



SLR-Tool: A tool for developing Systematic Literature Reviews

User's manual



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1. INTRODUCTION

Upon opening the application a menu appears showing the various options that can be put into practice.

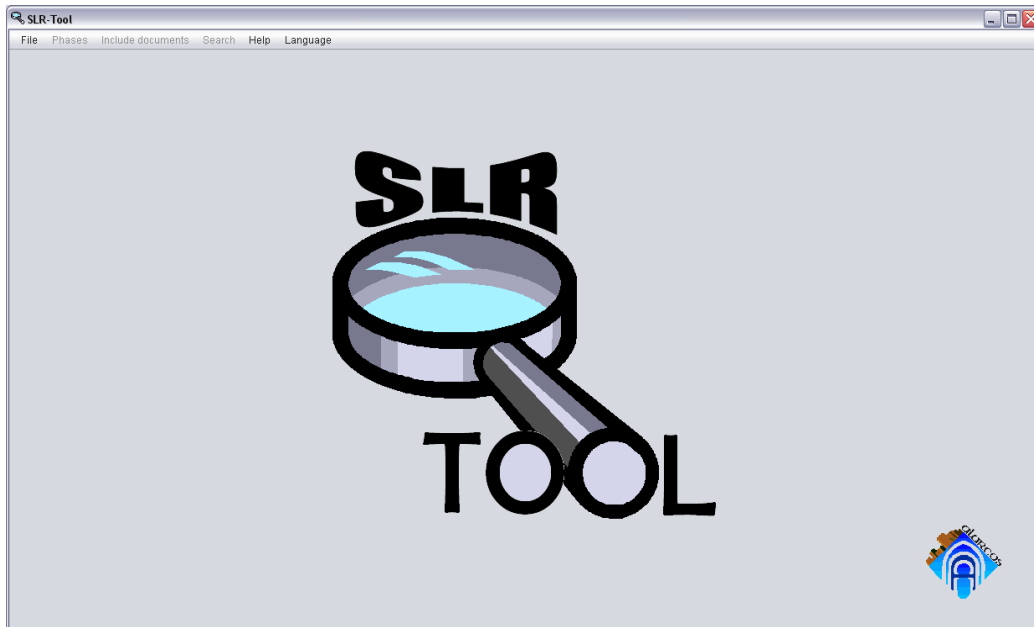


Figure 1. Main Screen

Hereafter, each of the option of the main menu will be thoroughly described.

1. FILE MENU

There are three possible options in the File menu:

- **New.** This menu option allows the user to create a new review in the application. A window appears which requests the name of the review to be created. This name will identify the review when it is necessary to access it in the future.

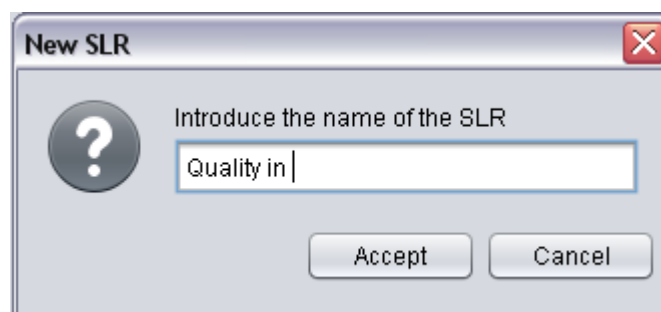


Figure 2. Introduce a new review

If the name introduced for the review already exists, or is not filled in, the tool will show a message indicating that an error has occurred.



Figure 3. Possible errors upon creating an SLR

- **Open.** This menu option allows the user to access previously created reviews.

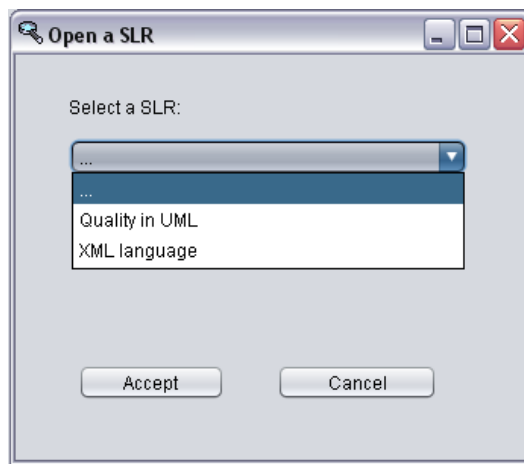


Figure 4. Open a review

As with the previous option, if no review is selected and the accept button is pressed, a message appears to inform the user that a review must be selected.



Figure 5. Error upon opening a SLR

- **Exit.** This option closes the application.

2. PHASES MENU

The phase menu contains three options whose functions are as follows:

- *Planning (protocol)*. This opens the view regarding those activities related to the planning phase of the review .
- *Execution*. This opens the view regarding those activities related to the execution phase of the review.
- *Report results*. This opens the view regarding those activities related to the phase in which the results of the review are presented.

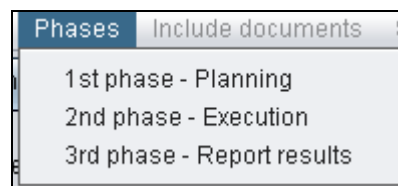


Figure 6. *Phases menu options*

2.1. PLANNING PHASE

Once a review has been created/opened or when the planning phase is selected the screen related to the planning phase of the review will appear.

Figure 7. *Planning phase: General Data*

As Figure 7 shows, the view related to planning is made up of 6 tabs, whose functions will be explained as follows.

2.1.1. GENERAL DATA TAB

The first tab, *General Data*, contains the least specific data in the revision. In the upper part it is possible to alter the name of the review, and to introduce the dates upon which the review commenced and was completed. The latter is done by filling in the date in the space provided for this, by following the format d/m/y. If the date introduced complies with the format, the text will appear in green. Otherwise it will appear in red. Another option for adding the date is to use the button situated next to the text frame. This will cause a calendar to appear which will provide the user with easy access to the necessary date



Figure 8. Planning phase: Calendar

It is also possible to add those participants who are in charge of the search and the selection of documents to individual tables. This is done by clicking onto the button which appears below each table, thus causing a dialogue frame to appear which will ask for the name of the person to be introduced.



Figure 9. Planning phase: Add Participant

Three text frames appear on the rest of the screen to which comments related to the background of the review, the justification for carrying this out and certain planning details can be added.

When the save button, which appears in the bottom left-hand corner, is pressed all the changes made in all the previously explained text fields are saved.

2.1.2. RESEARCH QUESTIONS TAB

The next tab, *Research Questions*, shows the point at which the research questions of the review that is being carried out are defined.

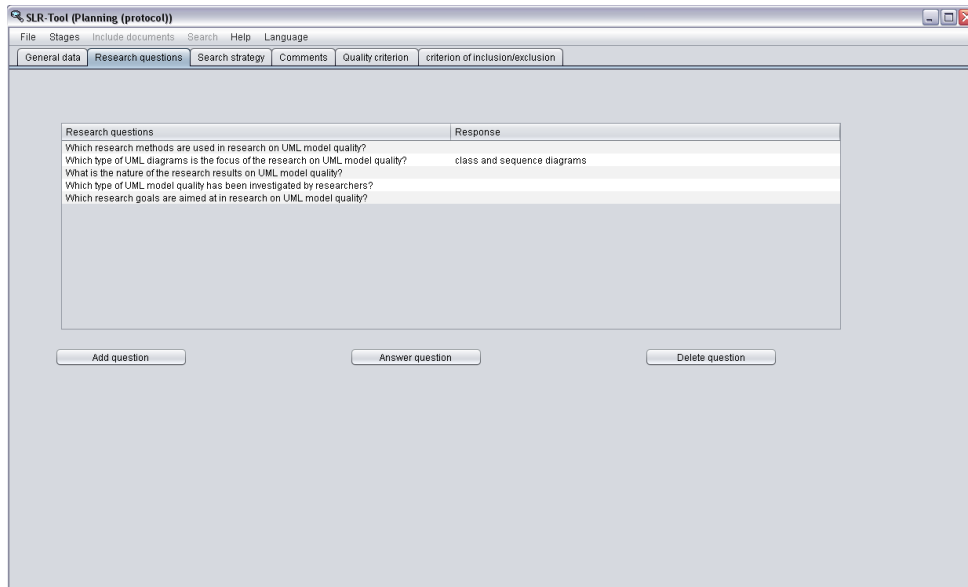


Figure 10. Planning phase: Research Questions

In this tab a table appears with those research questions which have been stored in the tool, along with their respective answers.

The research question is attached by pressing the *Add Question* button, upon which a dialogue appears which requests a description of the question.

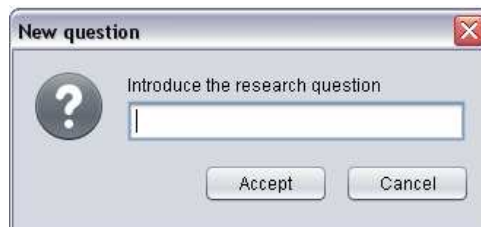


Figure 11. Planning phase: introduce Research Question

If we wish to answer a question it is necessary to first select the line of the table containing the question that we wish to respond to and to then press the *Answer question* button. If no line is chosen, an error message will appear to indicate that we must select a line. If the line has been selected, a dialogue similar to that previously shown will appear which will request the answer to the question.

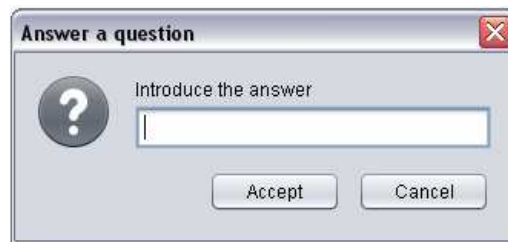


Figure 12. Planning phase: Answer research questions

If we wish to delete a question it is necessary to first select the line in the table corresponding to the question that we wish to eliminate, and to then press the Delete button. The question is thus deleted, but if no line is chosen the aforementioned error message also appears.

2.1.3. SEARCH STRATEGY TAB

The next tab *Search Strategy* concerns the protocol definition phase in which the search strategy is defined.

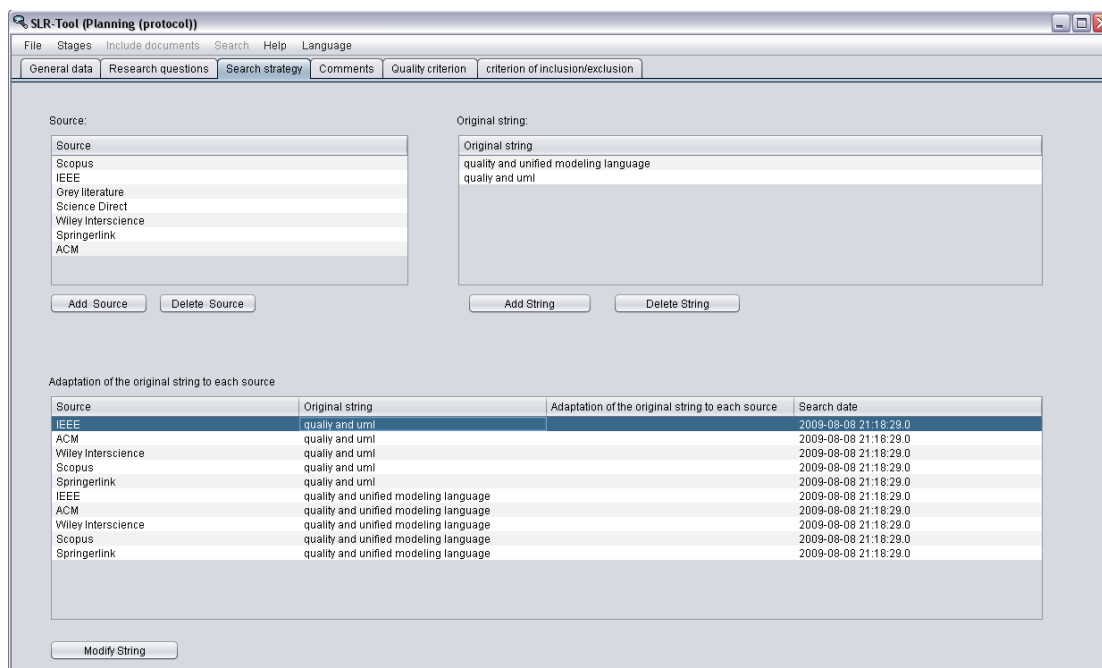


Figure 13. Planning phase: Search Strategy

At this point it is necessary to define the sources which will be used to search for the documents. To do this, we press the *Add source* button, which will cause a window to appear in which we can request the name of the source. If the name space is left empty, an error message will appear, but if a name is filled in it will be stored. A source can be deleted by selecting a line in the sources table and pressing the *Delete sources* button, which will cause the source to be deleted.

Similarly, it is also possible to add original search strings which will use the sources to obtain the documents. Search strings can be added and deleted in a manner similar to that of the sources, by pressing the *Add string* or *Delete string* buttons respectively.

These crosses are shown in the lower table (Figure 13), which represents the adaptation of the strings to each source. These lines can be modified by adding the string eventually used in a certain source and the date upon which the search was carried out. To do this, it is necessary to click on to the line that you wish to modify and press the *Modify string* button. A new window will appear which will request the necessary data. The results will be stored once the *Accept* button of said window has been pressed.

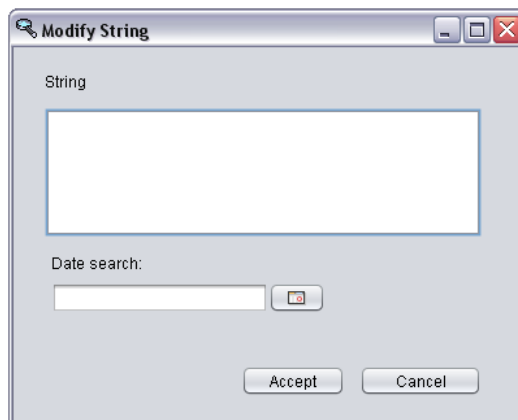


Figure 14. Planning phase: Modify search string for a source

2.1.4.COMMENTS TAB

The next tab, *Comments*, shows those options related to the management of user comments.

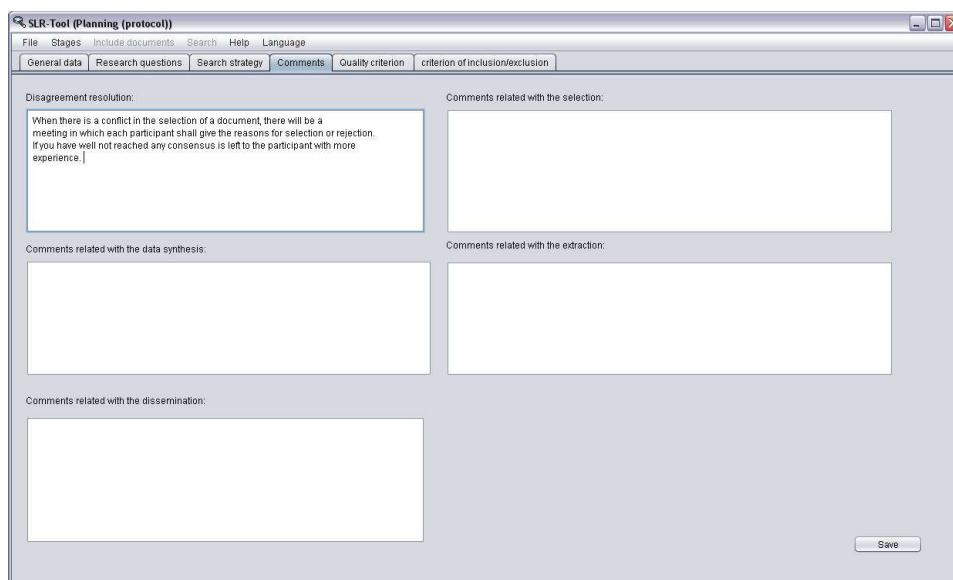


Figure 15. Planning phase: Comments

As Figure 15 shows, it is possible to add comments related to various aspects.

The various text frames can be used to add comments related to the selection of primary studies, to the extraction of data from these, and to the synthesis of the data extracted. They can also be used to show the results obtained. Comments related to the method to be followed can additionally be added when conflicts arise with regard to the various decisions made by the different participants in the review. There is a *Save* button in the bottom left-hand corner which is used to store all changes made in the aforementioned fields.

2.1.5. INCLUSION/EXCLUSION CRITERIA TAB

The inclusion/exclusion criteria tab manages the inclusion and exclusion criteria which influence the selection of primary studies.

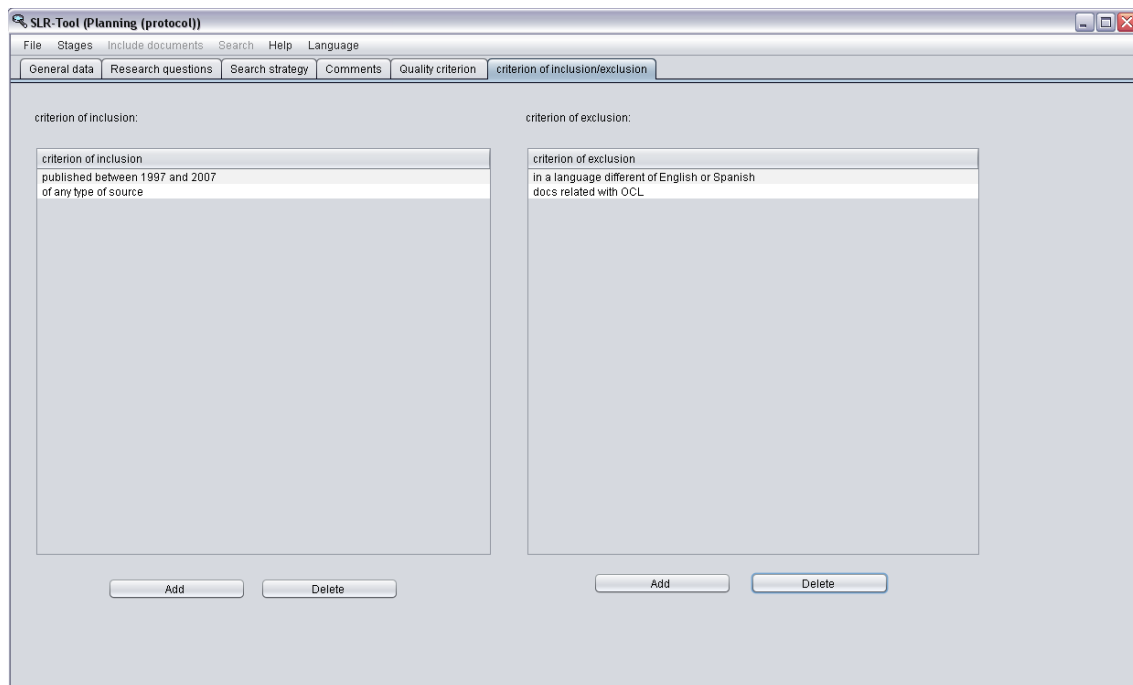


Figure 16. Planning phase: Inclusion/exclusion criteria

Two different tables appear in this tab, one for inclusion criteria and the other for exclusion criteria. Both function in a similar way: if we wish to add a criterion we must press the *Add* button which appears beneath the table corresponding to the type of criteria that we wish to add. If we wish to delete a criterion we must select the line in the criterion table that we wish to delete, and press the *Delete* button, which is beneath said table. The corresponding criterion will then be deleted. As with the aforementioned cases, if no line is selected and the delete button is pressed, the user will receive an error message.

2.1.6. QUALITY CRITERIA TAB

The last tab in the review phase is that of *Quality Criteria*, which manages all the quality criteria necessary to evaluate the quality of the empirical studies studied in the review (if that is the objective of the review).

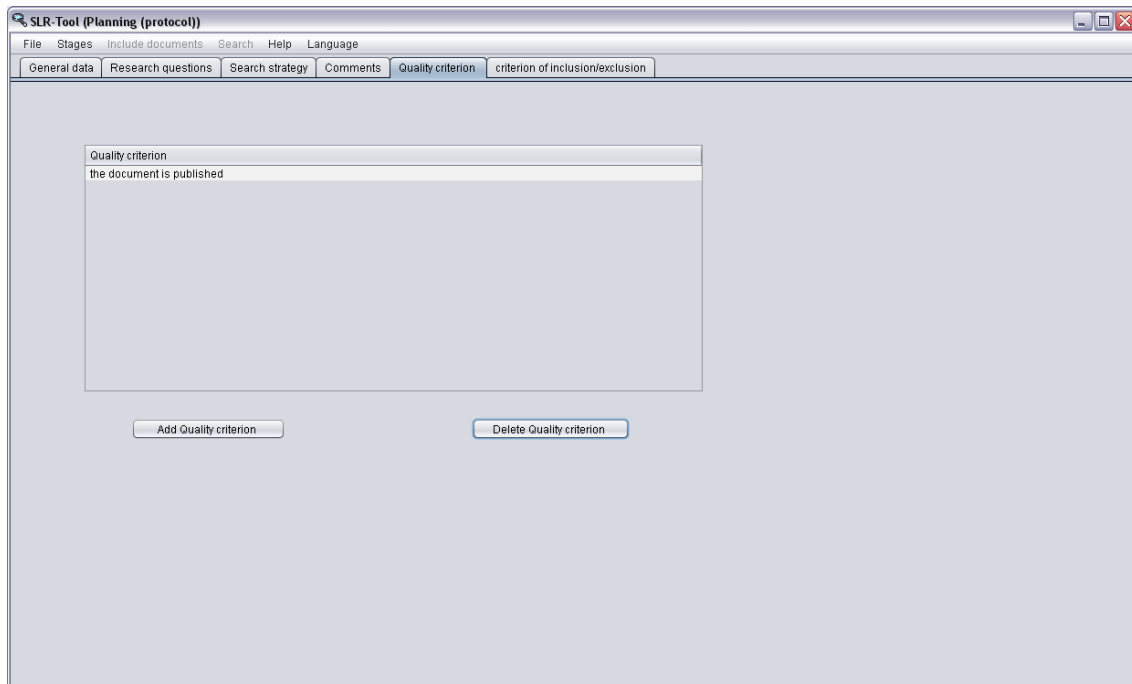


Figure 17. Planning phase: Quality Criteria

As Figure 17 shows, the criteria are presented in a table. The behavior of this table is similar to that of the inclusion and exclusion criteria tables: if we wish to add a criterion, we must press the *Add* button, which is beneath the table. A dialogue will appear which will request a description of the criterion. Once this criterion has been accepted it will be stored, and a description of the criterion will appear. If we wish to delete a criterion we must select the line of criterion that we wish to delete, and press the *Delete* button which is beneath the table. The corresponding criterion will then be deleted. As with the aforementioned cases, if no line is selected and the delete button is pressed, the user will receive an error message.

2.2.EXECUTION PHASE

There are two different tabs in the execution view which are called *Documents* and *Classification*.

2.2.1.DOCUMENTS TAB

The first tab, *Documents*, is used to collect all the functions related to the management of documents.

The upper part of the *Documents* tab also contains a pull down upon which the various filters that can be applied to the set of documents of the selection appear. These filters are:

- **All.** This filter shows all the documents that exist in the review,
- **By author.** When this option is selected a list of the authors that it is possible to consult appears beneath the pull down. Note that the authors of the documents should appear in a specific manner (*Surname, Name; Surname, Name; ...*) so that they will appear individually on the list. Otherwise the block of authors will be considered to be one single author. When one of the authors on the list is selected, only those works related to that author will appear in the documents table.

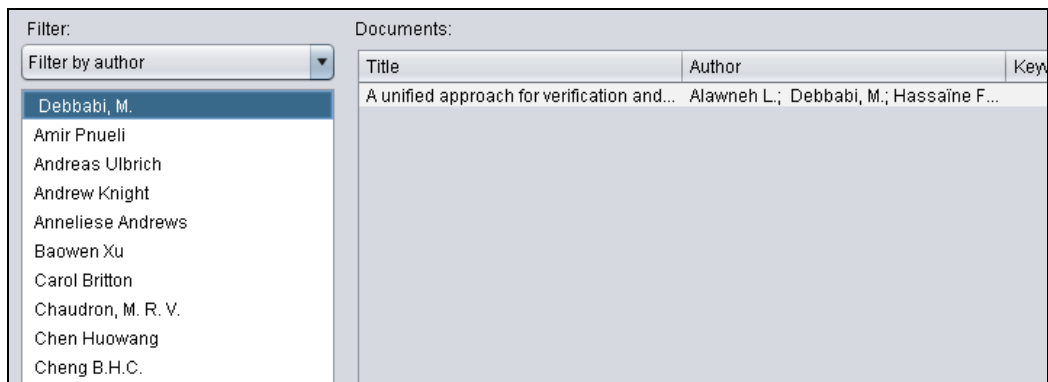


Figure 18. Execution phase: Filter by author

- **By keywords.** When this option is selected a list appears beneath the pull down of the key words that it is possible to consult. Note that the key words of the document must be written in a specific manner (*Key word; key word;...*) so that they will appear individually in the list. Otherwise the block of key words will be considered to be one single key word. When one of the key words is selected from the list, only those documents related to that word will appear in the documents table.

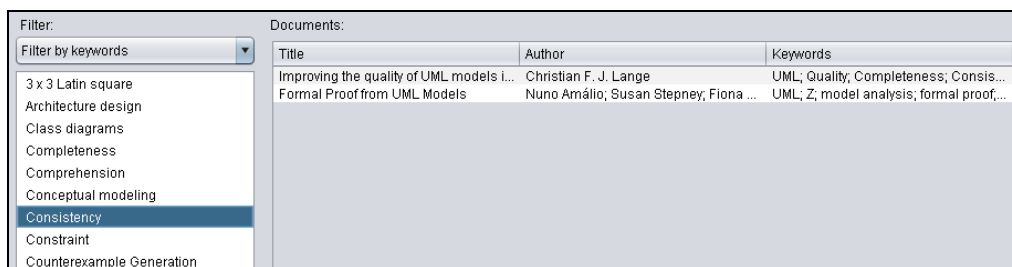


Figure 19. Execution phase: Filter by key words

- **By years.** When this option is selected a list of the years that it is possible to consult appears beneath the pull down. When one of the years on the list is selected, only those documents that are related to that year will appear in the documents table.

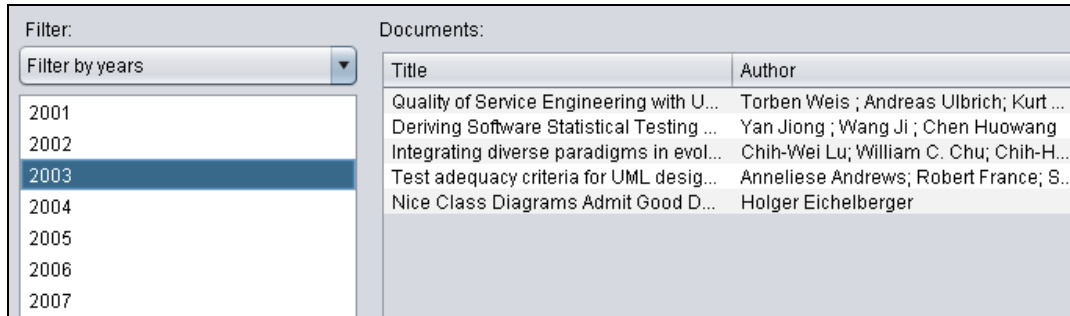


Figure 20. Execution phase: Filter by years

- **Primary studies.** When this option is selected a documents table appears showing those documents which are considered to be primary studies, i.e., those documents which have not been excluded from either the first or the second review.

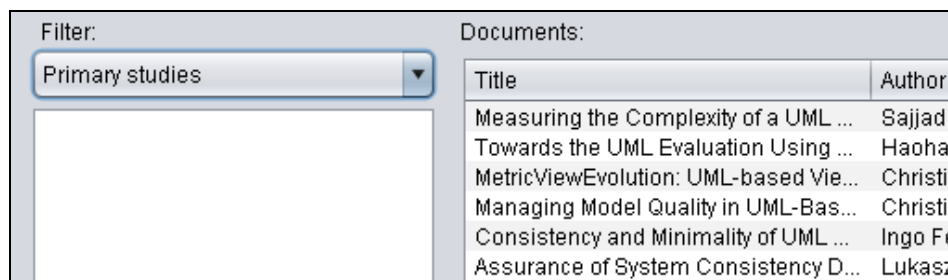


Figure 21. Execution phase: Filter primary studies

- **Excluded from 1st review .** When this option is selected, those documents which were eliminated during the first review appear in the documents table.

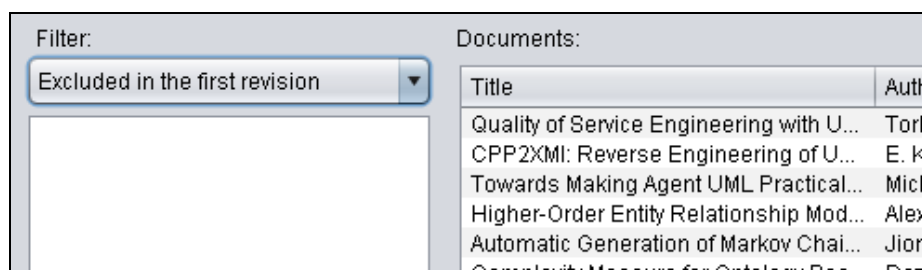


Figure 22. Execution phase: Filter studies excluded in first review

- **Excluded from 2nd review.** When this option is selected those documents which were eliminated during the second review appear in the documents table.

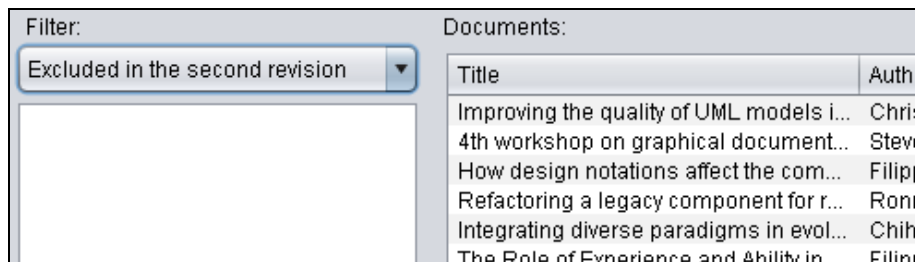


Figure 23. Execution phase: Filter the studies excluded in the second review

- **By source.** When this option is selected a list of the data sources that it is possible to consult appears beneath the pull down. When one of the sources on the list is selected, only those documents related to that source will appear in the documents table.

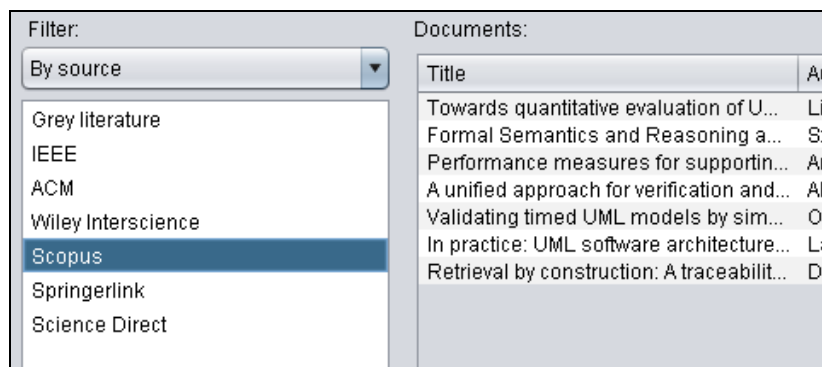


Figure 24. Execution phase: Filter by source

- **By Type.** When this option is selected a list of the types of documents that it is possible to consult appears beneath the pull down. When one of these types is selected from the list, only those documents related to that type will appear in the documents table.

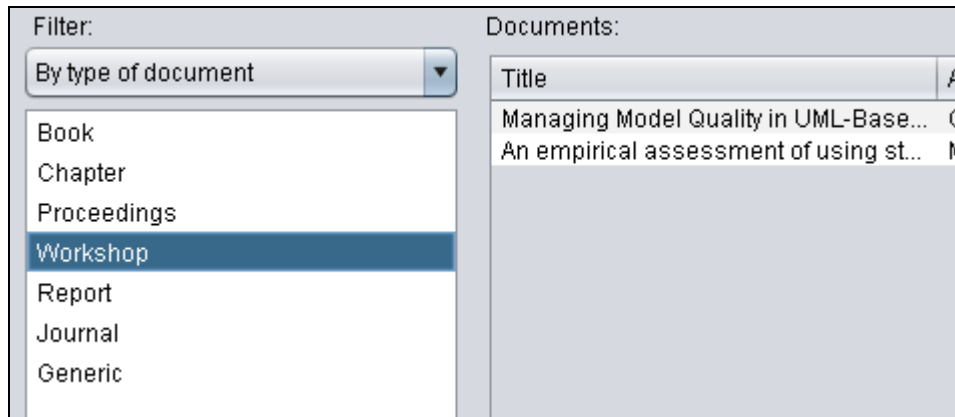


Figure 25. Execution phase: Filter by type of document

- Advanced filter.** When this option is selected a list of the groups of documents that the tool has collected appears beneath the pull down, in which the documents are grouped according to their similitude. This operation may take some time, depending on the quantity of documents that are loaded in the review. These groups are identified by a word which is common to all the documents. If one of these groups is selected, only those documents related to that group will appear in the documents table. Moreover, a list of the relevant terms related to the selected group may also appear in a text box in the documents table.

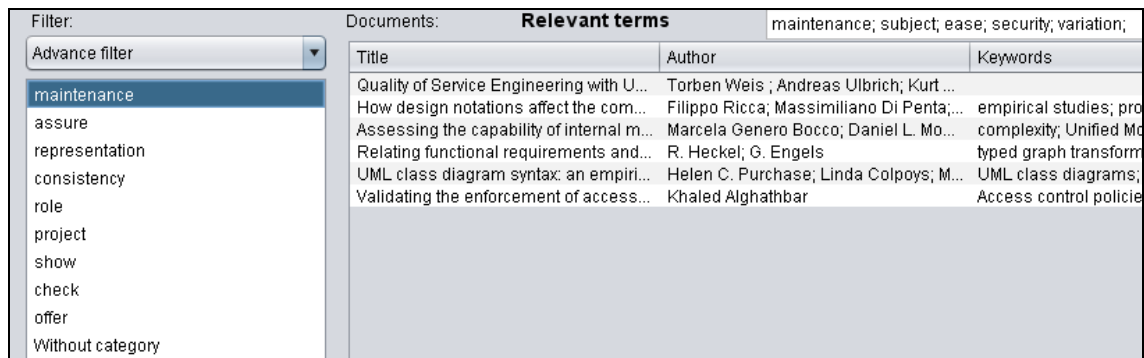


Figure 26. Execution phase: Advanced filter

As Figure 27 shows, the upper part of the tab contains a table which shows the documents that exist in the review. Clicking onto one of the lines of the documents will cause the three tabs that are situated in the lower part of the screen to become filled with the data from the document selected.

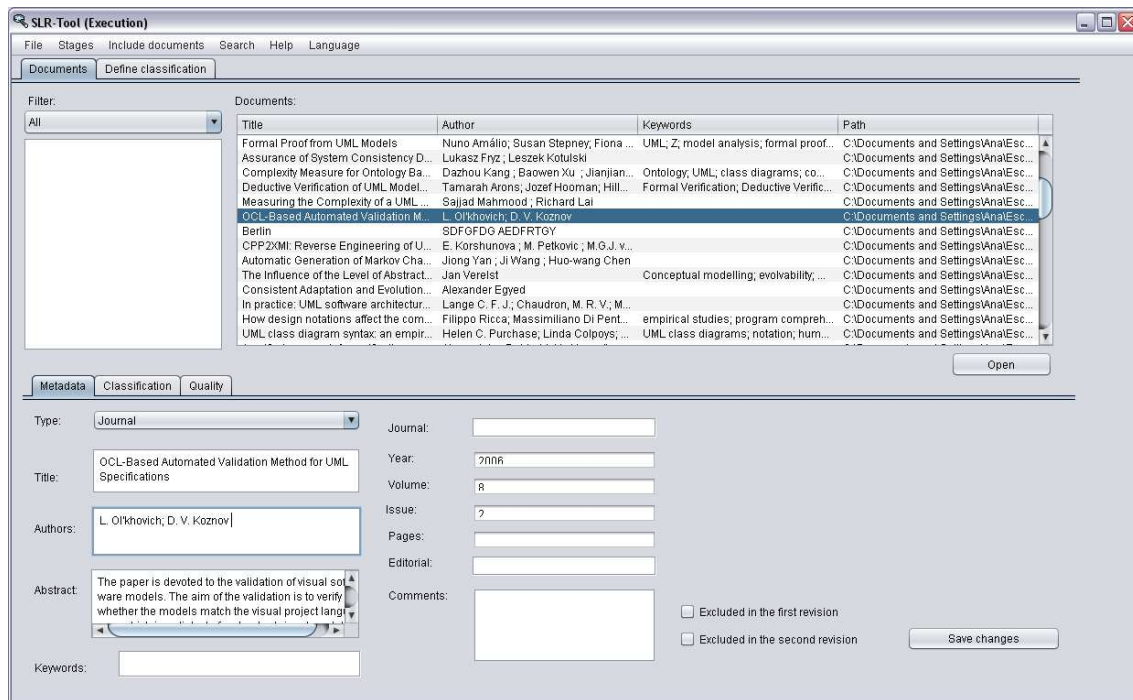


Figure 27. Execution phase: Documents

2.2.1.1. METADATA SUBTAB

The first of these tabs, *Metadata*, contains the metadata of the selected document. This concerns metadata which have been loaded manually through a reference file or though an automatic search of the PDF when the document was loaded. These metadata can be modified if necessary, in the case of omission or erroneous data. When the application has automatically extracted a certain piece of data from the PDF file, it will notify the user that said data are ready for review. Once the metadata have been updated, this icon will disappear.

2.2.1.2. CLASSIFICATION SUBTAB

Apart from the metadata, there is also the option of marking whether the selected document has been deleted during the first of the second review. The second tab, *Classification*, shows the classification that the document receives.

Category: Sub-category: Value:

Category	Sub-category	Value
Type of diagram		statechart
Type of quality	Semantic (Type of quality)	consistency

Figure 28. Execution phase: Classify document

As Figure 28 shows, three pull downs appear above a table. The table shows a summary of the classification of documents for each existing category. If lines exist whose cell which is related to the value of a category/subcategory is empty, this means that the selected document has not been classified in said category/subcategory. To carry out a classification it is necessary to press the first pull down and choose the category that we wish to classify. The second pull down will be filled in with subcategories if they exist, and if not the third pull down will be filled in with values from the category. If subcategories exist, upon clicking on to one of them, the third pull down is filled with the values of that specific subcategory. In both cases, whether subcategories exist or not, upon selecting the value of the third pull down the option of saving the classification for said category comes into operation. If the *Save* button is pressed, the result is stored and can be seen in the document classification table.

2.2.1.3. QUALITY SUBTAB

The third tab, *Quality*, presents the fulfillment of the quality criteria defined during the planning phase by the document that has been selected from the table. As with the *Classification* tab a table appears with the results of the fulfillment of each quality criterion. One line represents the quality criterion, a check box which indicates whether or not the criterion has been reviewed, and another check box which indicates the criterion's fulfillment value (yes or no). If we wish to indicate whether the document fulfils a certain criterion, then this is selected from a pull down which appears on the table, and in another pull down in which the fulfillment of the criterion is selected. Once a fulfillment as been selected, the *Save* button comes into operation which, if pressed, stores the data and shows them in the table.

Criterio de calidad	Revisado	Valor
the document is published	No	No

Figure 29. Execution phase: Quality criteria

2.2.2. DEFINE CLASSIFICATION TAB

The *Define Classification* tab is used to carry out activities related to the definition of the classification which will later be used to classify the documents of the review.

Figure 30. Execution phase: Define Classification

As Figure 30 shows, the tree of categories appears on the left of the tab along with the categories defined until then. As the same figure also shows, the categories and subcategories are identified with an icon (📁) and their final values are identified with a different icon (📄). To delete a category/subcategory or a value it is only necessary to click on to the category in question in the classification tree and to press the *Delete*

button which appears just beneath the tree. Please note that if one category/subcategory which has elements depending upon it is deleted, all those elements related to the chosen category are also deleted.

In order to add a category it is necessary to operate in the top right-hand frame. A name is written in the appropriate text frame. The category, which will depend on what we are creating, is then chosen. If we wish to define a first level category then it will be chosen as a category which depends on *None*. If we wish to create a second level category (i.e., a subcategory) then the appropriate parent category is chosen from the pull down. Please note that if a first level category already has values then subcategories cannot be added to it, and neither can subcategories be added to other subcategories. Independently of whether a category is defined in the first or the second level, the research question to which the category which is being created is related can be selected from a pull down. If we do not wish to relate the category to either question then we must indicate *None*. It is then necessary to press the *Save* button which will cause the category/subcategory to be stored.

To add a value to a category/subcategory it is necessary to operate in the bottom right-hand frame. The name is written in the appropriate text frame and the category/subcategory in which we wish to add said value is then selected from a pull down. Please note that it is only possible to add values to categories that do not have subcategories. The value will be stored by pressing the *Save* button.

2.3.REPORT RESULTS PHASE

This view contains all those activities related to the generation of tables and graphs in which the results from the execution phase are summarised. This view can be executed at any time, and shows the results obtained until that moment. This view contains four different tabs.

2.3.1.RESULTS BY SOURCE TAB

The first tab, *Results by Source* (Figure 31), shows a summary of the results with regard to sources. The table shows the various sources of the review, the number of documents found in these sources, the number of documents repeated with regard to other sources, the number of documents excluded in the first and second reviews and finally, the number of studies included (which is the total number less those which are repeated or excluded). The lower part of the tab contains a bar chart and a pie chart showing the documents included in the search.

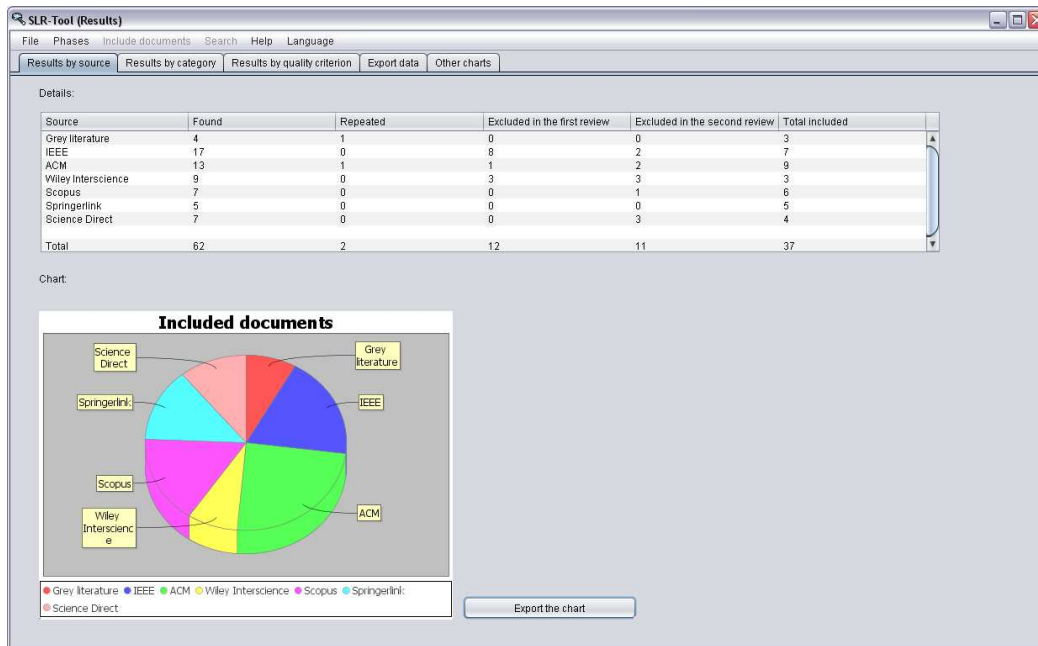


Figure 31. Report results phase: Results by source

Pressing the button "Export chart" the tool generates a PDF file with the graph that is adjacent to the button. The tool shows the path where the file has been generated.

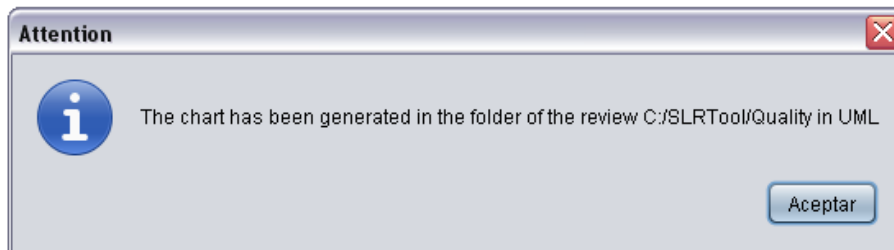


Figure 32. Message path generation

2.3.2. RESULTS PER CATEGORY TAB

The second tab, *Results per category* (Figure 33), shows a summary of the results per category. A table shows the number of documents appertaining to each category and subcategory. If documents exist which are not classified in any of the categories/subcategories, then they are summarised in an *Unclassified* class.

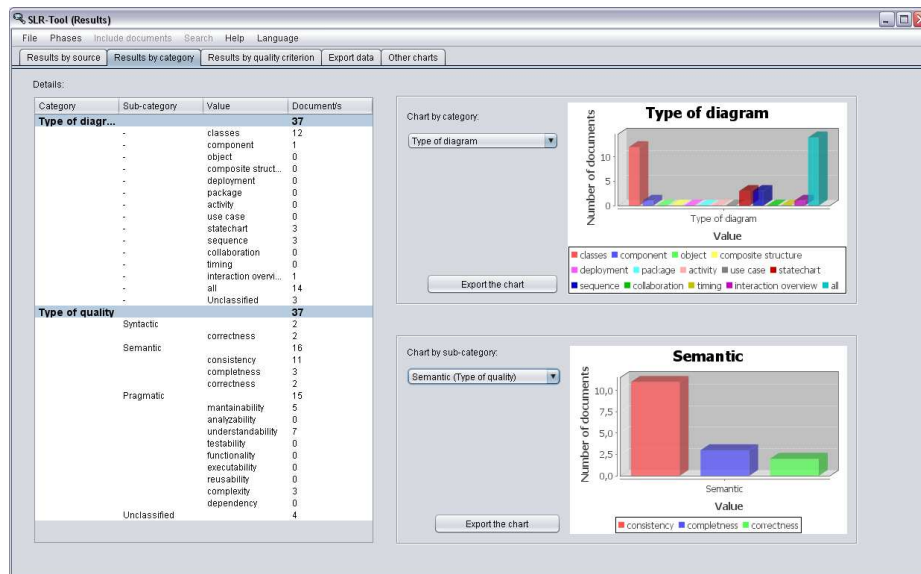


Figure 33. Report results phase: Results by category/subcategories

Two frames appear in the right-hand side of the frame: the upper one serves to generate a graph of the category chosen in the appropriate pull down, and the lower one serves to generate graphs for the subcategories.

Pressing the button "Export chart" the tool generates a PDF file with the graph that is adjacent to the button. The tool shows the path where the file has been generated.

2.3.3. RESULTS BY QUALITY CRITERIA TAB

The third tab, *Results by quality criteria*, summarises the fulfilment of the quality criteria by the documents in the review. The quality criteria, the number of documents that fulfill said criteria, those which do not fulfill it, and those which have not been reviewed are shown in this table. The lower part of the tab contains graphs summarizing the data from the aforementioned table.

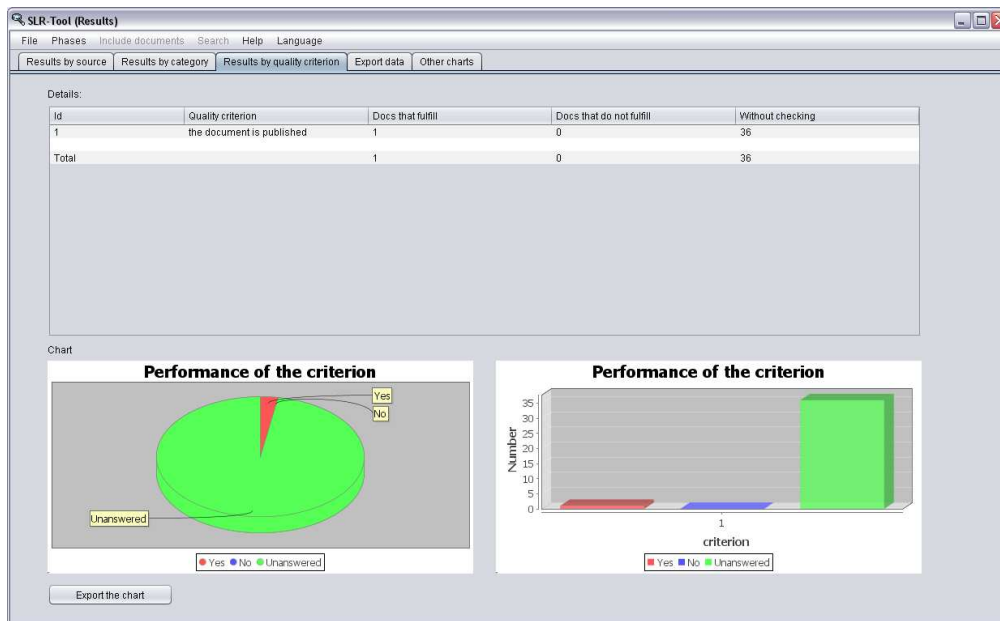


Figure 34. Report results phase: Results by quality criteria

Pressing the button "Export chart" the tool generates a PDF file with the graph that is adjacent to the button. The tool shows the path where the file has been generated.

2.3.4. EXPORT DATA TAB

The final tab, *Export data*, allows us to export all the data from the review to a Microsoft Excel document. Security copies will therefore exist of the changes as they take place.

2	Datos generales	
3		
4	Título	Quality in UML
5	Fecha de inicio	
6	Fecha de finalización	
7	Antecedentes	1. Genero, M., Piattini, M., & Calero, C. (2005). A S
8	Justificación	Research on what is related to the quality of UML to
9	Planificación	week 1: do the search; week 2: import documents; c
10	Personas que realizan la búsqueda	Jose Manuel Gomez
11	Personas que realizan la selección	Ana Fernandez
12		
13	Preguntas de investigacion	
14		
15	Pregunta	Respuesta
16	Which type of UML model quality has been investigated by researchers?	
17	Which research methods are used in research on UML model quality?	
18	What is the nature of the research results on UML model quality?	
19	Which type of UML diagrams is the focus of the research on UML model quality?	class and sequence diagrams
20	Which research goals are aimed at in research on UML model quality?	
21		
22		
23	Estrategia de búsqueda	
24		
25	Fuentes	
26		
27	Fuente	Repetidos
28	Grey literature	
29	IEEE	
30	ACM	
31	Wiley Interscience	
32	Scopus	
33	Revisión	Documentos
34		Categorías
		Clasificación de docs
		Calidad

Figure 35. Exported Excel sheet by SLR-Tool

Furthermore, it allows you the option to export in the selected route all documents or only included to EndNote/BibTeX/Ris files.

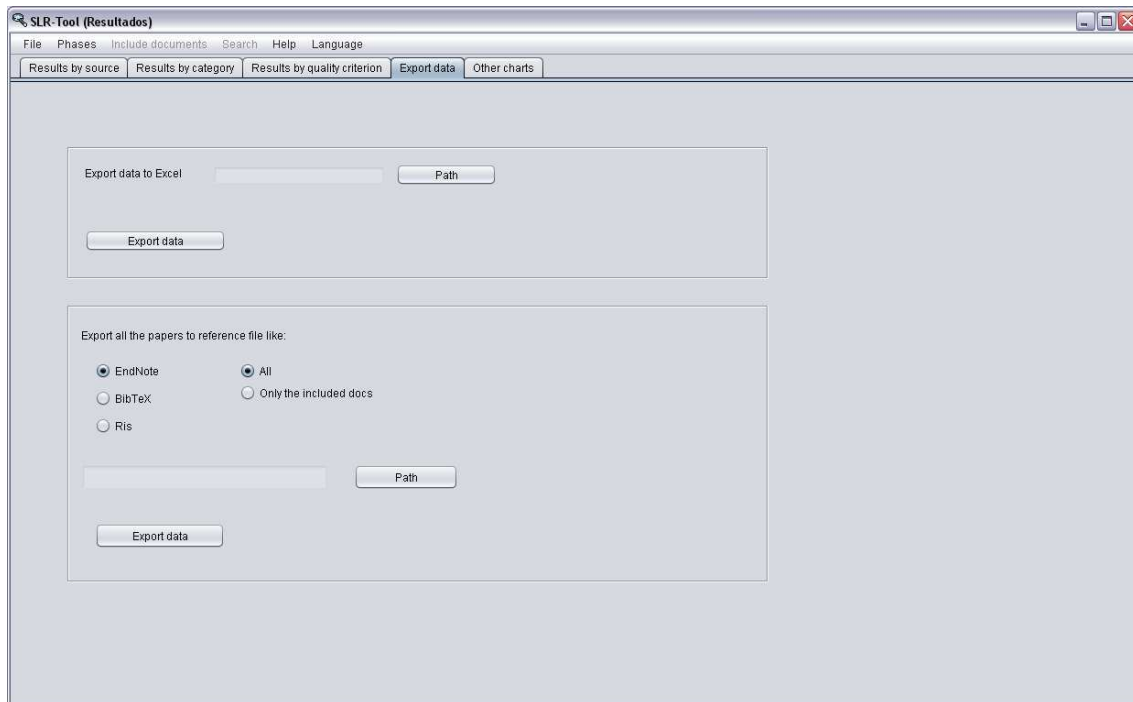


Figure 36. Export documents to EndNote/BibTeX/Ris files

3. INCLUDE DOCUMENTS MENU

The *Include documents* menu contains the possible ways in which to import the documents to the tool: *manually*, *from EndNote/BibText/Ris* or *automatically from a PDF file*. These options are only available during the execution phase of the review.

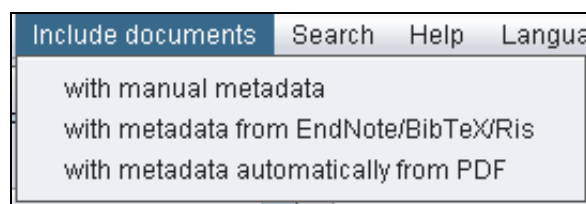


Figure 37. Include documents menu options

3.1. WITH MANUAL METADATA OPTION

In the first option, *Manually*, a window appears in which all the metadata related to the document can be requested. The metadata common to all the documents are the title, the route (where the PDF file can be found), the authors, key words, the summary, comments, year of publication and the source from which the document has been obtained.

Another series of fields which depends on the type of document also exist (for example, the title of the book if the document which is being loaded is a chapter from a book) . If the type of document is unknown, there is also a generic type which shows all the fields that it is possible to fill in.

Figure 38. Import document with metadata manually

3.2. WITH METADATA AUTOMATICALLY FROM PDF OPTION

In the second option, *Automatically from PDF*, a window appears in which it is only possible to request a route which contains the PDF file or the folder containing the PDF files that we wish to import, and the source from which these files have been obtained.

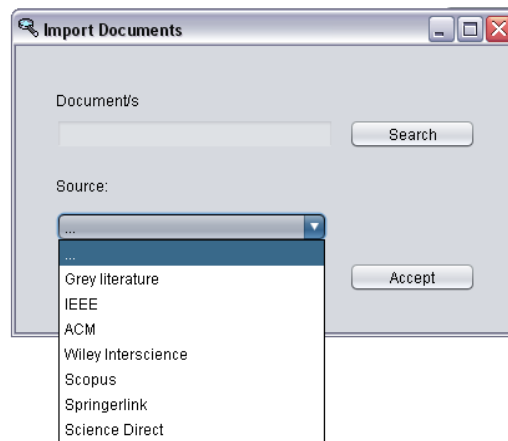


Figure 39. Import document with metadata extracted automatically

When the *Search* button is clicked, a window appears which shows the user files system in order to facilitate the location of the correct route. This button acts in a similar way in the three import options.

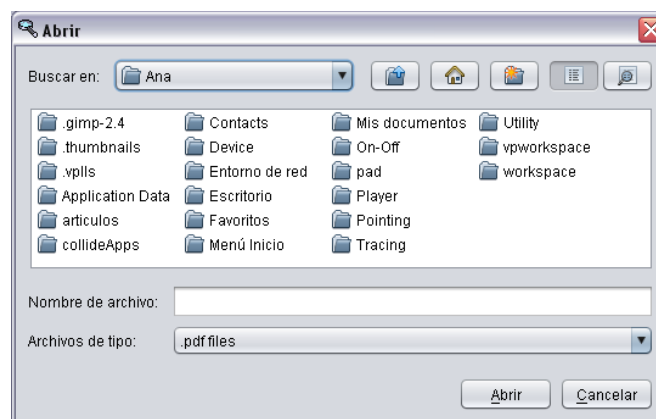


Figure 40. Search for a file

3.3. WITH METADATA FROM ENDNOTE/BIBTEX/RIS OPTION

The last option, *from EndNote/BibText/Ris* allows us to load the PDF document together with its EndNote, BibText or Ris reference file, from which the metadata of the document are extracted.

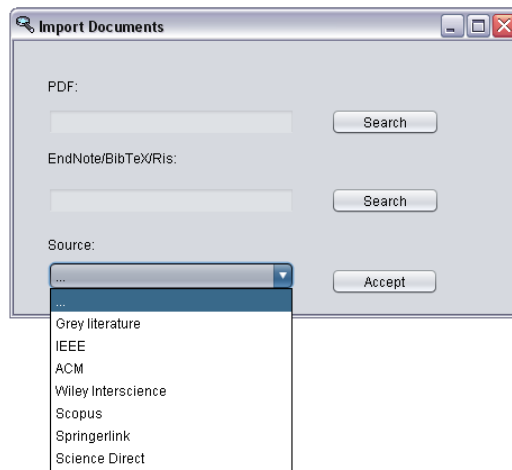


Figure 41. Import document with automatic extraction of metadata

4. SEARCH MENU

The *Search* menu contains all the manners in which it is possible to carry out a search of the various documents loaded in the review, and permits a more precise search to be carried out. This option is only available during the execution of review phase.

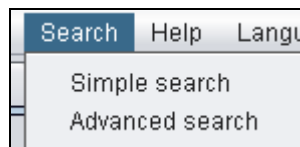


Figure 42. Search menu options

4.1.SIMPLE SEARCH OPTION

The first option is that of *Simple search*. This type of search allows the user to introduce a search string and select the fields in which s/he wishes to search for said string. The available fields are the title, the summary, key words or the complete text. An option also exists in which the string that is introduced searches all the fields selected (the search will return those documents from the fields that comply with the string), or searches one of the fields selected (the search will return those documents in which one of the fields selected complies with the string with regard to the menus).

The strings can be formed of terms and operators. The terms can be simple or composed; the former are simple words such as 'quality', and the latter are groups of words that must be enclosed in double inverted commas, such as "Unified Modeling Language". More than one term using boolean operators can appear in a string to form a complex string:

- The operator AND or && returns those documents in which the two terms sought are appear. For example, quality AND uml will return those documents in which both terms appear.
- The operator OR returns those documents in which at least some of the terms sought appear. Example: quality OR uml will return those documents in which one, or both, terms appear.
- The operator NOT excludes those documents which contain those terms that appear after it. Example: NOT ocl will return those documents in which the term *ocl* does not appear.

It is also possible to carry out wild card searches. In order to carry out wild card searches, the symbol ? is used. Example: te?t will return all those documents in which terms appear in which the symbol *?* can be substituted for a single character, for example *text y* and *test*. It is also possible to carry out wild card searches which can be substituted for zero or various other characters by using the carácter *. Example: improv* will return all those documents which contain terms in which the special character is substituted for zero or various characters, such as for example *improve* and *improving*.

The terms or their consultations can be grouped between brackets. Example: (quality AND (uml OR “unified modeling language”)) AND NOT ocl.

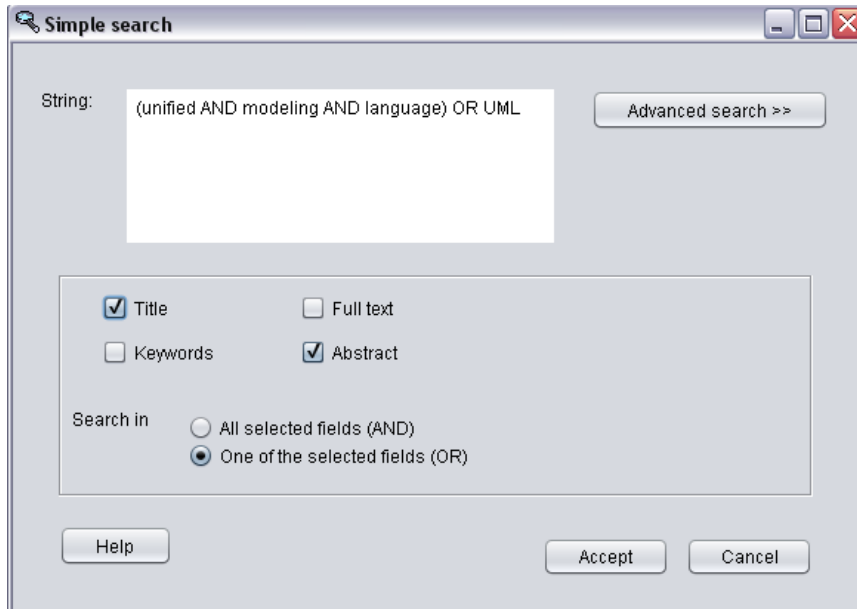


Figure 43. Options of the simple search option

4.2.ADVANCED SEARCH OPTION

In the *advanced search* option a window appears with different options with which the documents must comply. In the first space it is necessary to fill in all the terms that you wish to appear in the selected fields without using any of the operators between

them. In the second space it is necessary to fill in a sentence, or part of the sentence that you wish to search for. A search will therefore be made for the documents in which the words introduced in said space appear, in the same order in which they were introduced. In the third space it is necessary to fill in the words that may or may not appear in the text. This space is useful when we wish to introduce synonyms of words, etc. The last space is filled in with words that we do not wish to appear in the selected fields.

It is not obligatory to fill in all the spaces, as long as at least of them is completed. The system will return those documents that comply with all the conditions introduced.

The selection of fields in which the search will take place functions in a manner similar to that of the simple search.

Figure 44. Options of the advanced search option

5. HELP MENU

The *Help* menu contains two options that are explained follow.

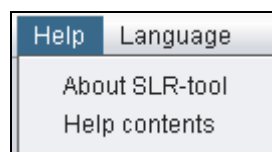


Figure 45. Help menu

5.1.ABOUT SLR-TOOL OPTION

The *About SLR-Tool* option shows a frame where is explained the details about the tool.



Figure 46. About SLR-Tool option

5.2.HELP CONTENTS OPTION

The *Help contents* option shows a user's manual.

6. LANGUAGE MENU

The application automatically opens in English, and the language can be altered at any time via the menu *Help* → *Language* . The languages available are English and Spanish.



Figure 47. Language menu