</td>
</tr>
<tr>
<td>LIST_CONTRIBUTIONS</td>
<td>GET</td>
<td>/contribution</td>
</tr>
<tr>
<td>LIST_CONTRIBUTION_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/contribution/{id}/provenance</td>
</tr>
<tr>
<td>ADD_CONTRIBUTION_TO_CONTRIBUTION</td>
<td>POST</td>
<td>/contribution/{id}/contribution/{id}</td>
</tr>
<tr>
<td>REMOVE_CONTRIBUTION_FROM_CONTRIBUTION</td>
<td>DELETE</td>
<td>/contribution/{id}/contribution/{id}</td>
</tr>
<tr>
<td>LIST_CONTRIBUTIONS_FROM_CONTRIBUTION</td>
<td>GET</td>
<td>/contribution/{id}/contribution</td>
</tr>
</tbody>
</table>

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
<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADD_AUTHOR_TO_CONTRIBUTION</td>
<td>POST</td>
<td>/contribution/{id}/user/{id};{ns}</td>
</tr>
<tr>
<td>REMOVE_AUTHOR_FROM_CONTRIBUTION</td>
<td>DELETE</td>
<td>/contribution/{id}/user/{id};{ns}</td>
</tr>
<tr>
<td>LIST_AUTHOR_FROM_CONTRIBUTION</td>
<td>GET</td>
<td>/contribution/{id}/user</td>
</tr>
<tr>
<td>SHARE_CONTRIBUTION</td>
<td>GET, POST, PUT</td>
<td>/contribution/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_CONTRIBUTION</td>
<td>DELETE</td>
<td>/contribution/{id}/share/{sharer-id};{sharer-ns}</td>
</tr>
</tbody>
</table>

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

```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:contribution xmlns:ims="http://ims.dei.unipd.it/"
ims:identifier="ctb-1"
ims:created="2012-09-13T18:00:44.675+02:00"
ims:last-modified="2012-09-13T18:00:44.675+02:00"
ims:title="title of ctb 1"
ims:year="2012"
ims:media-type="application/xml"
ims:language="ita">

<ims:authors>
  <ims:user xmlns:ims="http://ims.dei.unipd.it/"
ims:identifier="u1"/>
  <ims:user xmlns:ims="http://ims.dei.unipd.it/"
ims:identifier="u2"/>
  <ims:user xmlns:ims="http://ims.dei.unipd.it/"
ims:identifier="u3"/>
</ims:authors>

<ims:links>
  <ims:link xmlns:ims="http://ims.dei.unipd.it/"/>
</ims:links>
<ims:metadata/>
</ims:contribution>
```
Flexible and Independent Graphical Application

7.15.3 JSON Representation

```json
{
  "direct":{
    "contribution":{
      "identifier":"ctb-1",
      "created":"2012-09-13T18:00:44.675+02:00",
      "last-modified":"2012-09-13T18:00:44.675+02:00",
      "title":"title of ctb 1",
      "year":"2012",
      "authors":[
        {
          "user":{
            "identifier":"u1",
            "namespace":"http://ims.dei.unipd.it/
          }
        },
        {
          "user":{
            "identifier":"u2",
            "namespace":"http://ims.dei.unipd.it/
          }
        },
        {
          "user":{
            "identifier":"u3",
            "namespace":"http://ims.dei.unipd.it/
          }
        }
      ],
      "media-type":"application/xml",
      "language":"ita",
      "content":{
        "content":"Flexible and Independent Graphical Application";
      }
    }
  }
  "links":{
    "link":{
      "metadata":{
        "identifier":"md-1",
        "namespace":"http://ims.dei.unipd.it/
      }
    },
    "relation":{
      "concept":{
      }
    }
  }
}
```
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
7.16 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
<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_CORPUS</td>
<td>POST</td>
<td>/corpus</td>
</tr>
<tr>
<td>READ_CORPUS</td>
<td>GET</td>
<td>/corpus/{id}</td>
</tr>
<tr>
<td>UPDATE_CORPUS</td>
<td>PUT</td>
<td>/corpus/{id}</td>
</tr>
<tr>
<td>DELETE_CORPUS</td>
<td>DELETE</td>
<td>/corpus/{id}</td>
</tr>
<tr>
<td>LIST_CORPORA</td>
<td>GET</td>
<td>/corpus</td>
</tr>
<tr>
<td>LIST_CORPUS_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/corpus/{id}/provenance</td>
</tr>
<tr>
<td>ADD_INFORMATION_UNIT_TO_CORPUS</td>
<td>POST</td>
<td>/corpus/{id}/information-unit/{id}</td>
</tr>
<tr>
<td>REMOVE_INFORMATION_UNIT_FROM_CORPUS</td>
<td>DELETE</td>
<td>/corpus/{id}/information-unit/{id}</td>
</tr>
<tr>
<td>LIST_INFORMATION_UNIT_FROM_CORPUS</td>
<td>GET</td>
<td>/corpus/{id}/information-unit/{id}</td>
</tr>
<tr>
<td>ADD_CONTRIBUTION_TO_CORPUS</td>
<td>POST</td>
<td>/corpus/{id}/contribution/{id}</td>
</tr>
<tr>
<td>REMOVE_CONTRIBUTION_FROM_CORPUS</td>
<td>DELETE</td>
<td>/corpus/{id}/contribution/{id}</td>
</tr>
<tr>
<td>LIST_CONTRIBUTION_FROM_CORPUS</td>
<td>GET</td>
<td>/corpus/{id}/contribution</td>
</tr>
<tr>
<td>SHARE_CORPUS</td>
<td>GET,</td>
<td>/corpus/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_CORPUS</td>
<td>DELETE</td>
<td>/corpus/{id}/share/{sharer-id};{sharer-ns}</td>
</tr>
</tbody>
</table>

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

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ims:direct
xmlns:ims="http://ims.dei.unipd.it/"
xsi: schemaLocation="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsi="http://www.w3.org/2000/09/XMLSchema-instance" />
```
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
7.16.3 JSON Representation

```json
{
  "direct": {
    "corpus": {
      "identifier": "c1",
      "description": "Description of corpus, e.g. Wall Street Journal, 1987",
      "scope": "SHARED",
      "created": "2012-09-13T18:02:04.035+02:00",
      "last-modified": "2012-09-13T18:02:04.035+02:00",
      "owner": {
        "user": {
          "identifier": "user-1",
          "namespace": "http://ims.dei.unipd.it/
        }
      },
      "sharings": [
        {
          "sharing": {
            "group": {
              "identifier": "group-1",
              "namespace": "http://ims.dei.unipd.it/
            },
            "access-permission": "DENIED"
          }
        },
        {
          "sharing": {
            "group": {
              "identifier": "group-2",
              "namespace": "http://ims.dei.unipd.it/
            },
            "access-permission": "READ_ONLY"
          }
        },
        {
          "sharing": {
            "group": {
              "identifier": "group-3",
              "namespace": "http://ims.dei.unipd.it/
            },
            "access-permission": "READ_WRITE"
          }
        }
      ]
    }
  }
}
```


D3.3: Prototype of the Evaluation Infrastructure

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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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_ESTIMATE</td>
<td>POST</td>
<td>/estimate</td>
</tr>
<tr>
<td>READ_ESTIMATE</td>
<td>GET</td>
<td>/estimate/{id}</td>
</tr>
<tr>
<td>UPDATE_ESTIMATE</td>
<td>PUT</td>
<td>/estimate/{id}</td>
</tr>
<tr>
<td>DELETE_ESTIMATE</td>
<td>DELETE</td>
<td>/estimate/{id}</td>
</tr>
<tr>
<td>LIST_ESTIMATES</td>
<td>GET</td>
<td>/estimate</td>
</tr>
<tr>
<td>LIST_ESTIMATE_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/estimate/{id}/provenance</td>
</tr>
</tbody>
</table>

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

```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:estimate
    ims:identifier="est-1"
    ims:value="0.1"
    ims:created="2012-09-13T18:04:32.133+02:00"
```
7.17.3 JSON Representation

```
{
  "direct":{
    "estimate":{
      "identifier":"est-1",
      "created":"2012-09-13T18:04:32.133+02:00",
      "last-modified":"2012-09-13T18:04:32.133+02:00",
      "value":0.1,
      "descriptive-statistic":{
        "concept":{
          "identifier":"ds-1",
          "namespace":"http://ims.dei.unipd.it/
        }
      },
      "metric":{
        "concept":{
          "identifier":"mtc-1",
          "namespace":"http://ims.dei.unipd.it/
        }
      },
      "run":{
        "identifier":"run-1"
      },
      "task":{
        "identifier":"tsk-1"
      },
      "topic":{
        "identifier":"tpc-1"
      }
    }
  }
}
```

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

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.
XML Representation

```xml
<?xml version="1.0" encoding="UTF-8"?>
< ims : direct
xmlns:ims="http://ims.dei.unipd.it/"
xm lns: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:evaluation-activity
ims:identifier="ea-1"
ims:name="Name of evaluation activity 1"
ims:description="Description of evaluation activity, e.g. CLEF 2012"
ims:status="AVAILABLE"
ims:scope="SHARED"
ims:created="2012-09-13T18:12:34.954+02:00"
ims:last-modified="2012-09-13T18:12:34.954+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>
<ims:links>
<ims:link>
<ims:metadata
ims:identifier="md-1"
ims:namespace="http://ims.dei.unipd.it/" />
<ims:relation>
<ims:concept
ims:identifier="isDescriptionOf"
ims:namespace="http://ims.dei.unipd.it/" />
</ims:relation>
</ims:link>
<ims:link>
<ims:metadata
ims:identifier="md-2"
ims:namespace="http://ims.dei.unipd.it/" />
<ims:relation>
<ims:concept
ims:identifier="isCopyrightOf"
</ims:link>
</ims:links>
</ims:evaluation-activity>
</ims:direct>
```
7.18.3 JSON Representation

```json
{
  "direct":{
    "evaluation-activity":{
      "identifier":"ea-1",
      "namespace":"http://ims.dei.unipd.it/",
      "name":"Name of evaluation activity 1",
      "description":"Description of evaluation activity, e.g. CLEF 2012",
      "status":"AVAILABLE",
      "scope":"SHARED",
      "created":"2012-09-13T18:12:34.954+02:00",
      "last-modified":"2012-09-13T18:12:34.954+02:00",
      "owner":{
        "user":{
          "identifier":"user-1",
          "namespace":"http://ims.dei.unipd.it/
        }
      }
    },
    "sharings":[
      {
        "sharing":{
          "group":{
            "identifier":"group-1",
            "namespace":"http://ims.dei.unipd.it/
          },
          "access-permission":"DENIED"
        }
      },
      {
        "sharing":{
          "group":{
            "identifier":"group-2",
            "namespace":"http://ims.dei.unipd.it/
          },
          "access-permission":"READ_ONLY"
        }
      },
      {
        "sharing":{
          "group":{
            "identifier":"group-3",
            "namespace":"http://ims.dei.unipd.it/
          },
          "access-permission":"READ_WRITE"
        }
      }
    ]
  }
}
```
"identifier":"group-3",
"namespace":"http://ims.dei.unipd.it/
},
"access-permission":"READ_WRITE"
}
]
"links": [
{
"link": {
"metadata": {
"identifier": "md-1",
"namespace": "http://ims.dei.unipd.it/"
},
"relation": {
"concept": {
"identifier": "isDescriptionOf",
"namespace": "http://ims.dei.unipd.it/"
}
},
"evaluation-activity": {
"identifier": "ea-1"
}
},
{
"link": {
"metadata": {
"identifier": "md-2",
"namespace": "http://ims.dei.unipd.it/"
},
"relation": {
"concept": {
"identifier": "isCopyrightOf",
"namespace": "http://ims.dei.unipd.it/"
}
},
"evaluation-activity": {
"identifier": "ea-1"
}
},
{
"link": {
"metadata": {
"identifier": "md-3",
"namespace": "http://ims.dei.unipd.it/"
},
"relation": {
"concept": {
"identifier": "isAdministrationOf",
"namespace": "http://ims.dei.unipd.it/"
}
},
"evaluation-activity": {
"identifier": "ea-1"
}
}
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 academic, 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

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

```
<?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:campaign ims:identifier="c-1"
ims:namespace="http://ims.dei.unipd.it/"
ims:name="Name of campaign 1"
ims:description="Description of campaign 1"
ims:status="AVAILABLE"
ims:scope="SHARED"
ims:created="2012-09-13T18:34.955+02:00"
ims:last-modified="2012-09-13T18:34.955+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:sharings>
  </ims:campaign>
</ims:direct>
```
7.19.3 JSON Representation

```json
{
    "direct":{
        "campaign":{
            "identifier":"c-1",
            "namespace":"http://ims.dei.unipd.it/",
            "name":"Name of campaign 1",
            "description":"Description of campaign 1",
            "status":"AVAILABLE",
            "scope":"SHARED",
            "created":"2012-09-13T18:12:34.955+02:00",
            "last-modified":"2012-09-13T18:12:34.955+02:00",
            "owner":{
                "identifier":"user-1",
                "namespace":"http://ims.dei.unipd.it/"
            }
        }
    }
}
```
"sharings": [
  {
    "sharing": {
      "group": {
        "identifier": "group-1",
        "namespace": "http://ims.dei.unipd.it/",
      },
      "access-permission": "DENIED"
    }
  },
  {
    "sharing": {
      "group": {
        "identifier": "group-2",
        "namespace": "http://ims.dei.unipd.it/",
      },
      "access-permission": "READ_ONLY"
    }
  },
  {
    "sharing": {
      "group": {
        "identifier": "group-3",
        "namespace": "http://ims.dei.unipd.it/",
      },
      "access-permission": "READ_WRITE"
    }
  }
],
"links": [
  {
    "link": {
      "metadata": {
        "identifier": "md-1",
        "namespace": "http://ims.dei.unipd.it/",
      },
      "relation": {
        "concept": {
          "identifier": "isDescriptionOf",
          "namespace": "http://ims.dei.unipd.it/",
        },
        "evaluation-activity": {
          "identifier": "c-1"
        }
      }
    },
    {
      "link": {
        "metadata": {
          "identifier": "md-2",
          "namespace": "http://ims.dei.unipd.it/",
        },
        "relation": {
          "concept": {
            "identifier": "isCopyrightOf",
            "namespace": "http://ims.dei.unipd.it/",
          }
        }
      }
    }
  ]


7.20 Education Resource

Represents an evaluation activity carried out for educational purposes.

7.20.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_EDUCATION</td>
<td>POST</td>
<td>/education</td>
</tr>
<tr>
<td>READ_EDUCATION</td>
<td>GET</td>
<td>/education/{id};{ns}</td>
</tr>
<tr>
<td>UPDATE_EDUCATION</td>
<td>PUT</td>
<td>/education/{id};{ns}</td>
</tr>
<tr>
<td>DELETE_EDUCATION</td>
<td>DELETE</td>
<td>/education/{id};{ns}</td>
</tr>
<tr>
<td>LIST_EDUCATIONS</td>
<td>GET</td>
<td>/education</td>
</tr>
<tr>
<td>LIST_EDUCATION_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/education/{id};{ns}/provenance</td>
</tr>
<tr>
<td>ADD_CONTRIBUTION_TO_EDUCATION</td>
<td>POST</td>
<td>/education/{id};{ns}/contribution/{id}</td>
</tr>
<tr>
<td>REMOVE_CONTRIBUTION_FROM_EDUCATION</td>
<td>DELETE</td>
<td>/education/{id};{ns}/contribution/{id}</td>
</tr>
<tr>
<td>LIST_CONTRIBUTION_FROM_EDUCATION</td>
<td>GET</td>
<td>/education/{id};{ns}/contribution</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>ADD_TASK_TO_EDUCATION</td>
<td>POST</td>
<td>/education/{id}; {ns}/task/{id}</td>
</tr>
<tr>
<td>REMOVE_TASK_FROM_EDUCATION</td>
<td>DELETE</td>
<td>/education/{id}; {ns}/task/{id}</td>
</tr>
<tr>
<td>LIST_TASK_FROM_EDUCATION</td>
<td>GET</td>
<td>/education/{id}; {ns}/task</td>
</tr>
<tr>
<td>SHARE_EDUCATION</td>
<td>GET, POST, PUT</td>
<td>/education/{id}; {ns}/share/ {sharer-id}; {sharer-ns}/ permission/ {access-permission}</td>
</tr>
<tr>
<td>UNSHARE_EDUCATION</td>
<td>DELETE</td>
<td>/education/{id}; {ns}/share/ {sharer-id}; {sharer-ns}</td>
</tr>
</tbody>
</table>

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

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ims:direct xmlns:ims="http://ims.dei.unipd.it/">
  <ims:identifier>edu-1</ims:identifier>
  <ims:namespace>http://ims.dei.unipd.it/</ims:namespace>
  <ims:identifier>user-1</ims:identifier>
  <ims:namespace>http://ims.dei.unipd.it/</ims:namespace>
</ims:direct>
```

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

7.20.3 JSON Representation

```json
{
  "direct":{
    "education": {
      "identifier": "edu-1",
```
"namespace": "http://ims.dei.unipd.it/",
"name": "Name of education 1",
"description": "Description of education 1",
"status": "AVAILABLE",
"scope": "SHARED",
"created": "2012-09-13T18:12:34.955+02:00",
"last-modified": "2012-09-13T18:12:34.955+02:00",
"owner": {
    "identifier": "user-1",
    "namespace": "http://ims.dei.unipd.it/"
},
"shareings": [
    {
        "sharing": {
            "group": {
                "identifier": "group-1",
                "namespace": "http://ims.dei.unipd.it/"
            },
            "access-permission": "DENIED"
        }
    },
    {
        "sharing": {
            "group": {
                "identifier": "group-2",
                "namespace": "http://ims.dei.unipd.it/"
            },
            "access-permission": "READONLY"
        }
    },
    {
        "sharing": {
            "group": {
                "identifier": "group-3",
                "namespace": "http://ims.dei.unipd.it/"
            },
            "access-permission": "READWRITE"
        }
    }
],
"links": [
    {
        "link": {
            "metadata": {
                "identifier": "md-1",
                "namespace": "http://ims.dei.unipd.it/"
            },
            "relation": {
                "concept": {
                    "identifier": "isDescriptionOf",
                    "namespace": "http://ims.dei.unipd.it/"
                }
            },
            "evaluation-activity": {
                "identifier": "edu-1"
            }
        }
    }
]
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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_TRIAL</td>
<td>POST</td>
<td>/trial</td>
</tr>
<tr>
<td>READ_TRIAL</td>
<td>GET</td>
<td>/trial/{id};{ns}</td>
</tr>
<tr>
<td>UPDATE_TRIAL</td>
<td>PUT</td>
<td>/trial/{id};{ns}</td>
</tr>
<tr>
<td>DELETE_TRIAL</td>
<td>DELETE</td>
<td>/trial/{id};{ns}</td>
</tr>
<tr>
<td>LIST_TRIALS</td>
<td>GET</td>
<td>/trial</td>
</tr>
<tr>
<td>LIST_TRIAL_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/trial/{id};{ns}/provenance</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>ADD_CONTRIBUTION_TO_TRIAL</td>
<td>POST</td>
<td>/trial/{id};{ns}/contribution/{id}</td>
</tr>
<tr>
<td>REMOVE_CONTRIBUTION_FROM_TRIAL</td>
<td>DELETE</td>
<td>/trial/{id};{ns}/contribution/{id}</td>
</tr>
<tr>
<td>LIST_CONTRIBUTION_FROM_TRIAL</td>
<td>GET</td>
<td>/trial/{id};{ns}/contribution</td>
</tr>
<tr>
<td>ADD_TASK_TO_TRIAL</td>
<td>POST</td>
<td>/trial/{id};{ns}/task/{id}</td>
</tr>
<tr>
<td>REMOVE_TASK_FROM_TRIAL</td>
<td>DELETE</td>
<td>/trial/{id};{ns}/task/{id}</td>
</tr>
<tr>
<td>LIST_TASK_FROM_TRIAL</td>
<td>GET</td>
<td>/trial/{id};{ns}/task</td>
</tr>
<tr>
<td>SHARE_TRIAL</td>
<td>GET, POST,</td>
<td>/trial/{id};{ns}/share/{sharer-id};</td>
</tr>
<tr>
<td></td>
<td>PUT</td>
<td>{sharer-ns}/permission/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_TRIAL</td>
<td>DELETE</td>
<td>/trial/{id};{ns}/share/{sharer-id};</td>
</tr>
<tr>
<td></td>
<td></td>
<td>{sharer-ns}</td>
</tr>
</tbody>
</table>

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

```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:trial
  ims:identifier="t-1"
  ims:namespace="http://ims.dei.unipd.it/
  ims:name="Name of trial 1"
  ims:description="Description of trial 1"
  ims:status="AVAILABLE"
  ims:scope="SHARED"
  ims:created="2012-09-13T18:12:34.955+02:00"
  ims:last-modified="2012-09-13T18:12:34.955+02:00">
  <ims:owner>
    <ims:user
      ims:identifier="user-1"
      ims:namespace="http://ims.dei.unipd.it/"/>
```


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

```json
{
  "direct":{
    "trial":{
      "identifier":"t-1",
      "namespace":"http://ims.dei.unipd.it/",
      "name":"Name of trial 1",
      "description":"Description of trial 1",
      "status":"AVAILABLE",
      "scope":"SHARED",
      "created":"2012-09-13T18:12:34.955+02:00",
      "last-modified":"2012-09-13T18:12:34.955+02:00",
      "owner":{
        "identifier":"user-1",
        "namespace":"http://ims.dei.unipd.it/"
      }
    },
    "sharings":[
      {
        "sharing":{
          "group":{
            "identifier":"group-1",
            "namespace":"http://ims.dei.unipd.it/"
          },
          "access-permission":"DENIED"
        }},
        {
          "sharing":{
            "group":{
              "identifier":"group-2",
              "namespace":"http://ims.dei.unipd.it/"
            },
            "access-permission":"READ_ONLY"
          }
        },
        {
          "sharing":{
            "group":{
              "identifier":"group-3",
              "namespace":"http://ims.dei.unipd.it/"
            },
            "access-permission":"READ_WRITE"
          }
        }
      ],
      "links":{
        "link":{
          "metadata":{
            "identifier":"md-1",
            "namespace":"http://ims.dei.unipd.it/"
          },
          "relation":{
            "concept":{
              "identifier":"isDescriptionOf",
              "namespace":"http://ims.dei.unipd.it/"
            }
          }
        }
      }
    }
```
7.22 Experimental Collection Resource

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

7.22.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_EXPERIMENTAL_COLLECTION</td>
<td>POST</td>
<td>/experimental-collection</td>
</tr>
<tr>
<td>READ_EXPERIMENTAL_COLLECTION</td>
<td>GET</td>
<td>/experimental-collection/</td>
</tr>
<tr>
<td>UPDATE_EXPERIMENTAL_COLLECTION</td>
<td>PUT</td>
<td>/experimental-collection/</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>DELETE_EXPERIMENTAL_COLLECTION</td>
<td>DELETE</td>
<td>/experimental-collection/{id}</td>
</tr>
<tr>
<td>LIST_EXPERIMENTAL_Collections</td>
<td>GET</td>
<td>/experimental-collection</td>
</tr>
<tr>
<td>LIST_EXPERIMENTAL_COLLECTION_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/experimental-collection/{id}/provenance</td>
</tr>
<tr>
<td>ADD_CONTRIBUTION_TO_EXPERIMENTAL_COLLECTION</td>
<td>POST</td>
<td>/experimental-collection/{id}/contribution/{id}</td>
</tr>
<tr>
<td>REMOVE_CONTRIBUTION_FROM_EXPERIMENTAL_COLLECTION</td>
<td>DELETE</td>
<td>/experimental-collection/{id}/contribution/{id}</td>
</tr>
<tr>
<td>LIST_CONTRIBUTION_FROM_EXPERIMENTAL_COLLECTION</td>
<td>GET</td>
<td>/experimental-collection/{id}/contribution</td>
</tr>
<tr>
<td>ADD_CORPUS_TO_EXPERIMENTAL_COLLECTION</td>
<td>POST</td>
<td>/experimental-collection/{id}/corpus/{id}</td>
</tr>
<tr>
<td>REMOVE_CORPUS_FROM_EXPERIMENTAL_COLLECTION</td>
<td>DELETE</td>
<td>/experimental-collection/{id}/corpus/{id}</td>
</tr>
<tr>
<td>LIST_CORPUS_FROM_EXPERIMENTAL_COLLECTION</td>
<td>GET</td>
<td>/experimental-collection/{id}/corpus</td>
</tr>
<tr>
<td>ADD_TASK_TO_EXPERIMENTAL_COLLECTION</td>
<td>POST</td>
<td>/experimental-collection/{id}/task/{id}</td>
</tr>
<tr>
<td>REMOVE_TASK_FROM_EXPERIMENTAL_COLLECTION</td>
<td>DELETE</td>
<td>/experimental-collection/{id}/task/{id}</td>
</tr>
<tr>
<td>LIST_TASK_FROM_EXPERIMENTAL_COLLECTION</td>
<td>GET</td>
<td>/experimental-collection/{id}/task</td>
</tr>
<tr>
<td>ADD_TOPIC_GROUP_TO_EXPERIMENTAL_COLLECTION</td>
<td>POST</td>
<td>/experimental-collection/{id}/topic-group/{id}</td>
</tr>
<tr>
<td>REMOVE_TOPIC_GROUP_FROM_EXPERIMENTAL_COLLECTION</td>
<td>DELETE</td>
<td>/experimental-collection/{id}/topic-group/{id}</td>
</tr>
<tr>
<td>LIST_TOPIC_GROUP_FROM_EXPERIMENTAL_COLLECTION</td>
<td>GET</td>
<td>/experimental-collection/{id}/topic-group</td>
</tr>
<tr>
<td>SHARE_EXPERIMENTAL_COLLECTION</td>
<td>GET, POST, PUT</td>
<td>/experimental-collection/{id}/share/{sharer-id}; {sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_EXPERIMENTAL_COLLECTION</td>
<td>DELETE</td>
<td>/experimental-collection/{id}/share/{sharer-id}; {sharer-ns}</td>
</tr>
</tbody>
</table>

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

```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">
```

---

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
<ims:experimental-collection
  ims:identifier="ec-1"
  ims:description="description of experimental collection"
  ims:scope="SHARED"
  ims:created="2012-09-13T18:25:15.595+02:00"
  ims:last-modified="2012-09-13T18:25:15.595+02:00">
  <ims:owner
    ims:identifier="user-1"
    ims:namespace="http://ims.dei.unipd.it" />
  <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:links>
    <ims:link
      ims:metadata
        ims:identifier="md-1"
        ims:namespace="http://ims.dei.unipd.it" />
      <ims:relation
        ims:concept
          ims:identifier="isDescriptionOf"
          ims:namespace="http://ims.dei.unipd.it" />
    </ims:link>
    <ims:link
      ims:metadata
        ims:identifier="md-2"
        ims:namespace="http://ims.dei.unipd.it" />
      <ims:relation
        ims:concept
          ims:identifier="isCopyrightOf"
          ims:namespace="http://ims.dei.unipd.it" />
    </ims:link>
    <ims:link
      ims:metadata
        ims:identifier="md-3"
        ims:namespace="http://ims.dei.unipd.it" />
      <ims:relation
        ims:concept
          ims:identifier="isDescriptionOf"
          ims:namespace="http://ims.dei.unipd.it" />
    </ims:link>
    <ims:link
      ims:metadata
        ims:identifier="md-4"
        ims:namespace="http://ims.dei.unipd.it" />
      <ims:relation
        ims:concept
          ims:identifier="isCopyrightOf"
          ims:namespace="http://ims.dei.unipd.it" />
    </ims:link>
  </ims:links>
</ims:experimental-collection>
7.22.3 JSON Representation

```json
{
  "direct": {
    "experimental-collection": {
      "identifier": "ec-1",
      "description": "description of experimental collection",
      "scope": "SHARED",
      "created": "2012-09-13T18:25:15.595+02:00",
      "last-modified": "2012-09-13T18:25:15.595+02:00",
      "owner": {
        "user": {
          "identifier": "user-1",
          "namespace": "http://ims.dei.unipd.it/"
        }
      },
      "sharings": [
        {
          "sharing": {
            "group": {
              "identifier": "group-1",
              "namespace": "http://ims.dei.unipd.it/"
            },
            "access-permission": "DENIED"
          },
          {
            "sharing": {
              "group": {
                "identifier": "group-2",
                "namespace": "http://ims.dei.unipd.it/"
              },
              "access-permission": "READ_ONLY"
            },
            {
              "sharing": {
                "group": {
                  "identifier": "group-3",
                  "namespace": "http://ims.dei.unipd.it/"
                },
                "access-permission": "ALWAYS_AVAILABLE"
              }
            }
          }]
        }
      ]
    }
  }
```
"access-permission":"READ_WRITE"
],
"links": [
  {
    "link": {
      "metadata": {
        "identifier": "md-1",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "relation": {
        "concept": {
          "identifier": "isDescriptionOf",
          "namespace": "http://ims.dei.unipd.it/"
        }
      },
      "experimental-collection": {
        "identifier": "ec-1"
      }
    }
  },
  {
    "link": {
      "metadata": {
        "identifier": "md-2",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "relation": {
        "concept": {
          "identifier": "isCopyrightOf",
          "namespace": "http://ims.dei.unipd.it/"
        }
      },
      "experimental-collection": {
        "identifier": "ec-1"
      }
    }
  },
  {
    "link": {
      "metadata": {
        "identifier": "md-3",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "relation": {
        "concept": {
          "identifier": "isAdministrationOf",
          "namespace": "http://ims.dei.unipd.it/"
        }
      },
      "experimental-collection": {
        "identifier": "ec-1"
      }
    }
  }
],
"topic-group": {
  "identifier": "tg1"}
7.23 Experiment Resource

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

7.23.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_EXPERIMENT</td>
<td>POST</td>
<td>/experiment</td>
</tr>
<tr>
<td>READ_EXPERIMENT</td>
<td>GET</td>
<td>/experiment/{id}</td>
</tr>
<tr>
<td>UPDATE_EXPERIMENT</td>
<td>PUT</td>
<td>/experiment/{id}</td>
</tr>
<tr>
<td>DELETE_EXPERIMENT</td>
<td>DELETE</td>
<td>/experiment/{id}</td>
</tr>
<tr>
<td>LIST_EXPERIMENTS</td>
<td>GET</td>
<td>/experiment</td>
</tr>
<tr>
<td>LIST_EXPERIMENT_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/experiment/{id}/provenance</td>
</tr>
<tr>
<td>ADD_CONFIGURATION_TO_EXPERIMENT</td>
<td>POST</td>
<td>/experiment/{id}/configuration/{id}</td>
</tr>
<tr>
<td>REMOVE_CONFIGURATION_FROM_EXPERIMENT</td>
<td>DELETE</td>
<td>/experiment/{id}/configuration</td>
</tr>
<tr>
<td>READ_CONFIGURATION_FROM_EXPERIMENT</td>
<td>GET</td>
<td>/experiment/{id}/configuration</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>ADD_CONTRIBUTION_TO_EXPERIMENT</td>
<td>POST</td>
<td>/experiment/{id}/contribution/{id}</td>
</tr>
<tr>
<td>REMOVE_CONTRIBUTION_FROM_EXPERIMENT</td>
<td>DELETE</td>
<td>/experiment/{id}/contribution/{id}</td>
</tr>
<tr>
<td>LIST_CONTRIBUTION_FROM_EXPERIMENT</td>
<td>GET</td>
<td>/experiment/{id}/contribution</td>
</tr>
<tr>
<td>ADD_EXPERIMENT_ITEM_TO_EXPERIMENT</td>
<td>POST</td>
<td>/experiment/{id}/experiment-item/{id}</td>
</tr>
<tr>
<td>REMOVE_EXPERIMENT_ITEM_FROM_EXPERIMENT</td>
<td>DELETE</td>
<td>/experiment/{id}/experiment-item/{id}</td>
</tr>
<tr>
<td>LIST_EXPERIMENT_ITEM_FROM_EXPERIMENT</td>
<td>GET</td>
<td>/experiment/{id}/experiment-item</td>
</tr>
<tr>
<td>ADD_MEASURE_TO_EXPERIMENT</td>
<td>POST</td>
<td>/experiment/{id}/measure/{id}</td>
</tr>
<tr>
<td>REMOVE_MEASURE_FROM_EXPERIMENT</td>
<td>DELETE</td>
<td>/experiment/{id}/measure/{id}</td>
</tr>
<tr>
<td>LIST_MEASURE_FROM_EXPERIMENT</td>
<td>GET</td>
<td>/experiment/{id}/measure</td>
</tr>
<tr>
<td>ADD_STATISTICAL_TEST_TO_EXPERIMENT</td>
<td>POST</td>
<td>/experiment/{id}/statistical-test/{id}</td>
</tr>
<tr>
<td>REMOVE_STATISTICAL_TEST_FROM_EXPERIMENT</td>
<td>DELETE</td>
<td>/experiment/{id}/statistical-test/{id}</td>
</tr>
<tr>
<td>LIST_STATISTICAL_TEST_FROM_EXPERIMENT</td>
<td>GET</td>
<td>/experiment/{id}/statistical-test</td>
</tr>
<tr>
<td>SHARE_EXPERIMENT</td>
<td>GET, POST, PUT</td>
<td>/experiment/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_EXPERIMENT</td>
<td>DELETE</td>
<td>/experiment/{id}/share/{sharer-id};{sharer-ns}</td>
</tr>
</tbody>
</table>

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
<?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/data/xml/direct.3.00.xsd">
<ims:experiment
ims:identifier="exp-1"
ims:description="Description of experiment, e.g. experiment submitted to TREC7"
ims:scope="SHARED"
ims:created="2012-09-13T18:27:29.748+02:00"
ims:last-modified="2012-09-13T18:27:29.748+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>
<ims:links>
<ims:link>
<ims:metadata
ims:identifier="md-1"
ims:namespace="http://ims.dei.unipd.it/" />
<ims:relation>
<ims:concept
ims:identifier="isDescriptionOf"
ims:namespace="http://ims.dei.unipd.it/" />
</ims:relation>
</ims:link>
<ims:link>
<ims:metadata
ims:identifier="md-2"
ims:namespace="http://ims.dei.unipd.it/" />
<ims:relation>
<ims:concept
ims:identifier="isCopyrightOf"
ims:namespace="http://ims.dei.unipd.it/" />
</ims:relation>
</ims:link>
</ims:links>
</ims:experiment>
</ims:direct>
```
7.23.3 JSON Representation

```json
{
  "direct": {
    "experiment": {
      "identifier": "exp-1",
      "description": "Description of experiment, e.g. experiment submitted to TREC7",
      "scope": "SHARED",
      "created": "2012-09-13T18:29:748+02:00",
      "last-modified": "2012-09-13T18:29:748+02:00",
      "owner": {
        "identifier": "user-1",
        "namespace": "http://ims.dei.unipd.it/
      }
    },
    "sharings": [
      {
        "sharing": {
          "group": {
            "identifier": "group-1",
            "namespace": "http://ims.dei.unipd.it/
          },
          "access-permission": "DENIED"
        },
        
      },
      {
        "sharing": {
          "group": {
            "identifier": "group-2",
            "namespace": "http://ims.dei.unipd.it/
          },
          "access-permission": "READ_ONLY"
        }},
        
      },
      {
        "sharing": {
          "group": {
            "identifier": "group-3",
            "namespace": "http://ims.dei.unipd.it/
          },
          "access-permission": "READ_WRITE"
        }
      }
    ]
  }
}
```
"links": [ 
  { "link": { 
    "metadata": { 
      "identifier": "md-1",
      "namespace": "http://ims.dei.unipd.it/
    },
    "relation": { 
      "concept": { 
        "identifier": "isDescriptionOf",
        "namespace": "http://ims.dei.unipd.it/
      }
    },
    "experiment": { 
      "identifier": "exp-1"
    }
  }
  },
  { "link": { 
    "metadata": { 
      "identifier": "md-2",
      "namespace": "http://ims.dei.unipd.it/
    },
    "relation": { 
      "concept": { 
        "identifier": "isCopyrightOf",
        "namespace": "http://ims.dei.unipd.it/
      }
    },
    "experiment": { 
      "identifier": "exp-1"
    }
  }
  },
  { "link": { 
    "metadata": { 
      "identifier": "md-3",
      "namespace": "http://ims.dei.unipd.it/
    },
    "relation": { 
      "concept": { 
        "identifier": "isAdministrationOf",
        "namespace": "http://ims.dei.unipd.it/
      }
    },
    "experiment": { 
      "identifier": "exp-1"
    }
  }
  }
],
"task": {
  "identifier": "task-1"
},
"configuration": {
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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_EXPERIMENT-ITEM</td>
<td>POST</td>
<td>/experiment-item</td>
</tr>
<tr>
<td>READ_EXPERIMENT-ITEM</td>
<td>GET</td>
<td>/experiment-item/{id}</td>
</tr>
<tr>
<td>UPDATE_EXPERIMENT-ITEM</td>
<td>PUT</td>
<td>/experiment-item/{id}</td>
</tr>
<tr>
<td>DELETE_EXPERIMENT-ITEM</td>
<td>DELETE</td>
<td>/experiment-item/{id}</td>
</tr>
<tr>
<td>LIST_EXPERIMENT-ITEMS</td>
<td>GET</td>
<td>/experiment-item</td>
</tr>
<tr>
<td>LIST_EXPERIMENT-ITEM_PROVENANCE EVENTS</td>
<td>GET</td>
<td>/experiment-item/{id}/provenance</td>
</tr>
</tbody>
</table>

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

```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:experiment-item ims:identifier="ei-1">
</ims:experiment-item>
</ims:direct>
```

7.24.3 JSON Representation

```json
{
  "direct":{
    "experiment-item":{
      "identifier":"ei-1",
      "experiment":{
```
7.25 Ground Truth Resource

Represents a container of assessments obtained through the pooling technique.

7.25.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_GROUND-TRUTH</td>
<td>POST</td>
<td>/ground-truth</td>
</tr>
<tr>
<td>READ_GROUND-TRUTH</td>
<td>GET</td>
<td>/ground-truth/{id}</td>
</tr>
<tr>
<td>UPDATE_GROUND-TRUTH</td>
<td>PUT</td>
<td>/ground-truth/{id}</td>
</tr>
<tr>
<td>DELETE_GROUND-TRUTH</td>
<td>DELETE</td>
<td>/ground-truth/{id}</td>
</tr>
<tr>
<td>LIST_GROUND-TRUTHS</td>
<td>GET</td>
<td>/ground-truth</td>
</tr>
<tr>
<td>LIST_GROUND-TRUTH_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/ground-truth/{id}/provenance</td>
</tr>
<tr>
<td>ADD_CONTRIBUTION_TO_GROUND-TRUTH</td>
<td>POST</td>
<td>/ground-truth/{id}/contribution/{id}</td>
</tr>
<tr>
<td>REMOVE_CONTRIBUTION_FROM_GROUND-TRUTH</td>
<td>DELETE</td>
<td>/ground-truth/{id}/contribution/{id}</td>
</tr>
<tr>
<td>LIST_CONTRIBUTION_FROM_GROUND_TRUTH</td>
<td>GET</td>
<td>/ground-truth/{id}/contribution</td>
</tr>
<tr>
<td>ADD_GROUND_TRUTH_ITEM_TO_GROUND_TRUTH</td>
<td>POST</td>
<td>/ground-truth/{id}/ground-truth-item/{id}</td>
</tr>
<tr>
<td>REMOVE_GROUND_TRUTH_ITEM_FROM_GROUND_TRUTH</td>
<td>DELETE</td>
<td>/ground-truth/{id}/ground-truth-item/{id}</td>
</tr>
<tr>
<td>LIST_GROUND_TRUTH_ITEM_FROM_GROUND_TRUTH</td>
<td>GET</td>
<td>/ground-truth/{id}/ground-truth-item</td>
</tr>
<tr>
<td>ADD_STATISTICAL_TEST_TO_GROUND-TRUTH</td>
<td>POST</td>
<td>/ground-truth/{id}/statistical-test/{id}</td>
</tr>
<tr>
<td>REMOVE_STATISTICAL_TEST_FROM_GROUND-TRUTH</td>
<td>DELETE</td>
<td>/ground-truth/{id}/statistical-test/{id}</td>
</tr>
<tr>
<td>LIST_STATISTICAL_TEST_FROM_GROUND_TRUTH</td>
<td>GET</td>
<td>/ground-truth/{id}/statistical-test</td>
</tr>
</tbody>
</table>
Table 62: API for accessing the ground-truth resource.

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHARE_GROUND_TRUTH</td>
<td>GET, POST, PUT</td>
<td>/ground-truth/{id}/share/{sharer-id}; {sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_GROUND_TRUTH</td>
<td>DELETE</td>
<td>/ground-truth/{id}/share/{sharer-id}; {sharer-ns}</td>
</tr>
</tbody>
</table>

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 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: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>
        </ims:owner>
    </ims:ground-truth>
</ims:direct>
```
7.25.3 JSON Representation

```json
{
  "direct": {
    "ground-truth": {
      "identifier": "gt1",
      "description": "Description of ground truth",
      "scope": "SHARED",
      "created": "2012-09-13T18:30:01.195+02:00",
      "last-modified": "2012-09-13T18:30:01.196+02:00",
      "owner": {
        "identifier": "user-1",
        "namespace": "http://ims.dei.unipd.it/
      }
    }
  }
}
```

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"access-permission":"DENIED"}
},
"sharing":{
  "group":{
    "identifier":"group-2",
    "namespace":"http://ims.dei.unipd.it/
  },
  "access-permission":"READ_ONLY"
},
"sharing":{
  "group":{
    "identifier":"group-3",
    "namespace":"http://ims.dei.unipd.it/
  },
  "access-permission":"READ_WRITE"
}
],
"links":{
  "link":{
    "metadata":{
      "identifier":"md-1",
      "namespace":"http://ims.dei.unipd.it/
    },
    "relation":{
      "concept":{
        "identifier":"isDescriptionOf",
        "namespace":"http://ims.dei.unipd.it/
      }
    },
    "ground-truth":{
      "identifier":"gt1"
    }
  },
  "link":{
    "metadata":{
      "identifier":"md-2",
      "namespace":"http://ims.dei.unipd.it/
    },
    "relation":{
      "concept":{
        "identifier":"isCopyrightOf",
        "namespace":"http://ims.dei.unipd.it/
      }
    },
    "ground-truth":{
      "identifier":"gt1"
    }
  }
}
7.26 Ground Truth Item Resource

Represents an item of a GroundTruth.

7.26.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_GROUND_TRUTH_ITEM</td>
<td>POST</td>
<td>/ground-truth-item</td>
</tr>
<tr>
<td>READ_GROUND_TRUTH_ITEM</td>
<td>GET</td>
<td>/ground-truth-item/{id}</td>
</tr>
<tr>
<td>UPDATE_GROUND_TRUTH_ITEM</td>
<td>PUT</td>
<td>/ground-truth-item/{id}</td>
</tr>
<tr>
<td>DELETE_GROUND_TRUTH_ITEM</td>
<td>DELETE</td>
<td>/ground-truth-item/{id}</td>
</tr>
<tr>
<td>LIST_GROUND_TRUTH_ITEMS</td>
<td>GET</td>
<td>/ground-truth-item</td>
</tr>
<tr>
<td>LIST_GROUND_TRUTH_ITEM_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/ground-truth-item/{id}/provenance</td>
</tr>
</tbody>
</table>

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

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

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

```
{
    "direct": {
        "ground-truth-item": {
            "identifier": "gti1",
            "created": "2012-09-13T18:28:51.811+02:00",
            "last-modified": "2012-09-13T18:28:51.811+02:00",
            "ground-truth": {
                "identifier": "gt1"
            },
            "user": {
                "identifier": "user-1",
                "namespace": "http://ims.dei.unipd.it/"
            },
            "concept": {
                "identifier": "assessment1",
                "namespace": "http://ims.dei.unipd.it/"
            }
        }
    }
}
```

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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_INFORMATION_UNIT</td>
<td>POST</td>
<td>/information-unit</td>
</tr>
</tbody>
</table>
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

```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:information-unit xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
<ims:identifier>iu1</ims:identifier>
<ims:created>2012-09-13T18:31:22.810+02:00</ims:created>
<ims:last-modified>2012-09-13T18:31:22.810+02:00</ims:last-modified>
<ims:media-type>application/xml</ims:media-type>
<ims:language>ita</ims:language>
<ims:corpus><ims:identifier>c1</ims:identifier></ims:corpus>
<ims:content>
<DOC><DOCNO>FT911-3</DOCNO><PROFILE>AN-BEOA7AAIFT</PROFILE><DATE>910514</DATE><HEADLINE>FT 14 MAY 91 - International Company News: Contigas plans DM900m east German project</HEADLINE></DOC></ims:content>
</ims:information-unit></ims:direct>
```

### 7.28.3 JSON Representation

```json
{
  "direct":{
    "information-unit":{
      "identifier":"iu1",
      "created":"2012-09-13T18:31:22.810+02:00",
      "last-modified":"2012-09-13T18:31:22.810+02:00",
      "media-type":"application/xml",
      "uri":"http://www.uri1.com/"
    }
  }
}
```
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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_MEASURE</td>
<td>POST</td>
<td>/measure</td>
</tr>
<tr>
<td>READ_MEASURE</td>
<td>GET</td>
<td>/measure/{id}</td>
</tr>
<tr>
<td>UPDATE_MEASURE</td>
<td>PUT</td>
<td>/measure/{id}</td>
</tr>
<tr>
<td>DELETE_MEASURE</td>
<td>DELETE</td>
<td>/measure/{id}</td>
</tr>
<tr>
<td>LIST_MEASURE</td>
<td>GET</td>
<td>/measure</td>
</tr>
<tr>
<td>LIST_MEASURE_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/measure/{id}/provenance</td>
</tr>
</tbody>
</table>

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

```xml
<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:identifier="m-1"
 ims:created="2012-09-13T18:32:37.874+02:00"
 ims:last-modified="2012-09-13T18:32:37.874+02:00"
 <ims:concept
 ims:identifier="mtc-1"
```
7.29.3 JSON Representation

```json
{
  "direct":{
    "measure":{
      "identifier":"m-1",
      "created":"2012-09-13T18:32:37.874+02:00",
      "last-modified":"2012-09-13T18:32:37.874+02:00",
      "value":0.1,
      "concept":{
        "identifier":"mtc-1",
        "namespace":"http://ims.dei.unipd.it/
      },
      "experiment":{
        "identifier":"exp-1"
      },
      "topic":{
        "identifier":"tpc-1"
      }
    }
  }
}
```

7.30 Pool Resource

Represents a container of assessments obtained through the pooling technique.

7.30.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_POOL</td>
<td>POST</td>
<td>/pool</td>
</tr>
<tr>
<td>READPOOL</td>
<td>GET</td>
<td>/pool/{id}</td>
</tr>
<tr>
<td>UPDATE_POOL</td>
<td>PUT</td>
<td>/pool/{id}</td>
</tr>
<tr>
<td>DELETE_POOL</td>
<td>DELETE</td>
<td>/pool/{id}</td>
</tr>
<tr>
<td>LIST_POOLS</td>
<td>GET</td>
<td>/pool</td>
</tr>
<tr>
<td>LIST_POOL_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/pool/{id}/provenance</td>
</tr>
<tr>
<td>ADD_POOL_ITEM_TO_POOL</td>
<td>POST</td>
<td>/pool/{id}/pool-item/{id}</td>
</tr>
<tr>
<td>REMOVE_POOL_ITEM_FROM_POOL</td>
<td>DELETE</td>
<td>/pool-item/{id}</td>
</tr>
<tr>
<td>LIST_POOL_ITEM_FROM_POOL</td>
<td>GET</td>
<td>/pool/{id}/pool-item</td>
</tr>
<tr>
<td>ADD_RUN_TO_POOL</td>
<td>POST</td>
<td>/pool/{id}/run/{id}</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>REMOVE_RUN_FROM_POOL</td>
<td>DELETE</td>
<td>/pool/{id}/run/{id}</td>
</tr>
<tr>
<td>LIST_RUN_FROM_POOL</td>
<td>GET</td>
<td>/pool/{id}/run</td>
</tr>
<tr>
<td>SHARE_POOL</td>
<td>GET, POST, PUT</td>
<td>/pool/{id}/share/ {sharer-id}; {sharer-ns}/ permission/ {access-permission}</td>
</tr>
<tr>
<td>UNSHARE_POOL</td>
<td>DELETE</td>
<td>/pool/{id}/share/ {sharer-id}; {sharer-ns}</td>
</tr>
</tbody>
</table>

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

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ims:direct
xmlns:ims="http://ims.dei.unipd.it/"
xmns: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:pool
ims:identifier="gt1"
ims:description="Description of pool 1"
ims:scope="SHARED"
ims:created="2012-09-13T18:35:28.262+02:00"
ims:last_modified="2012-09-13T18:35:28.262+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:sharings>
<ims:sharings>
<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:sharings>
<ims:sharings>
<ims:sharing>
<ims:group
ims:identifier="group-3"
ims:namespace="http://ims.dei.unipd.it/" />
</ims:sharing>
</ims:sharings>
</ims:pool>
```

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7.30.3 JSON Representation

```json
{
  "direct": {
    "pool": {
      "identifier": "gt1",
      "description": "Description of pool 1",
      "scope": "SHARED",
      "created": "2012-09-13T18:35:28.262+02:00",
      "last-modified": "2012-09-13T18:35:28.262+02:00",
      "owner": {
        "identifier": "user-1",
        "namespace": "http://ims.dei.unipd.it/"
      }
    },
    "sharings": [
      {
        "sharing": {
          "identifier": "md-1",
          "namespace": "http://ims.dei.unipd.it/"
        }
      },
      {
        "sharing": {
          "identifier": "md-2",
          "namespace": "http://ims.dei.unipd.it/"
        }
      },
      {
        "sharing": {
          "identifier": "md-3",
          "namespace": "http://ims.dei.unipd.it/"
        }
      }
    ],
    "sharings": [
      {
        "sharing": {
          "identifier": "isDescriptionOf",
          "namespace": "http://ims.dei.unipd.it/"
        }
      },
      {
        "sharing": {
          "identifier": "isCopyrightOf",
          "namespace": "http://ims.dei.unipd.it/"
        }
      },
      {
        "sharing": {
          "identifier": "isAdministrationOf",
          "namespace": "http://ims.dei.unipd.it/"
        }
      }
    ],
    "link": {
      "metadata": {
        "identifier": "md-1",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "concept": {
        "identifier": "isDescriptionOf",
        "namespace": "http://ims.dei.unipd.it/"
      }
    },
    "link": {
      "metadata": {
        "identifier": "md-2",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "concept": {
        "identifier": "isCopyrightOf",
        "namespace": "http://ims.dei.unipd.it/"
      }
    },
    "link": {
      "metadata": {
        "identifier": "md-3",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "concept": {
        "identifier": "isAdministrationOf",
        "namespace": "http://ims.dei.unipd.it/"
      }
    }
  }
}
```
"group":{
    "identifier":"group-1",
    "namespace":"http://ims.dei.unipd.it/"
},
"access-permission":"DENIED"
},
"sharing":{
    "group":{
        "identifier":"group-2",
        "namespace":"http://ims.dei.unipd.it/"
    },
    "access-permission":"READ_ONLY"
},
"sharing":{
    "group":{
        "identifier":"group-3",
        "namespace":"http://ims.dei.unipd.it/"
    },
    "access-permission":"READ_WRITE"
}
],
"links":{
    "link":{
        "metadata":{
            "identifier":"md-1",
            "namespace":"http://ims.dei.unipd.it/"
        },
        "relation":{
            "concept":{
                "identifier":"isDescriptionOf",
                "namespace":"http://ims.dei.unipd.it/"
            },
            "pool":{
                "identifier":"gt1"
            }
        }
    },
    "link":{
        "metadata":{
            "identifier":"md-2",
            "namespace":"http://ims.dei.unipd.it/"
        },
        "relation":{
            "concept":{
                "identifier":"isCopyrightOf",
                "namespace":"http://ims.dei.unipd.it/"
            },
            "pool":{
                "identifier":"gt1"
            }
        }
    }
}
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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_POOL-ITEM</td>
<td>POST</td>
<td>/pool-item</td>
</tr>
<tr>
<td>READ_POOL-ITEM</td>
<td>GET</td>
<td>/pool-item/{id}</td>
</tr>
<tr>
<td>UPDATE_POOL-ITEM</td>
<td>PUT</td>
<td>/pool-item/{id}</td>
</tr>
<tr>
<td>DELETE_POOL-ITEM</td>
<td>DELETE</td>
<td>/pool-item/{id}</td>
</tr>
<tr>
<td>LIST_POOL-ITEMS</td>
<td>GET</td>
<td>/pool-item</td>
</tr>
<tr>
<td>LIST_POOL-ITEM_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/pool-item/{id}/provenance</td>
</tr>
</tbody>
</table>

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

```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"
```

7.31.3 JSON Representation

```
{
  "direct":{
    "pool-item":{
      "identifier":"pi1",
      "created":"2012-09-13T18:33:41.787+02:00",
      "last-modified":"2012-09-13T18:33:41.787+02:00",
      "pool":{
        "identifier":"gt1"
      },
      "user":{
        "identifier":"user-1",
        "namespace":"http://ims.dei.unipd.it/"
      },
      "concept":{
        "identifier":"assessment1",
        "namespace":"http://ims.dei.unipd.it/"
      },
      "topic":{
        "identifier":"t1"
      },
      "information-unit":{
        "identifier":"iu1"
      }
    }
  }
}
```

7.32 Run Resource

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

7.32.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_RUN</td>
<td>POST</td>
<td>/run</td>
</tr>
<tr>
<td>READ_RUN</td>
<td>GET</td>
<td>/run/{id}</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>UPDATE_RUN</td>
<td>PUT</td>
<td>/run/{id}</td>
</tr>
<tr>
<td>DELETE_RUN</td>
<td>DELETE</td>
<td>/run/{id}</td>
</tr>
<tr>
<td>LIST_RUNS</td>
<td>GET</td>
<td>/run</td>
</tr>
<tr>
<td>LIST_RUN_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/run/{id}/provenance</td>
</tr>
<tr>
<td>ADD_ESTIMATE_TO_RUN</td>
<td>POST</td>
<td>/run/{id}/estimate/{id}</td>
</tr>
<tr>
<td>REMOVE_ESTIMATE_FROM_RUN</td>
<td>DELETE</td>
<td>/run/{id}/estimate/{id}</td>
</tr>
<tr>
<td>LIST_ESTIMATE_FROM_RUN</td>
<td>GET</td>
<td>/run/{id}/estimate</td>
</tr>
<tr>
<td>ADD_RUN_ITEM_TO_RUN</td>
<td>POST</td>
<td>/run/{id}/run-item/{id}</td>
</tr>
<tr>
<td>REMOVE_RUN_ITEM_FROM_RUN</td>
<td>DELETE</td>
<td>/run/{id}/run-item/{id}</td>
</tr>
<tr>
<td>LIST_RUN_ITEM_FROM_RUN</td>
<td>GET</td>
<td>/run/{id}/run-item</td>
</tr>
<tr>
<td>SHARE_RUN</td>
<td>GET, POST, PUT</td>
<td>/run/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_RUN</td>
<td>DELETE</td>
<td>/run/{id}/share/{sharer-id};{sharer-ns}</td>
</tr>
</tbody>
</table>

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

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

```json
{
  "direct": {
    "run": {
      "identifier": "r-1",
      "description": "Description of Run, e.g. att98atdc",
      "query-construction": "Query Constrution, e.g. title filtered run-0.282",
      "scope": "SHARED",
      "created": "2012-09-13T18:38:00.653+02:00",
      "last-modified": "2012-09-13T18:38:00.653+02:00",
      "owner": {
        "identifier": "user-1",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "sharings": [
        {
          "sharing": {
            "group": {
              "identifier": "group-1",
              "namespace": "http://ims.dei.unipd.it/"
            },
            "access-permission": "DENIED"
          }
        },
        {
          "sharing": {
            "group": {
              "identifier": "group-2",
              "namespace": "http://ims.dei.unipd.it/"
            },
            "access-permission": "READ_ONLY"
          }
        },
        {
          "sharing": {
            "group": {
              "identifier": "group-3",
              "namespace": "http://ims.dei.unipd.it/"
            },
            "access-permission": "READ_WRITE"
          }
        }
      ],
      "links": {
        "link": {
          "identifier": "isFieldOf"
        },
        "identifier": "isFieldOf2"
      }
    }
  }
}
```
"metadata":{
    "identifier": "md-1",
    "namespace": "http://ims.dei.unipd.it/"
},
"relation":{
    "concept":{
      "identifier": "isDescriptionOf",
      "namespace": "http://ims.dei.unipd.it/"
    },
    "run":{
      "identifier": "r-1"
    }
},
"link":{
  "metadata":{
    "identifier": "md-2",
    "namespace": "http://ims.dei.unipd.it/"
  },
  "relation":{
    "concept":{
      "identifier": "isCopyrightOf",
      "namespace": "http://ims.dei.unipd.it/"
    },
    "run":{
      "identifier": "r-1"
    }
  },
  "link":{
    "metadata":{
      "identifier": "md-3",
      "namespace": "http://ims.dei.unipd.it/"
    },
    "relation":{
      "concept":{
        "identifier": "isAdministrationOf",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "run":{
        "identifier": "r-1"
      }
    }
  },
  "task":{
    "identifier": "tsk-1"
  },
  "configuration":{
    "identifier": "cnf-1"
  },
  "system":{
    "identifier": "sys-1"
  },
  "topic-fields":[
    "D3.3: Prototype of the Evaluation Infrastructure"
  ]}
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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_RUN_ITEM</td>
<td>POST</td>
<td>/run-item</td>
</tr>
<tr>
<td>READ_RUN_ITEM</td>
<td>GET</td>
<td>/run-item/{id}</td>
</tr>
<tr>
<td>UPDATE_RUN_ITEM</td>
<td>PUT</td>
<td>/run-item/{id}</td>
</tr>
<tr>
<td>DELETE_RUN_ITEM</td>
<td>DELETE</td>
<td>/run-item/{id}</td>
</tr>
<tr>
<td>LIST_RUN_ITEMS</td>
<td>GET</td>
<td>/run-item</td>
</tr>
<tr>
<td>LIST_RUN_ITEM_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/run-item/{id}/provenance</td>
</tr>
</tbody>
</table>

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

```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:run-item
ims:identifier="ri1"
ims:rank="4"
ims:score="5.4" />
</ims:direct>
```
7.33.3 JSON Representation

```json
{
  "direct": {
    "run-item": {
      "identifier": "ri1",
      "rank": "4",
      "score": "5.4",
      "run": {
        "identifier": "run-1"
      },
      "topic": {
        "identifier": "tpc-1"
      },
      "information-unit": {
        "identifier": "iu-1"
      }
    }
  }
}
```

7.34 Snapshot Resource
Stores the snapshot of a visualization.

7.34.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_SNAPSHOT</td>
<td>POST</td>
<td>/snapshot</td>
</tr>
<tr>
<td>READ_SNAPSHOT</td>
<td>GET</td>
<td>/snapshot/{id}</td>
</tr>
<tr>
<td>UPDATE_SNAPSHOT</td>
<td>PUT</td>
<td>/snapshot/{id}</td>
</tr>
<tr>
<td>DELETE_SNAPSHOT</td>
<td>DELETE</td>
<td>/snapshot/{id}</td>
</tr>
<tr>
<td>LIST_SNAPSHOTS</td>
<td>GET</td>
<td>/snapshot</td>
</tr>
<tr>
<td>LIST_SNAPSHOT_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/snapshot/{id}/provenance</td>
</tr>
<tr>
<td>SHARE_SNAPSHOT</td>
<td>GET, POST, PUT</td>
<td>/snapshot/{id}/share/{sharer-id}; {sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_SNAPSHOT</td>
<td>DELETE</td>
<td>/snapshot/{id}/share/{sharer-id}; {sharer-ns}</td>
</tr>
</tbody>
</table>

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

```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:snapshot
  ims:identifier="sn-1"
  ims:created="2012-09-13T18:39:07.632+02:00"
  ims:last-modified="2012-09-13T18:39:07.632+02:00"
  ims:media-type="application/x-gzip"
  ims:language="aze">
<ims:content
  ims:content-transfer-encoding="base64">
PGNvbnR1bnQ+x25hcHNob3QgaW1hZ2U8L2NvbnsR1bnQ+
</ims:content>
<ims:visualization
  ims:identifier="v-1"/>
</ims:snapshot>
</ims:direct>
```

### 7.34.3 JSON Representation

```json
{
  "direct": {
    "snapshot": {
      "identifier": "sn-1",
      "created": "2012-09-13T18:39:07.632+02:00",
      "last-modified": "2012-09-13T18:39:07.632+02:00",
      "media-type": "application/x-gzip",
      "language": "aze",
      "content": {
        "content-transfer-encoding": "base64",
        "content": "PGNvbnR1bnQ+x25hcHNob3QgaW1hZ2U8L2NvbnsR1bnQ+"
      },
      "visualization": {
        "identifier": "v-1"
      }
    }
  }
}
```

### 7.35 Statistical Test Resource

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

#### 7.35.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_STATISTICAL_TEST</td>
<td>POST</td>
<td>/statistical-test</td>
</tr>
</tbody>
</table>
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

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ims:direct
    xmlns:ims="http://ims.dei.unipd.it/">
    <ims:statistical-test
        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:identifier="st-1"/>
        <ims:created>2012-09-13T18:43:54.399+02:00</ims:created>
        <ims:last-modified>2012-09-13T18:43:54.399+02:00</ims:last-modified>
        <ims:scope>SHARED</ims:scope>
        <ims:owner/>
        <ims:sharings/>
        <ims:sharing>
            <ims:group
                xmlns:ims="http://ims.dei.unipd.it/"
                xmlns:namespace="http://ims.dei.unipd.it/"
                xmlns:identifier="group-1"
                xmlns:namespace="http://ims.dei.unipd.it/"
                xmlns:identifier="group-1"
                xmlns:namespace="http://ims.dei.unipd.it/"/>
        </ims:sharing>
    </ims:statistical-test>
</ims:direct>
```
<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>
<ims:parameters>
  <ims:parameter>
    <ims:concept
      ims:identifier="parameterA"
      ims:namespace="http://direct.dei.unipd.it/" />
    <ims:value>value 1</ims:value>
  </ims:parameter>
  <ims:parameter>
    <ims:concept
      ims:identifier="parameterB"
      ims:namespace="http://direct.dei.unipd.it/" />
    <ims:value>value 2</ims:value>
  </ims:parameter>
  <ims:parameter>
    <ims:concept
      ims:identifier="parameterC"
      ims:namespace="http://direct.dei.unipd.it/" />
    <ims:value>value 3</ims:value>
  </ims:parameter>
</ims:parameters>
<ims:concept
  ims:identifier="test type, e.g. t-test"
  ims:namespace="http://ims.dei.unipd.it/" />
<ims:metrics>
  <ims:concept
    ims:identifier="Mean average precision"
    ims:namespace="http://ims.dei.unipd.it/" />
  <ims:concept
    ims:identifier="Fall-out"
    ims:namespace="http://ims.dei.unipd.it/" />
  <ims:concept
    ims:identifier="F-measure"
    ims:namespace="http://ims.dei.unipd.it/" />
</ims:metrics>
<ims:ground-truths>
  <ims:ground-truth ims:identifier="gt-1" />
  <ims:ground-truth ims:identifier="gt-2" />
  <ims:ground-truth ims:identifier="gt-3" />
</ims:ground-truths>
<ims:tasks>
  <ims:task ims:identifier="tsk-1" />
  <ims:task ims:identifier="tsk-2" />
  <ims:task ims:identifier="tsk-3" />
</ims:tasks>
<ims:measures>
7.35.3 JSON Representation

```json
{
  "direct": {
    "statistical-test": {
      "identifier": "st-1",
      "created": "2012-09-13T18:40:32.055+02:00",
      "last-modified": "2012-09-13T18:40:32.055+02:00",
      "concept": {
        "identifier": "test type, e.g. t-test",
        "namespace": "http://ims.dei.unipd.it/"
      },
      "parameters": [
        {
          "parameter": {
            "concept": {
              "identifier": "parameterA",
              "namespace": "http://direct.dei.unipd.it/"
            },
            "value": "value 1"
          }
        },
        {
          "parameter": {
            "concept": {
              "identifier": "parameterB",
              "namespace": "http://direct.dei.unipd.it/"
            },
            "value": "value 2"
          }
        },
        {
          "parameter": {
            "concept": {
              "identifier": "parameterC",
              "namespace": "http://direct.dei.unipd.it/"
            },
            "value": "value 3"
          }
        }
      ],
      "metrics": [
        {
          "concept": {
            "identifier": "Mean average precision",
            "namespace": "http://ims.dei.unipd.it/"
          }
        }
      ]
    }
  }
}
```
{ "concept":{
  "identifier":"Fall-out",
  "namespace":"http://ims.dei.unipd.it/"
},

{ "concept":{
  "identifier":"F-measure",
  "namespace":"http://ims.dei.unipd.it/"
}
},

"ground-truths":[
  { "ground-truth":{
    "identifier":"gt-1"
  },
  { "ground-truth":{
    "identifier":"gt-2"
  },
  { "ground-truth":{
    "identifier":"gt-3"
  }
},

"tasks":[
  { "task":{
    "identifier":"tsk-1"
  },
  { "task":{
    "identifier":"tsk-2"
  },
  { "task":{
    "identifier":"tsk-3"
  }
},

"measures":[
  { "measure":{
    "identifier":"meas-1"
  },
  { "measure":{
    "identifier":"meas-2"
  }
}
"identifier":"meas-3"
}
{
"experiments":[
  {
    "experiment":{
      "identifier":"exp-1"
    }
  },
  {
    "experiment":{
      "identifier":"exp-2"
    }
  },
  {
    "experiment":{
      "identifier":"exp-3"
    }
  }
]
}

### 7.36 System Resource

Represents a running software engine, which is under evaluation.

#### 7.36.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_SYSTEM</td>
<td>POST</td>
<td>/system</td>
</tr>
<tr>
<td>READ_SYSTEM</td>
<td>GET</td>
<td>/system/{id}</td>
</tr>
<tr>
<td>UPDATE_SYSTEM</td>
<td>PUT</td>
<td>/system/{id}</td>
</tr>
<tr>
<td>DELETE_SYSTEM</td>
<td>DELETE</td>
<td>/system/{id}</td>
</tr>
<tr>
<td>READ_SYSTEM_FROM_RUN</td>
<td>GET</td>
<td>/system/{id}/run</td>
</tr>
<tr>
<td>LIST_SYSTEMS</td>
<td>GET</td>
<td>/system</td>
</tr>
<tr>
<td>LIST_SYSTEM_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/system/{id}/provenance</td>
</tr>
<tr>
<td>ADD_COMPONENT_TO_SYSTEM</td>
<td>POST</td>
<td>/system/{id}/component/{id}</td>
</tr>
<tr>
<td>REMOVE_COMPONENT_FROM_SYSTEM</td>
<td>DELETE</td>
<td>/system/{id}/component/{id}</td>
</tr>
<tr>
<td>LIST_COMPONENT_FROM_SYSTEM</td>
<td>GET</td>
<td>/system/{id}/component</td>
</tr>
<tr>
<td>ADD_CONFIGURATION_TO_SYSTEM</td>
<td>POST</td>
<td>/system/{id}/configuration/{id}</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>REMOVE_CONFIGURATION_FROM_SYSTEM</td>
<td>DELETE</td>
<td>/system/{id}/configuration/{id}</td>
</tr>
<tr>
<td>READ_CONFIGURATION_FROM_SYSTEM</td>
<td>GET</td>
<td>/system/{id}/configuration</td>
</tr>
<tr>
<td>ADD_RUN_TO_SYSTEM</td>
<td>POST</td>
<td>/system/{id}/run/{id}</td>
</tr>
<tr>
<td>REMOVE_RUN_FROM_SYSTEM</td>
<td>DELETE</td>
<td>/system/{id}/run/{id}</td>
</tr>
<tr>
<td>LIST_RUN_FROM_SYSTEM</td>
<td>GET</td>
<td>/system/{id}/run</td>
</tr>
<tr>
<td>LIST_APPLICATION_FROM_SYSTEM</td>
<td>GET</td>
<td>/system/{id}/application</td>
</tr>
<tr>
<td>SHARE_SYSTEM</td>
<td>GET, POST,</td>
<td>/system/{id}/share/{sharer-id};</td>
</tr>
<tr>
<td></td>
<td>PUT</td>
<td>{sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_SYSTEM</td>
<td>DELETE</td>
<td>/system/{id}/share/{sharer-id};</td>
</tr>
<tr>
<td></td>
<td></td>
<td>{sharer-ns}</td>
</tr>
</tbody>
</table>

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

```xml
<ims:direct
xmlns:ims="http://ims.dei.unipd.it/"
xmns: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:system
  ims:identifier="sys-1"
  ims:name="Name of sys-1"
  ims:description="Description of sys-1"
  ims:scope="SHARED"
  ims:created="2012-09-13T18:41:29.831+02:00"
  ims:last-modified="2012-09-13T18:41:29.831+02:00">
  <ims:owner>
    <ims:identifier="user-1"
     ims:namespace="http://ims.dei.unipd.it/" />
  </ims:owner>
  <ims:sharings>
    <ims:sharing>
     <ims:sharer-id>
      <ims:ns/>
    </ims:sharing>
  </ims:sharings>
</ims:system>
```

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

```json
{
  "direct": {
    "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"
  }
}```
"system":{
  "identifier":"sys-1",
  "created":"2012-09-13T18:41:29.831+02:00",
  "last-modified":"2012-09-13T18:41:29.831+02:00",
  "name":"Name of sys-1",
  "description":"Description of sys-1",
  "scope":"SHARED",
  "owner":{
    "identifier":"user-1",
    "namespace":"http://ims.dei.unipd.it/
  }
},
"sharings":[
  
  "sharing":{
    "group":{
      "identifier":"group-1",
      "namespace":"http://ims.dei.unipd.it/
    },
    "access-permission":"DENIED"
  }
],
  "sharing":{
    "group":{
      "identifier":"group-2",
      "namespace":"http://ims.dei.unipd.it/
    },
    "access-permission":"READ_ONLY"
  },
  "sharing":{
    "group":{
      "identifier":"group-3",
      "namespace":"http://ims.dei.unipd.it/
    },
    "access-permission":"READ_WRITE"
  }
],
"links":[
  
  "link":{
    "metadata":{
      "identifier":"md-1",
      "namespace":"http://ims.dei.unipd.it/
    },
    "relation":{
      "concept":{
        "identifier":"isPartOf",
        "namespace":"http://ims.dei.unipd.it/
      }
    },
    "system":{
      "identifier":"sys-1"
    }
  }
}
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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_TASK</td>
<td>POST</td>
<td>/task</td>
</tr>
<tr>
<td>READ_TASK</td>
<td>GET</td>
<td>/task/{id}</td>
</tr>
<tr>
<td>UPDATE_TASK</td>
<td>PUT</td>
<td>/task/{id}</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>DELETE_TASK</td>
<td>DELETE</td>
<td>/task/{id}</td>
</tr>
<tr>
<td>LIST_TASKS</td>
<td>GET</td>
<td>/task</td>
</tr>
<tr>
<td>LIST_TASK_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/task/{id}/provenance</td>
</tr>
<tr>
<td>ADD_CONTRIBUTION_TO_TASK</td>
<td>POST</td>
<td>/task/{id}/contribution/{id}</td>
</tr>
<tr>
<td>REMOVE_CONTRIBUTION_FROM_TASK</td>
<td>DELETE</td>
<td>/task/{id}/contribution/{id}</td>
</tr>
<tr>
<td>LIST_CONTRIBUTION_FROM_TASK</td>
<td>GET</td>
<td>/task/{id}/contribution</td>
</tr>
<tr>
<td>ADD_ESTIMATE_TO_TASK</td>
<td>POST</td>
<td>/task/{id}/estimate/{id}</td>
</tr>
<tr>
<td>REMOVE_ESTIMATE_FROM_TASK</td>
<td>DELETE</td>
<td>/task/{id}/estimate/{id}</td>
</tr>
<tr>
<td>LIST_ESTIMATE_FROM_TASK</td>
<td>GET</td>
<td>/task/{id}/estimate</td>
</tr>
<tr>
<td>ADD_MEASURE_TO_TASK</td>
<td>POST</td>
<td>/task/{id}/measure/{id}</td>
</tr>
<tr>
<td>REMOVE_MEASURE_FROM_TASK</td>
<td>DELETE</td>
<td>/task/{id}/measure/{id}</td>
</tr>
<tr>
<td>LIST_MEASURE_FROM_TASK</td>
<td>GET</td>
<td>/task/{id}/measure</td>
</tr>
<tr>
<td>ADD_RUN_TO_TASK</td>
<td>POST</td>
<td>/task/{id}/run/{id}</td>
</tr>
<tr>
<td>REMOVE_RUN_FROM_TASK</td>
<td>DELETE</td>
<td>/task/{id}/run/{id}</td>
</tr>
<tr>
<td>LIST_RUN_FROM_TASK</td>
<td>GET</td>
<td>/task/{id}/run</td>
</tr>
<tr>
<td>ADD_STATISTICAL_TEST_TO_TASK</td>
<td>POST</td>
<td>/task/{id}/statistical-test/{id}</td>
</tr>
<tr>
<td>REMOVE_STATISTICAL_TEST_FROM_TASK</td>
<td>DELETE</td>
<td>/task/{id}/statistical-test/{id}</td>
</tr>
<tr>
<td>LIST_STATISTICAL_TEST_FROM_TASK</td>
<td>GET</td>
<td>/task/{id}/statistical-test</td>
</tr>
<tr>
<td>ADD_TOPIC_FIELD_TO_TASK</td>
<td>POST</td>
<td>/task/{id}/topic-field/{id};{ns}</td>
</tr>
<tr>
<td>REMOVE_TOPIC_FIELD_FROM_TASK</td>
<td>DELETE</td>
<td>/task/{id}/topic-field/{id};{ns}</td>
</tr>
<tr>
<td>LIST_TOPIC_FIELD_FROM_TASK</td>
<td>GET</td>
<td>/task/{id}/topic-field</td>
</tr>
</tbody>
</table>
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.

7.3.7.2 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:task
        ims:identifier="tsk-1"
        ims:created="2012-09-13T18:46:19.914+02:00"
        ims:last-modified="2012-09-13T18:46:19.915+02:00"
        ims:description="Description of task, e.g. diversity task"
        ims:maximum-experiments-allowed="100"
        ims:scope="SHARED">
        <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>
    </ims:task>
</ims:direct>
```
7.37.3 JSON Representation

```json
{
  "direct":{
    "task":{
      "identifier":"tsk-1",
      "created":"2012-09-13T18:46:19.914+02:00",
      "last-modified":"2012-09-13T18:46:19.915+02:00",
      "description":"Description of task, e.g. diversity task",
      "maximum-experiments-allowed":"100",
      "scope":"SHARED",
      "owner":{
        "identifier":"user-1",
        "namespace":"http://ims.dei.unipd.it/
      }
    }
  }
}
```


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
7.38 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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_TOPIC_GROUP</td>
<td>POST</td>
<td>/topic-group</td>
</tr>
<tr>
<td>READ_TOPIC_GROUP</td>
<td>GET</td>
<td>/topic-group/{id}</td>
</tr>
<tr>
<td>UPDATE_TOPIC_GROUP</td>
<td>PUT</td>
<td>/topic-group/{id}</td>
</tr>
<tr>
<td>DELETE_TOPIC_GROUP</td>
<td>DELETE</td>
<td>/topic-group/{id}</td>
</tr>
<tr>
<td>LIST_TOPIC_GROUPS</td>
<td>GET</td>
<td>/topic-group</td>
</tr>
<tr>
<td>LIST_TOPIC_GROUP_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/topic-group/{id}/provenance</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>ADD_CONTRIBUTION_TO_TOPIC_GROUP</td>
<td>POST</td>
<td>/topic-group/{id}/contribution/{id}</td>
</tr>
<tr>
<td>REMOVE_CONTRIBUTION_FROM_TOPIC_GROUP</td>
<td>DELETE</td>
<td>/topic-group/{id}/contribution/{id}</td>
</tr>
<tr>
<td>LIST_CONTRIBUTION_FROM_TOPIC_GROUP</td>
<td>GET</td>
<td>/topic-group/{id}/contribution</td>
</tr>
<tr>
<td>ADD_TOPIC_TO_TOPIC_GROUP</td>
<td>POST</td>
<td>/topic-group/{id}/topic/{id}</td>
</tr>
<tr>
<td>REMOVE_TOPIC_FROM_TOPIC_GROUP</td>
<td>DELETE</td>
<td>/topic-group/{id}/topic/{id}</td>
</tr>
<tr>
<td>LIST_TOPIC_FROM_TOPIC_GROUP</td>
<td>GET</td>
<td>/topic-group/{id}/topic</td>
</tr>
<tr>
<td>SHARE_TOPIC_GROUP</td>
<td>GET, POST,</td>
<td>/topic-group/{id}/share/{sharer-id};</td>
</tr>
<tr>
<td></td>
<td>PUT</td>
<td>{sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_TOPIC_GROUP</td>
<td>DELETE</td>
<td>/topic-group/{id}/share/{sharer-id};</td>
</tr>
<tr>
<td></td>
<td></td>
<td>{sharer-ns}</td>
</tr>
</tbody>
</table>

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. ```
   <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:topic-group
   ims:identifier="tg-1"
   ims:description="description of topic group 1"
   ims:scope="SHARED"
   ims:created="2012-09-13T18:47:21.387+02:00"
   ims:last-modified="2012-09-13T18:47:21.387+02:00">
   <ims:owner>
   <ims:identifier="user-1"
   ims:namespace="http://ims.dei.unipd.it/"/>
   </ims:owner>
   <ims:sharings>
   </ims:sharings>
   </ims:topic-group>
   </ims:direct>
```
7.38.3 JSON Representation

```json
{
  "direct":{
    "topic-group":{
      "identifier":"tg-1",
      "created":"2012-09-13T18:47:21.387+02:00",
      "last-modified":"2012-09-13T18:47:21.387+02:00",
      "description":"description of topic group 1",
      "scope":"SHARED",
      "owner":{
        "user":{
          "identifier":"user-1",
          "namespace":"http://ims.dei.unipd.it/
        }
      }
    }
  },
  "sharing":{
    "sharing":{
      "group":{
        "identifier":"group-1",
        "namespace":"http://ims.dei.unipd.it/
      },
      "access-permission":"DENIED"
    }
  },
  "sharing":{
    "sharing":{
      "group":{
        "identifier":"group-2",
        "namespace":"http://ims.dei.unipd.it/
      },
      "access-permission":"READ_ONLY"
    }
  },
  "sharing":{
    "sharing":{
      "group":{
        "identifier":"group-3",
        "namespace":"http://ims.dei.unipd.it/
      },
      "access-permission":"READ_WRITE"
    }
  }
},
"links":{
  "link":{
    "metadata":{
      "identifier":"md-1",
      "namespace":"http://ims.dei.unipd.it/
    }
  },
  "relation":{
    "concept":{
      "identifier":"isDescriptionOf",
      "namespace":"http://ims.dei.unipd.it/
    }
  }
}
```
"topic-group":{
  "identifier":"tg-1"
}
},
"link":{
  "metadata":{
    "identifier":"md-2",
    "namespace":"http://ims.dei.unipd.it/"
  },
  "relation":{
    "concept":{
      "identifier":"isCopyrightOf",
      "namespace":"http://ims.dei.unipd.it/"
    }
  },
  "topic-group":{
    "identifier":"tg-1"
  }
}
},
"link":{
  "metadata":{
    "identifier":"md-3",
    "namespace":"http://ims.dei.unipd.it/"
  },
  "relation":{
    "concept":{
      "identifier":"isAdministrationOf",
      "namespace":"http://ims.dei.unipd.it/"
    }
  },
  "topic-group":{
    "identifier":"tg-1"
  }
}
},
"topics":[
  "topic":{
    "identifier":"t1"
  },
  "topic":{
    "identifier":"t2"
  },
  "topic":{
    "identifier":"t3"
  },
  "topic":{
    "identifier":"t4"
  }
]
7.39 Topic Resource

Represents the materialization of an information need.

7.39.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_TOPIC</td>
<td>POST</td>
<td>/topic</td>
</tr>
<tr>
<td>READ_TOPIC</td>
<td>GET</td>
<td>/topic/{id}</td>
</tr>
<tr>
<td>UPDATE_TOPIC</td>
<td>PUT</td>
<td>/topic/{id}</td>
</tr>
<tr>
<td>DELETE_TOPIC</td>
<td>DELETE</td>
<td>/topic/{id}</td>
</tr>
<tr>
<td>LIST_TOPICS</td>
<td>GET</td>
<td>/topic</td>
</tr>
<tr>
<td>LIST_TOPIC_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/topic/{id}/provenance</td>
</tr>
<tr>
<td>ADD_TOPIC_FIELD_TO_TOPIC</td>
<td>POST</td>
<td>/topic/{id}/topic-field</td>
</tr>
<tr>
<td>UPDATE_TOPIC_FIELD_FROM_TOPIC</td>
<td>PUT</td>
<td>/topic/{id}/topic-field/{id};{ns}</td>
</tr>
<tr>
<td>DELETE_TOPIC_FIELD_FROM_TOPIC</td>
<td>DELETE</td>
<td>/topic/{id}/topic-field/{id};{ns}</td>
</tr>
<tr>
<td>READ_TOPIC_FIELD_FROM_TOPIC</td>
<td>GET</td>
<td>/topic/{id}/topic-field/{id};{ns}</td>
</tr>
</tbody>
</table>

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

```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:topic
```
7.39.3 JSON Representation

```json
{
  "direct":{
    "topic":{
      "identifier":"tpc-1",
      "created":"2012-09-13T18:48:25.056+02:00",
      "last-modified":"2012-09-13T18:48:25.056+02:00",
      "topic-fields":{
        "topic-field":{
          "concept":{
            "identifier":"isFieldOf",
            "namespace":"http://ims.dei.unipd.it/"
          },
          "topic-field-contents":{
            "topic-field-content":{
              "media-type":"application/json",
              "language":"abk"
            }
          }
        }
      }
    }
  }
}
```
7.40 Track Resource

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

7.40.1 API

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_TRACK</td>
<td>POST</td>
<td>/track</td>
</tr>
<tr>
<td>READ_TRACK</td>
<td>GET</td>
<td>/track/{id}</td>
</tr>
<tr>
<td>UPDATE_TRACK</td>
<td>PUT</td>
<td>/track/{id}</td>
</tr>
<tr>
<td>DELETE_TRACK</td>
<td>DELETE</td>
<td>/track/{id}</td>
</tr>
<tr>
<td>LIST_TRACKS</td>
<td>GET</td>
<td>/track</td>
</tr>
</tbody>
</table>
Table 76: API for accessing the track resource.

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST_TRACK_PROVENANCE_EVENTS</td>
<td>GET</td>
<td>/track/{id}/provenance</td>
</tr>
<tr>
<td>ADD_TASK_TO_TRACK</td>
<td>POST</td>
<td>/track/{id}/task/{id}</td>
</tr>
<tr>
<td>UPDATE_TASK_OF_TRACK</td>
<td>PUT</td>
<td>/track/{id}/task/{id}</td>
</tr>
<tr>
<td>REMOVE_TASK_FROM_TRACK</td>
<td>PUT</td>
<td>/track/{id}/task/{id}</td>
</tr>
<tr>
<td>LIST_TASK_FROM_TRACK</td>
<td>GET</td>
<td>/track/{id}/task</td>
</tr>
<tr>
<td>SHARE_TRACK</td>
<td>GET, POST, PUT</td>
<td>/track/{id}/share/{sharer-id};{sharer-ns}/permission/{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_TRACK</td>
<td>DELETE</td>
<td>/track/{id}/share/{sharer-id};{sharer-ns}</td>
</tr>
</tbody>
</table>

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

```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:track>
  <ims:identifier>trk-1</ims:identifier>
  <ims:created>2012-09-13T8:49:42.367+02:00</ims:created>
  <ims:last-modified>2012-09-13T8:49:42.367+02:00</ims:last-modified>
  <ims:description>Description of track, e.g. CLEF 2012 Ad-Hoc Track</ims:description>
  <ims:scope>SHARED</ims:scope>
  <ims:owner>
    <ims:identifier>user-1</ims:identifier>
    <ims:namespace(http://ims.dei.unipd.it/) />
  </ims:owner>
  <ims:sharing>
    <ims:group>
      <ims:identifier>group-1</ims:identifier>
      <ims:namespace(http://ims.dei.unipd.it/) />
    </ims:group>
    <ims:access-permission>DENIED</ims:access-permission>
  </ims:sharing>
</ims:track>
```
7.40.3 JSON Representation

```json
{
  "direct":{
    "track":{
      "metadata":{
        "identifier":"md-1",
        "namespace":"http://ims.dei.unipd.it/"
      },
      "relation":{
        "concept":{
          "identifier":"isDescriptionOf",
          "namespace":"http://ims.dei.unipd.it/"
        }
      },
      "track":{
        "identifier":"trk-1"
      }
    },
    "link":{
      "metadata":{
        "identifier":"md-2",
        "namespace":"http://ims.dei.unipd.it/"
      },
      "relation":{
        "concept":{
          "identifier":"isCopyrightOf",
          "namespace":"http://ims.dei.unipd.it/"
        }
      },
      "track":{
        "identifier":"trk-1"
      }
    },
    "link":{
      "metadata":{
        "identifier":"md-3",
        "namespace":"http://ims.dei.unipd.it/"
      },
      "relation":{
        "concept":{
          "identifier":"isAdministrationOf",
          "namespace":"http://ims.dei.unipd.it/"
        }
      },
      "track":{
        "identifier":"trk-1"
      }
    }
  }
  "links":{
    "campaign":{
      "identifier":"ea-1",
      "namespace":"http://ims.dei.unipd.it/"
    }
  }
}
```
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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE_VISUALIZATION</td>
<td>POST</td>
<td>/visualization</td>
</tr>
<tr>
<td>READ_VISUALIZATION</td>
<td>GET</td>
<td>/visualization/{id}</td>
</tr>
<tr>
<td>UPDATE_VISUALIZATION</td>
<td>PUT</td>
<td>/visualization/{id}</td>
</tr>
<tr>
<td>DELETE_VISUALIZATION</td>
<td>DELETE</td>
<td>/visualization/{id}</td>
</tr>
<tr>
<td>Action</td>
<td>HTTP Method</td>
<td>URI</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>LIST_VISUALIZATIONS</td>
<td>GET</td>
<td>/visualization</td>
</tr>
<tr>
<td>LIST_VISUALIZATION_PROVENANCE_EVENTS</td>
<td>DELETE</td>
<td>/visualization/{id}/provenance</td>
</tr>
<tr>
<td>SHARE_VISUALIZATION</td>
<td>GET, POST,</td>
<td>/visualization/{id}/share/{sharer-id};</td>
</tr>
<tr>
<td></td>
<td>PUT</td>
<td>{sharer-ns}/permission/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>{access-permission}</td>
</tr>
<tr>
<td>UNSHARE_VISUALIZATION</td>
<td>DELETE</td>
<td>/visualization/{id}/share/{sharer-id};</td>
</tr>
<tr>
<td></td>
<td></td>
<td>{sharer-ns}</td>
</tr>
<tr>
<td>ADD_SNAPSHOT_TO_VISUALIZATION</td>
<td>POST</td>
<td>/visualization/{id}/snapshot/{id}</td>
</tr>
<tr>
<td>UPDATE_SNAPSHOT_OF_VISUALIZATION</td>
<td>PUT</td>
<td>/visualization/{id}/snapshot/{id}</td>
</tr>
<tr>
<td>REMOVE_SNAPSHOT_FROM_VISUALIZATION</td>
<td>DELETE</td>
<td>/visualization/{id}/snapshot/{id}</td>
</tr>
<tr>
<td>LIST_SNAPSHOT_FROM_VISUALIZATION</td>
<td>GET</td>
<td>/visualization/{id}/snapshot</td>
</tr>
</tbody>
</table>

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

```xml
<?xml version="1.0" encoding="utf-8"?>
  <ims:owner>
  </ims:owner>
  <ims:sharings>
    <ims:sharing>
      <ims:access-permission>DENIED</ims:access-permission>
    </ims:sharing>
    <ims:sharing>
      <ims:access-permission>READ_ONLY</ims:access-permission>
    </ims:sharing>
    <ims:sharing>
      <ims:access-permission>READ_WRITE</ims:access-permission>
    </ims:sharing>
  </ims:sharings>
</ims:visualization>
```
<ims:parameters>
  <ims:parameter>
    <ims:concept ims:identifier="parameterA" ims:namespace="http://direct.dei.unipd.it/" />
    <ims:value>value 1</ims:value>
  </ims:parameter>
  <ims:parameter>
    <ims:concept ims:identifier="parameterB" ims:namespace="http://direct.dei.unipd.it/" />
    <ims:value>value 2</ims:value>
  </ims:parameter>
  <ims:parameter>
    <ims:concept ims:identifier="parameterC" ims:namespace="http://direct.dei.unipd.it/" />
    <ims:value>value 3</ims:value>
  </ims:parameter>
</ims:parameters>

<ims:concept ims:identifier="type-1, e.g. Scatterplot" ims:namespace="http://ims.dei.unipd.it/" />

<ims:measures>
  <ims:measure ims:identifier="m-1">
    <ims:concept ims:identifier="precision" ims:namespace="http://ims.dei.unipd.it/" />
    <ims:value>4.0E-1</ims:value>
  </ims:measure>
  <ims:measure ims:identifier="m-2">
    <ims:concept ims:identifier="recall" ims:namespace="http://ims.dei.unipd.it/" />
    <ims:value>3.0E-1</ims:value>
  </ims:measure>
</ims:measures>

<ims:estimates>
  <ims:estimate ims:identifier="est-1" ims:value="0.0" />
  <ims:estimate ims:identifier="est-2" ims:value="0.0" />
  <ims:estimate ims:identifier="est-3" ims:value="0.0" />
</ims:estimates>

<ims:visualizations>
  <ims:snapshot ims:identifier="snp-1" />
  <ims:snapshot ims:identifier="snp-2" />
  <ims:snapshot ims:identifier="snp-3" />
</ims:snapshots>

<ims:experiments>
  <ims:experiment ims:identifier="exp-1" />
  <ims:experiment ims:identifier="exp-2" />
  <ims:experiment ims:identifier="exp-3" />
</ims:experiments>

<ims:ground-truths>
  <ims:ground-truth ims:identifier="gt-1" />
  <ims:ground-truth ims:identifier="gt-2" />
  <ims:ground-truth ims:identifier="gt-3" />
</ims:ground-truths>

<ims:tasks>
  <ims:task ims:identifier="tsk-1" />
  <ims:task ims:identifier="tsk-2" />
  <ims:task ims:identifier="tsk-3" />
</ims:tasks>

<ims:statistical-tests>
  <ims:statistical-test ims:identifier="st-1" />
  <ims:statistical-test ims:identifier="st-2" />
  <ims:statistical-test ims:identifier="st-3" />
</ims:statistical-tests>
</ims:visualization>

7.41.3 JSON Representation
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{
" direct " :{
" visualization " :{
" identifier " : "v -1 " ,
" created " : " 2012 -09 -13 T18 : 5 0 : 4 5 . 5 3 1 + 0 2 : 0 0 " ,
" last - modified " : " 2012 -09 -13 T18 : 5 0 : 4 5 . 5 3 1 + 0 2 : 0 0 " ,
" parameters " :[
{
" parameter " :{
" concept " :{
" identifier " : " parameterA " ,
" namespace " : " http :// direct . dei . unipd . it / "
},
" value " : " value 1 "
}
},
{
" parameter " :{
" concept " :{
" identifier " : " parameterB " ,
" namespace " : " http :// direct . dei . unipd . it / "
},
" value " : " value 2 "
}
},
{
" parameter " :{
" concept " :{
" identifier " : " parameterC " ,
" namespace " : " http :// direct . dei . unipd . it / "
},
" value " : " value 3 "
}
}
],
" concept " :{
" identifier " : " type -1 , e . g . Scatterplot " ,
" namespace " : " http :// ims . dei . unipd . it / "
},
" measures " :[
{
" measure " :{
" identifier " : " meas -1 "
}
},
{
" measure " :{
" identifier " : " meas -2 "
}
},
{
" measure " :{
" identifier " : " meas -3 "
}
}
],
" estimates " :[
{
" estimate " :{
" identifier " : " est -1 "

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D3.3: Prototype of the Evaluation Infrastructure

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D3.3: Prototype of the Evaluation Infrastructure

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"identifier": "gt-3"
},
"
tasks": [
    "task": {
      "identifier": "tsk-1"
    },
    "task": {
      "identifier": "tsk-2"
    },
    "task": {
      "identifier": "tsk-3"
    }
],
"
statistical-tests": [
    "statistical-test": {
      "identifier": "st-1"
    },
    "statistical-test": {
      "identifier": "st-2"
    },
    "statistical-test": {
      "identifier": "st-3"
    }
]
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

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ici.logEvent.</td>
<td>ici.le.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;,</td>
<td>No</td>
<td>Matches log events with respect to their identifier (a positive integer)</td>
</tr>
<tr>
<td>identifier</td>
<td></td>
<td></td>
<td>&gt;, &lt;, &gt;=,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.logEvent.</td>
<td>ici.le.level</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;,</td>
<td>No</td>
<td>Matches metadata sets with respect to their level, which is defined as the following enumeration: TRACE, DEBUG, INFO, WARN, ERROR, FATAL</td>
</tr>
<tr>
<td>level</td>
<td></td>
<td></td>
<td>&gt;, &lt;, &gt;=,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.logEvent.</td>
<td>ici.le. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;,</td>
<td>No</td>
<td>Matches log events with respect to their creation timestamp</td>
</tr>
<tr>
<td>created</td>
<td></td>
<td></td>
<td>&gt;, &lt;, &gt;=,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.logEvent.</td>
<td>ici.le. thread</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches log events with respect to the thread generating them</td>
</tr>
<tr>
<td>thread</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.logEvent.</td>
<td>ici.le. clsName</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches log events with respect to the name of the class generating them</td>
</tr>
<tr>
<td>className</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.logEvent.</td>
<td>ici.le. clsFileName</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches log events with respect to the name of the file of the class generating them</td>
</tr>
<tr>
<td>classFileName</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------</td>
<td>--------------------</td>
<td>--------------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.logEvent. classLine</td>
<td>ici.le. clsLine</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches log events with respect to the line of the file of the class generating them (a positive integer)</td>
</tr>
<tr>
<td>ici.logEvent. methodName</td>
<td>ici.le. methodName</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches log events with respect to the name of the method generating them</td>
</tr>
<tr>
<td>ici.logEvent. ip</td>
<td>ici.le.ip</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches log events with respect to IP address of the client generating them</td>
</tr>
<tr>
<td>ici.logEvent. user.identifier</td>
<td>ici.le.u.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches log events with respect to the identifier of the user generating them</td>
</tr>
<tr>
<td>ici.logEvent. user.namespace. identifier</td>
<td>ici.le.u.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches log events with respect to the identifier of the namespace of the user generating them</td>
</tr>
<tr>
<td>ici.logEvent. action</td>
<td>ici.le. action</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches log events with respect to the action generating them</td>
</tr>
<tr>
<td>ici.logEvent. resource. identifier</td>
<td>ici.le.r.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches log events with respect to the identifier of the resource involved by them</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-----------</td>
<td>--------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.logEvent. resource. namespace. identifier</td>
<td>ici.le.r.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches log events with respect to the identifier of the namespace of the resource involved by them</td>
</tr>
<tr>
<td>ici.logEvent. resource.class</td>
<td>ici.le.r.cls</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches log events with respect to the class of the resource involved by them</td>
</tr>
<tr>
<td>ici.logEvent. message</td>
<td>ici.le.msg</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td></td>
<td>Matches log events with respect to their message</td>
</tr>
<tr>
<td>ici.logEvent. exception</td>
<td>ici.le.ex</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td></td>
<td>Matches log events with respect to the exception described in them</td>
</tr>
<tr>
<td>ici.logEvent. general</td>
<td>ici.le.gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td></td>
<td>Matches log events with respect to the content of all their attributes</td>
</tr>
</tbody>
</table>

Table 78: Indexes for searching the log event resource.

### 8.1.2 Namespace Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ici.namespace. identifier</td>
<td>ici.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches namespaces with respect to their identifier</td>
</tr>
<tr>
<td>ici.namespace. prefix</td>
<td>ici.ns. prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches namespaces with respect to their prefix</td>
</tr>
</tbody>
</table>
### Indexes for searching the namespace resource.

#### 8.1.3 Concept Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ici.concept. identifier</td>
<td>ici.c.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches concepts with respect to their identifier</td>
</tr>
<tr>
<td>ici.concept. namespace. identifier</td>
<td>ici.c.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches concepts with respect to the identifier of their namespace</td>
</tr>
<tr>
<td>ici.concept. namespace. prefix</td>
<td>ici.c.ns. prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches concepts with respect to the prefix of their namespace</td>
</tr>
<tr>
<td>ici.concept. description</td>
<td>ici.c.desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches concepts with respect to their description</td>
</tr>
<tr>
<td>ici.concept. general</td>
<td>ici.c.gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches concepts with respect to the content of all their attributes</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td>------------</td>
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<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.concept.created</td>
<td>ici.c.created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches concepts with respect to their creation timestamp</td>
</tr>
<tr>
<td>ici.concept.lastModified</td>
<td>ici.c.lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches concepts with respect to their last modification timestamp</td>
</tr>
<tr>
<td>concept.source.identifier</td>
<td>ici.c.s.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>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</td>
</tr>
<tr>
<td>ici.concept.source.namespace.identifier</td>
<td>ici.c.s.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>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</td>
</tr>
<tr>
<td>ici.concept.source.namespace.prefix</td>
<td>ici.c.s.ns.prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>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</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
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<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.concept.</td>
<td>c.s.r.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>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</td>
</tr>
<tr>
<td>source.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>relation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>identifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.concept.</td>
<td>c.s.r.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>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</td>
</tr>
<tr>
<td>source.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>relation.</td>
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<td></td>
</tr>
<tr>
<td>namespace.</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>identifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.concept.</td>
<td>c.s.r.ns.</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>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</td>
</tr>
<tr>
<td>source.</td>
<td>prefix</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>relation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>namespace.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>prefix</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>-----------</td>
<td>-----------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.concept. target. namespace. id</td>
<td>ici.c.s.ns. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>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.</td>
</tr>
<tr>
<td>ici.concept. target. namespace. prefix</td>
<td>ici.c.s.ns. prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>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.</td>
</tr>
<tr>
<td>ici.concept. target. relation. id</td>
<td>c.s.r.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>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.</td>
</tr>
</tbody>
</table>

Table 80: Indexes for searching the concept resource.

8.1.4 Group Indexes

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

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ici.role.identifier</td>
<td>ici.r.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches roles with respect to their identifier</td>
</tr>
<tr>
<td>ici.role.namespace.identifier</td>
<td>ici.r.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches roles with respect to the identifier of their namespace</td>
</tr>
<tr>
<td>ici.role.namespace.prefix</td>
<td>ici.r.ns.prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches roles with respect to the prefix of their namespace</td>
</tr>
<tr>
<td>ici.role.description</td>
<td>ici.r.desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches roles with respect to their description</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------</td>
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<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.role.</td>
<td>ici.r.gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches roles with respect to the content of all their attributes</td>
</tr>
<tr>
<td>general</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.role.user.</td>
<td>ici.r.u.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches roles with respect to the identifier of the users belonging to them</td>
</tr>
<tr>
<td>identifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.role.user.</td>
<td>ici.r.u.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches roles with respect to the identifier of the namespace of the users belonging to them</td>
</tr>
<tr>
<td>namespace.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>identifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.role.user.</td>
<td>ici.r.u.ns.prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches roles with respect to the prefix of the namespace of the users belonging to them</td>
</tr>
<tr>
<td>namespace.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>identifier</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.role.</td>
<td>ici.r.created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches roles with respect to their creation timestamp</td>
</tr>
<tr>
<td>created</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.role.</td>
<td>ici.r.lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches roles with respect to their last modification timestamp</td>
</tr>
<tr>
<td>lastModified</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.role.user.</td>
<td>ici.r.u.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches roles with respect to the identifier of the users belonging to them</td>
</tr>
<tr>
<td>identifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.role.user.</td>
<td>ici.r.u.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches roles with respect to the identifier of the namespace of the users belonging to them</td>
</tr>
<tr>
<td>namespace.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>identifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------</td>
<td>------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.role.user.namespace.prefix</td>
<td>ici.r.u.ns.p</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches roles with respect to the prefix of the namespace of the users belonging to them</td>
</tr>
<tr>
<td></td>
<td>prefix</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ici.u.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their identifier</td>
</tr>
<tr>
<td></td>
<td>ici.u.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to the identifier of their namespace</td>
</tr>
<tr>
<td></td>
<td>ici.u.ns.p</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to the prefix of their namespace</td>
</tr>
<tr>
<td></td>
<td>lastName</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their last/family name</td>
</tr>
<tr>
<td></td>
<td>firstName</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their first name</td>
</tr>
<tr>
<td></td>
<td>affiliation</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td></td>
<td>Matches users with respect to their affiliation</td>
</tr>
<tr>
<td></td>
<td>email</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their email address</td>
</tr>
</tbody>
</table>

Table 82: Indexes for searching the role resource.

8.1.6 User Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ici.user.identifier</td>
<td>ici.u.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their identifier</td>
</tr>
<tr>
<td></td>
<td>ici.u.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to the identifier of their namespace</td>
</tr>
<tr>
<td></td>
<td>ici.u.ns.p</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to the prefix of their namespace</td>
</tr>
<tr>
<td></td>
<td>lastName</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their last/family name</td>
</tr>
<tr>
<td></td>
<td>firstName</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their first name</td>
</tr>
<tr>
<td></td>
<td>affiliation</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td></td>
<td>Matches users with respect to their affiliation</td>
</tr>
<tr>
<td></td>
<td>email</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their email address</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.user.country</td>
<td>ici.u.</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their country expressed using ISO 3166-1:2006 three letters codes</td>
</tr>
<tr>
<td></td>
<td>country</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.user.language</td>
<td>ici.u.lang</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their language expressed using ISO 639-2:1998 three letters codes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.user.birthDate</td>
<td>ici.u.</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>No</td>
<td>Matches users with respect to their birth date</td>
</tr>
<tr>
<td></td>
<td>birthDate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.user.gender</td>
<td>ici.u.gender</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches users with respect to their gender (MALE or FEMALE).</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>ici.user.address</td>
<td>ici.u.</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches users with respect to their address</td>
</tr>
<tr>
<td></td>
<td>address</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.user.city</td>
<td>ici.u.city</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their city</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>ici.user.state</td>
<td>ici.u.state</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their state/province/region</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ici.user.zip</td>
<td>ici.u.zip</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their ZIP code</td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>ici.user.phone</td>
<td>ici.u.phone</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their telephone number</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
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<td>-----------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.user.facsimile</td>
<td>ici.u.facsimile</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their facsimile number</td>
</tr>
<tr>
<td>ici.user.mobile</td>
<td>ici.u.mobile</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their mobile telephone number</td>
</tr>
<tr>
<td>ici.user.voipCallerId</td>
<td>ici.u.voip</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their VoIP caller identifier</td>
</tr>
<tr>
<td>ici.user.homepage</td>
<td>ici.u.homepage</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to their home page address.</td>
</tr>
<tr>
<td>ici.user.general</td>
<td>ici.u.gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches users with respect to the content of all their attributes</td>
</tr>
<tr>
<td>ici.user.group.identifier</td>
<td>ici.u.g.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to the identifier of the groups they belong to</td>
</tr>
<tr>
<td>ici.user.group.namespace.identifier</td>
<td>ici.u.g.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to the identifier of the namespace of the groups they belong to</td>
</tr>
<tr>
<td>ici.user.group.namespace.prefix</td>
<td>ici.u.g.ns.prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to the prefix of the namespace of the groups they belong to</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>------------------</td>
<td>---------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.user.role.identifier</td>
<td>ici.u.r.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to the identifier of the roles they belong to</td>
</tr>
<tr>
<td>ici.user.role.namespace.identifier</td>
<td>ici.u.r.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to the identifier of the namespace of the roles they belong to</td>
</tr>
<tr>
<td>ici.user.role.namespace.prefix</td>
<td>ici.u.r.ns.prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches users with respect to the prefix of the namespace of the roles they belong to</td>
</tr>
<tr>
<td>ici.user.created</td>
<td>ici.u.created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches users with respect to their creation timestamp</td>
</tr>
<tr>
<td>ici.user.lastModified</td>
<td>ici.u.lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches users with respect to their last modification timestamp</td>
</tr>
</tbody>
</table>

Table 83: Indexes for searching the user resource.

### 8.1.7 Metadata Set Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ici.metadataSet.identifier</td>
<td>ici.ms.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to their identifier</td>
</tr>
<tr>
<td>ici.metadataSet.namespace.identifier</td>
<td>ici.ms.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to the identifier of their namespace</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
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<td>-------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>metadataSet.</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>namespace.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>prefix</td>
<td></td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to the prefix of their namespace</td>
</tr>
<tr>
<td>iici.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>metadataSet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>name</td>
<td></td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to their name</td>
</tr>
<tr>
<td>iici.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>metadataSet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>description</td>
<td></td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches metadata sets with respect to their description</td>
</tr>
<tr>
<td>iici.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>metadataSet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>general</td>
<td></td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches metadata sets with respect to the content of all their attributes</td>
</tr>
<tr>
<td>iici.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>metadataSet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>superset.</td>
<td></td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to the identifier of the supersets they belong to</td>
</tr>
<tr>
<td>identifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iici.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>metadataSet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>superset.</td>
<td></td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to the identifier of the supersets they belong to</td>
</tr>
<tr>
<td>name</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iici.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>metadataSet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>superset.</td>
<td></td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to the identifier of the supersets they belong to</td>
</tr>
<tr>
<td>namespace.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iici.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>metadataSet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>superset.</td>
<td></td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to the prefix of the namespace of the supersets they belong to</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>------------------</td>
<td>-----------------------</td>
<td>---------------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici. metadataSet. subset. identifier</td>
<td>ici.ms. subset.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to the identifier of the subsets belonging to them</td>
</tr>
<tr>
<td>ici. metadataSet. subset. name</td>
<td>ici.ms. subset.name</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to the identifier of the subsets belonging to them</td>
</tr>
<tr>
<td>ici. metadataSet. subset. namespace. identifier</td>
<td>ici.ms. subset.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to the identifier of the namespace of the subsets belonging to them</td>
</tr>
<tr>
<td>ici. metadataSet. subset. namespace. prefix</td>
<td>ici.ms. subset.ns.prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata sets with respect to the prefix of the namespace of the subsets belonging to them</td>
</tr>
<tr>
<td>ici. metadataSet. created</td>
<td>ici.ms. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches metadata sets with respect to their creation timestamp</td>
</tr>
<tr>
<td>ici. metadataSet. lastModified</td>
<td>ici.ms. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches metadata sets with respect to their last modification timestamp</td>
</tr>
</tbody>
</table>

Table 84: Indexes for searching the metadata set resource.

8.1.8 Metadata Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ici. metadata. identifier</td>
<td>ici.md.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata with respect to their identifier</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>-----------</td>
<td>-----------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.metadata.namespace.identifier</td>
<td>ici.md.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata with respect to the identifier of their namespace</td>
</tr>
<tr>
<td>ici.metadata.namespace.prefix</td>
<td>ici.md.ns.prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata with respect to the prefix of their namespace</td>
</tr>
<tr>
<td>ici.metadata.general</td>
<td>ici.md.gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches metadata with respect to their textual content</td>
</tr>
<tr>
<td>ici.metadata.metadataSet.identifier</td>
<td>ici.md.ms.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata with respect to the identifier of the metadata sets they belong to</td>
</tr>
<tr>
<td>ici.metadata.metadataSet.name</td>
<td>ici.md.ms.name</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata with respect to the name of the metadata sets they belong to</td>
</tr>
<tr>
<td>ici.metadata.metadataSet.namespace.identifier</td>
<td>ici.md.ms.ns.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata with respect to the identifier of the namespace of the metadata sets they belong to</td>
</tr>
<tr>
<td>ici.metadata.metadataSet.namespace.prefix</td>
<td>ici.md.ms.ns.prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches metadata with respect to the prefix of the namespace of the metadata sets they belong to</td>
</tr>
<tr>
<td>ici.metadata.created</td>
<td>ici.md.created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches metadata with respect to their creation timestamp</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>-----------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ici.metadata.</td>
<td>ici.md.</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;,</td>
<td>No</td>
<td>Matches metadata with respect to their last modification timestamp</td>
</tr>
<tr>
<td>lastModified</td>
<td>lastModified</td>
<td></td>
<td>&gt;, &lt;, &gt;=, &lt;=</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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].

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dc.contributor</td>
<td>dc. contributor</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their contributor element</td>
</tr>
<tr>
<td>dc.coverage</td>
<td>dc.coverage</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their coverage element</td>
</tr>
<tr>
<td>dc.creator</td>
<td>dc.creator</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their creator element</td>
</tr>
<tr>
<td>dc.date</td>
<td>dc.date</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their date element</td>
</tr>
<tr>
<td>dc.description</td>
<td>dc. description</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their description element</td>
</tr>
<tr>
<td>dc.format</td>
<td>dc.format</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their format element</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>--------------</td>
<td>------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>dc.identifier</td>
<td>dc. identifier</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their identifier element</td>
</tr>
<tr>
<td>dc.language</td>
<td>dc.language</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their language element</td>
</tr>
<tr>
<td>dc.publisher</td>
<td>dc.publisher</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their publisher element</td>
</tr>
<tr>
<td>dc.relation</td>
<td>dc.relation</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their relation element</td>
</tr>
<tr>
<td>dc.rights</td>
<td>dc.rights</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their rights element</td>
</tr>
<tr>
<td>dc.source</td>
<td>dc.source</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their source element</td>
</tr>
<tr>
<td>dc.subject</td>
<td>dc.subject</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their subject element</td>
</tr>
<tr>
<td>dc.title</td>
<td>dc.title</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Dublin Core metadata with respect to their title element</td>
</tr>
</tbody>
</table>
Table 86: Indexes for searching the metadata resource according to the Dublin Core context set.

8.1.9 Application Indexes

Table 87: Indexes for searching the application resource.
### 8.1.10 Component Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct. components. identifier</td>
<td>direct.cmp. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches components with respect to their identifier</td>
</tr>
<tr>
<td>direct. components. description</td>
<td>direct.cmp. desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches components with respect to their description</td>
</tr>
<tr>
<td>direct. components. name</td>
<td>direct.cmp. name</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches components with respect to their name</td>
</tr>
<tr>
<td>direct. components. general</td>
<td>direct.cmp. gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches components with respect to the content of all their attributes</td>
</tr>
<tr>
<td>direct. components. created</td>
<td>direct.cmp. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches components with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct. components. lastModified</td>
<td>direct.cmp. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches components with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct. components. configuration. identifier</td>
<td>direct.cmp. conf.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches components with respect to the identifier of the configuration which they use.</td>
</tr>
<tr>
<td>ici.components. namespace. identifier</td>
<td>ici.cmp.ns. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches components with respect to the identifier of their namespace</td>
</tr>
<tr>
<td>ici.components. namespace. prefix</td>
<td>ici.cmp.ns. prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches components with respect to the prefix of their namespace</td>
</tr>
</tbody>
</table>

Table 88: Indexes for searching the component resource.
### 8.1.11 Configuration Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct. configurations. identifier</td>
<td>direct.cnf. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches configurations with respect to their identifier</td>
</tr>
<tr>
<td>direct. configurations. description</td>
<td>direct.cnf. desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches configurations with respect to their description</td>
</tr>
<tr>
<td>direct. configurations. general</td>
<td>direct.cnf. gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches configurations with respect to the content of all their attributes</td>
</tr>
</tbody>
</table>

Table 89: Indexes for searching the configuration resource.

### 8.1.12 Contribution Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct. contributions. identifier</td>
<td>direct.cnt. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches contributions with respect to their identifier</td>
</tr>
<tr>
<td>direct. contributions. description</td>
<td>direct.cnt. desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches contributions with respect to their description</td>
</tr>
<tr>
<td>direct. contributions. title</td>
<td>direct.cnt. title</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches contributions with respect to their title</td>
</tr>
<tr>
<td>direct. contributions. content</td>
<td>direct.cnt. cont</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches contributions with respect to the content of all their attributes</td>
</tr>
<tr>
<td>direct. contributions. general</td>
<td>direct.cnt. gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches contributions with respect to the content of all their attributes</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>direct. contributions. created</td>
<td>direct.cnt. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches components with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct. contributions. lastModified</td>
<td>direct.cnt. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches components with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct. contributions. cntYear</td>
<td>direct.cnt. cntYear</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches contributions with respect to their year</td>
</tr>
<tr>
<td>direct. contributions. contributionType</td>
<td>direct.cnt. contributionType</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches contributions with respect to their type</td>
</tr>
</tbody>
</table>

Table 90: Indexes for searching the contribution resource.

### 8.1.13 Corpus Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.corpora. identifier</td>
<td>direct.crp. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches corpora with respect to their identifier</td>
</tr>
<tr>
<td>direct.corpora. description</td>
<td>direct.crp. desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches corpora with respect to their description</td>
</tr>
<tr>
<td>direct.corpora. general</td>
<td>direct.crp. gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches corpora with respect to the content of all their attributes</td>
</tr>
<tr>
<td>direct.corpora. created</td>
<td>direct.crp. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches corpora with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct.corpora. lastModified</td>
<td>direct.crp. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches corpora with respect to their last modification timestamp</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------</td>
<td>---------------------</td>
<td>--------------------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>direct.corpora.lang</td>
<td>direct.crp.lang</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches corpora with respect to their language</td>
</tr>
<tr>
<td>direct.corpora.mediaType</td>
<td>direct.crp.mediaType</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches corpora with respect to their media Type</td>
</tr>
</tbody>
</table>

Table 91: Indexes for searching the corpus resource.

### 8.1.14 Estimate Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.estimates.identifier</td>
<td>direct.est.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches estimates with respect to their identifier</td>
</tr>
<tr>
<td>direct.estimates.value</td>
<td>direct.est.value</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches estimates with respect to their value</td>
</tr>
<tr>
<td>direct.estimates.created</td>
<td>direct.est.created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches estimates with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct.estimates.lastModified</td>
<td>direct.est.lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches estimates with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct.estimates.metric.identifier</td>
<td>direct.est.mtr.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches estimates with respect to their concepts (metrics) identifier</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td>------</td>
<td>-----------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>direct.estimates. metric.namespace. identifier</td>
<td>direct.est. mtr.ns</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches estimates with respect to their concepts (metrics) namespace identifier</td>
</tr>
<tr>
<td>direct.estimates. metric.namespace. prefix</td>
<td>direct.est. mtr.ns</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches estimates with respect to their concepts (metrics) namespace prefix</td>
</tr>
<tr>
<td>direct.estimates. descriptivestatistic.identifier</td>
<td>direct.est. dst.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches estimates with respect to their concepts (descriptive statistics) identifier</td>
</tr>
<tr>
<td>direct.estimates. descriptivestaticstic.namespace. identifier</td>
<td>direct.est. dst.ns</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches estimates with respect to their concepts (descriptive statistics) namespace identifier</td>
</tr>
<tr>
<td>direct.estimates. descriptivestaticstic.namespace.prefix</td>
<td>direct.est. dst.ns</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches estimates with respect to their concepts (descriptive statistics) namespace prefix</td>
</tr>
<tr>
<td>direct.estimates. task.identifier</td>
<td>direct.mtr. tsk.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches estimates with respect to their tasks identifier</td>
</tr>
<tr>
<td>direct.estimates. topic.identifier</td>
<td>direct.mtr. tpc.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches estimates with respect to their topics identifier</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------------------</td>
<td>-------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>direct.estimates. experiment. identifier</td>
<td>direct.mtr. exp.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches estimates with respect to their experiments identifier</td>
</tr>
<tr>
<td>direct.evaluationactivities. identifier</td>
<td>direct.evl. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches evaluation activities with respect to their identifier</td>
</tr>
<tr>
<td>direct.evaluationactivities. namespace.identifier</td>
<td>direct.evl. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches evaluation activities with respect to their namespace identifier</td>
</tr>
<tr>
<td>direct.evaluationactivities. namespace.prefix</td>
<td>direct.evl. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches evaluation activities with respect to their namespace prefix</td>
</tr>
<tr>
<td>direct.evaluationactivities. description</td>
<td>direct.evl. desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches evaluation activities with respect to their description</td>
</tr>
<tr>
<td>direct.evaluationactivities. name</td>
<td>direct.evl. name</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches evaluation activities with respect to their name</td>
</tr>
<tr>
<td>direct.evaluationactivities. general</td>
<td>direct.evl. gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches evaluation activities with respect to the content of all their attributes</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
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<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>direct. evaluationactivities. created</td>
<td>direct.evl. created</td>
<td>Exact Match</td>
<td>=, ==, &gt;, &gt;, &lt;, &lt;=</td>
<td>No</td>
<td>Matches evaluation activities with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct. evaluationactivities. lastModified</td>
<td>direct.evl. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &gt;, &gt;, &lt;, &lt;=</td>
<td>No</td>
<td>Matches evaluation activities with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct. evaluationactivities. type</td>
<td>direct.evl. type</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches evaluation activities with respect to their type</td>
</tr>
<tr>
<td>direct. evaluationactivities. status</td>
<td>direct.evl. status</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches evaluation activities with respect to their status</td>
</tr>
</tbody>
</table>

Table 93: Indexes for searching the evaluation activity resource.

### 8.1.16 Experimental Collection Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct. experimentalcollections. identifier</td>
<td>direct. expcl.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches experimental collections with respect to their identifier</td>
</tr>
<tr>
<td>direct. experimentalcollections. description</td>
<td>direct. expcl.desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches experimental collections with respect to their description</td>
</tr>
<tr>
<td>direct. experimentalcollections. general</td>
<td>direct. expcl.gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches experimental collections with respect to the content of all their attributes</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------------------</td>
<td>-----------------</td>
<td>---------------</td>
<td>-----------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>direct. experimentalcollections. created</td>
<td>direct. expcl. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches experimental collections with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct. experimentalcollections. lastModified</td>
<td>direct. expcl. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches experimental collections with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct. experimentalcollections. groundtruth.identifier</td>
<td>direct. expcl. grdtrt.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches experimental collections with respect to their ground truth identifier</td>
</tr>
<tr>
<td>direct. experimentalcollections. topicgroup.identifier</td>
<td>direct. expcl. tpcgrp.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches experimental collections with respect to their topic group identifier</td>
</tr>
</tbody>
</table>

Table 94: Indexes for searching the experimental collection resource.

### 8.1.17 Experiment Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct. experiments. id</td>
<td>direct.exp. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches experiments with respect to their identifier</td>
</tr>
<tr>
<td>direct. experiments. desc</td>
<td>direct.exp. desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches experiments with respect to their description</td>
</tr>
<tr>
<td>direct. experiments. gen</td>
<td>direct.exp. gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches experiments with respect to the content of all their attributes</td>
</tr>
</tbody>
</table>

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
<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct. experiments. created</td>
<td>direct.exp. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches experiments with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct. experiments. lastModified</td>
<td>direct.exp. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches experiments with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct. experiments. configuration. identifier</td>
<td>direct.exp. cnf.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches experiments with respect to their configuration identifier</td>
</tr>
<tr>
<td>direct. experiments. task.identifier</td>
<td>direct.exp. tsk.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches experiments with respect to their task identifier</td>
</tr>
<tr>
<td>direct. experiments. experimentType. identifier</td>
<td>direct.exp. exp.type.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches experiments with respect to their experiment type identifier</td>
</tr>
<tr>
<td>direct. experiments. experimentType. namespace. identifier</td>
<td>direct.exp. exp.type.ns. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches experiments with respect to their experiment type namespace identifier</td>
</tr>
<tr>
<td>direct. experiments. experimentType. namespace. prefix</td>
<td>direct.exp. exp.type.ns. prefix</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches experiments with respect to their experiment type namespace prefix</td>
</tr>
</tbody>
</table>

Table 95: Indexes for searching the experiment resource.

8.1.18 Ground Truth Indexes
### Table 96: Indexes for searching the ground truth resource.

#### 8.1.19 Pool Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.pool.identifier</td>
<td>direct.p.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches pools with respect to their identifier</td>
</tr>
<tr>
<td>direct.pool.description</td>
<td>direct.p.desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches pools with respect to their description</td>
</tr>
<tr>
<td>direct.pool.general</td>
<td>direct.p.gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches pools with respect to the content of all their attributes</td>
</tr>
<tr>
<td>direct.pool.created</td>
<td>direct.p.created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>No</td>
<td>Matches pools with respect to their creation timestamp</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------------------</td>
<td>------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>direct.pool.lastModified</td>
<td>direct.p.lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches pools with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct.pool.experimentalcollection.identifier</td>
<td>direct.p.expc.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches pools with respect to their experimental collection identifier</td>
</tr>
<tr>
<td>direct.pool.lastModified</td>
<td>direct.p.lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches pools with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct.pool.experimentalcollection.identifier</td>
<td>direct.p.expc.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches pools with respect to their experimental collection identifier</td>
</tr>
</tbody>
</table>

Table 97: Indexes for searching the pool resource.

### 8.1.20 Information Unit Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.informationUnit.identifier</td>
<td>direct.iu.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches Information Units with respect to their identifier</td>
</tr>
<tr>
<td>direct.informationUnit.description</td>
<td>direct.iu.desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Information Units with respect to their description</td>
</tr>
<tr>
<td>direct.informationUnit.general</td>
<td>direct.iu.gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches Information Units with respect to the content of all their attributes</td>
</tr>
<tr>
<td>direct.informationUnit.created</td>
<td>direct.iu.created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches Information Units with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct.informationUnit.lastModified</td>
<td>direct.iu.lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches Information Units with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct.informationUnit.corpus.identifier</td>
<td>direct.iu.crp.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches Information Units with respect to their corpus identifier</td>
</tr>
</tbody>
</table>
Table 98: Indexes for searching the Information Unit resource.

### 8.1.21 Measure Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>direct.measures.identifier</code></td>
<td><code>direct.msr.id</code></td>
<td>Exact Match</td>
<td><code>=, ==, &lt;&gt;</code></td>
<td><code>*</code> and <code>?</code></td>
<td>Matches measures with respect to their identifier</td>
</tr>
<tr>
<td><code>direct.measures.value</code></td>
<td><code>direct.msr.value</code></td>
<td>Exact Match</td>
<td><code>=, ==, &lt;&gt;, &gt;, &lt;, &gt;, &lt;=</code></td>
<td>No</td>
<td>Matches measures with respect to their value</td>
</tr>
<tr>
<td><code>direct.measures.created</code></td>
<td><code>direct.msr.created</code></td>
<td>Exact Match</td>
<td><code>=, ==, &lt;&gt;, &gt;, &lt;, &gt;, &lt;=</code></td>
<td>No</td>
<td>Matches measures with respect to their creation timestamp</td>
</tr>
<tr>
<td><code>direct.measures.lastModified</code></td>
<td><code>direct.msr.lastModified</code></td>
<td>Exact Match</td>
<td><code>=, ==, &lt;&gt;, &gt;, &lt;, &gt;, &lt;=</code></td>
<td>No</td>
<td>Matches measures with respect to their last modification timestamp</td>
</tr>
<tr>
<td><code>direct.measures.metric.identifier</code></td>
<td><code>direct.msr.mtr.id</code></td>
<td>Exact Match</td>
<td><code>=, ==, &lt;&gt;</code></td>
<td><code>*</code> and <code>?</code></td>
<td>Matches measures with respect to their concepts (metrics) identifier</td>
</tr>
<tr>
<td><code>direct.measures.metric.namespace.identifier</code></td>
<td><code>direct.msr.mtr.ns</code></td>
<td>Exact Match</td>
<td><code>=, ==, &lt;&gt;</code></td>
<td><code>*</code> and <code>?</code></td>
<td>Matches measures with respect to their concepts (metrics) namespace identifier</td>
</tr>
<tr>
<td><code>direct.measures.metric.namespace.prefix</code></td>
<td><code>direct.msr.mtr.ns</code></td>
<td>Exact Match</td>
<td><code>=, ==, &lt;&gt;</code></td>
<td><code>*</code> and <code>?</code></td>
<td>Matches measures with respect to their concepts (metrics) namespace prefix</td>
</tr>
<tr>
<td><code>direct.measures.topic.identifier</code></td>
<td><code>direct.msr.tpc.id</code></td>
<td>Exact Match</td>
<td><code>=, ==, &lt;&gt;</code></td>
<td><code>*</code> and <code>?</code></td>
<td>Matches measures with respect to their topics identifier</td>
</tr>
<tr>
<td>Index Name</td>
<td>Alias</td>
<td>Type</td>
<td>Relations</td>
<td>Wildcards</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>--------------</td>
<td>-----------</td>
<td>-----------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>direct.measures.experiment.identifier</td>
<td>direct.msr.exp.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches measures with respect to their experiments identifier</td>
</tr>
</tbody>
</table>

Table 99: Indexes for searching the measure resource.

8.1.22 Run Item Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.runItem.identifier</td>
<td>direct.rni.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches run items with respect to their identifier</td>
</tr>
<tr>
<td>direct.runItem.rank</td>
<td>direct.rni.rank</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches run items with respect to their rank</td>
</tr>
<tr>
<td>direct.runItem.score</td>
<td>direct.rni.score</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches run items with respect to their score</td>
</tr>
<tr>
<td>direct.runItem.topic.identifier</td>
<td>direct.rni.tpc.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches run items with respect to their topics identifier</td>
</tr>
<tr>
<td>direct.runItem.experiment.identifier</td>
<td>direct.rni.exp.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches run items with respect to their experiments identifier</td>
</tr>
<tr>
<td>direct.runItem.informationunit.identifier</td>
<td>direct.rni.iu.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches run items with respect to their information units identifier</td>
</tr>
</tbody>
</table>

Table 100: Indexes for searching the run item resource.

8.1.23 Snapshot Indexes

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
<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.snapshots.identifier</td>
<td>direct.snp. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches snapshots with respect to their identifier</td>
</tr>
<tr>
<td>direct.snapshots.created</td>
<td>direct.snp. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches snapshots with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct.snapshots.lastModified</td>
<td>direct.snp. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches snapshots with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct.snapshots.visualization. identifier</td>
<td>direct.snp. vsl.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches snapshots with respect to their visualization identifier</td>
</tr>
</tbody>
</table>

Table 101: Indexes for searching the snapshot resource.

### 8.1.24 Statistical Test Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.statisticalTests.identifier</td>
<td>direct.stt. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches statistical tests with respect to their identifier</td>
</tr>
<tr>
<td>direct.statisticalTests.created</td>
<td>direct.stt. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches statistical tests with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct.statisticalTests.lastModified</td>
<td>direct.stt. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches statistical tests with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct.statisticalTests.visualization. identifier</td>
<td>direct.stt. vsl.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches statistical tests with respect to their visualization identifier</td>
</tr>
<tr>
<td>direct.statisticalTests.statisticalAnalysis.identifier</td>
<td>direct.stt. vsl.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches statistical tests with respect to their statistical analysis identifier</td>
</tr>
</tbody>
</table>
### Table 102: Indexes for searching the statistical test resource.

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.statisticalTests.statisticalAnalysis.namespace.identifier</td>
<td>direct.stt.vsl.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches statistical tests with respect to their statistical analysis namespace identifier</td>
</tr>
<tr>
<td>direct.statisticalTests.statisticalAnalysis.namespace.prefix</td>
<td>direct.stt.vsl.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches statistical tests with respect to their statistical analysis namespace prefix</td>
</tr>
</tbody>
</table>

### 8.1.25 System Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.systems.identifier</td>
<td>direct.sys.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches systems with respect to their identifier</td>
</tr>
<tr>
<td>direct.systems.name</td>
<td>direct.sys.name</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches systems with respect to their name</td>
</tr>
<tr>
<td>direct.systems.description</td>
<td>direct.sys.desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches systems with respect to their description</td>
</tr>
<tr>
<td>direct.systems.created</td>
<td>direct.sys.created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches systems with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct.systems.lastModified</td>
<td>direct.sys.lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;=, &lt;=</td>
<td>No</td>
<td>Matches systems with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct.statisticalTests.configuration.identifier</td>
<td>direct.sys.cnf.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches systems with respect to their configuration identifier</td>
</tr>
</tbody>
</table>
### 8.1.26 Task Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.tasks.identifier</td>
<td>direct.tsk.id</td>
<td>Exact Match</td>
<td>$=, ==, &lt;&gt;$</td>
<td>* and ?</td>
<td>Matches tasks with respect to their identifier</td>
</tr>
<tr>
<td>direct.tasks.description</td>
<td>direct.tsk.desc</td>
<td>Best Match</td>
<td>$=, ==, &lt;&gt;$</td>
<td>*</td>
<td>Matches tasks with respect to their description</td>
</tr>
<tr>
<td>direct.tasks.created</td>
<td>direct.tsk.created</td>
<td>Exact Match</td>
<td>$=, ==, &lt;, &gt;, &lt;, &gt;, &lt;=$</td>
<td>No</td>
<td>Matches tasks with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct.tasks.lastModified</td>
<td>direct.tsk.lastModified</td>
<td>Exact Match</td>
<td>$=, ==, &lt;, &gt;, &lt;, &gt;, &lt;=$</td>
<td>No</td>
<td>Matches tasks with respect to their last modification timestamp</td>
</tr>
<tr>
<td>direct.tasks.type</td>
<td>direct.tsk.type</td>
<td>Exact Match</td>
<td>$=, ==, &lt;&gt;$</td>
<td>* and ?</td>
<td>Matches tasks with respect to their type</td>
</tr>
<tr>
<td>direct.tasks.evaluationActivity.identifier</td>
<td>direct.tsk.eva.id</td>
<td>Exact Match</td>
<td>$=, ==, &lt;&gt;$</td>
<td>* and ?</td>
<td>Matches systems with respect to their evaluation activity identifier</td>
</tr>
<tr>
<td>direct.tasks.evaluationActivity.namespace.identifier</td>
<td>direct.tsk.eva.ns.id</td>
<td>Exact Match</td>
<td>$=, ==, &lt;&gt;$</td>
<td>* and ?</td>
<td>Matches systems with respect to their evaluation activity namespace identifier</td>
</tr>
<tr>
<td>direct.tasks.evaluationActivity.namespace.prefix</td>
<td>direct.tsk.eva.ns.prefix</td>
<td>Exact Match</td>
<td>$=, ==, &lt;&gt;$</td>
<td>* and ?</td>
<td>Matches systems with respect to their evaluation activity namespace prefix</td>
</tr>
<tr>
<td>direct.tasks.track.identifier</td>
<td>direct.tsk.trk.id</td>
<td>Exact Match</td>
<td>$=, ==, &lt;&gt;$</td>
<td>* and ?</td>
<td>Matches systems with respect to their track identifier</td>
</tr>
</tbody>
</table>
### Topic Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.tasks. identifier</td>
<td>direct.tsk.</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches systems with respect to their experimental collection identifier</td>
</tr>
<tr>
<td>experimentalCollection</td>
<td>expc.id</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>identifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.topics. identifier</td>
<td>direct.tpc.</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches topics with respect to their identifier</td>
</tr>
<tr>
<td>id</td>
<td>tpc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>direct.topics. created</td>
<td>direct.tpc.</td>
<td>Exact Match</td>
<td>&gt;, &lt;, &gt;=,</td>
<td>No</td>
<td>Matches topics with respect to their creation timestamp</td>
</tr>
<tr>
<td>created</td>
<td>created</td>
<td></td>
<td>&lt;=</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.topics. lastModified</td>
<td>direct.tpc.</td>
<td>Exact Match</td>
<td>&gt;, &lt;, &gt;=,</td>
<td>No</td>
<td>Matches topics with respect to their last modification timestamp</td>
</tr>
<tr>
<td>lastModified</td>
<td>lastModified</td>
<td></td>
<td>&lt;=</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.topics. content</td>
<td>direct.tpc.</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches topics with respect to their content</td>
</tr>
<tr>
<td>content</td>
<td>content</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.topics. general</td>
<td>direct.tpc.</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches topics with respect to their content</td>
</tr>
<tr>
<td>general</td>
<td>general</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Topic Group Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.topicGroups. identifier</td>
<td>direct.tpcg.</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches topic groups with respect to their identifier</td>
</tr>
<tr>
<td>id</td>
<td>tpcg.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 104: Indexes for searching the task resource.

8.1.27 Topic Indexes

Table 105: Indexes for searching the topic resource.

8.1.28 Topic Group Indexes
<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct. topicGroups. desc</td>
<td>direct.tpcg. desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches topic groups with respect to their description</td>
</tr>
<tr>
<td>direct. topicGroups. gen</td>
<td>direct.tpcg. gen</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches topic groups with respect to the content of all their attributes</td>
</tr>
<tr>
<td>direct. topicGroups. created</td>
<td>direct.tpcg. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;, =, &lt;=</td>
<td>No</td>
<td>Matches topic groups with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct. topicGroups. lastModified</td>
<td>direct.tpcg. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;, =, &lt;=</td>
<td>No</td>
<td>Matches topic groups with respect to their last modification timestamp</td>
</tr>
</tbody>
</table>

Table 106: Indexes for searching the topic group resource.

8.1.29 Track Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.tracks. id</td>
<td>direct.trk. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches tracks with respect to their identifier</td>
</tr>
<tr>
<td>direct.tracks. desc</td>
<td>direct.trk. desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches tracks with respect to their description</td>
</tr>
<tr>
<td>direct.tracks. created</td>
<td>direct.trk. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;, =, &lt;=</td>
<td>No</td>
<td>Matches tracks with respect to their creation timestamp</td>
</tr>
<tr>
<td>direct.tracks. lastModified</td>
<td>direct.trk. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;, &gt;, &lt;, &gt;, =, &lt;=</td>
<td>No</td>
<td>Matches tracks with respect to their last modification timestamp</td>
</tr>
</tbody>
</table>
### Indexes for searching the track resource.

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct.tracks. submissionDeadline</td>
<td>direct.trk. subddl</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;,</td>
<td>No</td>
<td>Matches tracks with respect to their submission deadline</td>
</tr>
<tr>
<td>direct.tracks. evalact.identifier</td>
<td>direct.trk. evalact.id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches tracks with respect to their evaluation activity identifier</td>
</tr>
<tr>
<td>direct.tracks. evalact.namespace.</td>
<td>direct.trk. evalact.</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches tracks with respect to their evaluation activity namespace identifier</td>
</tr>
<tr>
<td>prefix</td>
<td>namespace.id</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>direct.tracks. evalact.namespace.</td>
<td>direct.trk. evalact.</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches tracks with respect to their evaluation activity namespace prefix</td>
</tr>
<tr>
<td>prefix</td>
<td>namespace. prefix</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 107: Indexes for searching the track resource.

#### 8.1.30 Visualization Indexes

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Alias</th>
<th>Type</th>
<th>Relations</th>
<th>Wildcards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct. visualizations. id</td>
<td>direct.vsl. id</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;</td>
<td>* and ?</td>
<td>Matches visualizations with respect to their identifier</td>
</tr>
<tr>
<td>direct. visualizations. description</td>
<td>direct.vsl. desc</td>
<td>Best Match</td>
<td>=, ==, &lt;&gt;</td>
<td>*</td>
<td>Matches visualizations with respect to their description</td>
</tr>
<tr>
<td>direct. visualizations. created</td>
<td>direct.vsl. created</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;,</td>
<td>No</td>
<td>Matches visualizations with respect to their creation timestamp</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;, &lt;, &gt;=, &lt;=</td>
<td></td>
<td></td>
</tr>
<tr>
<td>direct. visualizations. lastModified</td>
<td>direct.vsl. lastModified</td>
<td>Exact Match</td>
<td>=, ==, &lt;&gt;,</td>
<td>No</td>
<td>Matches visualizations with respect to their last modification timestamp</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;, &lt;, &gt;=, &lt;=</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

- \( \text{limit=value} \)
  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**, **NOT** operators.
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

<table>
<thead>
<tr>
<th>Action</th>
<th>HTTP Method</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE GUERRILLA</td>
<td>POST</td>
<td>/guerrilla</td>
</tr>
<tr>
<td>READ GUERRILLA</td>
<td>GET</td>
<td>/guerrilla/{id}</td>
</tr>
<tr>
<td>UPDATE GUERRILLA</td>
<td>PUT</td>
<td>/guerrilla/{id}</td>
</tr>
<tr>
<td>DELETE GUERRILLA</td>
<td>DELETE</td>
<td>/guerrilla/{id}</td>
</tr>
<tr>
<td>LIST GUERRILLAS</td>
<td>GET</td>
<td>/guerrilla</td>
</tr>
<tr>
<td>LIST GUERRILLA_PROVENEANCE_EVENTS</td>
<td>GET</td>
<td>/guerrilla/{id}/provenance</td>
</tr>
<tr>
<td>ADD_MEASURE_TO_GUERRILLA</td>
<td>POST</td>
<td>/guerrilla/{id}/metric{id};{ns}/measure{id}</td>
</tr>
<tr>
<td>REMOVE_MEASURE_FROM_GUERRILLA</td>
<td>DELETE</td>
<td>/guerrilla/{id}/metric{id};{ns}/measure{id}</td>
</tr>
<tr>
<td>LIST_MEASURE_FROM_GUERRILLA</td>
<td>GET</td>
<td>/guerrilla/{id}/measure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Package</th>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIRECT</td>
<td>3.00.0</td>
<td>Description of experiment, e.g. experiment submitted to TREC7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Package</th>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIRECT</td>
<td>3.00.0</td>
<td>Description of experiment, e.g. experiment submitted to TREC7</td>
</tr>
</tbody>
</table>

### 9.2 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:guerrilla ims:identifier="exp-1"
    ims:owner">
    <ims:user ims:identifier="user-1" ims:namespace="http://ims.dei.unipd.it/"/>
    <ims:scope>SHARED</ims:scope>
    <ims:created>2012-09-20T14:21:46.781+02:00</ims:created>
    <ims:last-modified>2012-09-20T14:21:46.781+02:00</ims:last-modified>
  </ims:guerrilla>
</ims:direct>
```
<ims:metric>
  <ims:concept ims:identifier="Separation of Actual Content and Representations"
    ims:namespace="http://www.ns1.com/">
    <ims:value>0.0E0</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Special Characters"
    ims:namespace="http://www.ns1.com/">
    <ims:value>0.0E0</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Synonyms or Domain Specific Terminology"
    ims:namespace="http://www.ns1.com/">
    <ims:value>0.0E0</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Duplicate Documents"
    ims:namespace="http://www.ns1.com/">
    <ims:value>0.0E0</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Meta Data Quality"
    ims:namespace="http://www.ns1.com/">
    <ims:value>0.0E0</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Tokenization"
    ims:namespace="http://www.ns1.com/">
    <ims:value>6.66666667E-1</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Core Business Entities"
    ims:namespace="http://www.ns1.com/">
    <ims:value>8.0E-1</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Stemming"
    ims:namespace="http://www.ns1.com/">
    <ims:value>0.0E0</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Average Index Metrics"
    ims:namespace="http://www.ns1.com/">
    <ims:value>3.3E-1</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Phrasal Queries"
    ims:namespace="http://www.ns1.com/">
    <ims:value>1.0E0</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Query Syntax"
    ims:namespace="http://www.ns1.com/">
    <ims:value>8.0E-1</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Over- and Under-Specified Queries"
    ims:namespace="http://www.ns1.com/">
    <ims:value>0.0E0</ims:value>
  </ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Feedback"
    ims:namespace="http://www.ns1.com/">
    <ims:value>3.3E-1</ims:value>
  </ims:metric>

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<ims:value>0.0E0</ims:value>

</ims:metric>

<ims:metric>
    <ims:value>0.0E0</ims:value>
  </ims:concept>
</ims:metric>

<ims:metric>
    <ims:value>1.0E0</ims:value>
  </ims:concept>
</ims:metric>

<ims:metric>
    <ims:value>4.66666667E-1</ims:value>
  </ims:concept>
</ims:metric>

<ims:metric>
    <ims:value>1.0E0</ims:value>
  </ims:concept>
</ims:metric>

<ims:metric>
    <ims:value>0.0E0</ims:value>
  </ims:concept>
</ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Browsing" ims:namespace="http://www.ns1.com/">
    <ims:value>1.0E0</ims:value>
  </ims:concept>
</ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Personalization" ims:namespace="http://www.ns1.com/">
    <ims:value>0.0E0</ims:value>
  </ims:concept>
</ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Social Aspects" ims:namespace="http://www.ns1.com/">
    <ims:value>0.0E0</ims:value>
  </ims:concept>
</ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Exception Handling" ims:namespace="http://www.ns1.com/">
    <ims:value>0.0E0</ims:value>
  </ims:concept>
</ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Result List Presentation" ims:namespace="http://www.ns1.com/">
    <ims:value>1.0E0</ims:value>
  </ims:concept>
</ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Entertainment" ims:namespace="http://www.ns1.com/">
    <ims:value>5.0E-1</ims:value>
  </ims:concept>
</ims:metric>

<ims:metric>
  <ims:concept ims:identifier="Localization" ims:namespace="http://www.ns1.com/">
    <ims:value>1.0E0</ims:value>
  </ims:concept>
</ims:metric>
251  <ims:concept ims:identifier="Known / Suspected Item Retrieval"
  ims:namespace="http://www.ns1.com/">
  <ims:value>4.0E-1</ims:value>
</ims:metric>
255  <ims:metric>
  <ims:concept ims:identifier="Diversity" ims:namespace="http://www.ns1.com/">
  <ims:value>0.0E0</ims:value>
</ims:metric>
262  <ims:metric>
  <ims:concept ims:identifier="Geo - Location"
  ims:namespace="http://www.ns1.com/">
  <ims:value>0.0E0</ims:value>
</ims:metric>
267  <ims:metric>
  <ims:concept ims:identifier="Average Search Results Metrics"
  ims:namespace="http://www.ns1.com/">
  <ims:value>4.4E-1</ims:value>
</ims:metric>
270  </ims:metrics>
271  </ims:guerrilla>
274  </ims:direct>

9.3 JSON Representation

```json
1 {
  "direct": {
    "guerrilla": {
      "identifier": "exp-1",
      "description": "Description of experiment, e.g. experiment submitted to TREC7",
      "scope": "SHARED",
      "created": "2012-09-22T16:24:37.143+02:00",
      "last-modified": "2012-09-22T16:24:37.143+02:00",
      "owner": {
        "user": {
          "identifier": "user-1",
          "namespace": "http://ims.dei.unipd.it/
        }
      },
      "sharings": [
        { "sharing": {
          "group": {
            "identifier": "group-1",
            "namespace": "http://ims.dei.unipd.it/
          },
          "access-permission": "DENIED"
        },
        { "sharing": {
          "group": {
            "identifier": "group-2",
            "namespace": "http://ims.dei.unipd.it/
          },
          "access-permission": "READ_ONLY"
        }
      ]
    }
  }
}
```
"identifier":"group-3",
"namespace":"http://ims.dei.unipd.it/"
},
"access-permission":"READ_WRITE"
}
}
"links":
{
"link":{
"metadata":{
"identifier":"md-1",
"namespace":"http://ims.dei.unipd.it/"
},
"relation":{
"concept":{
"identifier":"isDescriptionOf",
"namespace":"http://ims.dei.unipd.it/"
}
},
"guerrilla":{
"identifier":"exp-1"
}
},
"link":{
"metadata":{
"identifier":"md-2",
"namespace":"http://ims.dei.unipd.it/"
},
"relation":{
"concept":{
"identifier":"isCopyrightOf",
"namespace":"http://ims.dei.unipd.it/"
}
},
"guerrilla":{
"identifier":"exp-1"
}
},
"link":{
"metadata":{
"identifier":"md-3",
"namespace":"http://ims.dei.unipd.it/"
},
"relation":{
"concept":{
"identifier":"isAdministrationOf",
"namespace":"http://ims.dei.unipd.it/"
}
},
"guerrilla":{
"identifier":"exp-1"
}
}
"task": {
    "identifier": "task-1"
},
"configuration": {
    "identifier": "configuration-1"
},
"application": {
    "identifier": "https://www.ige.ch/
},
"metrics": [
    {
        "metric": {
            "concept": {
                "identifier": "Completeness",
                "namespace": "http://www.ns1.com/
            },
            "value": "1.0E0"
        }
    },
    {
        "metric": {
            "concept": {
                "identifier": "Freshness",
                "namespace": "http://www.ns1.com/
            },
            "value": "5.0E-1"
        }
    },
    {
        "metric": {
            "concept": {
                "identifier": "Binary Document Handling",
                "namespace": "http://www.ns1.com/
            },
            "value": "3.33333333E-1"
        }
    },
    {
        "metric": {
            "concept": {
                "identifier": "Separation of Actual Content and Representations",
                "namespace": "http://www.ns1.com/
            },
            "value": "0.0E0"
        }
    },
    {
        "metric": {
            "concept": {
                "identifier": "Special Characters",
                "namespace": "http://www.ns1.com/
            },
            "value": "0.0E0"
        }
    },
    {
        "metric": {
            "concept": {
                "identifier": "Synonyms or Domain Specific Terminology",
                "namespace": "http://www.ns1.com/
            }
        }
    }
]
},
  "value": "0.0E0"
},
  "metric": {
    "concept": {
      "identifier": "Duplicate Documents",
      "namespace": "http://www.ns1.com/
    },
    "value": "0.0E0"
  },
  "metric": {
    "concept": {
      "identifier": "Meta Data Quality",
      "namespace": "http://www.ns1.com/
    },
    "value": "0.0E0"
  },
  "metric": {
    "concept": {
      "identifier": "Tokenization",
      "namespace": "http://www.ns1.com/
    },
    "value": "6.66666667E-1"
  },
  "metric": {
    "concept": {
      "identifier": "Core Business Entities",
      "namespace": "http://www.ns1.com/
    },
    "value": "8.0E-1"
  },
  "metric": {
    "concept": {
      "identifier": "Stemming",
      "namespace": "http://www.ns1.com/
    },
    "value": "0.0E0"
  },
  "metric": {
    "concept": {
      "identifier": "Average Index Metrics",
      "namespace": "http://www.ns1.com/
    },
    "value": "3.3E-1"
  }
},
"metric": {


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D3.3: Prototype of the Evaluation Infrastructure

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```json
{
    "metric":{
        "concept":{
            "identifier":"Entertainment",
            "namespace":"http://www.ns1.com/"
        },
        "value":"5.0E-1"
    },
    "metric":{
        "concept":{
            "identifier":"Localization",
            "namespace":"http://www.ns1.com/"
        },
        "value":"1.0E0"
    },
    "metric":{
        "concept":{
            "identifier":"Facets",
            "namespace":"http://www.ns1.com/"
        },
        "value":"1.0E0"
    },
    "metric":{
        "concept":{
            "identifier":"Result List Import / Export",
            "namespace":"http://www.ns1.com/"
        },
        "value":"0.0E0"
    },
    "metric":{
        "concept":{
            "identifier":"Sorting of Result List",
            "namespace":"http://www.ns1.com/"
        },
        "value":"1.0E0"
    },
    "metric":{
        "concept":{
            "identifier":"Justification of Results",
            "namespace":"http://www.ns1.com/"
        },
        "value":"3.33333E-1"
    }
}
```
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
{},
  "metric":{
    "concept":{
      "identifier":"Factual Queries",
      "namespace":"http://www.ns1.com/"
    },
    "value":"8.0E-1"
  },
},
  "metric":{
    "concept":{
      "identifier":"Known / Suspected Item Retrieval",
      "namespace":"http://www.ns1.com/"
    },
    "value":"4.0E-1"
  },
},
  "metric":{
    "concept":{
      "identifier":"Diversity",
      "namespace":"http://www.ns1.com/"
    },
    "value":"0.0E0"
  },
},
  "metric":{
    "concept":{
      "identifier":"Geo-Location",
      "namespace":"http://www.ns1.com/"
    },
    "value":"0.0E0"
  },
},
  "metric":{
    "concept":{
      "identifier":"Average Search Results Metrics",
      "namespace":"http://www.ns1.com/"
    },
    "value":"4.4E-1"
  }
}
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 activities, 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\(^\text{10}\); 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

---

\(^{10}\) [http://www.clef-initiative.eu/about/steering-committee](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:

`/evaluation-activity`

using the HTTP method GET. In order to obtain information on a specific instance of the evaluation
activity resource, the request will be

`/evaluation-activity/{id};{ns}`

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

`clef-initiative/edition`

In order to access a specific CLEF edition, e.g. CLEF 2009, the URL of the page will be

`clef-initiative/edition/clef2009`
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.](image)

When the user clicks on a specific edition, the landing page can be (i) and external website in
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

clef-initiative/edition/clef2009

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}.

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 workshop 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
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.
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
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:

```
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\footnote{http://developer.yahoo.com/yui/} 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
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.](image)

### 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”.

---

**D3.3: Prototype of the Evaluation Infrastructure**  
Network of Excellence co-funded by the 7th Framework Programme of the European Commission, grant agreement n. 238191
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.

![Contact Form Screenshot](image-url)

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,
... 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 contain 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).
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

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XMLSpy v2011 (x64) (http://www.altova.com) by Università degli Studi di Padova (Università degli Studi di Padova) -->
<xs:annotation>
<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>
</xs:annotation>
<xs:include schemaLocation="http://ims.dei.unipd.it/data/xml/direct.3.00.xsd"
<xs:annotation>
<xs:documentation xml:lang="en">Version 3.00.</xs:documentation>
</xs:annotation>
<xs:include schemaLocation="http://ims.dei.unipd.it/data/xml/ici.3.00.xsd"
<xs:annotation>
<xs:documentation xml:lang="en">Imports the schema for the IMS Component Integrator (ICI) library.
</xs:documentation>
</xs:annotation>
<xs:include schemaLocation="http://ims.dei.unipd.it/data/xml/fast.3.00.xsd"
<xs:annotation>
<xs:documentation xml:lang="en">Imports the schema for the Flexible Annotation Semantic Tool (FAST) service.
</xs:documentation>
</xs:annotation>
<xs:element name="task" substitutionGroup="ims:resource">
<xs:annotation>
<xs:documentation xml:lang="en">Represents a piece of work that is undertaken within an evaluation activity and aims at testing a specific (research) hypothesis.
</xs:documentation>
</xs:annotation>
```

\(^{12}\)http://ims.dei.unipd.it/data/xml/direct.3.00.xsd

\(^{13}\)http://ims.dei.unipd.it/data/xml/ici.3.00.xsd
<xs:sequence>
  <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
  <xs:element ref="ims:campaign" minOccurs="0"/>
  <xs:element ref="ims:education" minOccurs="0"/>
  <xs:element ref="ims:trial" minOccurs="0"/>
  <xs:element ref="ims:track" minOccurs="0"/>
  <xs:element ref="ims:experimental-collection" minOccurs="0"/>
</xs:sequence>

<xs:attribute ref="ims:description"/>
<xs:attribute name="maximum-experiments-allowed" type="xs:int"/>
<xs:annotation>
  <xs:documentation>The maximum number of experiments that can be submitted per participant for this task.</xs:documentation>
</xs:annotation>
</xs:extension>
</xs:complexType>
</xs:element>

<xs:element name="education" substitutionGroup="ims:resource">
<xs:annotation>
  <xs:documentation xml:lang="en">Represents an activity which is carried out for educational purposes.</xs:documentation>
</xs:annotation>
<xs:complexType>
  <xs:sequence>
    <xs:element ref="ims:links" minOccurs="0"/>
    <xs:element name="tasks" minOccurs="0">
      <xs:annotation>
        <xs:documentation xml:lang="en">The list of tasks for this evaluation activity.</xs:documentation>
      </xs:annotation>
      <xs:complexType>
        <xs:sequence>
          <xs:element ref="ims:task" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="name">
    <xs:annotation>
      <xs:documentation xml:lang="en">The name of the evaluation activity.</xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute ref="ims:description"/>
  <xs:attribute name="status" type="ims:status-type"/>
  <xs:annotation>
    <xs:documentation xml:lang="en">The status of the evaluation activity.</xs:documentation>
  </xs:annotation>
</xs:complexType>
</xs:element>

<xs:element name="trial" substitutionGroup="ims:resource"/>
<xs:annotation>
  <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>
</xs:annotation>

<xs:complexType>
  <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-controllable-resource-type">
    <xs:sequence>
      <xs:element ref="ims:links" minOccurs="0"/>
      <xs:element name="tasks" minOccurs="0">
        <xs:annotation>
          <xs:documentation xml:lang="en">The list of tasks for this evaluation activity.</xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="name">
        <xs:annotation>
          <xs:documentation xml:lang="en">The name of the evaluation activity.</xs:documentation>
        </xs:annotation>
        <xs:attribute name="status" type="ims:status-type">
          <xs:annotation>
            <xs:documentation xml:lang="en">The status of the evaluation activity.</xs:documentation>
          </xs:annotation>
        </xs:attribute>
      </xs:element>
    </xs:sequence>
    <xs:element name="campaign" substitutionGroup="ims:resource">
      <xs:annotation>
        <xs:documentation xml:lang="en">Represents a public and shared activity conducted in an evaluation forum, such as TREC or CLEF.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:sequence>
      <xs:element name="tracks" minOccurs="0" maxOccurs="unbounded">
        <xs:annotation>
          <xs:documentation xml:lang="en">The list of tracks for this evaluation activity.</xs:documentation>
        </xs:annotation>
      </xs:element>
    </xs:sequence>
  </xs:extension>
</xs:complexType>
<xs:element name="tasks" minOccurs="0">
  <xs:annotation>
    <xs:documentation xml:lang="en">The list of tasks for this evaluation activity.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="ims:task" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>

<xs:element name="name">
  <xs:annotation>
    <xs:documentation xml:lang="en">The name of the evaluation activity.</xs:documentation>
  </xs:annotation>
  <xs:attribute type="ims:status-type">}
  <xs:attribute name="status">
    <xs:annotation>
      <xs:documentation xml:lang="en">The status of the evaluation activity.</xs:documentation>
    </xs:annotation>
    <xs:attribute name="name">
      <xs:annotation>
        <xs:documentation xml:lang="en">The name of the evaluation activity.</xs:documentation>
      </xs:annotation>
      <xs:attribute name="status">
        <xs:annotation>
          <xs:documentation xml:lang="en">The status of the evaluation activity.</xs:documentation>
        </xs:annotation>
      </xs:attribute>
      <xs:attribute ref="ims:description"/>
    </xs:attribute>
    <xs:attribute name="type">
      <xs:annotation>
        <xs:documentation xml:lang="en">The type of the evaluation activity.</xs:documentation>
      </xs:annotation>
    </xs:attribute>
  </xs:attribute>
</xs:element>

<xs:element name="evaluation-activity" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation xml:lang="en">Represents any type of activity aiming at the evaluation of applications, systems, or methodologies for information access.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-controllable-resource-type">
        <xs:sequence>
          <xs:element ref="ims:links" minOccurs="0"/>
        </xs:sequence>
        <xs:attribute name="name">
          <xs:annotation>
            <xs:documentation xml:lang="en">The name of the evaluation activity.</xs:documentation>
          </xs:annotation>
          <xs:attribute name="description"/>
        </xs:attribute>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
<xs:documentation xml:lang="en">Represents a public and shared activity conducted in an evaluation forum, such as TREC or CLEF.</xs:documentation>

<xs:enumeration>
<xs:enumeration value="TRIAL">
<xs:annotation>
<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>
</xs:annotation>
</xs:enumeration>

<xs:enumeration value="EDUCATION">
<xs:annotation>
<xs:documentation xml:lang="en">Represents an activity which is carried out for educational purposes.</xs:documentation>
</xs:annotation>
</xs:enumeration>

<xs:attribute name="status" type="ims:status-type">
<xs:documentation xml:lang="en">The status of the evaluation activity.</xs:documentation>
</xs:attribute>

<xs:element name="track" substitutionGroup="ims:resource">
<xs:annotation>
<xs:documentation xml:lang="en">Represents a group of tasks carried within an evaluation activity of type campaign.</xs:documentation>
</xs:annotation>
<xs:complexType>
<xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-resource-type">
<xs:sequence>
<xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
<xs:element ref="ims:campaign" minOccurs="0"/>
</xs:sequence>
<xs:attribute ref="ims:description"/>
<xs:attribute name="submission-deadline" type="xs:date">
<xs:annotation>
<xs:documentation xml:lang="en">The deadline of the submissions for the track.</xs:documentation>
</xs:annotation>
</xs:attribute>
</xs:extension>
</xs:complexType>
</xs:element>

<xs:element name="direct" type="ims:ici-type">
<xs:annotation>
<xs:documentation xml:lang="en">Provides information about one or more resources of the DIRECT system.</xs:documentation>
</xs:annotation>
</xs:element>
<xs:simpleType name="status-type">
  <xs:annotation>
    <xs:documentation xml:lang="en">Represents the status of some kind of activity.</xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:token">
    <xs:enumeration value="NOT_STARTED_YET">
      <xs:annotation>
        <xs:documentation xml:lang="en">The activity has not been started yet.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="ONGOING">
      <xs:annotation>
        <xs:documentation xml:lang="en">The activity is ongoing.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="COMPLETED">
      <xs:annotation>
        <xs:documentation xml:lang="en">The activity is completed.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="AVAILABLE">
      <xs:annotation>
        <xs:documentation xml:lang="en">The outcomes, if any, of the activity are available.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
  </xs:restriction>
</xs:simpleType>

<xsl:element name="application" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents a running software application evaluated during a Guerrilla experiment</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-resource-type">
        <xs:sequence>
          <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
          <xs:element ref="ims:configuration" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
        <xs:attribute ref="ims:name"/>
        <xs:attribute ref="ims:description"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xsl:element>

<xsl:element name="configuration" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents the configuration of a component, a system or an application under evaluation.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
        <xs:sequence>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xsl:element>
<xs:element name="parameters" minOccurs="0">
  <xs:annotation>
    <xs:documentation>The list of parameters associated to this configuration.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence maxOccurs="unbounded">
      <xs:element ref="ims:parameter"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>

<xs:element name="component" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents a building block of a running system.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent base="ims:identifiable-timestamp-traceable-access-controllable-resource-type">
      <xs:sequence>
        <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
        <xs:element ref="ims:concept" minOccurs="0"/>
        <xs:element ref="ims:configuration" minOccurs="0"/>
      </xs:sequence>
      <xs:attribute ref="ims:name"/>
      <xs:attribute ref="ims:description"/>
    </xs:complexContent>
  </xs:complexType>
</xs:element>

<xs:element name="system" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents a running software engine, which is under evaluation.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent base="ims:identifiable-timestamp-traceable-access-controllable-resource-type">
      <xs:sequence>
        <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
        <xs:element ref="ims:configuration" minOccurs="0"/>
      </xs:sequence>
      <xs:attribute ref="ims:name"/>
      <xs:attribute ref="ims:description"/>
    </xs:complexContent>
  </xs:complexType>
</xs:element>

<xs:element name="experiment" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents part of the data produced by a system under evaluation.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent base="ims:identifiable-timestamp-traceable-access-controllable-resource-type">
      <xs:sequence>
        <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
        <xs:element ref="ims:configuration" minOccurs="0"/>
      </xs:sequence>
      <xs:attribute ref="ims:name"/>
      <xs:attribute ref="ims:description"/>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
<xs:element name="run" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents a ranked list of documents for each topic in the experimental collection.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-resource-type">
        <xs:sequence>
          <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
          <xs:element ref="ims:task" minOccurs="0"/>
          <xs:element ref="ims:configuration" minOccurs="0"/>
          <xs:element name="topic-fields" minOccurs="0">
            <xs:annotation>
              <xs:documentation>The list of topic fields employed by this run.</xs:documentation>
            </xs:annotation>
            <xs:complexType maxOccurs="unbounded">
              <xs:element ref="ims:concept"/>
            </xs:complexType>
          </xs:element>
          <xs:element ref="ims:system" minOccurs="0"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>

<xs:element name="guerrilla" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents an evaluation activity performed on corporate IR systems.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-resource-type">
        <xs:sequence>
          <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
          <xs:element ref="ims:task" minOccurs="0"/>
          <xs:element ref="ims:configuration" minOccurs="0"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
<xs:element ref="ims:application" minOccurs="0"/>
<xs:element name="metrics" minOccurs="0">
    <xs:annotation>
        <xs:documentation>The list of metrics and the values associated with this guerrilla.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
        <xs:sequence minOccurs="0" maxOccurs="unbounded">
            <xs:element name="metric">
                <xs:annotation>
                    <xs:documentation>A metric and the value associated with this guerrilla.</xs:documentation>
                </xs:annotation>
                <xs:complexType>
                    <xs:sequence>
                        <xs:element ref="ims:concept"/>
                        <xs:element name="value" type="xs:double">
                            <xs:annotation>
                                <xs:documentation>The value of the metric.</xs:documentation>
                            </xs:annotation>
                        </xs:element>
                    </xs:sequence>
                </xs:complexType>
            </xs:element>
        </xs:sequence>
    </xs:complexType>
</xs:element>

<xs:element name="living" substitutionGroup="ims:resource">
    <xs:annotation>
        <xs:documentation>Represents the specific experimental data resulting from the Living Retrieval Laboratories.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
        <xs:complexContent>
            <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-resource-type">
                <xs:sequence>
                    <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
                </xs:sequence>
            </xs:extension>
        </xs:complexContent>
    </xs:complexType>
</xs:element>

<xs:complexType name="identifiable-timestamp-traceable-parameterizable-resource-type">
    <xs:annotation>
        <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>
    </xs:annotation>
    <xs:complexContent>
        <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
            <xs:sequence>
                <xs:element ref="ims:parameter" minOccurs="0"/>
            </xs:sequence>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>
<xs:complexType>
  <xs:complexContent>
    <xs:extension base="ims:identifiable-resource-type">
      <xs:sequence>
        <xs:element ref="ims:concept" minOccurs="0"/>
        <xs:element name="value" type="xs:string" minOccurs="0"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:element name="experiment-item" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents an item of an experiment.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:identifiable-resource-type">
        <xs:sequence>
          <xs:element ref="ims:experiment" minOccurs="0"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>

<xs:element name="run-item" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents a component of a Run and relates a run with a document retrieved for a given topic.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:identifiable-resource-type">
        <xs:sequence>
          <xs:element ref="ims:run" minOccurs="0"/>
          <xs:element ref="ims:topic" minOccurs="0"/>
          <xs:element ref="ims:information-unit" minOccurs="0"/>
        </xs:sequence>
        <xs:attribute name="rank" type="xs:int"/>
        <xs:attribute>
          <xs:documentation>The rank of the document associated to the run item in the ranked list.</xs:documentation>
        </xs:attribute>
        <xs:attribute name="score" type="xs:double"/>
        <xs:attribute>
          <xs:documentation>The score provided by the system under evaluation to the document corresponding to the run item.</xs:documentation>
        </xs:attribute>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
<xs:element name="corpus" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents a set of informative units.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-resource-type">
        <xs:sequence>
          <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
          <xs:element name="media-types" minOccurs="0" maxOccurs="unbounded">
            <xs:annotation>
              <xs:documentation>The list of media types of the corpus.</xs:documentation>
            </xs:annotation>
            <xs:complexType>
              <xs:sequence>
                <xs:element name="media-type" type="xs:string" minOccurs="0" maxOccurs="unbounded">
                  <xs:annotation>
                    <xs:documentation>The media types of a corpus according to MIME (Multipurpose Internet Mail Extensions) standard.</xs:documentation>
                  </xs:annotation>
                </xs:element>
              </xs:sequence>
            </xs:complexType>
          </xs:element>
          <xs:element name="languages" minOccurs="0" maxOccurs="unbounded">
            <xs:annotation>
              <xs:documentation>The list of languages of the corpus.</xs:documentation>
            </xs:annotation>
            <xs:complexType>
              <xs:sequence>
                <xs:element name="language" type="xs:language" minOccurs="0" maxOccurs="unbounded">
                  <xs:annotation>
                    <xs:documentation>The languages of a corpus.</xs:documentation>
                  </xs:annotation>
                </xs:element>
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
<xs:complexContent>
  <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
    <xs:sequence>
      <xs:element ref="ims:corpus" minOccurs="0" maxOccurs="1"/>
      <xs:element ref="ims:content" minOccurs="0" maxOccurs="1"/>
      <xs:attribute ref="ims:language"/>
      <xs:attribute ref="ims:media-type"/>
      <xs:attribute name="uri" type="xs:anyURI"/>
    </xs:sequence>
  </xs:extension>
</xs:complexContent>

<xs:element name="topic" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents the materialization of an information need.</xs:documentation>
  </xs:annotation>
</xs:element>

<xs:complexContent>
  <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
    <xs:sequence maxOccurs="unbounded">
      <xs:element name="topic-field">
        <xs:annotation>
          <xs:documentation>A field used in this topic.</xs:documentation>
        </xs:annotation>
        <xs:complexType>
          <xs:sequence minOccurs="0" maxOccurs="unbounded">
            <xs:element ref="ims:concept"/>
          </xs:sequence>
          <xs:attribute name="topic-field-contents">The list of contents of the topic field.</xs:attribute>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:extension>
</xs:complexContent>

<xs:element name="topic-field-content"/>

<xs:documentation>The content of a topic field.</xs:documentation>
</xs:element>
<xs:element name="name" type="xs:string">
  <xs:annotation>
    <xs:documentation>The name of the resource.</xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="topic-group" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents a set of topics which are grouped together because they are used to address a research task carried out in an evaluation activity.</xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="ground-truth" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents a component of an evaluation collection.</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="ground-truth-item" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents an item of a ground truth..</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
        <xs:sequence>
          <xs:element ref="ims:ground-truth" minOccurs="0"/>
          <xs:element ref="ims:user" minOccurs="0"/>
          <xs:element ref="ims:concept" minOccurs="0"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>

<xs:element name="experimental-collection" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents a logical entity that allows us to set up a traditional IR evaluation environment.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:identifiable-timestamp-access-controllable-resource-type">
        <xs:sequence>
          <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
          <xs:element ref="ims:topic-group" minOccurs="0"/>
          <xs:element name="corpora" minOccurs="0">
            <xs:annotation>
              <xs:documentation>The list of corpus that belongs to the experimental collection.</xs:documentation>
            </xs:annotation>
            <xs:complexType>
              <xs:complexContent>
                <xs:sequence>
                  <xs:element ref="ims:corpus" minOccurs="0" maxOccurs="unbounded"/>
                </xs:sequence>
              </xs:complexContent>
            </xs:complexType>
          </xs:element>
          <xs:element ref="ims:ground-truth" minOccurs="0"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>

<xs:element name="measure" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents the value of a metric calculated on some experiments handled by the infrastructure.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">  
        <xs:sequence>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
<xs:element ref="ims:concept" minOccurs="0"/>
<xs:element name="value" type="xs:double" minOccurs="0">
    <xs:annotation>
        <xs:documentation>The numerical value of the measure.</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element ref="ims:experiment" minOccurs="0"/>
<xs:element ref="ims:topic" minOccurs="0"/>
</xs:sequence>
</xs:extension>
</xs:complexType>
</xs:element>
<xs:element name="pool" substitutionGroup="ims:resource">
    <xs:annotation>
        <xs:documentation>Represents a container of assessments obtained through the pooling technique.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
        <xs:complexContent>
            <xs:extension base="ims:identifiable-timestamp-traceable-access-controllable-resource-type">
                <xs:sequence>
                    <xs:element ref="ims:links" minOccurs="0" maxOccurs="unbounded"/>
                    <xs:attribute ref="ims:description"/>
                </xs:sequence>
            </xs:extension>
        </xs:complexContent>
    </xs:complexType>
</xs:element>
<xs:element name="pool-item" substitutionGroup="ims:resource">
    <xs:annotation>
        <xs:documentation>Represents a relevance judgment, which is provided on an information unit in the pool for a given topic.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
        <xs:complexContent>
            <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
                <xs:sequence>
                    <xs:element ref="ims:pool" minOccurs="0"/>
                    <xs:element ref="ims:user" minOccurs="0"/>
                    <xs:element ref="ims:concept" minOccurs="0"/>
                    <xs:element ref="ims:topic" minOccurs="0"/>
                    <xs:element ref="ims:information-unit" minOccurs="0"/>
                </xs:sequence>
            </xs:extension>
        </xs:complexContent>
    </xs:complexType>
</xs:element>
<xs:element name="estimate" substitutionGroup="ims:resource">
    <xs:annotation>
        <xs:documentation>Represents the estimated numerical value of a descriptive statistic calculated by the infrastructure.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
        <xs:complexContent>
            <xs:extension base="ims:identifiable-timestamp-traceable-resource-type">
                <xs:sequence>
                    <xs:element name="descriptive-statistic" minOccurs="0" maxOccurs="1">
                        <xs:annotation/>
                    </xs:element>
                </xs:sequence>
            </xs:extension>
        </xs:complexContent>
    </xs:complexType>
</xs:element>
The descriptive statistic for this estimate.

The metric for this estimate.

The numerical value of the estimate.

Represents an example of statistical analysis which can be carried out on the available data.

The list of metrics used in the statistical test.

The ground truth objects used to compute the metrics used in this test.
<xs:sequence maxOccurs="unbounded">
  <xs:element ref="ims:ground-truth"/>
</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="tasks" minOccurs="0">
  <xs:documentation>The task objects used to compute the metrics used in this test.</xs:documentation>
</xs:annotation>
</xs:complexType>
</xs:element>
<xs:element name="measures" minOccurs="0">
  <xs:annotation>
    <xs:documentation>The measure objects used to compute the metrics used in this test.</xs:documentation>
  </xs:annotation>
</xs:complexType>
</xs:element>
<xs:element name="experiments" minOccurs="0">
  <xs:annotation>
    <xs:documentation>The experiment objects used to compute the metrics used in this test.</xs:documentation>
  </xs:annotation>
</xs:complexType>
</xs:element>
<xs:element name="visualizations" minOccurs="0">
  <xs:annotation>
    <xs:documentation>The visualization related to the statistical test.</xs:documentation>
  </xs:annotation>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:extension>
</xs:complexType>
</xs:element>
<xs:complexType name="identifiable - timestamp - traceable - access - controllable - parameterizable - resource - type">
  <xs:annotation>
    <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>
  </xs:annotation>
</xs:complexType>
</xs:element>
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<xs:element name="visualization" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation>Represents the information used by the infrastructure to store and recover whichever visualization of the data that the users do.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:identifiable - timestamp - traceable - access - controllable - parameterizable - resource - type">
        <xs:sequence>
          <xs:element ref="ims:concept" minOccurs="0"/>
          <xs:element name="measures" minOccurs="0">
            <xs:annotation>
              <xs:documentation>The measure objects used to compute the metrics used in this visualization.</xs:documentation>
            </xs:annotation>
            <xs:complexType>
              <xs:sequence maxOccurs="unbounded">
                <xs:element ref="ims:measure"/>
              </xs:sequence>
            </xs:complexType>
          </xs:element>
          <xs:element name="estimates" minOccurs="0">
            <xs:annotation>
              <xs:documentation>The estimate objects used to compute the metrics used in this visualization.</xs:documentation>
            </xs:annotation>
            <xs:complexType>
              <xs:sequence maxOccurs="unbounded">
                <xs:element ref="ims:estimate"/>
              </xs:sequence>
            </xs:complexType>
          </xs:element>
          <xs:element name="snapshots" minOccurs="0">
            <xs:annotation>
              <xs:documentation>The list of snapshot to which this visualization refers.</xs:documentation>
            </xs:annotation>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexType>
  </xs:sequence>
</xs:complexType>
</xs:element>
<xs:complexType>
  <xs:sequence maxOccurs="unbounded">
    <xs:element ref="ims:snapshot"/>
  </xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="experiments" minOccurs="0">
  <xs:annotation>
    <xs:documentation>The list of experiment to which this visualization refers.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence maxOccurs="unbounded">
      <xs:element ref="ims:experiment"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="ground-truths" minOccurs="0">
  <xs:annotation>
    <xs:documentation>The list of ground truth to which this visualization refers.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence maxOccurs="unbounded">
      <xs:element ref="ims:ground-truth"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="tasks" minOccurs="0">
  <xs:annotation>
    <xs:documentation>The list of task to which this visualization refers.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence maxOccurs="unbounded">
      <xs:element ref="ims:task"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="statistical-tests" minOccurs="0">
  <xs:annotation>
    <xs:documentation>The list of statistical test to which this visualization refers.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence maxOccurs="unbounded">
      <xs:element ref="ims:statistical-test"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:complexType>
  <xs:extension base="ims:resource">
    <xs:element name="snapshot" substitutionGroup="ims:resource">
      <xs:documentation>Represents the information used by the infrastructure to store and recover whichever Snapshot of the data that the users do.</xs:documentation>
    </xs:element>
  </xs:complexType>
</xs:complexType>

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A.2 ICI XML Schema

```xml
<?xml version="1.0" encoding="UTF-8"?>
```

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2 <!-- edited with XMLSpy v2012 rel. 2 sp1 (x64) (http://www.altova.com) by Università degli Studi di Padova (Università degli Studi di Padova) -->
4  
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>
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:element>
45 </xs:schema>
<xs:element name="details" minOccurs="0">
  <xs:annotation>
    <xs:documentation xml:lang="en">Additional details which describe the occurred error.</xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="diagnostic" minOccurs="0">
  <xs:annotation>
    <xs:documentation xml:lang="en">Additional diagnostic and debug messages.</xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="namespace">
  <xs:annotation>
    <xs:documentation xml:lang="en">Represents a namespace.</xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="code" type="xs:hexBinary" use="required">
  <xs:annotation>
    <xs:documentation xml:lang="en">The unique code of the error.</xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="type" type="xs:token" use="required">
  <xs:annotation>
    <xs:documentation xml:lang="en">The type of the error.</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:annotation>
  <xs:documentation xml:lang="en">The prefix used for referring to the namespace.</xs:documentation>
</xs:annotation>

<xs:attribute>
  <xs:attribute ref="ims:description"/>
</xs:extension>

<xs:complexType>
</xs:complexType>

<xs:element name="user" substitutionGroup="ims:resource">
  <xs:documentation xml:lang="en">Represents a user.</xs:documentation>
</xs:element>

<xs:complexType>
  <xs:sequence>
    <xs:element name="groups" minOccurs="0">
      <xs:annotation>
        <xs:documentation xml:lang="en">The groups to which the user belongs.</xs:documentation>
      </xs:annotation>
    </xs:complexType>
    <xs:element>
      <xs:complexType>
        <xs:sequence>
          <xs:element ref="ims:group" maxOccurs="unbounded"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="roles" minOccurs="0">
      <xs:annotation>
        <xs:documentation xml:lang="en">The roles the user is acting in.</xs:documentation>
      </xs:annotation>
    </xs:complexType>
    <xs:element>
      <xs:complexType>
        <xs:sequence>
          <xs:element ref="ims:role" maxOccurs="unbounded"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:element name="password" type="xs:string">
  <xs:annotation>
    <xs:documentation xml:lang="en">The password of the user.</xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="first-name" type="xs:string">
  <xs:annotation>
    <xs:documentation xml:lang="en">The first name of the user.</xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="last-name" type="xs:string">
  <xs:annotation>
    <xs:documentation xml:lang="en">The last/family name of the user.</xs:/documentation>
  </xs:annotation>
</xs:element>
<xs:attribute name="affiliation" type="xs:string">
  <xs:annotation>
    <xs:documentation xml:lang="en">The affiliation of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute name="e-mail" type="xs:string">
  <xs:annotation>
    <xs:documentation xml:lang="en">The e-mail of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute name="birth-date" type="xs:date">
  <xs:annotation>
    <xs:documentation xml:lang="en">The birth date of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute name="gender">
  <xs:annotation>
    <xs:documentation xml:lang="en">The gender of the user.</xs:documentation>
  </xs:annotation>
  <xs:simpleType>
    <xs:restriction base="xs:token">
      <xs:enumeration value="MALE">
        <xs:annotation>
          <xs:documentation xml:lang="en">The male gender.</xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="FEMALE">
        <xs:annotation>
          <xs:documentation xml:lang="en">The female gender.</xs:documentation>
        </xs:annotation>
      </xs:enumeration>
    </xs:restriction>
  </xs:simpleType>
</xs:attribute>

<xs:attribute name="address" type="xs:string">
  <xs:annotation>
    <xs:documentation xml:lang="en">The address of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute name="city" type="xs:string">
  <xs:annotation>
    <xs:documentation xml:lang="en">The city of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute name="state" type="xs:string">
  <xs:annotation>
    <xs:documentation xml:lang="en">The state/province/region of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute name="zip">
  <xs:annotation>
    <xs:documentation xml:lang="en">The zip code of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>
<xs:attribute name="phone" type="xs:string">
  <xs:annotation>
    <xs:documentation xml:lang="en">The telephone number of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute name="facsimile" type="xs:string">
  <xs:annotation>
    <xs:documentation xml:lang="en">The facsimile number of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute name="mobile" type="xs:string">
  <xs:annotation>
    <xs:documentation xml:lang="en">The mobile telephone number of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute name="voip-caller-id" type="xs:token">
  <xs:annotation>
    <xs:documentation xml:lang="en">The VoIP caller identifier of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute name="homepage" type="xs:anyURI">
  <xs:annotation>
    <xs:documentation xml:lang="en">The home page of the user.</xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:element name="role" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation xml:lang="en">Represents a role of users.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:namespace-identifiable-timestamp-traceable-resource-type">
        <xs:sequence>
          <xs:element name="users" minOccurs="0">
            <xs:annotation>
              <xs:documentation xml:lang="en">The users acting in this role.</xs:documentation>
            </xs:annotation>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>

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<xs:element name="binary-object" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation xml:lang="en">Represents a binary object.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-controllable-resource-type">
        <xs:sequence>
          <xs:element ref="ims:links" minOccurs="0"/>
        </xs:sequence>
        <xs:attribute ref="ims:media-type"/>
        <xs:attribute ref="ims:language"/>
        <xs:attribute name="link" type="xs:anyURI">
          <xs:annotation>
            <xs:documentation xml:lang="en">A URI that represents a link to the binary object.</xs:documentation>
          </xs:annotation>
        </xs:attribute>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>

<xs:element name="digital-object" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation xml:lang="en">Represents a digital object.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-controllable-resource-type">
        <xs:sequence>
          <xs:element ref="ims:links" minOccurs="0"/>
        </xs:sequence>
        <xs:attribute ref="ims:media-type"/>
        <xs:attribute ref="ims:language"/>
        <xs:attribute name="link" type="xs:anyURI">
          <xs:annotation>
            <xs:documentation xml:lang="en">A URI that represents a link to the digital object.</xs:documentation>
          </xs:annotation>
        </xs:attribute>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>

<xs:element name="concept" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation xml:lang="en">Represents a concept "viewed as an idea or notion; a unit of thought".</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:namespace-identifiable-timestamp-traceable-resource-type">
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
<xs:element name="group" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation xml:lang="en">Represents a group of users.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:extension base="ims:namespace-identifiable-timestamp-traceable-resource-type">
      <xs:sequence>
        <xs:element name="users" minOccurs="0">
          <xs:annotation>
            <xs:documentation xml:lang="en">The users belonging to the group.</xs:documentation>
          </xs:annotation>
          <xs:complexType>
            <xs:sequence>
              <xs:element ref="ims:user" maxOccurs="unbounded"/>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
        <xs:attribute ref="ims:description"/>
      </xs:sequence>
    </xs:complexType>
  </xs:extension>
</xs:element>

<xs:element name="result" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation xml:lang="en">Represent the results of a search.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:extension base="ims:resource-type">
      <xs:sequence>
        <xs:element ref="ims:query" minOccurs="0"/>
        <xs:element ref="ims:resource-class" minOccurs="0"/>
        <xs:element name="items" minOccurs="0">
          <xs:annotation>
            <xs:documentation xml:lang="en">The items retrieved in these results.</xs:documentation>
          </xs:annotation>
          <xs:complexType>
            <xs:sequence>
              <xs:element name="item" maxOccurs="unbounded">
                <xs:annotation>
                  <xs:documentation xml:lang="en">An item of the results.</xs:documentation>
                </xs:annotation>
              </xs:element>
              <xs:attribute ref="ims:identifier" use="required"/>
              <xs:attribute ref="ims:namespace"/>
              <xs:attribute name="rank" type="xs:nonNegativeInteger" use="required"/>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:extension>
</xs:element>
<xs:attribute name="score" use="required">
     <xs:annotation>
         <xs:documentation xml:lang="en">The score of the item. It must be in the [0, 1] interval.</xs:documentation>
     </xs:annotation>
     <xs:simpleType>
         <xs:restriction base="xs:double">
             <xs:minInclusive value="0.0"/>
             <xs:maxInclusive value="1.0"/>
         </xs:restriction>
     </xs:simpleType>
 </xs:attribute>

<xs:attribute ref="ims:created"/>

<xs:attribute name="size" type="xs:nonNegativeInteger" use="required">
     <xs:annotation>
         <xs:documentation xml:lang="en">The size of the results, i.e. the number of items in the results.</xs:documentation>
     </xs:annotation>
 </xs:attribute>

<xs:element name="query" substitutionGroup="ims:resource">
     <xs:annotation>
         <xs:documentation xml:lang="en">Represents a query to be searched for.</xs:documentation>
     </xs:annotation>
     <xs:complexType>
         <xs:complexContent>
             <xs:extension base="ims:resource-type">
                 <xs:sequence>
                     <xs:element name="cql" type="xs:string">
                         <xs:annotation>
                             <xs:documentation xml:lang="en">The CQL representation of the query.</xs:documentation>
                         </xs:annotation>
                     </xs:element>
                     <xs:element ref="ims:resource-class" minOccurs="0"/>
                     <xs:element ref="xcql:xcql" minOccurs="0"/>
                 </xs:sequence>
                 <xs:annotation>
                     <xs:documentation xml:lang="en">The XCQL representation of the query together with its results, if any.</xs:documentation>
                 </xs:annotation>
             </xs:extension>
         </xs:complexContent>
     </xs:complexType>
 </xs:element>
<xs:element name="log-event" substitutionGroup="ims:resource">
  <xs:annotation>
    <xs:documentation xml:lang="en">Represents a log event.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ims:serially-identifiable-resource-type">
        <xs:sequence>
          <xs:element name="message" minOccurs="0">
            <xs:annotation>
              <xs:documentation xml:lang="en">The message describing this log event.</xs:documentation>
            </xs:annotation>
            <xs:complexType mixed="true">
              <xs:complexContent>
                <xs:restriction base="xs:anyType">
                  <xs:sequence minOccurs="0" maxOccurs="unbounded">
                    <xs:element/>
                  </xs:sequence>
                  <xs:attribute ref="ims:language"/>
                </xs:restriction>
              </xs:complexContent>
            </xs:complexType>
          </xs:element>
          <xs:element ref="ims:user" minOccurs="0"/>
          <xs:element name="action" type="xs:token" minOccurs="0">
            <xs:annotation>
              <xs:documentation xml:lang="en">The action performed by the user when this log event was originated.</xs:documentation>
            </xs:annotation>
          </xs:element>
          <xs:element name="ip" type="xs:string" minOccurs="0">
            <xs:annotation>
              <xs:documentation xml:lang="en">The IP address of the host causing this log event.</xs:documentation>
            </xs:annotation>
          </xs:element>
          <xs:element name="resource" minOccurs="0">
            <xs:annotation>
              <xs:documentation xml:lang="en">The resource whose access is causing this log event.</xs:documentation>
            </xs:annotation>
            <xs:complexType>
              <xs:complexContent>
                <xs:extension base="ims:namespace-identifiable-resource-type">
                  <xs:sequence>
                    <xs:element ref="ims:resource-class" minOccurs="0"/>
                  </xs:sequence>
                </xs:extension>
              </xs:complexContent>
            </xs:complexType>
          </xs:element>
          <xs:element name="thread" type="xs:string" minOccurs="0">
            <xs:annotation>
              <xs:documentation xml:lang="en">The name of the thread which generated this log event.</xs:documentation>
            </xs:annotation>
          </xs:element>
          <xs:element name="classname" type="xs:string" minOccurs="0">
            <xs:annotation>
            </xs:annotation>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
The name of the class which generated this log event.

The name of the method which generated this log event.

The line number in the source code of the class which generated this log event.

The name of the file containing the class which generated this log event.

The information about the exception that caused this log event.

The level of a log event.

Designates the finest-grained informational events.

Designates fine-grained informational events that are most useful to debug an application.
<xs:annotation>
  <xs:documentation xml:lang="en">Designates informational messages that highlight the progress of the application at coarse-grained level.</xs:documentation>
</xs:annotation>

<xs:enumeration>
  <xs:annotation>
    <xs:documentation xml:lang="en">Designates potentially harmful situations.</xs:documentation>
  </xs:annotation>
</xs:enumeration>

<xs:enumeration value="WARN">
  <xs:annotation>
    <xs:documentation xml:lang="en">Designates error events that might still allow the application to continue running.</xs:documentation>
  </xs:annotation>
</xs:enumeration>

<xs:enumeration value="ERROR">
  <xs:annotation>
    <xs:documentation xml:lang="en">Designates very severe error events that will presumably lead the application to abort.</xs:documentation>
  </xs:annotation>
</xs:enumeration>

<xs:element name="metadata-set" substitutionGroup="ims:resource">
  <xs:documentation xml:lang="en">Represents a set of metadata resources. Metadata sets can be nested.</xs:documentation>
</xs:element>

<xs:sequence>
  <xs:element name="supersets" minOccurs="0">
    <xs:annotation>
      <xs:documentation xml:lang="en">The super-sets of this metadata set.</xs:documentation>
    </xs:annotation>
  </xs:element>
</xs:sequence>

<xs:sequence>
  <xs:element name="subsets" minOccurs="0">
    <xs:annotation>
      <xs:documentation xml:lang="en">The sub-sets of this metadata set.</xs:documentation>
    </xs:annotation>
  </xs:element>
</xs:sequence>
<xs:sequence>
  <xs:element ref="ims:metadata-set" maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
</xs:element>
</xs:sequence>
<xs:element name="metadata-set" minOccurs="0">
  <xs:annotation>
    <xs:documentation xml:lang="en">The metadata sets to which this metadata belongs.</xs:documentation>
  </xs:annotation>
</xs:element>
</xs:complexType>
</xs:element>
<xsl:element name="links" minOccurs="0">
  <xs:annotation>
    <xs:documentation xml:lang="en">The links among this metadata and other metadata resources.</xs:documentation>
  </xs:annotation>
</xs:element>
<xsl:element name="fields" minOccurs="0">
  <xs:annotation>
    <xs:documentation xml:lang="en">The fields of this metadata.</xs:documentation>
  </xs:annotation>
</xs:element>
Additional attributes of the metadata record, if any. Additional attributes of the metadata record, if any.

An event describing a fact about the provenance of a resource. An event describing a fact about the provenance of a resource.

The timestamp at which the event occurred. The timestamp at which the event occurred.

The user who caused the event. The user who caused the event.

The action carried out in the event. The action carried out in the event.

Indicates the a user created a resource. Indicates the a user created a resource.

Indicates the a user read a resource. Indicates the a user read a resource.

Indicates the a user updated a resource. Indicates the a user updated a resource.
<xs:enumeration value="DELETED">
  <xs:annotation>
    <xs:documentation xml:lang="en">Indicates the a user deleted a resource.</xs:documentation>
  </xs:annotation>
</xs:enumeration>

<xs:enumeration value="ACCESSED">
  <xs:annotation>
    <xs:documentation xml:lang="en">Indicates the a user accessed a resource.</xs:documentation>
  </xs:annotation>
</xs:enumeration>

<xs:element name="what">
  <xs:annotation>
    <xs:documentation xml:lang="en">The resource originated by the event.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="ims:resource"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>

<xs:element name="why" type="xs:token">
  <xs:annotation>
    <xs:documentation xml:lang="en">The motivation that originated the event.</xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="resource-class" type="xs:token">
  <xs:annotation>
    <xs:documentation xml:lang="en">The type of resource retrieved in a search.</xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="owner">
  <xs:annotation>
    <xs:documentation xml:lang="en">The owner of a resource.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="ims:user"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>

<xs:element name="access-permission">
  <xs:annotation>
    <xs:documentation xml:lang="en">The access permission of a group to a resource.</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:enumeration value="DENIED">
    <xs:annotation>
        <xs:documentation xml:lang="en">Denotes that access is denied.</xs:documentation>
    </xs:annotation>
</xs:enumeration>

<xs:enumeration value="READ_ONLY">
    <xs:annotation>
        <xs:documentation xml:lang="en">Denotes the read only access.</xs:documentation>
    </xs:annotation>
</xs:enumeration>

<xs:enumeration value="READ_WRITE">
    <xs:annotation>
        <xs:documentation xml:lang="en">Denotes the read/write access.</xs:documentation>
    </xs:annotation>
</xs:enumeration>

</xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="links">
    <xs:annotation>
        <xs:documentation xml:lang="en">The list of links among two resources.</xs:documentation>
    </xs:annotation>
</xs:complexType>

<xs:element name="link" maxOccurs="unbounded">
    <xs:annotation>
        <xs:documentation xml:lang="en">A link among two resources.</xs:documentation>
    </xs:annotation>
</xs:complexType>

<xs:sequence>
    <xs:element ref="ims:resource">
        <xs:annotation>
            <xs:documentation xml:lang="en">The resource which is acting as source of a link.</xs:documentation>
        </xs:annotation>
    </xs:element>
    <xs:element name="relation">
        <xs:annotation>
            <xs:documentation xml:lang="en">The relation among the source and target resources comprising the link.</xs:documentation>
        </xs:annotation>
    </xs:element>
</xs:sequence>
</xs:complexType>

<xs:element ref="ims:concept"/>
</xs:complexType>

<xs:element>
    <xs:annotation>
        <xs:documentation xml:lang="en">The resource which is acting as target of a link.</xs:documentation>
    </xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
The list of groups which share a resource with their access permissions.

A sharing of the resource with a group.

The content of a resource.

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.

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.
Message Bodies"./xs:documentation>
</xs:annotation>
</xs:enumeration>
</xs:restriction>
</xs:simpleType>
</xs:attribute>
</xs:restriction>
</xs:complexType>
</xs:element>
<xs:attribute name="identifier" type="xs:token">
<xs:annotation>
<xs:documentation xml:lang="en">The unique identifier of a resource.
</xs:documentation>
</xs:annotation>
</xs:attribute>
<xs:attribute name="serial-identifier" type="xs:positiveInteger">
<xs:annotation>
<xs:documentation xml:lang="en">The unique serial identifier of a resource.
</xs:documentation>
</xs:annotation>
</xs:attribute>
<xs:attribute name="namespace" type="xs:token">
<xs:annotation>
<xs:documentation xml:lang="en">The namespace of a resource.
</xs:documentation>
</xs:annotation>
</xs:attribute>
<xs:attribute name="language">
<xs:annotation>
</xs:documentation>
</xs:annotation>
</xs:simpleType>
</xs:attribute>
</xs:complexType>
</xs:element>
<xs:attribute name="country">
<xs:annotation>
<xs:documentation xml:lang="en">The country of a resource.
</xs:documentation>
</xs:annotation>
</xs:attribute>
<xs:attribute name="description" type="xs:string">
<xs:annotation>
<xs:documentation xml:lang="en">The description of a resource.
</xs:documentation>
</xs:annotation>
</xs:attribute>

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Network of Excellence co-funded by the 7th Framework Programme of the European Commission, grant agreement n. 258191
<xs:annotation>
  <xs:attribute name="created" type="xs:dateTime">
    <xs:documentation xml:lang="en">The creation timestamp of a resource.</xs:documentation>
  </xs:attribute>
</xs:annotation>

<xs:attribute name="last-modified" type="xs:dateTime">
  <xs:documentation xml:lang="en">The last modification timestamp of the resource.</xs:documentation>
</xs:attribute>

<xs:attribute name="scope">
  <xs:documentation xml:lang="en">The scope of a resource.</xs:documentation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="PRIVATE">
      <xs:documentation xml:lang="en">Denotes private resources.</xs:documentation>
    </xs:enumeration>
    <xs:enumeration value="SHARED">
      <xs:documentation xml:lang="en">Denotes shared resources.</xs:documentation>
    </xs:enumeration>
    <xs:enumeration value="PUBLIC">
      <xs:documentation xml:lang="en">Denotes public resources.</xs:documentation>
    </xs:enumeration>
  </xs:restriction>
</xs:attribute>

<xs:attribute name="media-type">
  <xs:documentation xml:lang="en">The media type of an object according to MIME (Multipurpose Internet Mail Extensions) standard.</xs:documentation>
  <xs:restriction base="xs:string">
    <xs:pattern value="(text|image|audio|video|application|message|multipart)/([^\s]+)(;[\s\S]*)?"/>
  </xs:restriction>
</xs:attribute>

<xs:complexType name="resource-type">
  <xs:documentation>
    Represents an entity which has identity.
  </xs:documentation>
</xs:complexType>

<xs:complexType name="identifiable-resource-type">
  <xs:documentation>
    Represents an entity which is identified by means...
of a unique identifier.</xs:documentation>
</xs:annotation>
</xs:complexContent>
</xs:complexType>
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</xs:complexType>
</xs:complexType>
</xs:complexType>
</xs:complexType>
<xs:complexType name="namespace-identifiable-timestamp-traceable-access-controllable-resource-type">
  <xs:annotation>
    <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>
  </xs:annotation>
  <xs:complexContent>
    <xs:extension base="ims:namespace-identifiable-timestamp-traceable-access-controllable-resource-type">
      <xs:attribute ref="ims:namespace"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="serially-identifiable-resource-type">
  <xs:annotation>
    <xs:documentation xml:lang="en">Represents an entity which is identified by means of a unique identifier and a serial identifier.</xs:documentation>
  </xs:annotation>
  <xs:complexContent>
    <xs:extension base="ims:resource-type">
      <xs:attribute ref="ims:serial-identifier"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="ici-type">
  <xs:annotation>
    <xs:documentation xml:lang="en">Contains the representation of one or more resources.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element ref="ims:file-metadata" minOccurs="0"/>
    <xs:element ref="ims:resource" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
References


Gamma, E., Helm, R., Johnson, R., and Vlissides, J. (1995). Design Patterns: Elements of Reusable Object–Oriented Software. Addison-Wesley, Reading (MA), USA.


