

BBT –Submission and Connection Management tool

System Description

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Introduction

In the report “*Definition of a model for sustainable interoperable thesauri maintenance*”¹, we propose a coherent overarching thesaurus for the humanities, a “backbone” or “metathesaurus”, under which all the vocabularies and terminologies in use in the domain can be aligned. The proposed approach is bottom-up; top-level terms are developed by adequate abstraction from existing local terminological systems.

In the design report “*Assisting Backbone Thesaurus use and maintenance*”², we describe how to support all the stakeholders in this endeavor, by proposing a maintenance methodology, along with an assisting toolset that:

- enables independent local thesauri maintainers to create and maintain their thesauri, and at the same time incorporate them while still maintaining their independence, into a shared common thesaurus, that will be available to the public,
- enables the curators of this common scheme of abstract terms (hereafter Backbone Thesaurus, or BBT), to support and maintain the BBT, as a central thesaurus which would provide the general terms under which *local thesauri maintainers* can link/connect their thesauri, and
- enables potential users (public, scientific community, etc.) to browse, navigate, visualize and use this very rich thesaurus that would incorporate the wealth of the different thesauri.

This document describes the methodology and tool (Submission and Connection Management tool) that enables independent local thesauri maintainers and potential BBT users (public, scientific community, etc.) to propose to the curators new BBT terms or modifications on the BBT existing terms, as well as assists local thesauri maintainers to use and link/connect their thesauri to BBT.

¹ “*Definition of a model for sustainable interoperable thesauri maintenance*”, produced by Thesaurus Maintenance Working Group, VCC3, DARIAH EU, Version 1.2, September 2016, (http://backbonethesaurus.eu/sites/default/files/DARIAH_BBT%20v%201.2%20draft%20v4_0.pdf)

² “*Assisting Backbone Thesaurus use and maintenance*”, produced by Thesaurus Maintenance Working Group, VCC3, DARIAH EU, Version 2.0, March 2017, (http://backbonethesaurus.eu/sites/default/files/assistingbackbonethesaurusmaintenance_v2.0_draft.pdf)

1 BBT - Submission and Connection Management tool

The BBT Submission and Connection Management tool is a communication system, developed by FORTH-ICS (www.ics.forth.gr), that supports discussions regarding the changes proposed for the BBT term, hereafter called submissions. It keeps track of the different versions of the BBT and the history of the submissions (related past discussions). It also notifies all the interested parties, about the progress of a submission, and the release of the new versions of the BBT.

The BBT Submission and Connection Management tool is used by *local thesauri maintainers* when they want to suggest changes for the BBT (*contributors*); it provides a form by which they can request modifications/additions/deletions regarding the terms of the BBT model. The tool is also used by the *curators* to browse and review submissions, and decide whether they agree to the suggested changes or disagree and reject/postpone them. The system also provides access to the previous versions of the thesaurus and the history of all the submissions in order to facilitate *curator's* job. The *curators* may also forward a submission to users that are experts in specific domains (*reviewers*), for further consultation. Finally, the tool is used by *thesaurus Reviewers* that take part on specific change-related discussions.

The BBT Submission and Connection Management tool also assists *local thesauri maintainers* to use and link their thesauri to BBT. As mentioned earlier publishing a new version of the BBT may also affect the local thesauri that are linked to BBT and therefore *local thesauri maintainers* need to be notified. The system provides (a) a service for creating (and removing) links originating from BBT terms to local thesauri terms (LOD identified), (b) a storage for contact info, along with (c) a notification mechanism that enables *local thesauri maintainers* to receive information on BBT new releases.

1.1 Users

The BBT Submission and Connection Management tool can be accessed only with a valid username and password. Depending on the user's role, the user will have different rights. The different user-roles of the system are:

- **Contributors:** Contributors are persons who wish to comment or suggest changes on the BBT, requesting additions, deletions or modifications on the BBT terms and their relations. Contributors can also be *local thesauri maintainers* who wish to connect their local thesauri terms to terms in the BBT. Furthermore, *contributor* could be any person who is interested in browsing the BBT terms, their history of submissions and their connections with other thesauri terms.
- **Curators:** The *curators* are responsible for the maintenance of the BBT. Their role is to make changes to the thesaurus by consulting the submissions concerning the current and the previous versions of the thesaurus. They might also ask the consultancy of the thesaurus *reviewers* in order to take a decision about a specific change request.
- **Reviewers:** The *reviewers* review submissions forwarded by the *curators* that are pertinent to their expertise (domain of knowledge), and respond back to the *curators* with proposed changes to the BBT.
- **System Administrators:** The *System Administrators* are responsible for the maintenance of the system information and the system software: manage the new users, take and restore backups, etc.

The system provides a sign-in functionality, which enables anyone to login providing minimum communication information. Signed-in users get the role of *contributor*; to get a different role the user should contact systems administrator.

1.2 System functionality

The system provides navigation on the BBT and its versions, enables the connection of local thesauri terms to BBT terms, receives suggestions on possible changes in the BBT terms, while supporting the discussion on the suggestions and finally provides notifications about BBT releases on all the involved parties/users of the BBT.

1.2.1 Navigate the BBT and its versions

The BBT Submission and Connection Management tool provides browsing and navigation on the tree of BBT terms³ (see Figure 1). It provides forms that display term information (see Figure 2). The user can navigate the thesaurus by moving from term to term while is able from a single form to access the related submissions made for this specific term, all connected-terms from external thesauri to this specific term and the terms version history.

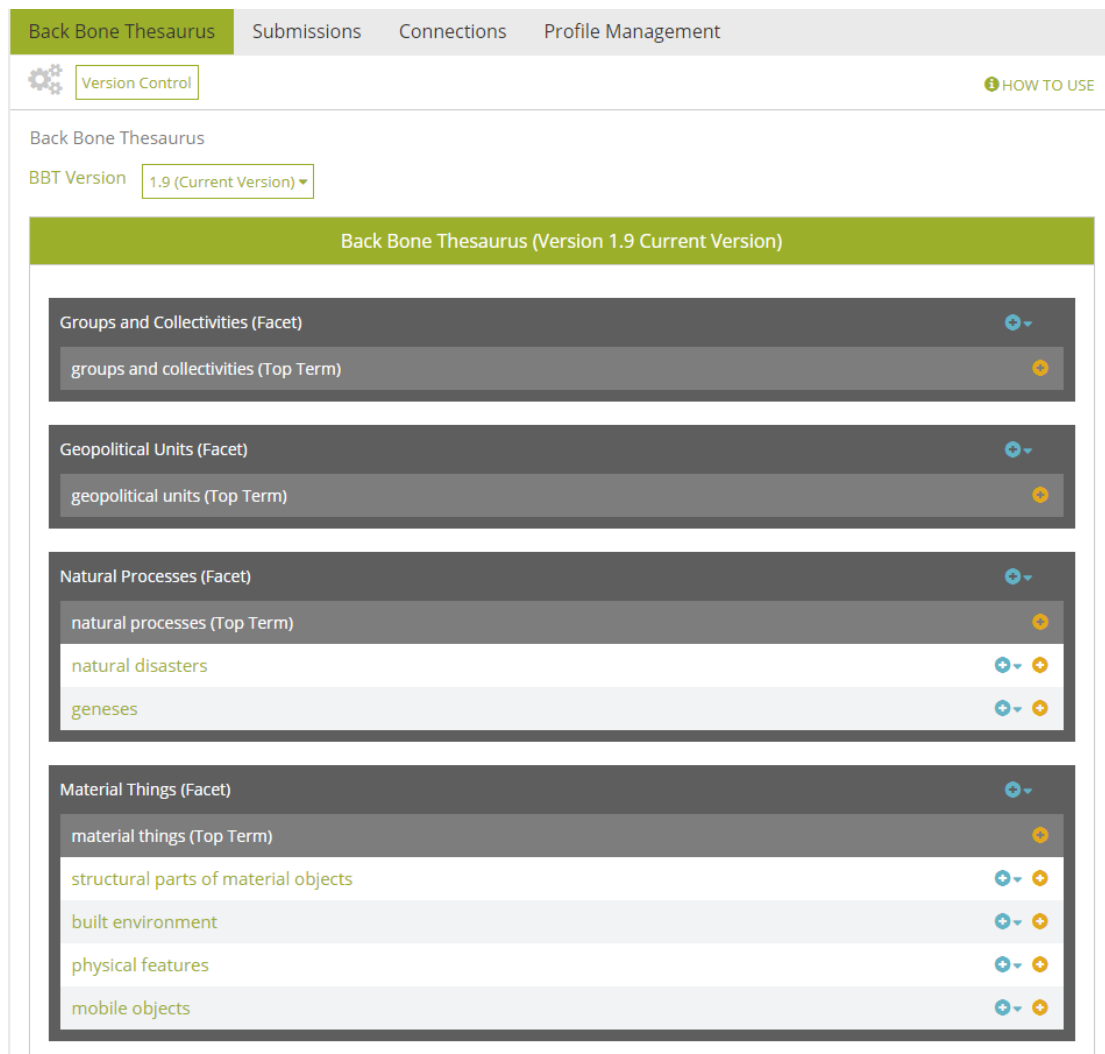


Figure 1: Back Bone thesaurus – tree view

³ Note that the BBT Submission and Connection Management tool does not replace the BBT Access Service (https://vocabs.dariah.eu/backbone_thesaurus), which is responsible for hosting and providing the web-presence and LOD access to the current version the BBT.

Back Bone Thesaurus | Submissions | Connections | Profile Management

Version Control HOW TO USE

Back Bone Thesaurus | Term: disciplines

Term: disciplines view mode

BBT Version: 1.9

Scope Note	This term classifies professional or potentially professional areas of employment, that are socially and/ or legally recognized on the basis of the criteria of self-coherence, the efficacy of the practices they employ, the adoption of common methods and the ability to transfer knowledge and expertise in the relevant professional sector. Each sector includes types of activities that point to a certain unity of action characteristic of some sort of professional or potentially potential specialization. The specialization may relate to the production or modification of material objects, the conception and understanding of activities or phenomena, the provision /transfer of services, knowledge and know-how and the creation of works and phenomena with aesthetic value. Note: It is important to clarify that the terms classified in the "disciplines" term should not be confused with the actor who performs an act or the results of his activity or the method used in order to achieve this result. The actor as "the efficient cause", the result as "the final cause" and the method as the sum of the rules and constraints that an actor follows in order to perform an act, are different terms which belong to different facets and hierarchies. When determining the activities classified in the "Disciplines" hierarchy we should not confuse the history of a specific discipline ie the specific temporal and spatial environment in which this discipline appeared and was perceived with the type of activities characterizing this discipline.
URI	http://vocab.dariah.eu/bbt/Concept/000010
Facet	Activities
Broader	activities
Narrower Term Examples	"construction of material objects and installations ", "conception and comprehension of phenomena ", "provision of knowledge and expertise ", "production of works and/or phenomena of aesthetic value "

[Create new submission for](#) View table of related submissions

[Create new connection](#) View table of local thesauri connections

Figure 2: BBT Term form

1.2.2 Connecting local thesauri terms to BBT terms.

Local thesauri maintainers create their own local thesauri, using their own workflow and software. We encourage local thesaurus maintainers to use terms from BBT as top-terms in their thesauri. This will enable the alignment of their vocabularies and terminologies (thesauri) under one shared thesaurus, the BBT.

The first step in connecting local thesauri with the BBT in general means deciding which of the upper level terms of the local thesauri should be classified⁴ under the general terms of the BBT. We propose, that local thesauri maintainers should include in their local thesauri general BBT terms, by using local terms (declared as "same as"/"exact equivalence" or "narrower of" to the BBT terms, by their LOD identifiers as these are provided by the [BBT Access Service](#)⁵). This would constitute a one-direction link/connection from the local thesaurus to the BBT.

Additionally we use the BBT Submission and Connection Management tool to maintain a second connection originating from the BBT term to its connected term in the local thesauri. The system provides a form (see Figure 3) which enables local thesaurus maintainers to create

⁴ This linking/connection of the local thesaurus with the BBT is performed by the local thesaurus maintainers using their own thesaurus maintenance workflow and software.

⁵ BBT Access Service (https://vocabs.dariah.eu/backbone_thesaurus) provides consistent identification (LOD identification) for all concepts of the BBT, in order to be referenced by the local thesauri. It is based on Scosmos (<http://skosmos.org>) an open source tool customized and maintained by ACDH-OEAW (www.oew.ac.at/acdh).

this connection (LOD identification of the local thesaurus term which is declared as “same as” or “narrower of” the BBT term). The system also stores contact information of the local thesauri maintainers in order to keep them updated for changes on the specific BBT term (e.g. contact e-mail, organization info, etc.). This information is initially received during the user signing-in phase and can be later updated by the user.

The BBT Submission and Connection Management tool also includes a service that notifies the local thesauri maintainers about changes in the new version of BBT that may affect them. For instance, if a BBT term is modified (e.g. its scope note is updated, thus its meaning is altered), all local thesauri developed that are connected to the specific BBT term as a top-terms in their thesauri, should be notified about the change in order to verify if the specific change affects their local thesauri.

Connections | Connections Form (edit mode)

Form for editing a new connection of a local thesaurus with the BBT edit mode

Submitter: lida Submission Date: 13.10.2017 Version: 1.9

BBT Term name*
 Go to BBT

Information related to connected term

Connected Term Name*

Connected Term URI

Connected Term Relation

Information related to connected thesaurus

Thesaurus Name
 Go Edit Delete

Thesaurus Description	my-activities
Thesaurus URI	http://my-activities
Thesaurus Viewer	http://my-activities-viewer

Save

Figure 3: Connection form

Local thesauri maintainers may also decide to disconnect their thesauri from BBT. For that, they should remove the local connections declared as “same as” or “narrower” to the BBT terms (removal of the one-direction link/connection from the local thesaurus to the BBT). Additionally they should use the BBT Submission and Connection Management tool to remove the connection originating from the BBT term to its connected term in the local thesauri (and maybe would also remove the related local thesauri maintainers contact information).

1.2.3 Receive and maintain suggestions on the BBT

The BBT Submission and Connection Management tool also receives requests (submissions) from users who want to suggest changes on the BBT model (*contributors*) and assists the *curators* in making decisions about these requests, by providing full version control on the BBT

and on the submissions. It provides access to the current state of the thesaurus, all BBT previous versions, maintaining all their differences from version to version and finally provides access the history of all submissions.

It provides *contributors* with forms for sending requests for modifications/additions/deletions on specific terms or specific relations of the BBT model (see Figure 5). The *curators* can browse through the submissions, review them and decide whether they agree to accept the suggested change or disagree and reject or postpone the change. To assist them in making their decisions the system provides the previous versions of the thesaurus and the history of all the submissions ever made in order to facilitate the work of *curators*. In Figure 4, we present the Use Case diagram for the submission process. The submission workflow and coordination is described in detail in section 1.4.1.

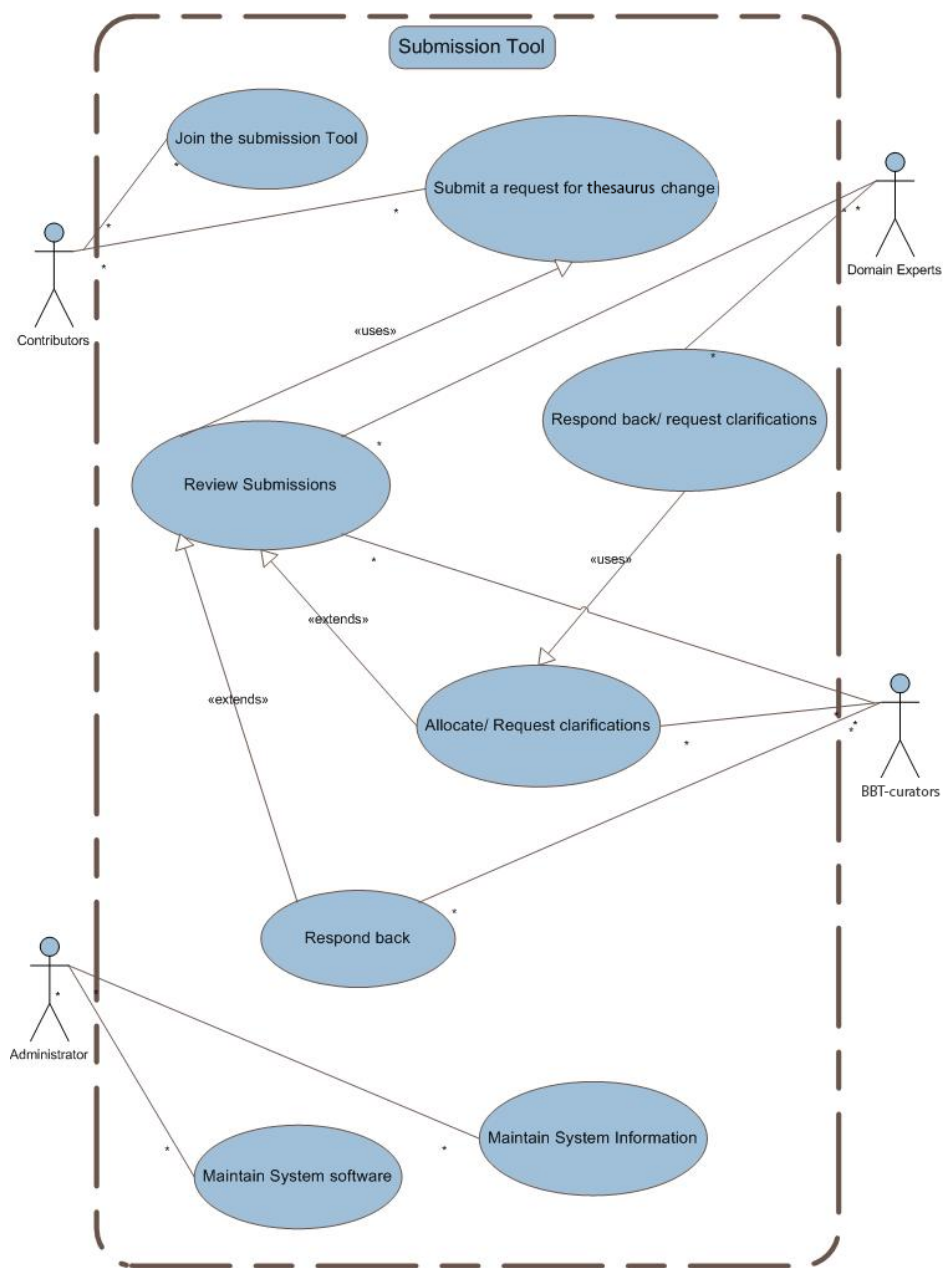


Figure 4: Use Case diagram for the Submission

The *curators* use the [BBT management tool](#)⁶ to implement the actual changes in the thesaurus database. After several minor or few major changes of the BBT model, a release of the BBT may be decided by the *curators*.

[Submissions](#) | [Submission Form \(edit mode\)](#)

The screenshot shows a web form titled "Submission form for creating a new term or facet for the BBT" in edit mode. At the top, it displays "Submitter: sysadmin", "Submission Date: 31.10.2017", and "Version: 1.9". The form contains several fields: "New BBT Term or Facet name*" (text input), "Translation of new BBT Term or Facet name" (text input with example "e.g. de:Aktivität, gr: δραστηριότητα"), "Type*" (dropdown menu set to "Term"), "Scope Note*" (text area), "Translations of Scope Note" (text input with example "e.g. de:Scope note auf deutsch, gr: Scope note στα ελληνικά"), "Broader Term" (text input with "+", "-", and "Go to BTT" buttons), "Justification" (text area), "Relevant submissions" (text input), "Similar Terms or Facets of other Thesauri" (text input), and "Comment" (text area). At the bottom, there are "Save" and "Submit" buttons.

Figure 5: Submission form for creating a new BBT term

As a new version is created, all changes between the new and the previous version of the thesaurus are semi-automatically tracked (some of the changes may need to be manually identified by the *curator*). Now all past submissions follow the current version of the BBT. The mechanism described above enables the system to provide access to the previous versions of the thesaurus, the differences between versions and the history of all the submissions.

⁶ The current BBT management tool, is based on THEMAS system (<http://www.ics.forth.gr/isl/THEMAS>), an open source Web based system for creating, managing and administering multi-faceted multilingual thesauri according to the principles of ISO 25964-1 and ISO 25964-2 standards, developed by FORTH-ICS (www.ics.forth.gr).

The BBT Submission and Connection Management tool provides *contributors* with automatic feedback (email notifications) regarding the status of their submission and the status of the BBT: a new version of the thesaurus (a submission is made) is about to be (or is) released.

1.2.4 Notifications about BBT releases

The BBT Submission and Connection Management tool includes a service that notifies the *local thesauri maintainers* about changes in the new version of BBT that may affect them. For instance, if a BBT term is modified (e.g. its scope note is updated, thus its meaning is altered), all local thesauri developed that are connected to the specific BBT term as a top-terms in their thesauri, should be notified about the change in order to verify if the specific change affects their local thesauri.

Furthermore, the system provides all *contributors* with automatic feedback (email notifications) regarding the status of their submission and the status of the BBT: a new version of the thesaurus (a submission-request is implemented) is about to be (or is) released.

1.2.5 Integration with external systems

The system is designed to be customized to support interaction with other external tools, by using web services technology, which allows the systems to communicate with each other without intimate knowledge of each other's internal behaviour or technology.

A sample of the customizable functions that the system provides via web services are listed below:

1. Add a new submission into the system
2. Return the table of differences between two subsequent versions, as the *curator* has marked them
3. Return the history of a term (all the term differences from version to version)
4. Receive a new BBT version and automatically load it into to the system.

We welcome any suggestions for additional functions or customizations on the existing ones.

1.3 User actions

By using the BBT Submission and Connection Management tool the *contributors* are able to search for a term or a facet in the BBT, to search for other submissions or connections and create a new submission or a new connection. The system stores the history of the dialogue between the *contributors*, the *curators* and the *reviewers* and inform all the interested parties when a change on the thesaurus has occurred or a new version of the thesaurus has been released. All the interested parties are kept up to date, by receiving e-mail from the system. Furthermore, the system assists *local thesauri maintainers* to use and connect their thesauri to BBT.

The functionalities of the system for each of the user-roles are the presented in the following sections.

1.3.1 Contributors actions

The *contributors* have the following functions:

- List all terms and facets in the BBT
- Search for a term or a facet
- View term or facet details
- View the history of a term
- Submit a request for change in the BBT model. The *contributors* can create a submission for adding, deleting, modifying a term or a facet, for merging or splitting terms in the BBT model. The system provides a form where the user has to fill in the

necessary information: term(s), scope note(s), context of use, justification and example.

- List all submissions
- Search for submissions
- View submission details
- Reply to a comment from a *curator* or a *reviewer* on a submission
- List all connections from BBT to all local thesauri
- Search for connections from BBT to all local thesauri
- Create (or delete or modify) a connection from a BBT term to a local thesauri term

1.3.2 Curators actions

The *curators* have all the functions available to the *contributors* as well as:

- Initiate, take part (add comments) and close the discussion on a submission
- Invite *reviewers* on a submission
- Invite a *contributor* to take part on specific parts of the discussion (e.g. request for clarification or explanation)
- Change the status of a submission
- Insert a new Version of the BBT history

1.3.3 Reviewers actions

The *reviewers* have the same functions as the *contributors*, as well as:

- Take part (add comments) on a submission, after invitation from a *curator*
- Invite a *contributor* to take part on specific parts of the discussion (e.g. request for clarification or explanation)

1.3.4 Administrator actions

The *administrators* have the same functions as the *curators*, as well as:

- Manage the users accounts
- Manage submissions and connections

1.4 Submissions

1.4.1 Submission workflow

When inserting a new change request (submission) into the system the *contributor* receives automatic response that certifies the submission. Once this is done, the new submission is inserted into the system's submission pool. Notifications on the new submissions are sent by e-mail to the *curators*, in order to inform them for the new change requests. Furthermore, the *curators* can see the new submissions in the system in their system workspace. The process that is followed after a new submission is described below:

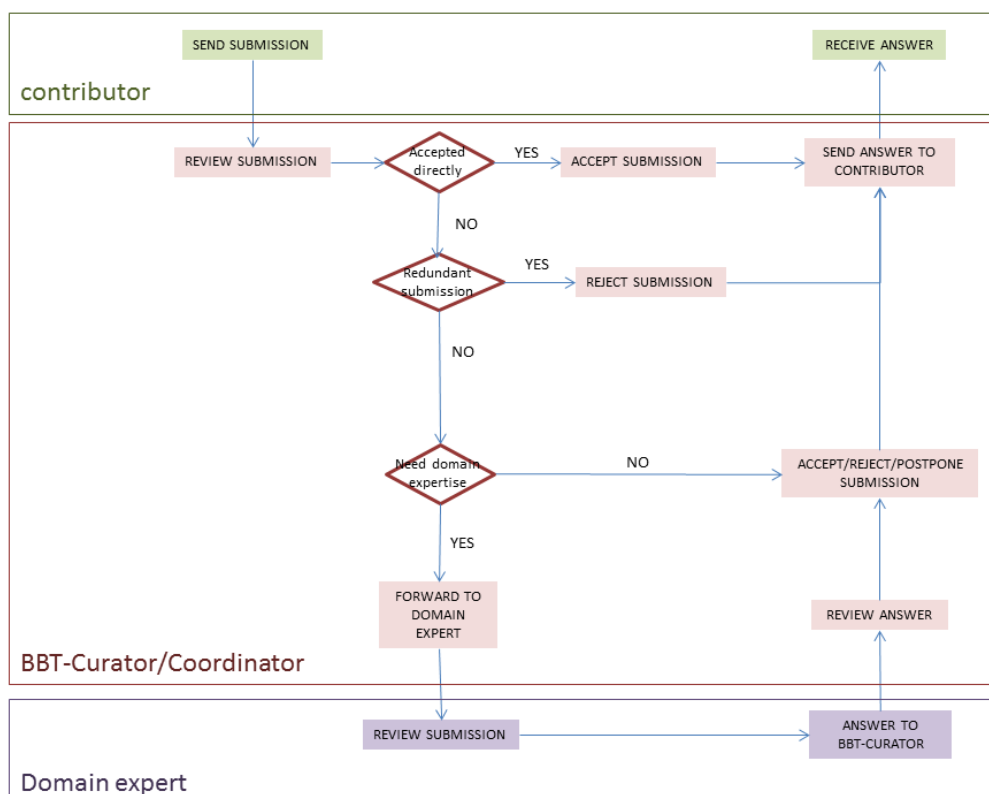


Figure 6: Activity Diagram of the submission workflow

When the new submission is inserted, the *curators* may check whether the submission is redundant, or not, and initiate the discussion on the proposed change, by welcoming the other *curators* to review the new submission. If the submission is directly accepted, one of the *curators* implements the change into the BBT database using the BBT Management Tool. Otherwise the submission is rejected, postponed or beyond *curators'* expertise. If the *curators* consider that the submission is beyond their expertise, they may send it to a *reviewer* (invite him/her in the discussion). The *reviewer* will be informed by e-mail for the submission. After the *reviewer* checks the submission, he/she state his/her opinion on the change. The *curators* review the *reviewer's* answer, and again decide to accept, reject, or postpone the submission. In all cases the *contributors* are informed by e-mail about the progress of their submissions. In Figure 6, above, you can see the activity diagram of the submission workflow. Although it is not presented in the diagram, a discussion may contain many iterations of discussions. A *curator* may end the discussion (e.g. concluding that a common agreement is reached or by asking a voting to take place, etc.).

The *curators* are also responsible to decide upon the publication of a new version of BBT model: a new version of BBT may include several changes of the BBT. In order for an official version of the BBT model to be released, the *curators* use the BBT Management Tool to implement any pending changes in the thesaurus database, as mentioned above. Then they export official version of the BBT model from the BBT Management Tool in two forms: the BBT Definition Document (the official textual description of the BBT model) and the BBT LOD model (a SKOS RDF document). The new version of BBT LOD model should be sent to the BBT – Thesaurus Access tool to be loaded and to be publicly accessible (by the *BBT access providers*).

1.4.2 Submission statuses

Submissions have statuses that can be changed by the selected user actions. They are listed below (see also Figure 7):

- **saved:** The *contributor* may save a submission, without submitting it. Submissions that have been saved and not submitted are registered as “saved”. Only the contributor sees his saved submissions and he may also delete them.
- **submitted :** Once the *contributor* sends a submission, the submission takes the status “submitted”. This status shows that the submission has not yet been checked from the *curator*. The *contributor* may delete his submission or change its status back to “saved” to be able to update his submission.
- **under discussion:** After the submission is sent, the *curator* checks the submission and starts the discussion with other *curators* about the submission by adding comments to the submission. Now the submission is on a discussion-track and cannot be updated or deleted.

There is a case that he might need some explanations or even more information about the submission. If that is the case, then he sends a submission back to the *contributor* or a *reviewer*. The *contributor* or the *reviewer* reviews the received submissions and replies giving explanations or more information about the submission.

- **(accepted) on implementation:** When a submission has the status “on implementation”, means that the change request is in the phase of implementation.
- **(accepted) wait for release:** After the implementation is completed, the *curator* changes the submission status to “wait for release”. Now no more comments may be added to the submission.

Notice that the contributors see the above two statuses as “accepted”.

- **postponed:** The request for change will be reviewed later in time.
- **rejected:** The request for change is considered as not implementable and all the parties are informed.
- **released:** When a new official version of the BBT model is released, all submissions with status “wait for release” change to “released” and all the interested parties are informed about the final status of the request for change.

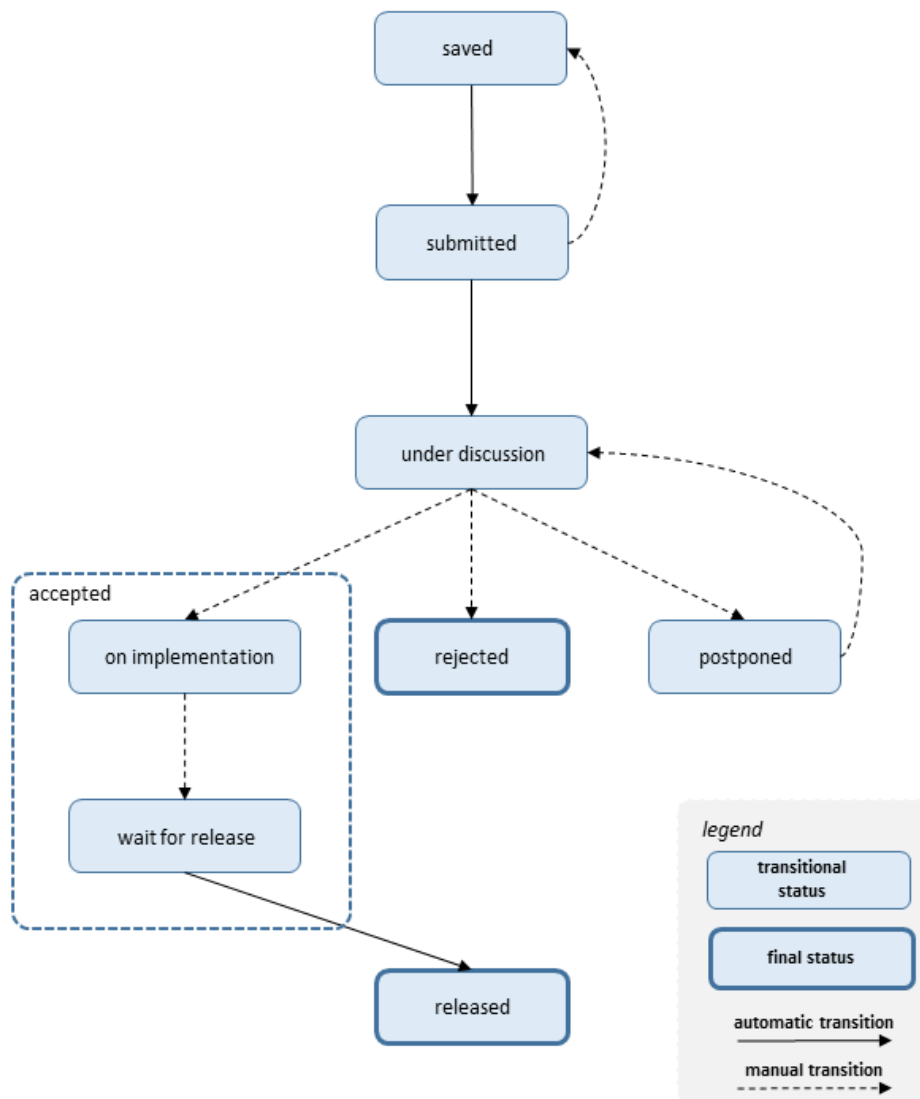


Figure 7: Sequence Diagram of submission statuses

1.5 Implementation details

1.5.1 System Architecture

The system is developed on a 3-tier architecture, which allows us to create a modular code that can be easily maintained and expanded.

Storage management

The *storage management* module includes a XML Database where all the RDF files of BBT versions, XML term definition files (one for each term), the XML submission files, the XML files describing the connections and related local thesauri, as well as the XML files for user profiles and their local thesauri information. The system stores all the versions of the BBT; each version of the BBT includes the thesaurus information in an RDF (SKOS) document and the XML term definition files (one for each term) that contain the description of terms and relations between terms.

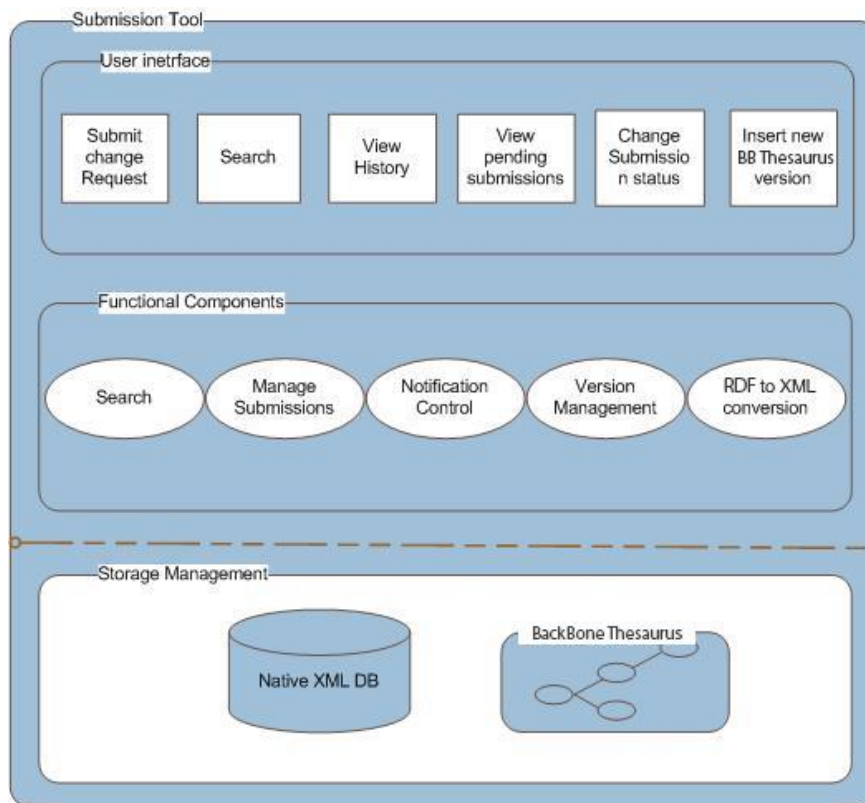


Figure 8: System Architecture

User interface

The *user interface* includes the interaction components that *contributors*, *curators* and *reviewers* use for the change requests, along with change-request reviewing and thesaurus versioning reviewing and the *search*. Notice that the actions provided to the users depend on the users' role. This front-end of the system provides users with clear view of the operations available for the specific documentation stage. The system's functionality is invoked with simple user actions, such as button selections etc.

Functional components

The *functional components* constitute the basic mechanism that incorporates all the system's intelligence. It includes various functional modules such as the *search* mechanism for the submissions, search mechanism for the Terms, the mechanism for adding a new submission, the *permissions management* component, the *notification control* mechanism, the *version Management* component, the *RDF to XML conversion* module, etc. These modules are invoked by user actions or through the interaction with other modules and react with the storage mechanism.

1.5.2 System Platform

Web Application Server and Web-browser

The Submission and Connection Management tool is a *web based on-line application*, which is based on *client-server architecture*. As mentioned earlier, the system is developed using J2EE technology, on a 3-tier architecture, which allows us to create modular code that can be easily maintained and expanded. It is accessible to every *user* who owns a login account. The only prerequisite for using the tool are access to the World Wide Web (Internet) and a Web Browser (e.g. Internet Explorer, Mozilla Firefox, etc.).

Database

We have chosen eXist Native XML DB, as our system XML database. The choice has been made based on the following criteria: open source, documentation, reputation, encoding support, interface capability with other systems.

Operating system

The Submission and Connection Management tool Application Server is developed and operated on a Windows Operating system, but we expect to run smoothly on any operating system since the underlying technologies are running on any operating system.

1.6 System Access

- Web Application <http://backbonethesaurus/SCMT>

For more details, please contact daskalak@ics.forth.gr or georgis@ics.forth.gr.