User Manual for Requirements Engineering Editor (RED)

Harald Störrle
Henry Henry

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Technical University of Denmark
Informatics and Mathematical Modelling
Asmussens Allé, Building 303B, room 56
2800 Kgs. Lyngby
Phone (+45) 45 25 37 57
hsto@dtu.dk
http://www.imm.dtu.dk/ hsto/
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Summary

RED (Requirements Engineering Editor) tool has been created in 2010 as a tool for helping the students who are enrolled in the course 02264 - Requirements Engineering at Technical University of Denmark. The main purpose of this tool is to make it easier for course attendees to gather, store and elaborate on the outcomes of their work during the semester.

The tool cover the different aspects of requirements engineering such as defining the Project Vision, Assumption, Glossary, Goal, Persona, Stakeholder, and the Requirements.

Preface

This user manual was prepared at the department of Informatics and Mathematical Modelling at the Technical University of Denmark for guiding all the users of this RED tool, be it the students who are taking the course 02264 Requirements Engineering in DTU or all Requirements Engineer in general, to help them understand how to use all the features available in this tool.

In all of the chapters in this user manual, we will be using example on the Library Management System, the default example used in the course 02264 Requirements Engineering in DTU.

Lyngby, 08-March-2014

Harald Störrle
Henry Henry

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Chapter 1

Navigating around the views and editors

1.1 Overview of the UI

RED tool is built based on Eclipse, so you will notice a lot of similarities with Eclipse. It means that RED tool consists of different views and editors which can be moved around or resized based on user's preference.
When you launch RED, you will be shown with the main window which looks similar to the one in Figure 1.1.

If any of the view is not appearing, you can easily turn them on by clicking the menu "Window" - "Show View". All the RED views are grouped under the group "Other", while the views under the group "General" are the default views provided by Eclipse which is irrelevant to RED tool and can be ignored at this point.

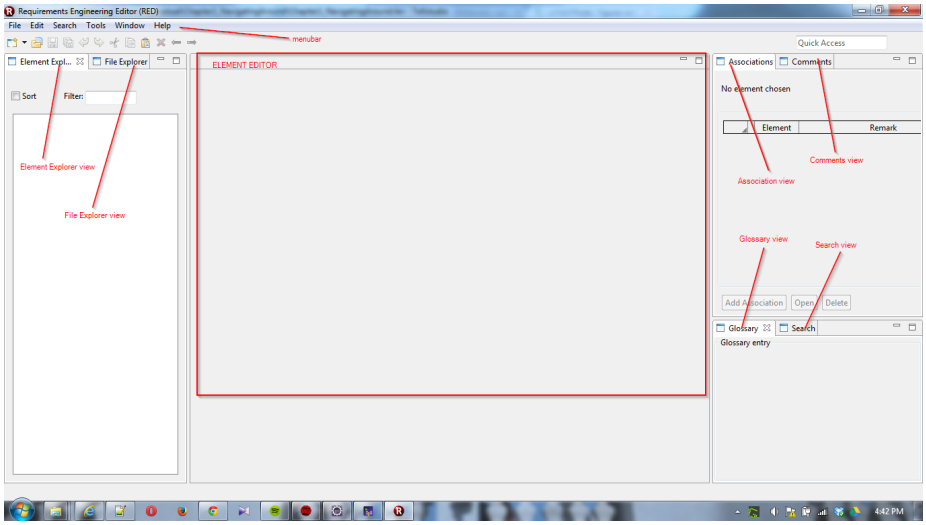


Figure 1.1: RED Main Window

1.2 Element Explorer View

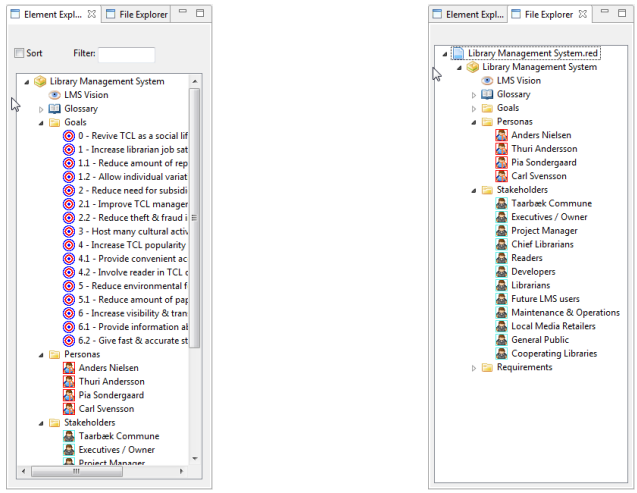
Element Explorer, as can be seen in Figure 1.2a is the view which contains all the Elements in a RED project. The elements can be a Group element, which is a container of other elements and can be Project, Glossary or Folder. It can also be a Specification Element (Assumption, Goal, Vision, Persona, Requirement, Stakeholder, Vision, Test Case and Scenario), GlossaryEntry or a generic Document type.

1.3 File Explorer View

File Explorer, as can be seen in Figure 1.2b is similar to Element Explorer, however it also shows the file where the elements are saved in.

1.4 Associations View

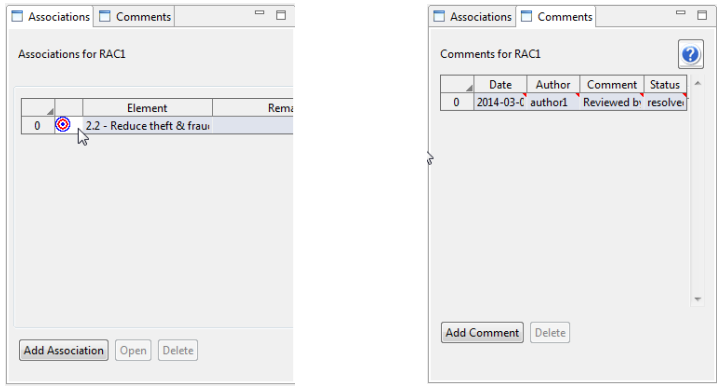
Associations view, as can be seen in Figure 1.3a is meant to provide an overview of all the associations (relationships) that an active element has to other ele-



(a) Element Explorer **(b)** File Explorer

Figure 1.2: Element and File Explorer

ments. For example, if a Requirement Element has the rationale relationship to a Goal element, it will automatically be shown in the association view as well. You can also easily navigate to the element which it is associated to by clicking the open button after selecting an associated element.



(a) Associations **(b)** Comments

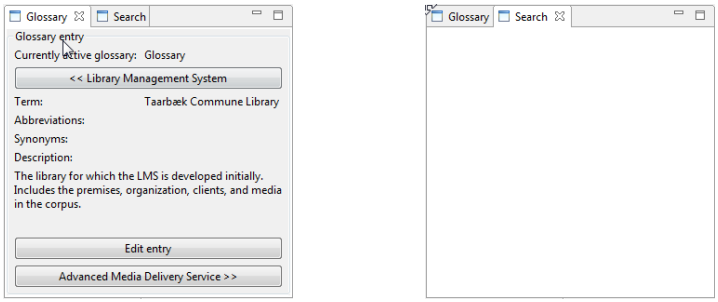
Figure 1.3: Associations and Comments

1.5 Comments View

The Comments View, as can be seen in Figure 1.3b makes it possible to comment on an active element. Commenting on work made is a useful way of reviewing and providing feedback, which is needed in group work where the workload is often divided between the group members. It could also prove useful for a teacher or teaching assistant when reviewing the students work.

1.6 Glossary View

The Glossary view, as can be seen in Figure 1.4a displays a glossary entry to the user, and provide a way to browse through the entries of a glossary.



(a) Glossary **(b)** Search

Figure 1.4: Glossary and Search

1.7 Search View

The search view, as can be seen in Figure 1.4b is responsible for displaying the list of a search results in a tree structure.

1.8 Element Editor

Element editor is usually displayed at the center of the main window and has different layout for different elements, i.e. the editor for Goals specification ele-

ment can be different from the editor for Vision specification element. However, all of them always has a Management and Tracing Tab. Some of them also have a rich text editor which allows the user to type with customized fonts and also add element reference and glossary reference.

1.8.1 Generic Text Editor

The text editor which can usually be found in most of the specification elements, allow the user to type in some details and also to add element reference and glossary reference which is very useful for navigation. For example, we can add a glossary reference for a text "LMS" and link it to a glossary entry "Library Management System". For more information, refer to section 3.3 and 3.4.

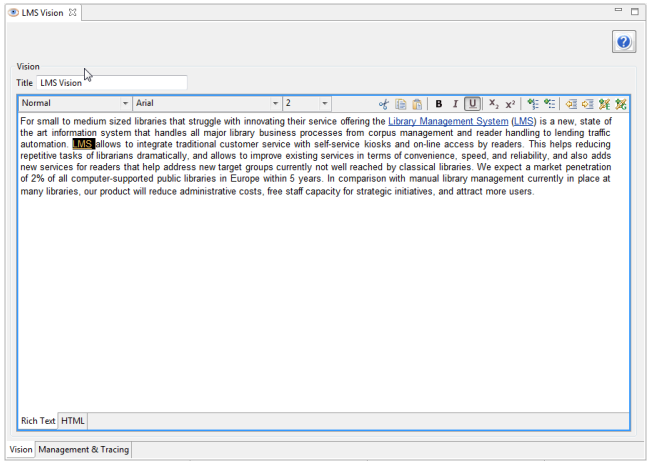


Figure 1.5: Element Editor for Vision

1.9 Management and Tracing Tab

The management and tracing tab is used for documenting and reviewing changes to an element and for creating relationship to other elements. For example someone may write a draft Requirement and save it. He can lock/unlock the element to prevent accidental overwrite by someone else. He can also edit it again next time and leave a change log by documenting the purpose of the change. He can also indicate that the requirement has dependencies on another Requirement.

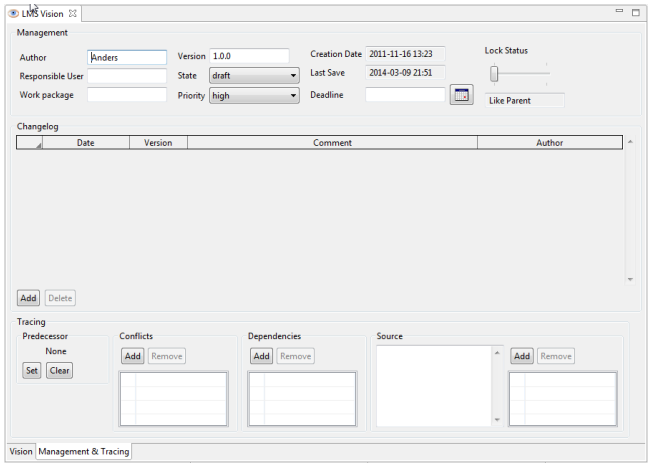


Figure 1.6: Management and Tracing tab

Chapter 2

Organizing Workspace

This chapter talks about the recommended layout for a good RED Requirements document. This chapter also talks about how you can move elements around, quickly search for an element, adding references, and also adding comments. This chapter contains explanation about steps which are quite intuitive, so feel free to skip this chapter if you are already familiar with the tool.

2.1 Project

It is recommended to have a Project element created before starting a requirements elicitation and elaboration process, although it is not mandatory. The project element should be placed on the top of all the elements, and then followed by the project Vision and Assumption. Following that, we can have Glossary, and then all the individual specification elements. It is recommended to group each of the specification elements into a folder (and subfolders if necessary).

To create a project, simply click on the menu File - New - Project and fill up the details. Alternatively, you can right click in the Element Explorer and choose New - Project. Currently the wizard does not prompt the user to fill up the project details, so the user should double click the project element and fill up the

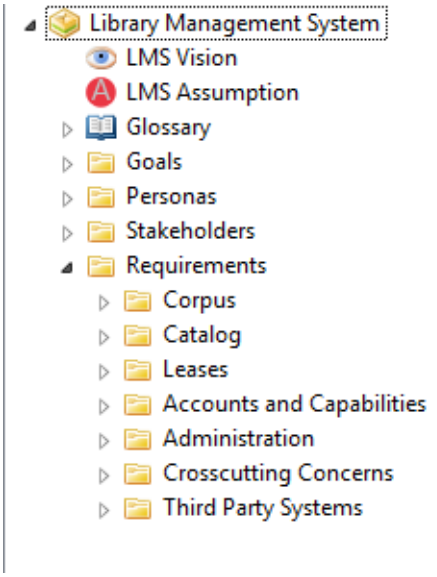


Figure 2.1: Recommended Layout for a RED project

details about the project. It should contain the details of the project members and also document all the important milestone dates for the project.

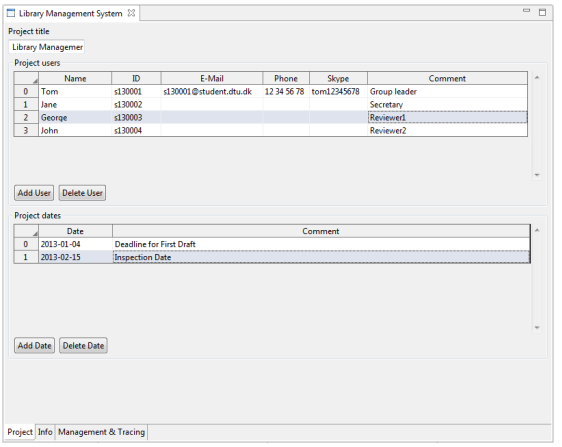


Figure 2.2: Details in a Project Editor

2.2 Folder

The folder element is a container for grouping similar elements together. For example, all personas should be grouped under a folder named "Persona" for a more structured view.

To create a folder, simply click on the menu File - New - Folder and fill up the details, or alternatively select an element in the Element Explorer and right click - New - Folder.

2.3 Document

A user can also create a generic text document which may not fit into any of the existing specification elements. For example, a user may want to put a links of some of the references/conference papers which may be relevant to the project and name the document as "References".

To create a folder, simply click on the menu File - New - Document and fill up the details.

2.4 Searching for Elements

Searching for a text in all the elements can be a painful process. For example, two requirement engineers may have made inconsistencies throughout all the documents when one of them is using the word "User" and the other one using "Customer" and they may want to standardize everything to use "Customer". This can be done by running a search. To do this, the user can click the menu "Search". A search dialog similar to Figure 2.3 will appear and the user can type the search string. The result will then be displayed in the Search View and they will be able to go to each of them to edit.

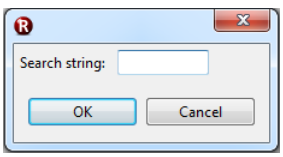


Figure 2.3: Search Dialog

2.5 Sorting and Filtering Elements

RED also allows the user to sort and filter the element for quickly navigating to the element (see Figure 2.4). In the top part of the element explorer view, the user can click the Sort check box which will sort the element by the name in alphabetical order, but still maintaining the hierarchical structure. The filter text box can automatically filter and show only the element which match the filtering criteria typed by the user.

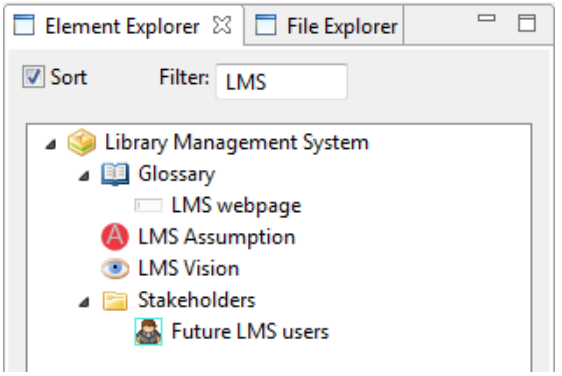


Figure 2.4: Sorting and Filtering

2.6 Moving Elements

Moving element can be done by selecting an element in the Element explorer view and then dragging it to the intended location within the element explorer view.

2.7 Renaming Elements

Renaming of element can by done by selecting an element and then pressing the hotkey F2 or by a right click followed by the option rename.

2.8 Locking Elements

The locking feature in RED is useful for preventing people from making changes to a specification element.

To lock the element, follow the following step: 1. Set the lock password, which is accessible from the menu Edit - Set Workspace Password in the RED menu bar. 2. Select the specification element, under Management And tracing, change the lock status to the desirable lock status.

There are 4 different lock status available:

1. Like Parent : this lock status makes the element to follow the lock status of its parent container's lock status
2. Editable : allow the element for editing and commenting
3. Commenting Only : allow the element only for commenting
4. Locked : don't allow editing and commenting

Unlocking the specification element will prompt a request for password if the workspace password is not set.

As can be seen in Figure 2.5, RED also allows setting the status of the element to be set as draft, under review, complete, etc. This feature, combined with the locking will allow the specification element for reviewing and allow it to be locked once it has decided to be a final version.

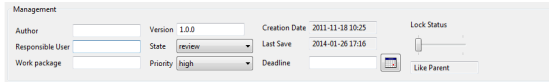


Figure 2.5: Reviewing and Locking under Management and Tracing tab

2.9 Documenting changes

RED also allows documenting any changes to the specification element via the change log. This menu is accessible via Management and Tracing tab as well.

2.10 Creating references

The management and tracing tab also allows us to create relationship to other specification elements. The relationship that can be defined are for example:

1. Predecessor: allows to define the element to be a successor of another element in different stages of the project.
2. Conflicts: defines that the element can cause contradiction to another element. For example a goal "Reduce cost" may be in conflict with a goal "Increase marketing campaign"
3. Dependencies: Dependencies means that the change in the element that it depends on may have impact on the current element.
4. Source: defines that the element comes from another element.

2.11 Adding comments

The comments view should be used for reviewing purpose, to write additional comments regarding the specification element. Any issues or concerns regarding the specification element that has been documented here should be reviewed during an inspection and indicated with the status if the issue has been resolved.

To add comments, simply go to the Comments view and click the button Add Comments. (If the button is not visible, you may want to expand the comments view downwards because sometime it may be blocked by the Glossary View)

Chapter 3

Managing Glossary And Reference

3.1 Creating Glossary

A good requirement documents should also contains a glossary of the domain specific terms. Glossary should be made preferably before starting the project, and then updated and reviewed at any time within the ongoing project duration. Glossary element is a container type, and needs to be filled with the glossary entry as its constituents. Glossary will be useful to eliminate doubts about certain keywords used in the project. For example: a keyword Hospitality Solution System should be explained in more details, are we actually referring to hospitality in restaurant context or in the hotel industry.

To create glossary, one can simply click on the menu File - New - Glossary. By default, currently RED does not assign any name to the glossary element, so the user should select and then rename it if necessary.

3.2 Creating Glossary Entry

Glossary entry is the constituent of the glossary, which provides the definition to the domain specific terms used in the project. It can also have synonyms or abbreviations tied to the terms. To create a glossary entry, click on the menu File - New - Glossary Entry or select the glossary in the Element Explorer and right click - New - Glossary Entry and fill up the details.

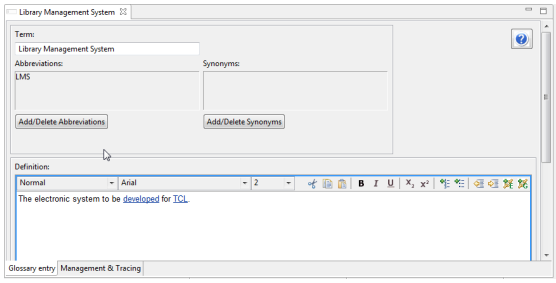


Figure 3.1: Glossary Entry

3.3 Creating Glossary Reference

After glossary and glossary entries have been created, at any time when you are writing any specification elements, as long as the specification elements has a text editor, you can create a glossary reference to link it back to the glossary entry.

For example, in the Goal specification element shown in Figure 3.2, the text mentions the term "LMS", and we can create the glossary reference to link it back to the terms "LMS" we have created earlier by clicking on the button in the rightmost part of the text editor (see the highlighted box in the figure).

After the glossary reference has been created, if we highlight the text "LMS" in the text editor for the Goal, the Glossary View should automatically display the terms. This makes it easier for people who don't have the domain knowledge on the project to be able to understand it easier.

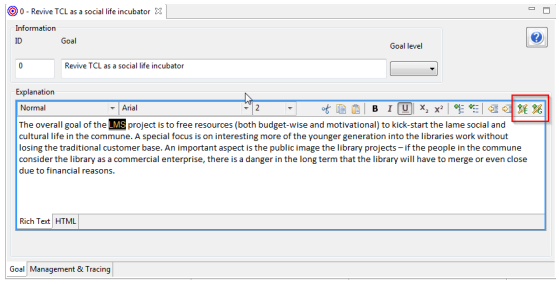


Figure 3.2: Glossary Reference

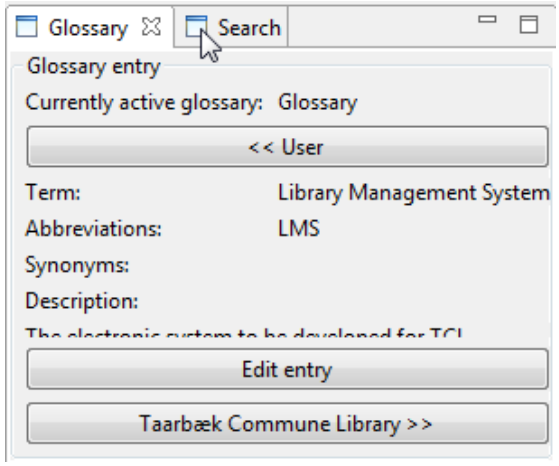


Figure 3.3: Glossary View showing the terms LMS after the text is highlighted

3.4 Creating Element Reference

In some cases, it may be useful to create an element reference from the text to easily navigate to another element. To do this, you can highlight the text and then click on the button "Create Element Reference" (the highlighted button as shown in Figure 3.2)

Chapter 4

Specification Elements

This chapter talks about the different specification elements that you can define in RED. To create a new specification element, you can simply click the menu File - New - Specification Elements, and then select one of the specification element. Alternatively, you can also right click from the Element Explorer to create a new specification element. The latter is preferable because you don't have to specify where you want to place the specification element, as it is using the element that you have selected in the Element Explorer View as the parent container.

4.1 Vision

Vision specification element (Figure 4.1) specifies the purpose, motivation, and background for building the system.

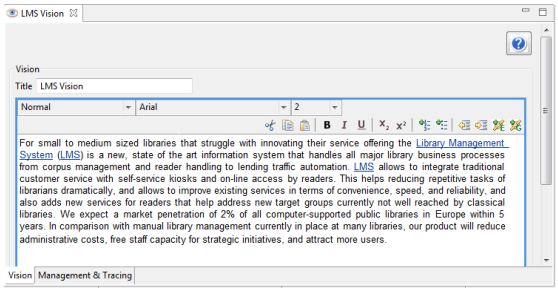


Figure 4.1: Vision of LMS

4.2 Assumption

Assumption specification element (Figure 4.1) specifies the premises or condition that is assumed to be true for the project.

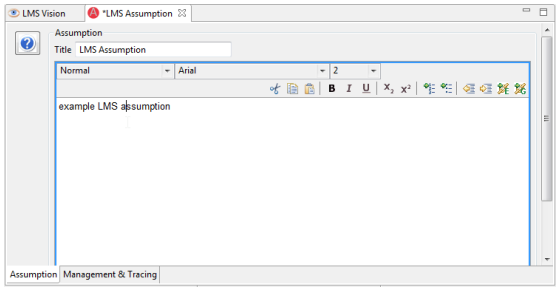


Figure 4.2: Assumption of LMS

4.3 Goal

Goal specification element (Figure 4.3a) is used to specify why the stakeholder wants the particular system or function.

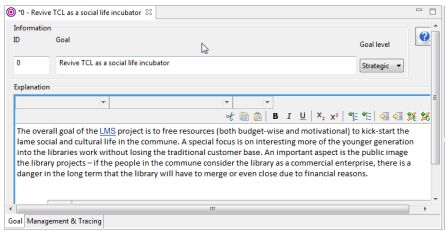
A goal can have 3 different levels, shown below from the highest level to the most detailed level:

1. Strategic goal: goal which specifies the project vision objective
2. Business goal: quantifiable goal for procedures/policies

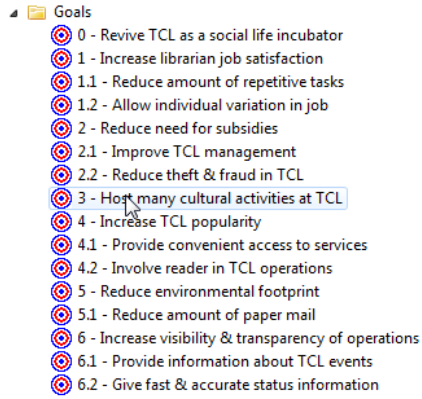
3. Solution goal: desired goal of a system

It is recommended to name the goal with a structured numbering similar to a tree,so that each of the goal are linked to parent goal and have child goals, for example the one shown in Figure 4.3b

In some cases, the user may want to specify conflicting goals. This can be done by adding the conflicts relationship in the Management and Tracing tab.



(a) A single Goal



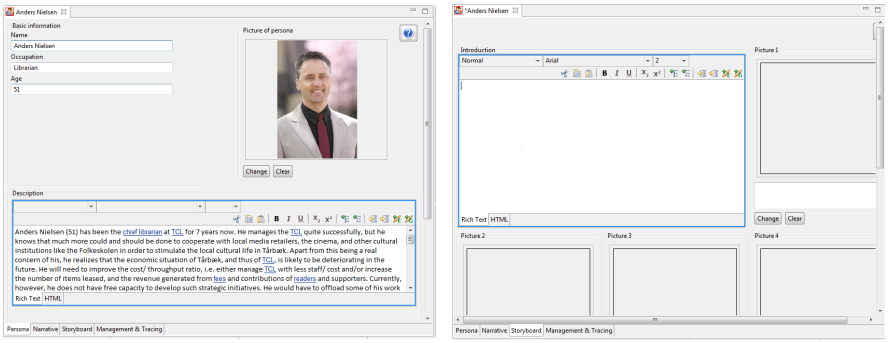
(b) Goals arranged as goal tree

Figure 4.3: Goals of LMS

4.4 Personas and Storyboard

The persona specification element (see Figure 4.4a) allows the user to create a persona, which is is prototypical for a real group of users, their goals and desires, capabilities and limitations, and activities or usage profiles.

RED also allows the user to create a storyboard (see Figure 4.4b) to explain about the personas. Currently RED tool supports adding up to 5 figures in each storyboard.



(a) An example of Persona (b) Storyboard tab

Figure 4.4: Persona and Storyboard in RED

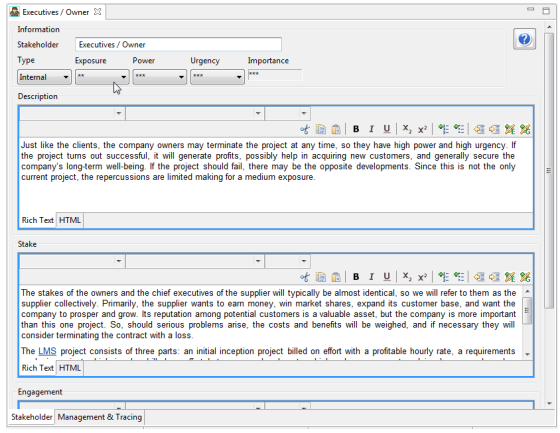


Figure 4.5: An example of stakeholder

4.5 Stakeholder

The Stakeholder specification element (see Figure 4.5) allows you to define the stakeholder, who is a person, group, or organization that has a direct or indirect stake in an organization because it can affect or be affected by the organization's actions, objectives, and policies.

The stakeholder can either be an internal stakeholder or external stakeholder. Internal stakeholder are people who are directly involved in the project.

A stakeholder can also have different aspects such as:

1. Exposure: the degree to which the stakeholder will be affected by the system and the changes it implies

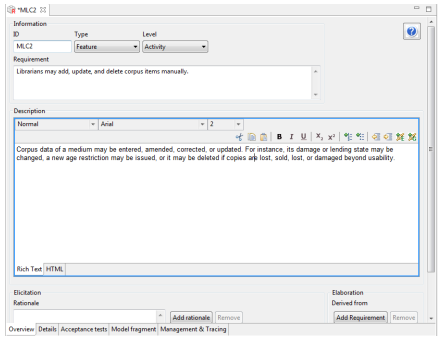
2. Power: the degree of force a stakeholder is capable of exerting

3. Urgency: the timeframe in which a stakeholder is expected to react to changes in the system

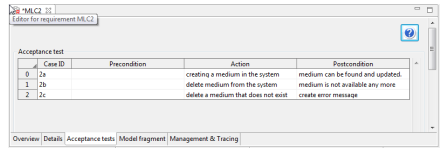
4. Importance: Indicate how significant is the stakeholder in your project. Importance is automatically calculated based on formula $Importance = \lceil (Power + Urgency) \rceil / 2$

4.6 Requirements and Acceptance Test

The Requirement specification element (see Figure 4.6a) allows the user to define the functional requirements and the non functional requirements (aka. quality attributes) of the system.



(a) An example of Requirement



(b) An example of Acceptance Test

Figure 4.6: Requirement and Acceptance Test

It also allows the user to specify the rationale of having the requirement. Rationale means justification of this requirement: why is it being selected. Alternatively, instead of specifying it in some sentences, the user may want to link the rationale to a goal instead. This can be done by clicking the button Add Rationale and choose the goal.

The requirement may also be a requirement which is derived from other requirement. This can be specified by clicking the button Add requirement under the "Derived From" part.

A requirement should also be specified with the Acceptance Test, (see Figure 4.6b) which indicates the operational procedure to check whether a deliverable satisfies a given requirement. The acceptance test can be some measurable parameters and qualities of the final product to be expected.

4.7 Model fragments

User can also create a Model Fragment for a requirement under the tab Model Fragment (see Figure 4.7). To draw the model fragment, use the palette at the right side of the model fragment editor.

Example of the steps for creating a class diagram:
1. Click "class" in the palette and click in the drawing panel.
2. Input the name of the class, for example Librarian class
3. Resize the sketch of the class if required
4. Add a property by choosing "property" in the palette and click somewhere in the middle containment of the class and then type the property name
5. Add an operation by choosing "operation" in the palette and click somewhere in the bottom containment of the class and then type the operation name
6. Create another class, for example Corpus class by repeating step 1-5
7. Choose association under the Relations part in the palette and link the two class together

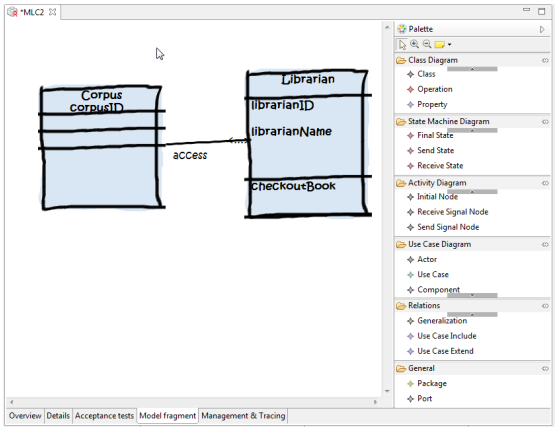


Figure 4.7: Model Fragment example

4.8 Test Case

<Work in progress...>

4.9 Scenario

<Work in progress...>

Chapter 5

Exporting and Importing other format

This chapter talks about how a user can export the RED file to html based report, exporting the comments for review or exporting to MPL file(aka Prolog format).

5.1 Exporting report

Exporting the report can be done by clicking the menu Tools - Generate Report. The program will prompt you to select the starting element, and to choose whether you want a folder-based structure or simple structure (See Figure 5.1)

The difference between the two options is that the folder based structure will generate the report based on the position of each of the folder, while the simple structure will sort all elements based on its type regardless of the containing folder, and always output them based on the following ordering: Project, Vision, Assumption, Chapter1-Stakeholders, Chapter2-Goals, Chapter3-Personas, Chapter4-Requirements.

You can also choose whether to save the images (for example personas picture,

storyboard picture, model fragments) as images internally or to save it as separate picture format.

IMPORTANT NOTE: note that only some browser (for example Google Chrome) can maintain the HTML formatting during copy-paste to MS Word document.

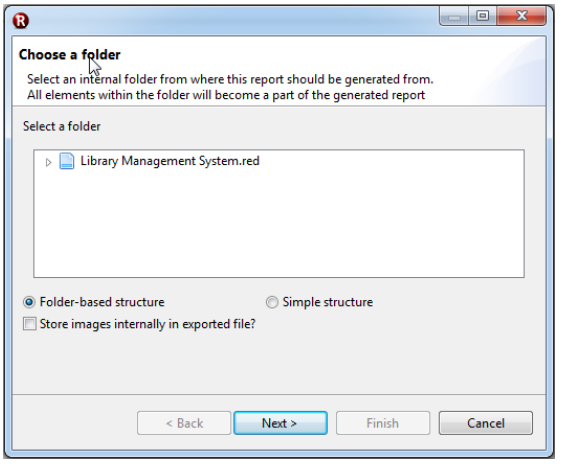


Figure 5.1: Export to report dialog

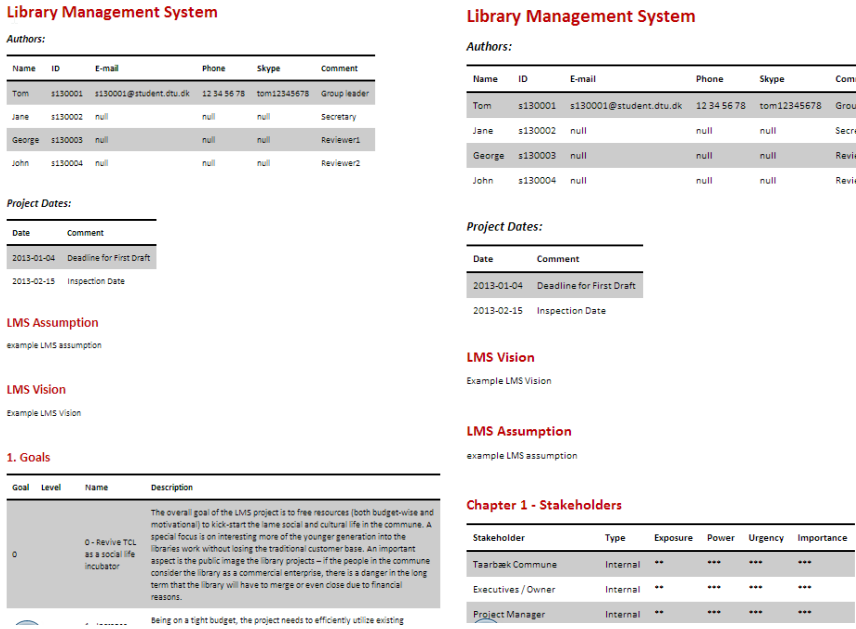
5.2 Exporting comments

RED supports exporting of all comments into CSV file. To do this, select the elements that you want to include in the search from the Element Explorer and select the menu Edit - Export Comments.

The format of the output CSV file currently follows the template that is suitable for uploading to FIT (Formal Inspection Tool).

5.3 Exporting to MPL (Prolog file)

RED also allows the user to export the document into a prolog format which is the same format as the one produced by MACH tool. Sample of the produced prolog file can be seen in Figure 5.3



Library Management System

Authors:

Name	ID	E-mail	Phone	Skype	Comment
Tom	s130001	s130001@student.dtu.dk	12 34 56 78	tom12345678	Group leader
Jane	s130002	null	null	null	Secretary
George	s130003	null	null	null	Reviewer1
John	s130004	null	null	null	Reviewer2

Project Dates:

Date	Comment
2013-01-04	Deadline for First Draft
2013-02-15	Inspection Date

LMS Assumption

example LMS assumption

LMS Vision

Example LMS Vision

1. Goals

Goal	Level	Name	Description
0		0 - Revive TCL as a social life incubator	The overall goal of the LMS project is to free resources (both budget-wise and motivational) to kick-start the lame social and cultural life in the commune. A special focus is on interesting more of the younger generation into the libraries work without losing the traditional customer base. An important aspect is the public image the library projects – if the people in the commune consider the library as a commercial enterprise, there is a danger in the long term that the library will have to merge or even close due to financial reasons.
			Being on a tight budget, the project needs to efficiently utilize existing

(a) Folder-based Report output

Library Management System

Authors:

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Tom	s130001	s130001@student.dtu.dk	12 34 56 78	tom12345678	Group leader
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Project Dates:

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LMS Vision

Example LMS Vision

LMS Assumption

example LMS assumption

Chapter 1 - Stakeholders

Stakeholder	Type	Exposure	Power	Urgency	Importance
Taarbæk Commune	Internal	**	***	***	***
Executives / Owner	Internal	**	***	***	***
Project Manager	Internal	**	***	***	***

(b) Simple Report output

Figure 5.2: Difference between folder-based and simple report

Library Management System.pl

```
1  :-module('Library Management System.red',[]).
2  me(file-0,[name-'Library Management System.red',ownedMember-ids[1,422],timeCreated-'Wed Nov 16 11:20:19 CET
   2011',lastModified-'Sun Mar 16 22:40:32 CET 2014',uri-'C:\Users\HenryLie\Desktop\RED\Library Management
   System.red']).
3  me(project-1,[name-'Library Management System',ownedMember-ids[2,21,264,279,282,283,333],timeCreated-'Sun Mar
   09 10:06:36 CET 2014',lastModified-'Sun Mar 16 22:40:32 CET 2014',uri-'C:\Users\HenryLie\Desktop\RED\Library
   Management System.red']).
4  me(folder-2,[name-'Goals',ownedMember-ids[3,5,7,8,9,10,11,12,13,14,15,16,17,18,19,20],timeCreated-'Wed Nov 16
   16:23:17 CET 2011',lastModified-'Sun Mar 16 17:31:32 CET 2014',uri-'C:\Users\HenryLie\Desktop\RED\Library
   Management System.red']).
5  me(goal-3,[name-'0 - Revive TCL as a social life incubator',uri-'C:\Users\HenryLie\Desktop\RED\Library
   Management System.red',timeCreated-'Fri Nov 18 10:25:36 CET 2011',lastModified-'Sun Mar 16 17:31:32 CET 2014',
   ownedMember-ids[4,6,27],comments-ids[4],relSrc-ids[6,27],goalID-'0',goalSentence-'Revive TCL as a social life
   incubator',explanation-'The overall goal of the LMS project is to free resources (both budget-wise and
   motivational) to kick-start the lame social and cultural life in the commune. A special focus is on
   interesting more of the younger generation into the libraries work without losing the traditional customer
   base. An important aspect is the public image the library projects – if the people in the commune consider the
   library as a commercial enterprise, there is a danger in the long term that the library will have to merge or
   even close due to financial reasons.']).
6  me(comment-4,[,timeCreated-'Sun Mar 16 17:31:19 CET 2014',comment-'Is this correct?']).
7  me(goal-5,[name-'1 - Increase librarian job satisfaction ',uri-'C:\Users\HenryLie\Desktop\RED\Library
   Management System.red',timeCreated-'Fri Nov 18 10:44:08 CET 2011',lastModified-'Sun Jan 26 17:46:58 CET 2014',
   ownedMember-ids[6],relTgt-ids[6],goalID-'1',goalSentence-'Increase librarian job satisfaction ',explanation-
   'Being on a tight budget, the project needs to efficiently utilize existing resources, and the biggest asset
   we have is the expertise and network of the librarians. It is vital to make them active proponents of change.
   We critically rely on their enthusiasm and participation.']).
8  me(relation-6,[relatesToID-'3',relatedByID-'5',relationshipType-'ElementReferenceImpl']).
```

Figure 5.3: Export to MPL (Prolog format)

5.4 Importing an existing MPL (Prolog file)

RED also supports importing an existing prolog format into the existing .red file format. The format of the prolog file needs to follow the same format as what is generated during export from .red file to prolog file.

Chapter 6

Model Weaving

This is an experimental feature which is still under progress. Use only with caution... <Work in progress ...>