

# DELIVERABLE

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## Deliverable 9.1 – Annotation Component Design

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2	2010-10-29	Mark James	Made Media Ltd	Executive Summary, Intro, Scope for Storage/Usage & Initial Acceptance Criteria
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### Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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# 1. Executive Summary

This document details the use cases and technical design for the build and integration for a component to provide annotations on items stored in the content repositories of The European Digital Mathematics Library (EuDML).

It comprises:

An introduction to the high-level requirements for annotation within EuDML

An overview of the current technical architecture of the EuDML system, how the Annotation Component fits into this general architecture, along with a summary of research into other technologies which are being used which would be a consideration for the Annotation Component

A summary of the usage of annotations and user engagement features used by other websites

A list of use cases for annotations on EuDML followed by a clarification of scope based on the use cases

A proposed technical design for the Annotation Component comprising a SOAP service interface for creating/managing annotations and collections, and a Linked Data approach (with suggestions for an ontology for annotations)

Acceptance criteria for the final Annotation Component, detailing the points by which the component will be assessed to be completed

## 2. Introduction

The Annotation Component aims to provide annotation support for EuDML, allowing users to add additional metadata to items stored in EuDML content repositories, such as comments, reading lists or corrections. In EuDML, user annotations would be made available to both the EuDML Search Service and the Association Analyser Toolset.

Annotations will allow users to interact with items stored within EuDML; by exposing the annotation support to user via features on the EuDML website & user interface it will create an additional benefit to using the EuDML website over read-only digital libraries.

Annotations exist as a type of additional metadata stored in addition to the Information Resources within the EuDML system.

## 3. Technical Landscape

### 3.1. Project Approach to EuDML System Components

The EuDML architecture follows a Service Oriented Architecture (SOA) paradigm as outlined in the introductory document to the EuDML Architecture and Design [1] (as Figure 2). Work Package 9 should provide a service component for annotations, which communicates with other system components as required.

SOAP communication will be provided and maintained by EuDML system components to allow for communication with external consumers. Communication between EuDML components may be performed using alternative methods where it allows for improved performance of the system, and additional remoting interfaces can be provided to consumers alongside SOAP where those remoting interfaces can provide a benefit.

Each component should be provided as a combination of a Service containing and providing the logic, and one or multiple Service Facades each providing an API to other components/software (as per Figure 3 in the EuDML Architecture and Design [1]). This encapsulation allows communication between the Service and Service Facade to be determined purely by the implementation of each component, and multiple facades provided to meet differing requirements for remoting methods.

### 3.2. Authentication

Users are stored within the YADDA User Directory Component and authorisation & authentication by the YADDA AAS Component being built and provided as part of EuDML Work Package 4.

### 3.3. Resource Identification

Resource identification is currently being defined by WP4 with technical details available on the EuDML wiki [2]. The current identifier scheme for entities within the EuDML system is for an ID representing each entity in the form: urn:euDML:<type\_id>:<object\_id>

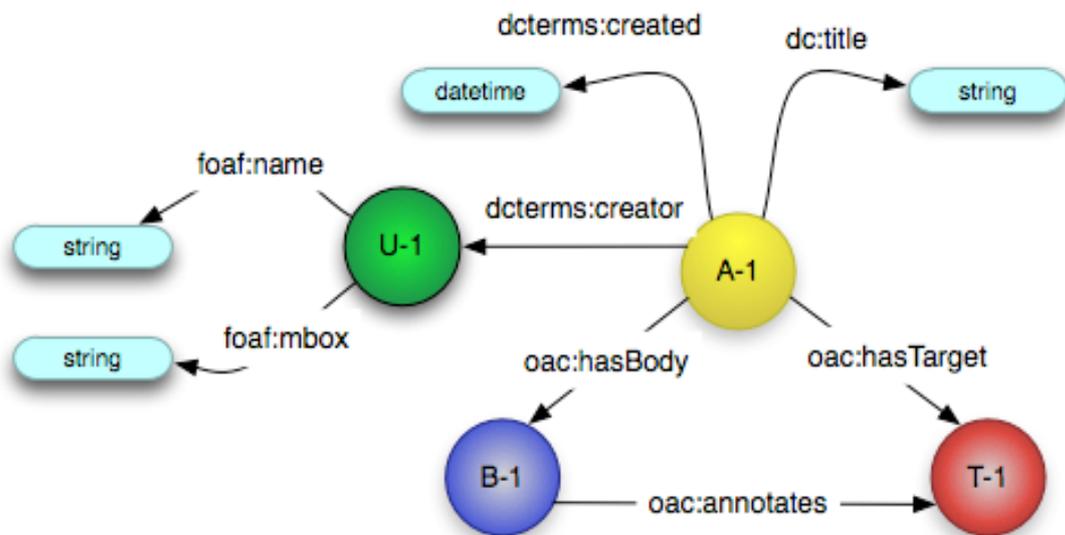
## 4. Other Annotation Services

The annotation support and support for user-interactive features available by the public websites of other digital libraries and academic websites is summarised in Appendix I by means of a matrix showing the sites and their feature set.

Annotea [3] attempted to define an RDF [4] infrastructure/ontology for providing annotations.

OpenAnnotation [5] is a movement to define a standard approach for the annotation of resources using the approach of Linked Data; this approach attempts to model annotations as RDF with dereferenceable URIs [6].

It would be to the benefit of the EuDML project to utilise this existing proposal for annotations; EuDML annotations should exist in the wider ecosystem rather than being contained within a data ‘silo’.



*Fig 1. An overview of the Annotation model provided by OpenAnnotation [5]. A-1 is the annotation entity, B-1 is the body of that annotation, T-1 is the target and U-1 is the author. Other properties are detailed as a relationship to a data type.*

## 5. Use Cases

This section details the following use cases for the Annotation Component:

- UC1 — View all annotations for an item
- UC2 — Add a comment to an item
- UC3 — Respond to a comment (or question/explanation)
- UC4 — Suggest a correction to the metadata for an item
- UC5 — Accept a suggestion for a change in metadata for an item
- UC6 — Reject a correction to the metadata for an item
- UC7 — Provide a link or reference to another relevant (non-item) URL
- UC8 — Provide a link or reference to another relevant EuDML item
- UC9 — Suggest a subject for an item
- UC10 — Add an item to a personal collection
- UC11 — Share a collection
- UC12 — Report an offensive/inappropriate comment
- UC13 — Moderate a comment reported as offensive/inappropriate
- UC14 — Delete Collection
- UC15 — Change name of Collection
- UC16 — Make Collection Public
- UC17 — Make Collection Private
- UC18 — Remove Item from Collection
- UC19 — Withdraw a comment from an item

Each use case listed below includes a summary description, a goal and business case for the inclusion of that use case, in addition to expected use case participants, expected interacting systems/components and the expected user interaction journey (golden path).

NAME	UC1 — View all annotations for an item
SUMMARY	A user wishes to see an item including all annotations which have been made to that item
GOAL	To show on screen a list of all annotations to an item suitable for their language choice which are either public or are owned by that user
BUSINESS CASE	Provides availability of annotation data for review and response by EuDML website users
PARTICIPANTS	Registered Users of Web User Interface, Registered Users via API
STARTED BY	Web User
GOLDEN PATH	User Visits EuDML website → User Logs In → User Visits EuDML Item page → User Can See Annotations
TRANSACTIONS & ENTITIES	List Annotations (Annotation, Item), Authenticate User (User)

INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Search Service, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC2 — Add a comment to an item
SUMMARY	A user wishes to make a public text note about an item (e.g., “This is a really useful article”) via the EuDML website
GOAL	To provide a registered user with a field in which they can add a text note against a specific item
BUSINESS CASE	To allow & encourage interaction with the EuDML system by users
PARTICIPANTS	Registered Users of Web User Interface, Registered Users via API
STARTED BY	Registered Web User
GOLDEN PATH	User Visits EuDML Item page → User selects to make a public comment on the Item page → User Enters Text into Comment Form → Comment is visible on website
TRANSACTIONS & ENTITIES	Authenticate User (User), Add Annotation (Annotation, Item)
INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, Indexing Service, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC3 — Respond to a comment (or question/explanation)
SUMMARY	A visitor to the EuDML website sees a public note and wishes to reply to that note
GOAL	To provide a registered user with a field in which they can add a text note referencing an existing annotation
BUSINESS CASE	To allow & encourage interaction & discourse with the EuDML system by users
PARTICIPANTS	Registered Users of Web User Interface, Registered Users via API
STARTED BY	Registered Web User
GOLDEN PATH	User Visits EuDML Item page → User Can See Annotations → User selects to respond to an existing public comment on the Item page → User Enters Text into Comment Form → Comment is visible on website
TRANSACTIONS & ENTITIES	List Annotations (Annotation, Item), Authenticate User (User), Add Annotation (Annotation, Item)

INTERACTION WITH OTHER USE CASES	Combines ‘UC1 – View all annotations for an item’ and ‘UC2 – Add a comment to an item’
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Search Service, YADDA Storage Service, YADDA User Directory, YADDA AAS, Indexing Service

NAME	UC4 — Suggest a correction to the metadata for an item
SUMMARY	A user notices that a piece of data (such as the date of publication) for an information resource is incorrect, and wishes to submit a correction to EuDML
GOAL	To provide the user with a form with which they can suggest a change to the metadata stored within EuDML for an information resource, and to have that suggestion made available to EuDML moderators
BUSINESS CASE	To improve the quality of information made available by EuDML
PARTICIPANTS	Registered Users of Web User Interface, Registered Users via API
STARTED BY	Registered Web User
GOLDEN PATH	User Visits EuDML Item page → User selects to send a correction → User Enters correction into Form along with note → Correction is shown to moderator for to be accepted
TRANSACTIONS & ENTITIES	Authenticate User (User), Add Annotation (Annotation, Item)
INTERACTION WITH OTHER USE CASES	Leads onto ‘UC5 – Accept a suggestion for a change in metadata for an item’
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, Indexing Service, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC5 — Accept a suggestion for a change in metadata for an item
SUMMARY	After reviewing a suggestion for a change in the metadata for an information resource, a EuDML moderator can update the metadata for that item
GOAL	To provide a moderator with a list of suggestions for corrections, and for the moderator to make a correction to the information resource stored by EuDML
BUSINESS CASE	To improve the quality of information made available by EuDML
PARTICIPANTS	EuDML Moderator
STARTED BY	EuDML Moderator
GOLDEN PATH	Moderator Logs In to EuDML Website → Moderator Views List of Suggested Corrections → Moderator Makes Correction → Correction is replicated across EuDML

TRANSACTIONS & ENTITIES	Authenticate User (User), List Annotations (Annotation, Item), Archive Suggestion (Annotation), Update Item (Item)
INTERACTION WITH OTHER USE CASES	Started by ‘Suggesting a correction to the metadata for an item’
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, Indexing Service, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC6 — Reject a correction to the metadata for an item
SUMMARY	After reviewing a suggestion for a change in the metadata for an information resource, a EuDML moderator can reject that suggestion
GOAL	To provide a moderator with a list of suggestions for corrections, and for the moderator to reject a specific correction
BUSINESS CASE	To reduce the time taken by moderators to moderate corrections by allowing moderators to remove inappropriate suggestions for corrections to information resources so they do not get reviewed multiple times
PARTICIPANTS	EuDML Moderator, Original Correction Submitter
STARTED BY	EuDML Moderator
GOLDEN PATH	Moderator Logs In to EuDML Website → Moderator Views List of Suggested Corrections → Moderator Rejects Correction → Optional Email Sent to original submitter
TRANSACTIONS & ENTITIES	Authenticate User (User), List Annotations (Annotation, Item), Archive Suggestion (Annotation), Send Email (User)
INTERACTION WITH OTHER USE CASES	Started by ‘UC4 – Suggest a correction to the metadata for an item’
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC7 — Provide a link or reference to another relevant (non-item) URL
SUMMARY	A user wishes to make a public text note about an item which references an external item (e.g., “There is an interesting discussion about this topic at <a href="http://www.example.com/forum/1">http://www.example.com/forum/1</a> ”) via the EuDML website
GOAL	To provide a registered user with a field in which they can add a text note against a specific item and allow links to be included
BUSINESS CASE	To allow & encourage interaction with the EuDML system by users
PARTICIPANTS	Registered Users of Web User Interface, Registered Users via API
STARTED BY	Registered Web User

GOLDEN PATH	User Visits EuDML Item page → User selects to make a public comment on the Item page → User Enters Text into Comment Form including URL → Comment is visible on website
TRANSACTIONS & ENTITIES	Authenticate User (User), Add Annotation (Annotation, Item, External URL)
INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, Indexing Service, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC8 — Provide a link or reference to another relevant EuDML item
SUMMARY	A user wishes to make a public text note about an item which references another item on the EuDML website (e.g., “This article discusses similar topics to Another Article”)
GOAL	To provide a registered user with a field in which they can add a text note against a specific item including an excerpt from that item, for that note to appear with an embedded reference to that article, and for that reference to be made available to be analysed by the EuDML system
BUSINESS CASE	To allow & encourage interaction with the EuDML system by users. To improve the quality of information about relationships between information resources stored within EuDML
PARTICIPANTS	Registered Users of Web User Interface, Registered Users via API
STARTED BY	Registered Web User
GOLDEN PATH	User Visits EuDML Item page → User selects to make a public comment on the Item page → User Enters Text into Comment Form including excerpt and reference in specific format → Comment is visible on website
TRANSACTIONS & ENTITIES	Authenticate User (User), Add Annotation (Annotation, Item, External URL)
INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, Indexing Service, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC9 — Suggest a subject for an item
SUMMARY	A user wishes to propose that an information resource on the EuDML website is relevant to a named subject/area of research

GOAL	To provide the user with a form with which they can suggest a new subject to be added to an information resource, and to have that suggestion made available to EuDML moderators.
BUSINESS CASE	To improve the quality of information made available by EuDML
PARTICIPANTS	Registered Users of Web User Interface, Registered Users via API
STARTED BY	Registered Web User
GOLDEN PATH	User Visits EuDML Item page → User selects to add a subject → User Enters correction into Form along with note → Correction is shown to moderator for to be accepted
TRANSACTIONS & ENTITIES	Authenticate User (User), List Subjects (Annotation, Item), Add Annotation (Annotation, Item)
INTERACTION WITH OTHER USE CASES	Leads onto 'UC5 – Accept a suggestion for a change in metadata for an item'
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, Indexing Service, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC10 — Add an item to a personal collection
SUMMARY	A user wishes to add an information resource to a personal (private) collection
GOAL	To provide a mechanism by which a user can create named private collections to store useful items, and add information resources to that collection
BUSINESS CASE	To encourage user interaction with the EuDML website
PARTICIPANTS	Registered Users of Web User Interface, Registered Users via API
STARTED BY	Registered Web User
GOLDEN PATH	User Visits EuDML Item page → User selects to create a new collection from this item → User Enters a name for the collection → The user's collection is displayed including the item
TRANSACTIONS & ENTITIES	Authenticate User (User), Create Collection (Collection), Add Item to Collection (Item, Collection), View Collection (Collection, Item)
INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC11 — Share a collection
SUMMARY	A user wishes to share a collection of information resources with colleagues
GOAL	To provide a mechanism by which a user can share a collection with colleagues who are registered EuDML users
BUSINESS CASE	To encourage user interaction with the EuDML website
PARTICIPANTS	Registered Users of Web User Interface, Registered Users via API
STARTED BY	Registered Web User
GOLDEN PATH	User Visits EuDML ‘My Collections’ page → User clicks to view a collection → User enters email address of colleague → Colleague logs in → Colleague Visits EuDML ‘My Collections’ page → Colleague can now click to display the collection which has been shared with them
TRANSACTIONS & ENTITIES	Authenticate User (User), View Collection (Collection, Item), Add User to Collection (Collection, Item)
INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC12 — Report an offensive/inappropriate comment
SUMMARY	When a user post a comment which is offensive or in some other way inappropriate, a user reports that comment as offensive to start a process of removal/review by moderators
GOAL	To have the comment flagged as offensive/inappropriate for further action to be taken by an EuDML moderator
BUSINESS CASE	To keep EuDML as a system containing only that discussion which is civil
PARTICIPANTS	User of web interface — Adding offensive comment; Users of web interface — Reporting comment as offensive
STARTED BY	User of web interface
GOLDEN PATH	User notices offensive comment on website → User selects the comment and clicks ‘Flag as offensive’ → User is asked to enter reason for report → User is shown message detailing moderator process
TRANSACTIONS & ENTITIES	Authenticate User (User), List Annotations (Annotation, Item), Add Annotation (Annotation), Delete Annotation (Annotation)
INTERACTION WITH OTHER USE CASES	Includes ‘UC2 – Add a comment to an item’; Leads to ‘UC13 – Moderate a comment reported as offensive/inappropriate’

INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS
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NAME	UC13 — Moderate a comment reported as offensive/inappropriate
SUMMARY	When a moderator is notified of an offensive or inappropriate comment, the moderator should be able to take action to remove that comment or user from EuDML.
GOAL	To have the comment removed from public view on EuDML by a moderator. Optionally to remove the user's account access from EuDML
BUSINESS CASE	To keep EuDML as a system containing only that discussion which is civil
PARTICIPANTS	EuDML moderators — Removing annotation & banning user
STARTED BY	UC12 — Report an offensive/inappropriate comment
GOLDEN PATH	Moderator Logs In to EuDML Website → Moderator Views List of Offensive Comments → Moderator Removes Comment → Moderator Removes User's Login Privileges
TRANSACTIONS & ENTITIES	Authenticate User (User), List Annotations (Annotation, Item), Add Annotation (Annotation), Delete Annotation (Annotation)
INTERACTION WITH OTHER USE CASES	Started by 'UC12 — Report an offensive/inappropriate comment'
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC14 — Delete Collection
SUMMARY	When a user has created a collection but now wishes to delete that collection
GOAL	To have the collection removed from the EuDML system.
BUSINESS CASE	To allow the user to remove items from EuDML so that the system does not appear to house stale/unwanted content
PARTICIPANTS	EuDML user (Owner of Collection)
STARTED BY	EuDML user (Owner of Collection)
GOLDEN PATH	User Visits EuDML 'My Collections' page → User clicks to view a collection → User clicks 'Delete Collection' button → If the user's collection has been shared, the user should confirm that their collection should be deleted → Collection is removed from EuDML

TRANSACTIONS & ENTITIES	Authenticate User (User), View Collection (Collection, Item), Delete Collection (Collection)
INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC15 — Change name of Collection
SUMMARY	When a user has created a collection but now wishes to change the name of that collection
GOAL	For the collection’s name to be updated by the owner of that collection
BUSINESS CASE	To allow the user to rename items from EuDML so that the system does not appear to house stale/unwanted content
PARTICIPANTS	EuDML user (Owner of Collection)
STARTED BY	EuDML user (Owner of Collection)
GOLDEN PATH	User Visits EuDML ‘My Collections’ page → User clicks to view a collection → User clicks ‘Delete Collection’ button → If the user’s collection has been shared, the user should confirm that their collection should be deleted → Collection is removed from EuDML
TRANSACTIONS & ENTITIES	Authenticate User (User), View Collection (Collection, Item), Update Collection Name (Collection)
INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC16 —Make collection public
SUMMARY	A user wishes to make their collection of information resources public
GOAL	To provide a mechanism by which a user can change the visibility of a collection to allow all users (registered and unregistered) to view that collection
BUSINESS CASE	To allow EuDML information to be curated by EuDML users
PARTICIPANTS	Registered Users of Web User Interface, Unregistered Users of Web User Interface
STARTED BY	Registered Web User

GOLDEN PATH	User Visits EuDML ‘My Collections’ page → User clicks to view a collection → Selects ‘Make Public’ → Unregistered user visits Collection page
TRANSACTIONS & ENTITIES	Authenticate User (User), View Collection (Collection, Item), Change Collection Visibility (Collection)
INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC17 —Make collection private
SUMMARY	A user wishes to make their collection of information resources private after previously making that collection public or sharing that collection with other users
GOAL	To provide a mechanism by which a user can change the visibility of a collection to remove the ability for all other users to see that collection
BUSINESS CASE	To allow a user to control their presence on EuDML
PARTICIPANTS	Registered Users of Web User Interface
STARTED BY	Registered Web User
GOLDEN PATH	User Visits EuDML ‘My Collections’ page → User clicks to view a collection → Selects ‘Make Private’ → User Confirms action → Page updates to show that Collection is now private
TRANSACTIONS & ENTITIES	Authenticate User (User), View Collection (Collection, Item), Change Collection Visibility (Collection)
INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC18 — Remove Item from Collection
SUMMARY	A user wishes to remove an item (e.g., an article) from a collection they have created which includes that item
GOAL	To provide a mechanism by which a user can delete an item from a collection.
BUSINESS CASE	To allow a user to control their presence on EuDML
PARTICIPANTS	Registered Users of Web User Interface
STARTED BY	Registered Web User

GOLDEN PATH	User Visits EuDML ‘My Collections’ page → User clicks to view a collection → User Selects ‘Remove from Collection’ on an item within that collection → Page updates to show that the item has been removed from that collection
TRANSACTIONS & ENTITIES	Authenticate User (User), View Collection (Collection, Item), Remove Information Resource from Collection (Collection, Item)
INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS

NAME	UC18 — Withdraw a comment from an item
SUMMARY	A user wishes to withdraw a comment that was previously added by that user to an item. The comment should not be removed entirely, but instead replaced with a message which reads the equivalent of “comment withdrawn”
GOAL	To provide a mechanism by which a user can remove the content of an item which they previously added to EuDML
BUSINESS CASE	To allow a user to withdraw a comment made on EuDML (but without removing the history that a comment was made)
PARTICIPANTS	Registered Users of Web User Interface
STARTED BY	Registered Web User
GOLDEN PATH	User Visits EuDML Item page → User Selects ‘Withdraw Comment’ on a comment that they have previously written → User confirms action → Comment is replaced by the localised phrase “Comment withdrawn”
TRANSACTIONS & ENTITIES	Authenticate User (User), List Annotations (Annotation, Item), Add Annotation (Annotation), Withdraw Annotation (Annotation)
INTERACTION WITH OTHER USE CASES	–
INTERACTION WITH OTHER SYSTEM COMPONENTS	EuDML Website Component, YADDA Storage Service, YADDA User Directory, YADDA AAS

## 6. Scope

### 6.1. Storage

The Annotation Component Design should cover where the annotations will be stored, and address issues of identification, replication, and synchronisation.

The Annotation Component Design should detail the data to be stored by an ‘annotation’ entity, and provide examples of the data to be stored for a specific types of annotations as identified in the use cases (to a degree which validates the approach as being able to cover all possible annotation types which describe content items).

The Annotation Component Design should classify the types of data required for storing annotation data.

The Annotation Component Design should not detail an object schema for every possible class of annotation (instead the basic annotation entity should be flexible to cover new annotation types).

The Annotation Component Design should detail the data required for a ‘collection’ entity acting as a collection of information resources.

### 6.2. Usage

The Annotation Component Design should cover method of access to annotations within EuDML for website users and control of access to annotations for specific users through a public/shared/private classification (alongside the access restriction provided by WP4).

The Annotation Component Design should not cover the creation or management of user accounts (covered as part of WP4 and WP6).

The Annotation Component Design should detail the different processes required to be implemented by service facades provided by the component.

The Annotation Component Design should detail the manner by which other resources can be identified and references from within an annotation.

### 6.3. Lifetime

The Annotation Component Design should detail the expectations from a host server for running the annotation component.

The Annotation Component design should specify the expected duration for the hosting/server provision for the component.

## 6.4. Integration

The Annotation Component design should specify the service interfaces which the component will be required to provide to other components, and identify which other components within the EuDML global system will be accessed by these interfaces (include what interfaces will be required to provide data for the website user interface in WP6).

The Annotation Component design should identify the service interfaces of other components which will be required by the annotation component.

## 6.5. User Interface

The Annotation Component design should not attempt to provide details on a graphical user interface (this will be available by way of the global EuDML system/YADDA).

## 6.6. Moderation

The Annotation Component design should detail the processes and human actors involved with moderating annotations.

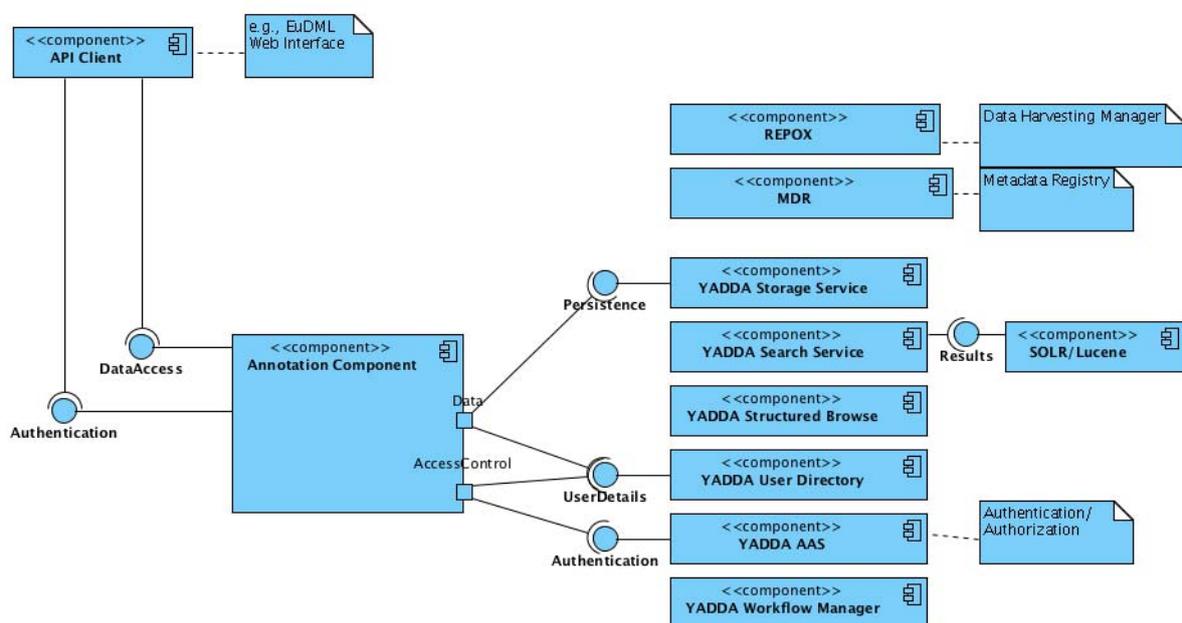
The Annotation Component design should detail the processes and human actors involved with public users flagging annotations as incorrect or offensive.

## 7. Technical Architecture

### 7.1. Overview

The following UML diagram provides an overview of the service layer for EuDML showing the Annotation Component’s interaction with services being provided by other Work Packages and the areas of inter-service communication required for the Annotation Component.

These areas are shown as Service Interfaces and will be implemented by means of a Service Facade to either expose the data or consume data from other system components.



*Fig 2. Component Diagram (for Top-Level Annotation Component)*

### 7.2. Service Interfaces

EuDML must provide the following Service Interfaces (public interfaces are those available to public users, private interfaces are available for communication between component parts of the EuDML system):

**DataAccess (public)** — for requesting/manipulating entities from the component via system tasks (based on the consuming user’s authentication-level)

**Authentication (public)** — for public clients to authenticate with the annotation component

Authentication (internal) — to allow the component to delegate to YADDA AAS for user authentication

UserDetails (internal) — to allow the component to delegate to YADDA User Directory for user authentication/identification

Persistence (internal) — to allow annotations/entities to be permanently stored. This interface also allows components produced as part of other EuDML work packages to access/enrich the annotation data (such as analysing user comments for associations)

Public Service Interfaces should be implemented and exposed as web services using SOAP (Simple Object Access Protocol) v1.2. Private Service Interfaces should be written as required using the protocols defined by those components in WP4.

### 7.3. Service Facades

The above service interfaces will be implemented as service facades during the development of the annotation component.

To conform with existing annotation services available on the web, the design consists of a linked data approach, utilising RDF and SPARQL technologies (to be provided by the component implementation) to provide a system for querying and updating annotations and collections.

#### **Service Facade Implementations**

The system should contain the following Service Facades:

A Service Facade for the public DataAccess service which provides a SPARQL endpoint to an RDF Store, which respects a user's access level when that user has authenticated via the SOAP endpoint.

A Service Facade for the public DataAccess service which provides a SOAP endpoint for creating/deleting entities from the component's RDF Store.

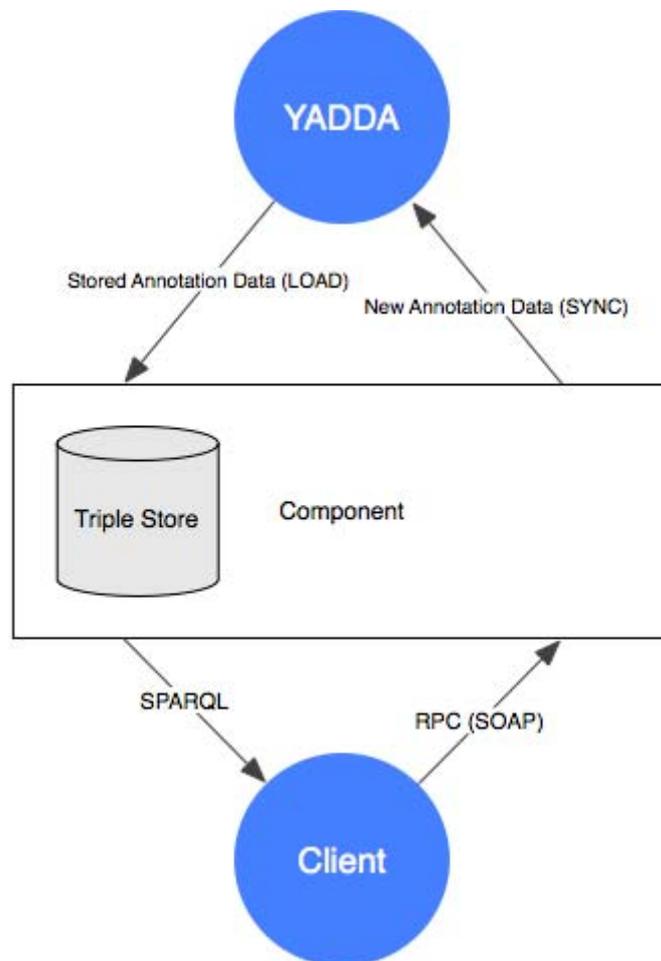
A Service Facade for the public Authentication service which provides a SOAP endpoint for creating access tokens to associate users of the annotation component with their respective permissions in the EuDML access control list.

A Service Facade for the private Data service which synchronises data from YADDA components to the Annotation Component. This service facade should include functionality for a new instance of the annotation component to replicate data from YADDA components into the triple store of the new annotation component installation.

A Service Facade for the private Authentication service which interfaces with YADDA user data & authentication/authorisation components to enable the annotation component to query user levels

and access permissions to allow the annotation component to provide access tokens for use of the public DataAccess service.

A Service Facade for the private Data service which synchronises data from YADDA components to the Annotation Component. This service interface/facade should include functionality for a new instance of the annotation component to replicate data from YADDA components into the triple store of the new annotation component installation.



*Fig 3. A simplified overview of expected communication between a client (either a user using the component as an RDF data store, or the EuDML Website Component using the data via RPC calls), YADDA backend services and the Annotation Component.*

## 7.4. Annotation Component Entities

An Annotation is a comment or other remark on an EuDML Information Resource or EuDML item. The annotation can have a body which may be inline plain text, inline text in another format (e.g., rich text with embedded links and embedded math, or an external resource identified by a URL.

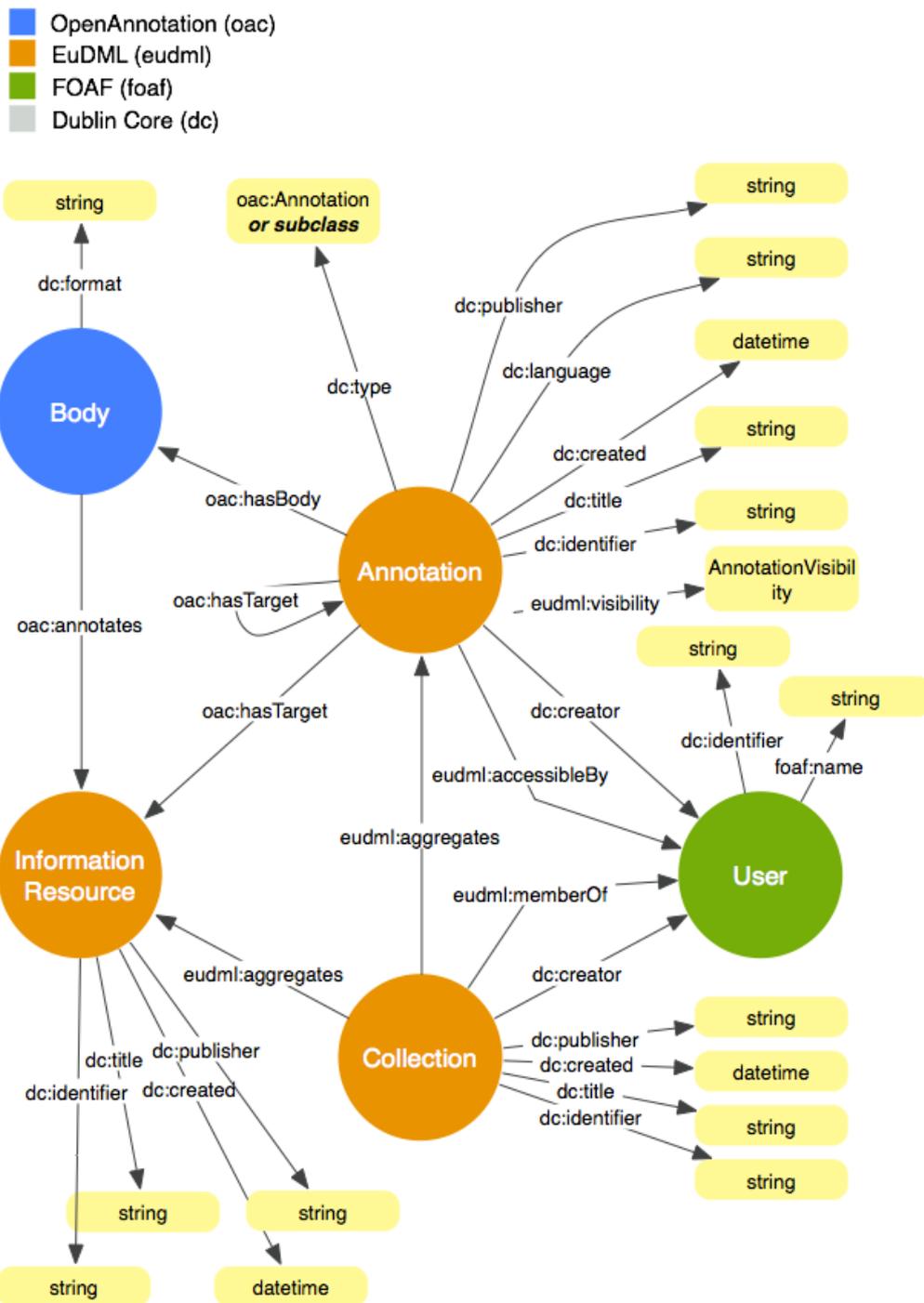


Fig 4. An example of an initial annotation ontology implementing Dublin Core, FOAF OpenAnnotation and custom EuDML ontologies.

A Collection is a grouping of EuDML Information Resources. A user may have multiple active collections (expected to be listed as part of the EuDML website component in that user’s My Collections page or similar), collections may be public, private (only to the user) or private (to the user and any other users that user has shared the collection with).

Figure 4 suggests an initial ontology for the Annotation Component. This diagram is meant to demonstrate the approach which will be taken to fully map and define the require annotation during EuDML deliverables D9.2–D9.4.

The Annotation and Collection entities should have an associated visibility property, which is used to determine which users can see via SPARQL or direct access according to the access control levels determined by the EuDML YADDA AAS Component.

## 7.5. Resource Identification

Internal EuDML Resources should use the EuDML identifier format as specified by WP4 [2], which is provided in a standard URN format.

When making the annotations available to public users, both EuDML Information Resources/Entities and external resources should be specified as a URL or URL Fragment for any resource which is also publically available. If a resource is not available (e.g., the original article text) then the EuDML URN will suffice.

The Annotation Component should allow items to be referenced as URL fragments:

- For HTML/XHTML documents, fragment identifiers should be specified as per RFC 2854/RFC 3236
- For PDF documents, fragments should be specified as per RFC 3778
- For plain text documents, fragment identifiers should be specified as per RFC 5147
- For XML documents, fragments should be specified using XPointer (RFC 3023)
- For media documents, fragments should be specified as per the W3 Media Fragments Specification [7].

## 7.6. Authentication

The component requires the ability to perform authentication of users and transfer the authentication to the RDF DataAccess endpoint.

Authentication should be performed via the SOAP-protocol API provided by the Data Access. Making a request to the Authenticate SOAP remote procedure should return a randomly-generated ‘access token’ for use in further requests to the service interface.

The RDF endpoint should utilise HTTP Basic Authentication over SSL. The username should be the user’s email address, the password should be the SOAP Access Token.

## 7.7. Internationalization

The annotation component should allow a requesting user to specify the language as any request to retrieve annotations or collections.

When an annotation or collection is created, it should be assigned a language as textual IETF language tags (e.g., en-GB, pl-PL or pt-BR). If the language is not specified, the text must be assumed to be in the en language tag with no region or dialect specified. For users interacting with the annotation component via a web browser it is expected that this language can be taken directly from the web browser's language preference.

Where an annotation is made to indicate a subject addition, the user may be indicating a subject which is specific to a language/region (or the text used is a translation of an existing/alternate subject).

Where annotations are being viewed as part of the EuDML website component (EuDML WP9), it is expected that all annotations would be displayed where those annotations are Notes (as per the Annotation Classes Listing in Section 7.5) regardless of language, but Annotations of type 'SubjectAddition' would be only displayed in the user's chosen language.

## 7.8. LaTeX and MathML

The annotation component should allow for users to enter mathematical formula into formatted textual fields as LaTeX or MathML. It is expected that the User Interface Component (WP6) will render embedded LaTeX and MathML markup in their correct graphical representation rather than as plain text.

## 7.9. Annotation Hierarchy

Annotations should have a title (as a Dublin Core 'title' property). In most instances that title should be auto-generated by the component based on the type of annotation and the annotation target.

- OpenAnnotation
- OWL
- RDFS
- EuDML

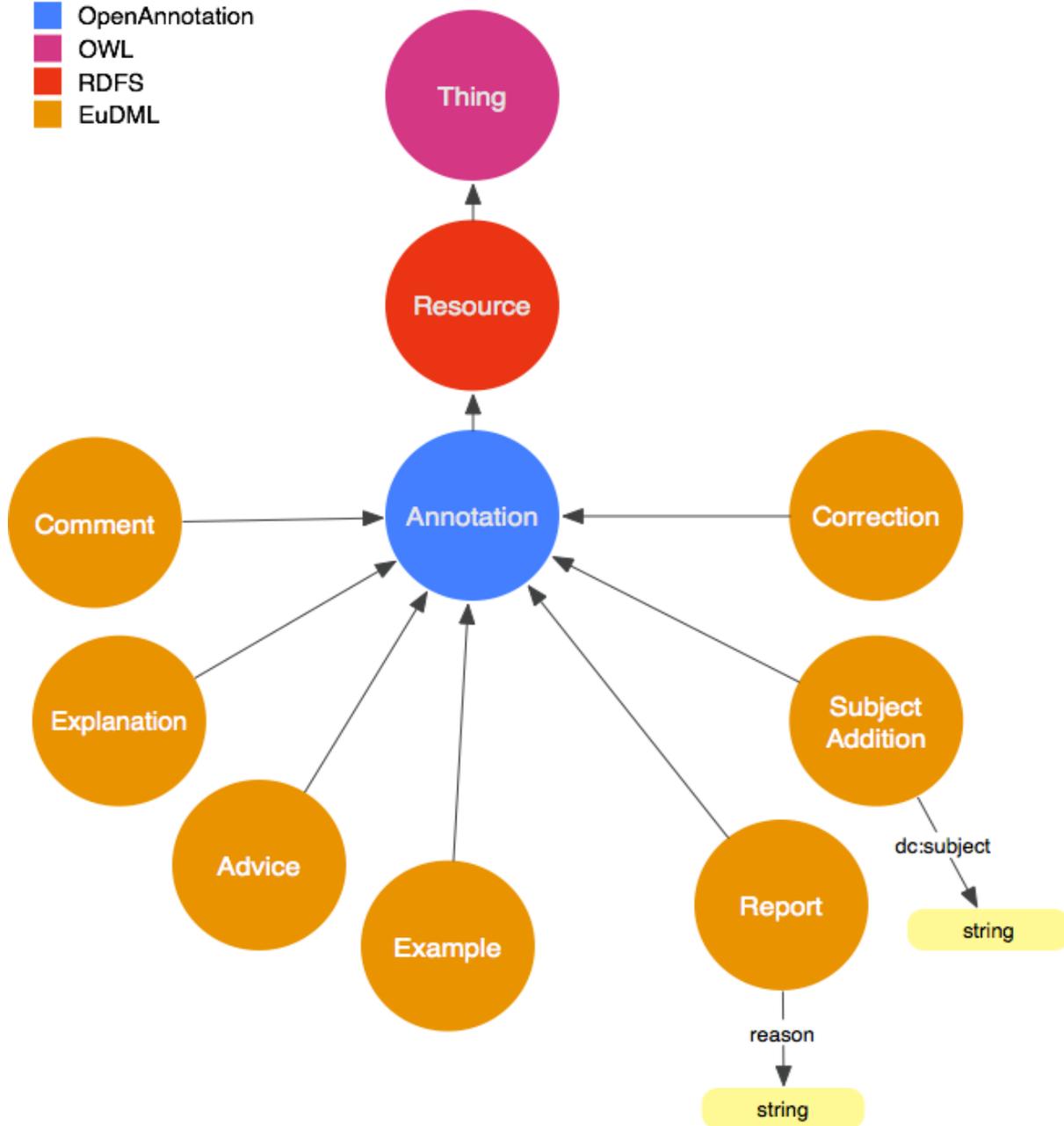


Fig 5. A suggested entity hierarchy for types of annotation within the EuDML annotation component (detailing the annotations as extensions of the OWL, RDFS and OpenAnnotation types)

## 7.10. SOAP Service Interface

The following section details the methods required for implementation of the SOAP service implementation of the public DataAccess and public Authentication service interfaces.

NAME	Authenticate User
RPC NAME	Authenticate

DETAILS	Authenticating a user should require an email address and password as registered in YADDA, and provide an access token for use with subsequent requests to the SOAP or RDF interfaces.
REQUIRED ACCESS	Any
PARAMETERS	email address (string), password (string)
RETURNS	Generated access token of annotation if successful, appropriate error message otherwise

NAME	Add Annotation
RPC NAME	AddAnnotation
DETAILS	Create an annotation. Requires the user to be authorised via the Authentication service interface. Can either reference an existing Annotation, an Information Resource or a Collection. The default visibility for annotations is public, except where the intended viewer for the annotation is a moderator (e.g., a case where a user is reporting an offensive comment) or the target of the annotation is a Collection (in this case the annotation will be created with the visibility level of the collection).
REQUIRED ACCESS	Registered User
PARAMETERS	session token (string), target (URI), type (eudml:AnnotationType), body (string), format (string), language (IETF language tag string), visibility
RETURNS	URI of annotation if successful, appropriate error message otherwise

NAME	Update Annotation
RPC NAME	UpdateAnnotation
DETAILS	Updating the content of an existing annotation. In order for the annotation to be updated, the user must have Moderator-level access
REQUIRED ACCESS	Registered User
PARAMETERS	session token (string), target (URI), type (eudml:AnnotationType), body (string), format (string), language (IETF language tag string), visibility
RETURNS	URI of annotation if successful, appropriate error message otherwise

NAME	Withdraw Annotation
RPC NAME	WithdrawAnnotation
DETAILS	Replaces the Annotation's content with a body representing a withdrawal. The user must have moderator-level access or be the creator of that annotation
REQUIRED ACCESS	Registered User

PARAMETERS	session token (string), Public URL of annotation
RETURNS	URI of annotation if successful, appropriate error message otherwise

NAME	Delete Annotation
RPC NAME	DeleteAnnotation
DETAILS	Delete an annotation. In order for the annotation to be deleted, the user must have Moderator-level access.
PARAMETERS	Public URL of annotation
RETURNS	True if successful, False and error message otherwise

NAME	Share Annotation
RPC NAME	ShareAnnotation
DETAILS	Sharing an annotation should provide access to that annotation to a second user (in the triple store the annotation and the second user should be related with the accessibleBy relationship)
PARAMETERS	Public URL of annotation. EuDML Identifier or email address for user
RETURNS	True if successful, False and error message otherwise

NAME	Unshare Annotation
RPC NAME	UnshareAnnotation
DETAILS	Sharing an annotation must be limited to the creator of that annotation only.
PARAMETERS	Public URL of annotation. EuDML Identifier or email address for user
RETURNS	True if successful, False and error message otherwise

NAME	Change Annotation Visibility
RPC NAME	ChangeAnnotationVisibility
DETAILS	In order for an annotation to have it's visibility changed, the user must have Moderator-level access.
PARAMETERS	Public URL of annotation, new visibility
RETURNS	True and the new visibility if successful, False and error message otherwise

NAME	Create Collection
RPC NAME	CreateCollection
DETAILS	Creating a collection allows the implementation of the bookshelf and also shared public bookshelves. A user can have multiple collections.
PARAMETERS	Collection Name (string), visibility (public or private)
RETURNS	The URL of the new collection if successful, False and error message otherwise

NAME	Share Collection
RPC NAME	AddUserToCollection
DETAILS	Adding a separate user to an existing collection.
PARAMETERS	Collection ID, EuDML Identifier or email address for user
RETURNS	True if successful, False and error message otherwise

NAME	Unshare Collection
RPC NAME	RemoveUserFromCollection
DETAILS	Removing a user from a shared collection
PARAMETERS	Collection ID, EuDML Identifier or email address for user
RETURNS	True if successful, False and error message otherwise

NAME	Rename Collection
RPC NAME	RenameCollection
DETAILS	Renaming an existing collection. Only the owner of a collection can rename a collection
PARAMETERS	Collection ID, New name
RETURNS	True if successful, False and error message otherwise

NAME	Change Collection Visibility
RPC NAME	ChangeCollectionVisibility
DETAILS	Changing the visibility of a collection must also change the visibility of any annotations for which this collection is a target
PARAMETERS	URL of collection, visibility
RETURNS	True and the new visibility if successful, False and error message otherwise

NAME	Delete Collection
RPC NAME	DeleteCollection
DETAILS	The owner of a collection and users with moderator access should can delete a collection
PARAMETERS	URL of collection
RETURNS	True if successful, False and error message otherwise

NAME	Add Information Resource to Collection
RPC NAME	AddToCollection
DETAILS	Adding information resource to a collection allows the user to bookmark a publication
PARAMETERS	URL of collection, URL of Information Resource
RETURNS	True if successful, False and error message otherwise

NAME	Remove Information Resource from Collection
RPC NAME	RemoveFromCollection
DETAILS	Removing an information resource from a collection allows the user to delete a EuDML publication from their (possibly shared) bookmark collection
PARAMETERS	URL of collection, URL of Information Resource
RETURNS	True if successful, False and error message otherwise

## 7.11. Moderation

Moderation for EuDML annotations will be triggered by a user of the site clicking on a ‘Report’ button/link next to a comment. They should be asked to fill in a report message as text.

At this point, the system should create a new annotation of type Report, with the Body of that annotation set to the user’s message, and the target set to the URL/ID of the offending comment. An email should then be dispatched to the EuDML moderator mailing list containing the body of the annotation as text and both the ID of the offending comment and the ID of the ‘report’ annotation.

A page should be developed as part of the website EuDML system component which will allow moderators to search annotations by Type, and also by ID/URL; the user should have the capability of deleting the annotation. This will allow a user with moderator-level access, upon receipt of an email notification, to use the website to remove an offensive comment.

Moderators should have an access level which allows them to see all annotations, including annotations with the visibility level of ‘private’.

## 8. Requirements & Acceptance Criteria

The following table lists the criteria for the Annotation Component to be considered complete and deliverable based on current requirements and scope.

Name	Category	Detail
Use Cases satisfied	Domain Completeness	Each of the use cases is agreed to have been satisfied by the component in a test environment.
Usable by website	Interaction & Access	The component is agreed to provide the correct and appropriate amount of data to the EuDML website frontend to allow a user interface to be built for the component as part of the website.
Interaction Documented	Documentation	The method of completing the golden path for each use case should be documented and added to the EuDML project wiki.
Database Injection	Security	The component will be tested by EuDML project members for possible security flaws for common attack vectors regarding database/information injection. A report from this test will be added to the EuDML project wiki.
Output is safe	Security	The component will be tested by EuDML project members for possible security flaws for common attack vectors regarding cross-site scripting. A report from this test will be added to the EuDML project wiki.
Private Data is Private	Security	The annotation component should. A report should be produced and uploaded to the EuDML wiki that details the requirements for methods/annotations to be private, the methods taken to ensure that privacy is correctly represented by the system.
Maximum Annotation Count	Capacity	The Annotation Component will be determined to be fit for purpose if 1000000 annotations are able to be added to the system during testing.
Maximum Annotation Rate	Capacity	The Annotation Component will be determined to be fit for purpose if 100 annotations are able to be added to the EuDML system within a one minute period during testing.
Load Time	Availability	The annotation component should respond to user queries for set of 10 annotations for an information resource in under 2 seconds during testing.
Uptime	Availability	The component should be stable and be shown to run at a 99.5% uptime during a test period of no shorter than 3 weeks.
Downtime Impact	Availability	A document should be produced detailing the effect of the annotation component being unavailable on other EuDML components/services and potential third-party systems interacting with any public services provided by the EuDML annotation component.

## 9. References

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## 10. Appendix I — Annotation Usage on existing academic Websites and Digital Libraries

The following table summarises the availability of annotations and other interactive features across existing Digital Libraries as per October 2010.

	Mendeley	Project Euclid	Europeana	Google Scholar	Zentralblatt Math (non-beta)	Arxiv	Citeseer	Elsevier	Science Direct	Jstor	Springer Link
User can create an account	YES	YES	YES	YES	YES		YES		YES	YES	YES
Users can share items (e.g. Email, Facebook, Twitter)	YES		YES			YES	YES	YES			YES
Users can get the URL of the page and embed code to share with others				YES							
Users can report a problem on the page				YES							
Users can comment on items by sending an email					YES						
Users can subscribe to RSS							YES	YES	YES		YES
Users can order a Journal								YES			
Users can get a free sample of the journal								YES			
Users can bookmark the item								YES			
Users can email and export citations										YES	
Registered users can save items to a virtual bookshelf	YES		YES	YES			YES		YES		YES
Registered users can organise their bookshelf (i.e. groups)	YES										
Registered users can filter their bookshelf	YES										
From within the bookshelf, registered users can share items	YES		YES								

Registered users can mark items as 'Favourite'	<b>YES</b>										
Registered users can add / submit their own publications	<b>YES</b>						<b>YES</b>				
Registered users can add friends to their network and post status updates	<b>YES</b>										
Registered users can add tags	<b>YES</b>		<b>YES</b>				<b>YES</b>				<b>YES</b>
Registered users can add notes	<b>YES</b>										
Registered users can edit item details – Type, title, authors, publisher, Editors, City, Edition, Pages, Year, URL and Keywords	<b>YES</b>										
Registered users can submit corrections to items							<b>YES</b>				
Registered users can monitor changes to the item							<b>YES</b>				
Registered users can create volume and issue alerts									<b>YES</b>		
Registered users can add items to their quick links									<b>YES</b>		
Registered users can email the author using the envelope icon next to the Author's name									<b>YES</b>		
Registered users can save / export citations										<b>YES</b>	<b>YES</b>
Registered users can save searches										<b>YES</b>	
Authors can track their accepted articles								<b>YES</b>			