

User Manual: Risk Monitor Tool ver: 1.0

January 9, 2021

1 Download and Setup

The following steps need to be followed diligently for the correct setup of the tool in your machine.

STEP-1. Pre-requisite: User must have Java SDK installed in their machine.

STEP-2. Download: User needs to download the following files from the github repository (refer to 1(a)) for using the tool:

- *RiskMonitor_TOOL-SetupFiles.rar*: It contains the PartialOrderTool installation files (refer to 1(b)).

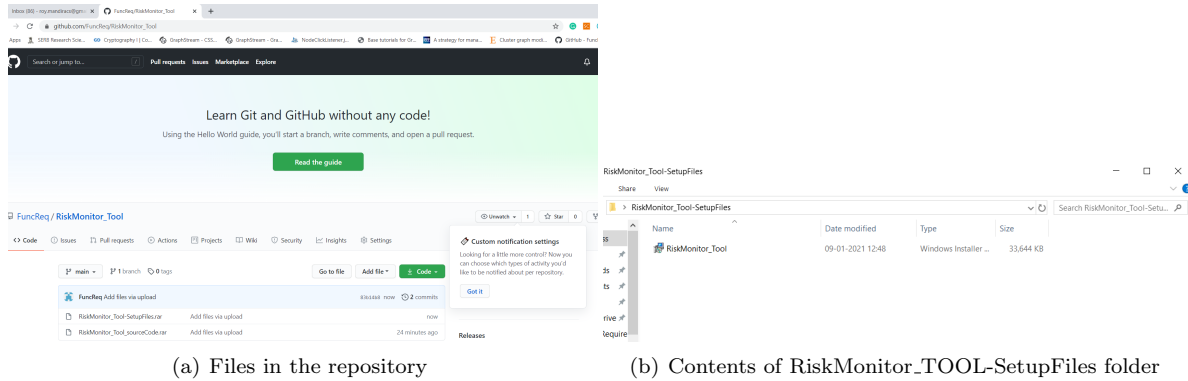


Figure 1: Tool SetUp

STEP-3. Extract: The downloaded RAR files need to be extracted at any suitable location.

STEP-4. Installing the Tool:

- Open the RiskMonitor_TOOL-SetupFiles folder.
- Right click on RiskMonitor_Tool.msi file and select install option (refer to 2(a)).
- The installation wizard appears. Click on the "Next" button at the bottom of the wizard (refer to 2(b)).
- Next select a suitable installation location and click on "Next" button (refer to boxed portion in 2(c)).
- On the next screen of the wizard click on "Install" button at the bottom to start the installation process (refer to 2(d)).
- Finally on completion of the installation click on "Finish" button to exit the wizard (refer to 2(e)).

Now go to the location in your system where the tool is installed.

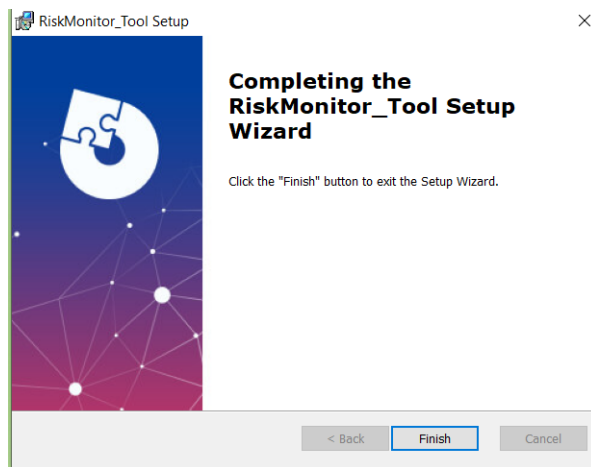
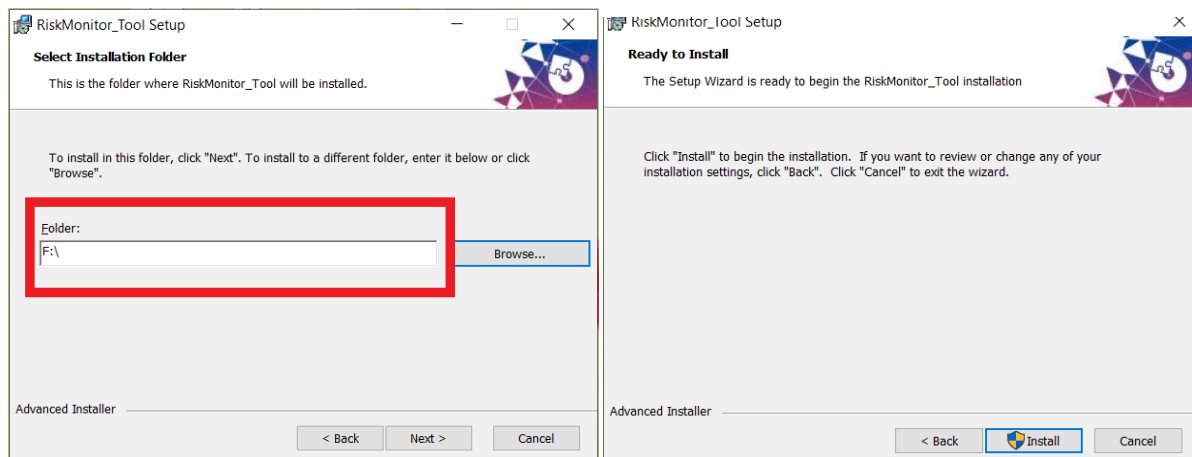
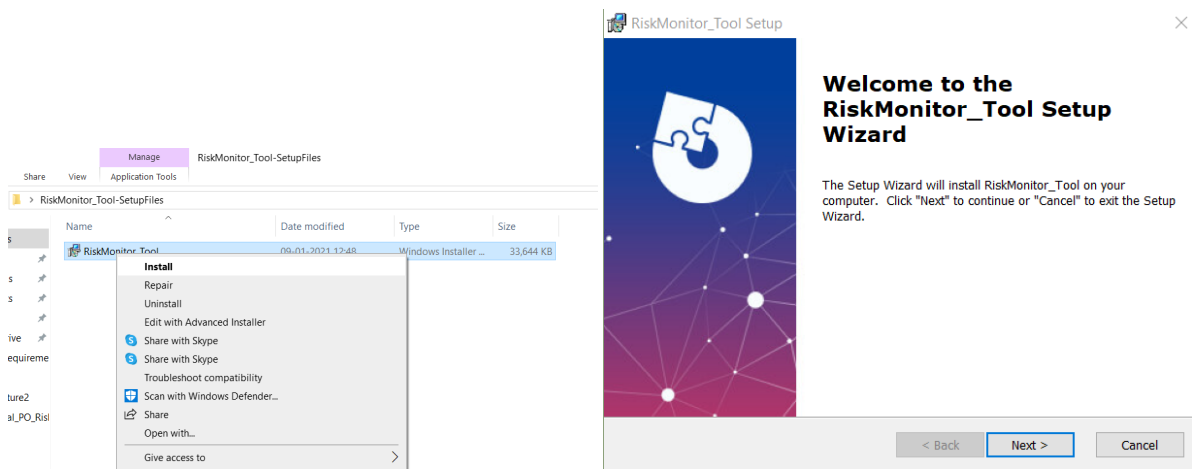


Figure 2: Installing Risk Monitor Tool

2 Using the Risk Monitor Tool

STEP-1. Right click on the Tool icon (i.e. RiskMonitor_Tool.exe) and select "Open" option (refer to 3(b)).

STEP-2. The tool interface opens (refer to 3(a)).

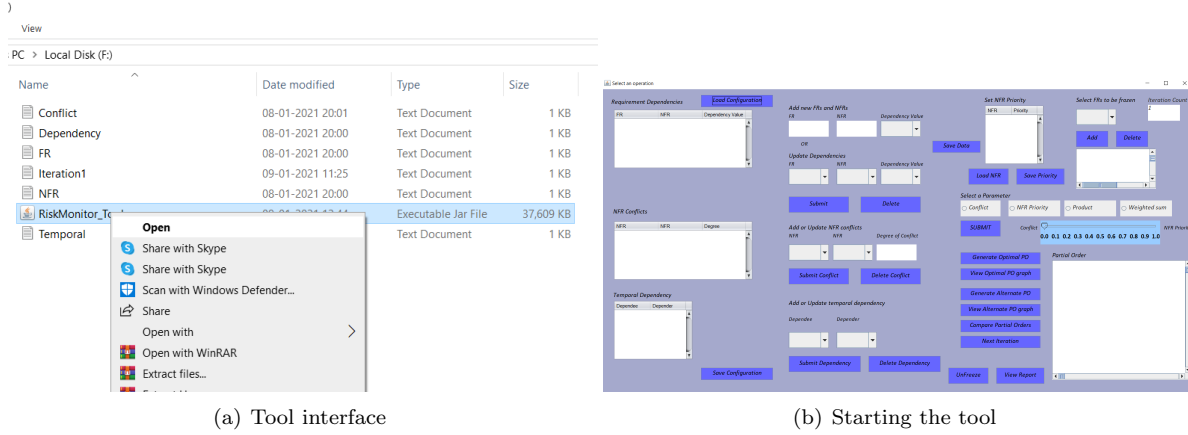


Figure 3: Starting the application

STEP-3. Providing Input Data: The set of functional, non-functional requirements, dependencies and conflicts can be provided in the following ways:

- *Option 1:* The user can choose to use the sample data set that is installed along with the tool (refer to Figure 4).
 - (a) Click on the "Load Configuration" (refer to Figure 3(b)) button to load the data of the sample data set in the tool.
 - (b) Figure 5 shows the data sets that are loaded in the tool.

Name	Date modified	Type	Size
Conflict	08-01-2021 20:01	Text Document	1 KB
Dependency	08-01-2021 20:00	Text Document	1 KB
FR	08-01-2021 20:00	Text Document	1 KB
Iteration1	09-01-2021 11:25	Text Document	1 KB
NFR	08-01-2021 20:00	Text Document	1 KB
RiskMonitor_Tool	09-01-2021 12:44	Executable Jar File	37,609 KB
Temporal	08-01-2021 15:45	Text Document	1 KB

Figure 4: Sample Data Set

- *Option 2:* User can directly provide input in the tool as follows:
 - (a) **Adding new FR & NFR:** In the "Add new FRs and NFRs" (refer to Figure 6) section type the label of FR, its corresponding NFR and select the dependency value from the drop-down list (refer to the boxed portion in Figure 6). Then click on the "Submit" button. The table at the left portion (refer to Figure 3(b)) displays the input submitted.

Requirement Dependencies

FR	NFR	Dependency Value
f1	nf1	8
f1	nf2	4
f2	nf3	8
f2	nf4	2
f3	nf3	7
f3	nf4	4
f4	nf5	6
f4	nf6	6

NFR Conflicts

NFR	NFR	Degree
nf4	nf3	80
nf6	nf7	60
nf8	nf9	80

Temporal Dependency

Dependee	Depender
f1	f4

Load Configuration

Save Configuration

Figure 5: Data Loaded

- (b) **Adding new NFR conflict:** FRs and NFRs has to be added into the list manually or to be loaded from existing set before specifying the conflicts. In the "*Add or Update NFR conflicts*" (refer to Figure 7) section select the pair of NFR that are in conflict using the drop-down list and also specify the degree of conflict (refer to the boxed portion in Figure 7). Then click on the "*Submit Conflict*" button.
- (c) **Adding temporal dependency between FRs:** Similarly here also FRs has to be added into the list manually or to be loaded from existing set before specifying the dependencies. In the "*Add or Update temporal dependency*" (refer to Figure 8) section select the dependee and depender FR using the drop-down list (refer to the boxed portion in Figure 8). Then click on the "*Submit Dependency*" button.

STEP-4. The existing list of inputs can be modified or deleted as follows:

- **Modify FR-NFR dependency Value:** In the "*Add new FRs and NFRs*" section select a FR, NFR and a new dependency value from the drop-down list (refer to the boxed portion in Figure 9) and click on "*Submit*" button. The change can be viewed in the table at left.
- **Delete FR-NFR association:** In the "*Add new FRs and NFRs*" section select the FR and NFR from the drop-down list (refer to the boxed portion in Figure 9) and click on

Add new FRs and NFRs

FR	NFR	Dependency Value
<input type="text"/>	<input type="text"/>	<input type="text"/> ▼

OR

Update Dependencies

FR	NFR	Dependency Value
<input type="text"/> ▼	<input type="text"/> ▼	<input type="text"/> ▼

Submit **Delete**

Figure 6: Adding FR & corresponding NFR

Add or Update NFR conflicts

NFR	NFR	Degree of Conflict
<input type="text"/> ▼	<input type="text"/> ▼	<input type="text"/>

Submit Conflict **Delete Conflict**

Figure 7: Adding NFR conflicts

Add or Update temporal dependency

Dependee	Depender
<input type="text"/> ▼	<input type="text"/> ▼

Submit Dependency **Delete Dependency**

Figure 8: Adding temporal dependency

"Delete" button. The change can be viewed in the table at left.

- **Modify NFR conflict value:** In the "Add or Update Conflicts" section select the pair of NFRs from the drop-down list and type the new conflict value (refer to the boxed portion in Figure 7) and click on "Submit Conflict" button. The change can be viewed in the table at left.
- **Delete NFR conflict:** In the "Add or Update Conflicts" section select the the pair of NFRs from the drop-down list (refer to the boxed portion in Figure 7) and click on "Delete Conflict" button. The change can be viewed in the table at left.

Add new FRs and NFRs

FR: NFR: Dependency Value:

OR

Update Dependencies

FR: NFR: Dependency Value:

Submit **Delete**

Figure 9: Update or remove FR-NFR dependency

- **Delete temporal dependency:** In the "Add or Update temporal dependency" section select the pair of FRs from the drop-down list (refer to the boxed portion in Figure 8) and click on "Delete Dependency" button. The change can be viewed in the table at the left.

STEP-5. Once all the required dependencies and conflicts have been fixed click on "Save Data" button.

STEP-6. Click on "Load NFR" button to load the NFR and set their priority values. Put priority value against each NFR and then click on "Save Priority" button (refer to Figure 10).

Set NFR Priority

NFR	Priority
nf1	45
nf2	60
nf3	75
nf4	90
nf5	65
nf6	50
nf8	74
nf7	87
nf9	40

Load NFR

Save Priority

Figure 10: Setting NFR priority

STEP-7. Now select any one of the parameters in the "Select a Parameter" section on the right (refer to Figure 11). In the case of parameter Weighted Sum, specify the weight to be assigned by dragging the slider to a position. The value at the left portion of the slider indicates weight assigned to the conflict and the right portion to the NFR priority (refer to the boxed portion in Figure 11). In Figure 11 the slider is at position 0:4 which means weight assigned to conflict is

0:4 and that to NFR priority is 0:6. After selecting the parameter click on the "Submit" button to set the parameter.

Figure 11: Setting parameter

STEP-8. Now, click on the "Generate Optimal PO" button to generate the Optimal Partial Order. Partial order in the form of linear sequence(s) that will be displayed in the white text area (refer to Figure 12(a)).

STEP-9. Click on "View Optimal PO Graph" to see the optimal partial order in the form of a graph (refer to Figure 12(b)).

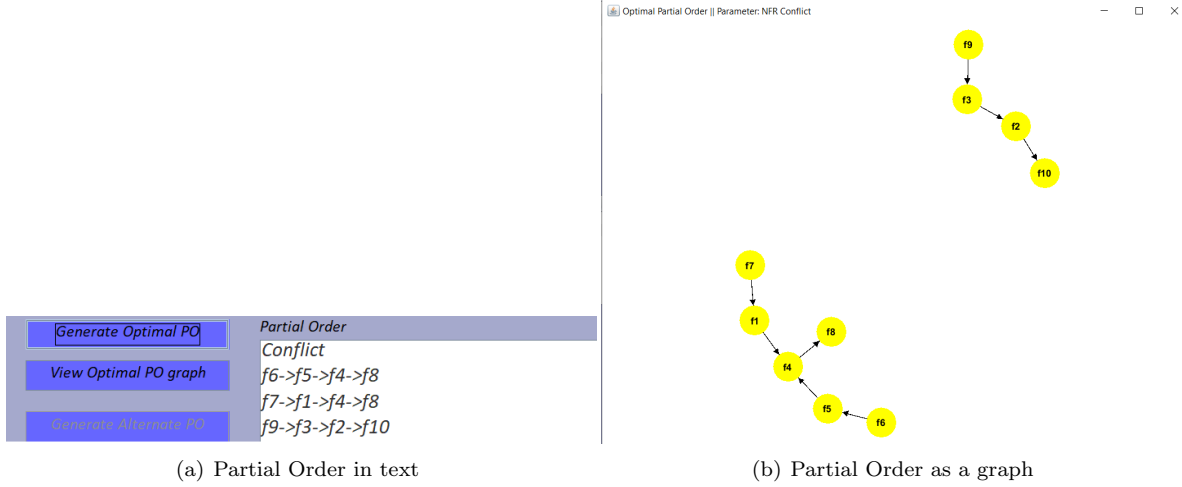


Figure 12: Optimal Partial Order in Iteration 1

STEP-10. Select the set of FRs to be frozen in the next increment in the "Select frozen FRs" section (refer to Figure 13). Click on the drop-down list to select an FR and then click on "Add" button. We will see that the FR is added to the text area (refer to the boxed portion of Figure 13). To remove an FR from the list, select the FR from the drop-down list and click on "Delete" button.

STEP-11. Click on the "Generate Alternate PO" button to generate the Alternate Partial Order. Partial order in the form of linear sequence(s) that will be displayed in the white text area (refer to boxed portion Figure 14(a)).

STEP-12. Click on "View Alternate PO Graph" to see the alternate partial order in the form of a graph (refer to Figure 14(b)).

STEP-13. Click on the "Compare Partial Order" button to see the set of conflicting precedences (refer to the boxed portion in Figure 17). It also displays the quantitative risk exposure values.

STEP-14. Then click on the "View Report" button to view the qualitative risk analysis and risk reduction strategies (refer to Figure 16).

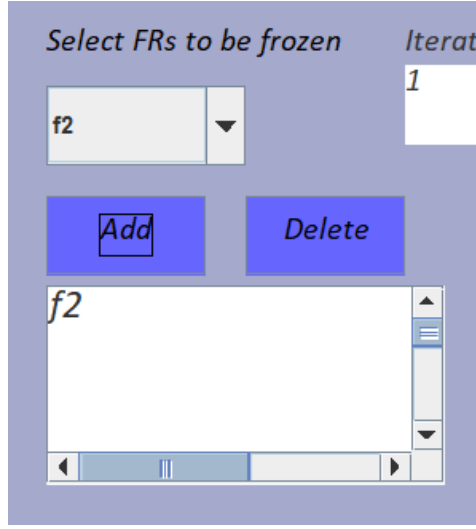
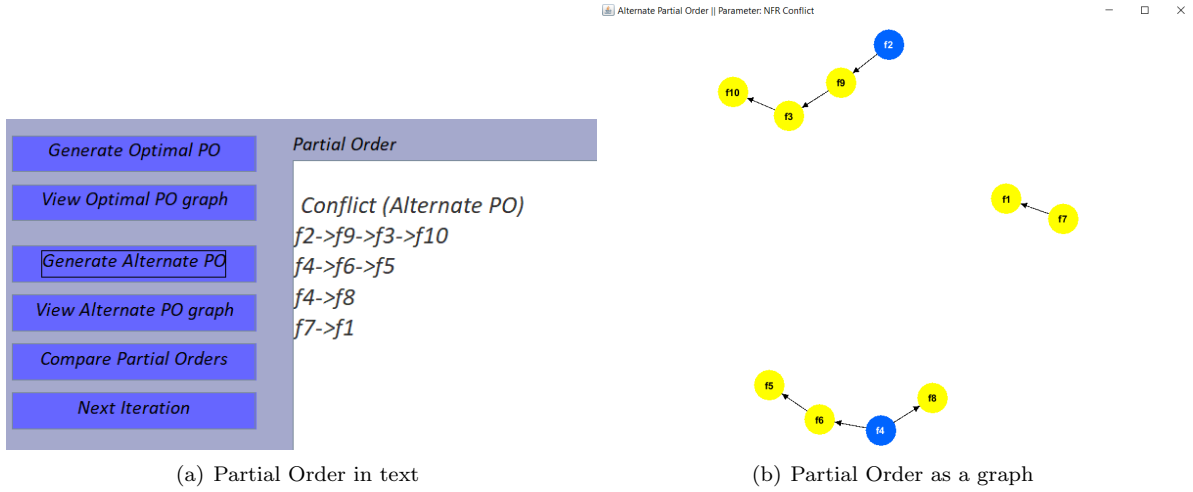


Figure 13: Selecting Frozen Requirements



(a) Partial Order in text

(b) Partial Order as a graph

Figure 14: Alternate Partial Order in Iteration 2

- STEP*-15. Then click on the "Next Iteration" button to move to the next iteration of the software development.
- STEP*-16. Add new FR, NFR dependencies, conflicts, or modify them using *STEP* – 3 and *STEP* – 4.
- STEP*-17. If there are new NFRs then repeat *STEP* – 6 to set the priority of the new NFR.
- STEP*-18. To set a new parameter follow the instruction in *STEP* – 7, otherwise one can also continue with the already set parameter in the previous iteration.
- STEP*-19. Follow steps *STEP* – 8 to *STEP* – 14 to generate partial orders and to perform risk analysis.
- STEP*-20. User can again click on "Next Iteration" to perform successive risk analysis by providing user choices for different increments.
- STEP*-21. At any $n - th$ ($n > 1$) iteration user can click on "UnFreeze" button to remove choices from previous iterations to reduce the risk. Figure 17(a) shows user need to select the increment from

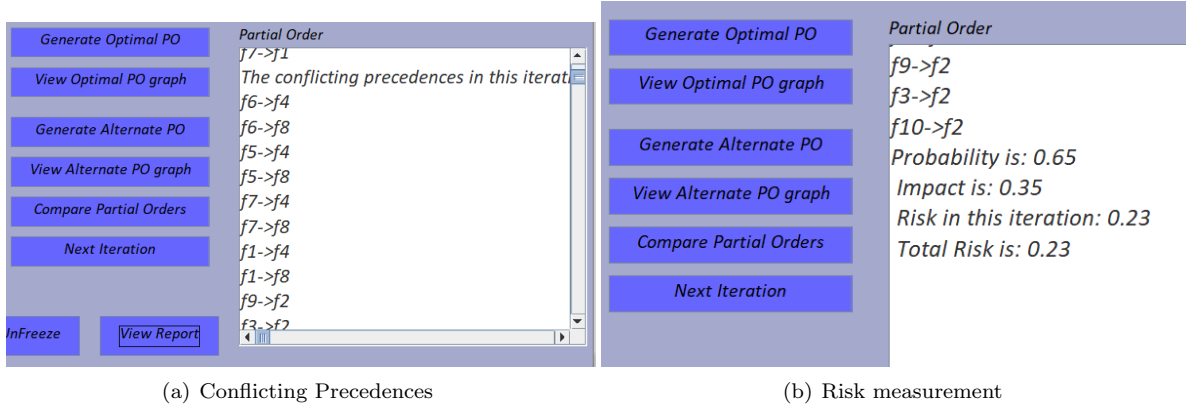


Figure 15: Partial Order comparison result

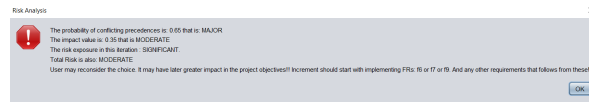


Figure 16: Qualitative Risk Analysis

which requirements need to be removed. Figure 17(b) demonstrates the risk that can be reduced against different choices. Figure 17(c) shows the result of how much risk is reduced.

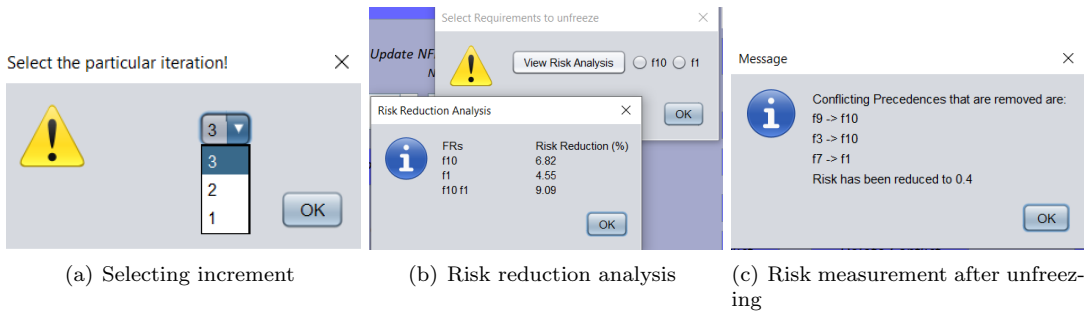


Figure 17: Unfreezing requirements

STEP-22. "Save Configuration" button is used to store the updated set of requirements (as the requirements undergo changes in the successive iteration) and also the NFR priorities and requirements that are added to the frozen list before closing the application. When the interface is reloaded user can click on "Load Configuration" button to resume work from where it was left.