SafeBook

A SaaS platform for ALM & Requirements Management

Contents

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1. SafeBook

SafeBook is a web-browser-based online requirement management software. SafeBook follows a V-shape working flow methodology with three levels, as shown in figure [1].
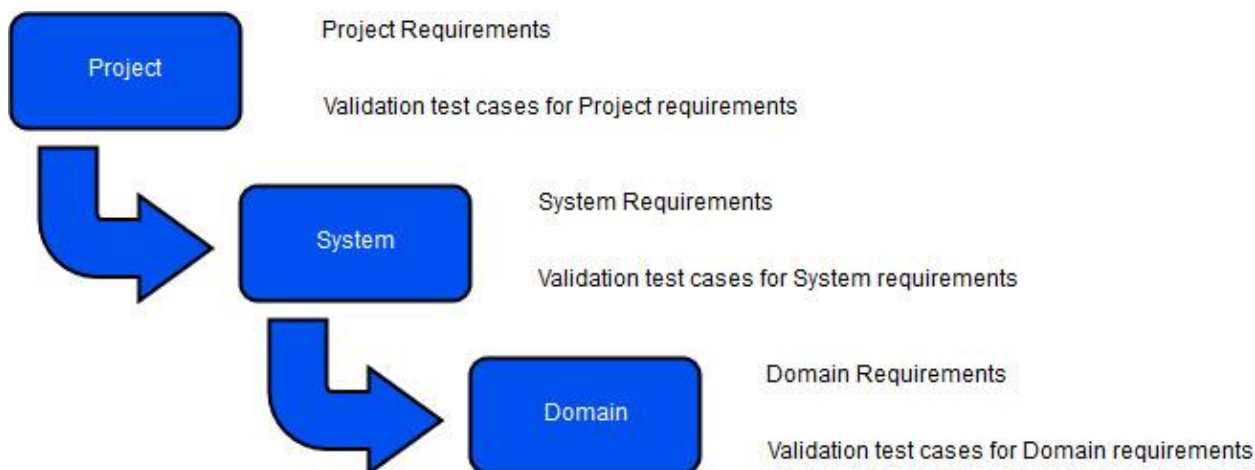

Figure 1. SafeBook's workflow diagram

Before explaining how the software works, we will briefly explain some basic concepts and terms to provide a basic understanding of the workflow. For that, we will refer to an example project.

-Example project:

A customer come to us, with the need for developing a car like the popular model K.I.T.T from the TV series "Knight Rider".

The customer will provide his concerns, ideas and needs, such as

- *"We want that the car color has to be the same of the one in the TV series"*
- *"We want to use LED panels instead of lamps"*
- *"The motor has to be electrical"*
- *"The car has to be sold in all EU commercial space"*

These ideas shall be translated to project requirements, each of them related to a proper validation test case.

> The underlined project is the level where the general requirements for the entire development are defined, determining all the levels below.

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The Project K.I.T.T. includes different components referred to as systems. In figure [2], we can see which systems compose the K.I.T.T.
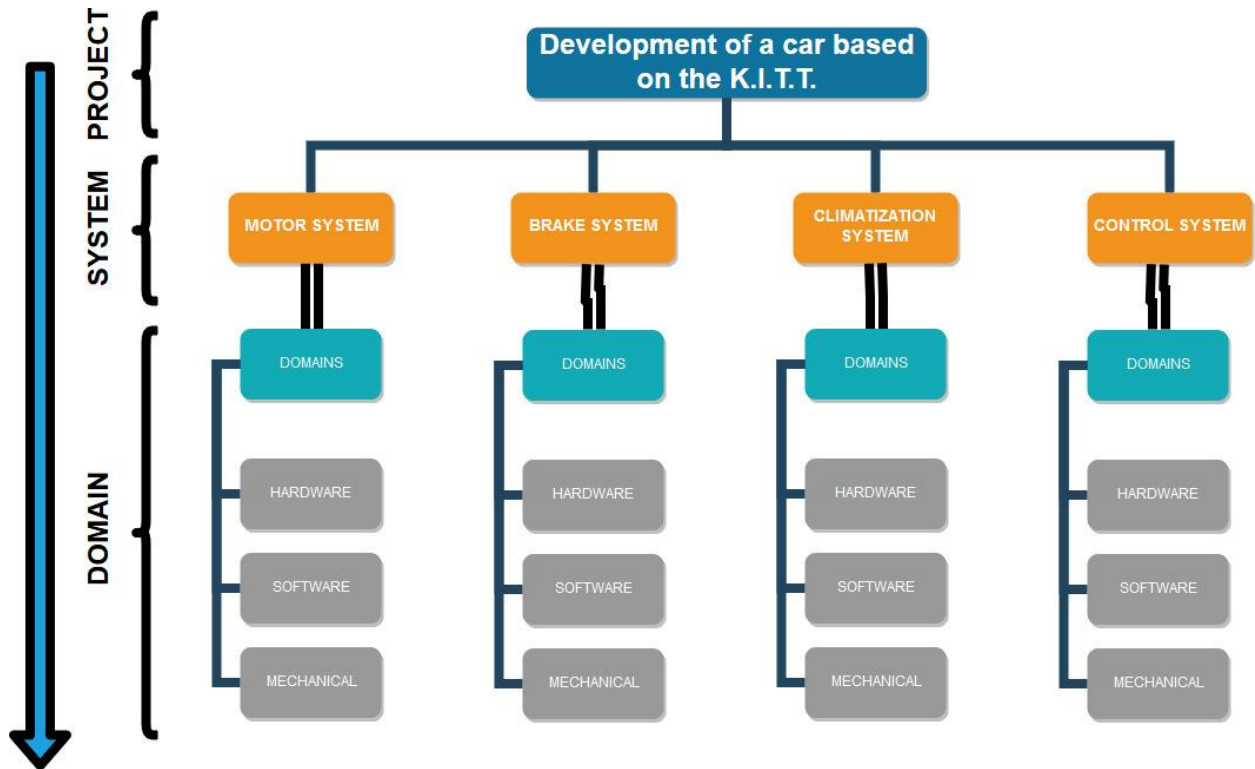
Figure 2. K.I.T.T. project level definition

> The system are the parts and components working together to constitute the project. Project requirements can be allocated into one or several systems.

Each system is implemented by three different domains. In this example: hardware, software and mechanical.

> The domain is the implementation level of each requirement. Each system requirements can be traced to one or several domain requirements.

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1.1 Browser compatibility

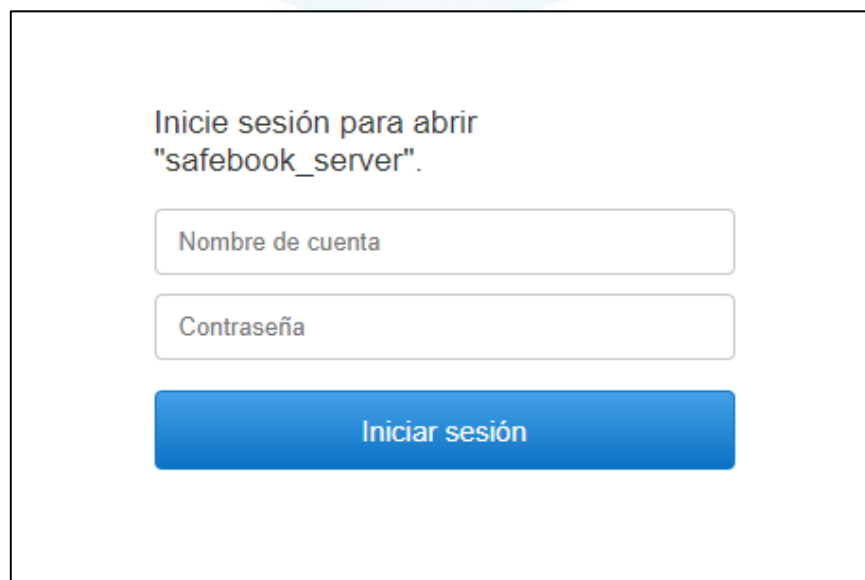It is recommended to use SafeBook in any of the web browsers in table [1], with JavaScript applet enabled.

Desktop browsers	Mobile browsers
Safari 11.0.x	Mobile Safari on iOS 11.2
Chrome 58	Chrome 65 on Android 7
Internet Explorer 11.x	
Microsoft Edge 41	

Table 1. Recommended web browsers

2 Project creation

After accessing the SafeBook website, it will appear a logging window in the default language of the user's operating system. The logging window is shown in figure [3]

Inicie sesión para abrir
"safebook_server".

Nombre de cuenta

Contraseña

Iniciar sesión

Figure 3. Logging box

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After logging in as an administrator, the web browser will show the main screen of the SafeBook (figure [4]). The main screen includes:

1. Create new project button
2. System requirements visualizer
3. Domain requirements visualizer
4. Domain test cases visualizer
5. System test cases visualizer
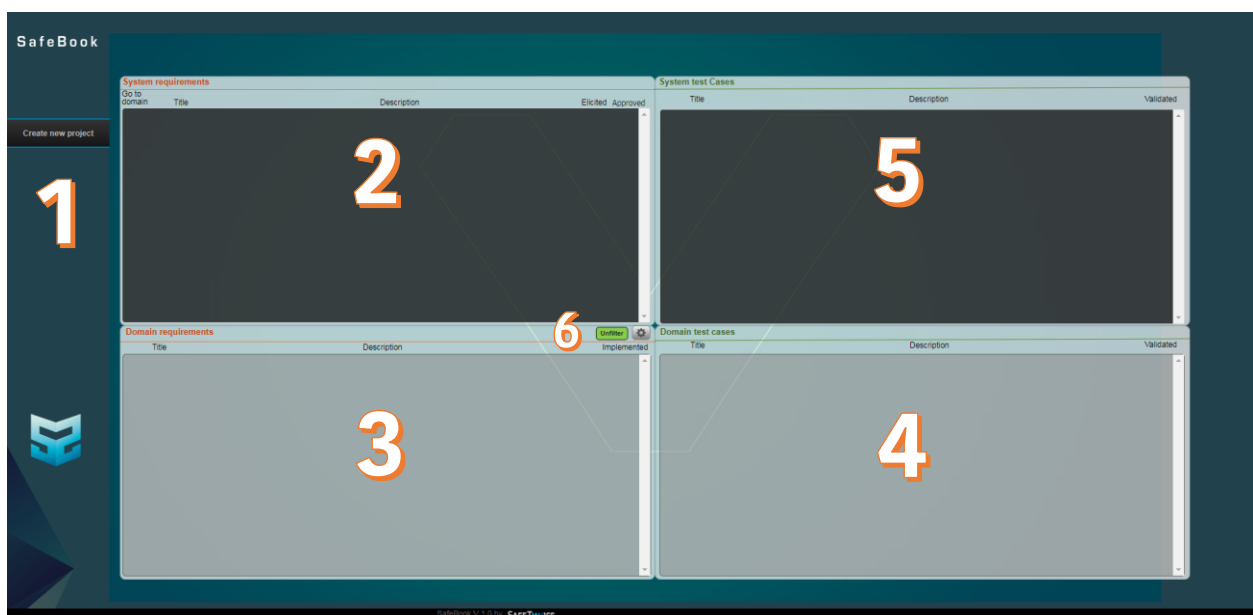6. Domain requirements filter/unfilter buttons

Figure 4. Main screen layout

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2.1   Project creation.

After getting familiarized with the main screen, we proceed to click the **Create new project** button. We will jump to the New Project screen, where we can assign a name and a description for the project and select which users have access to the it.
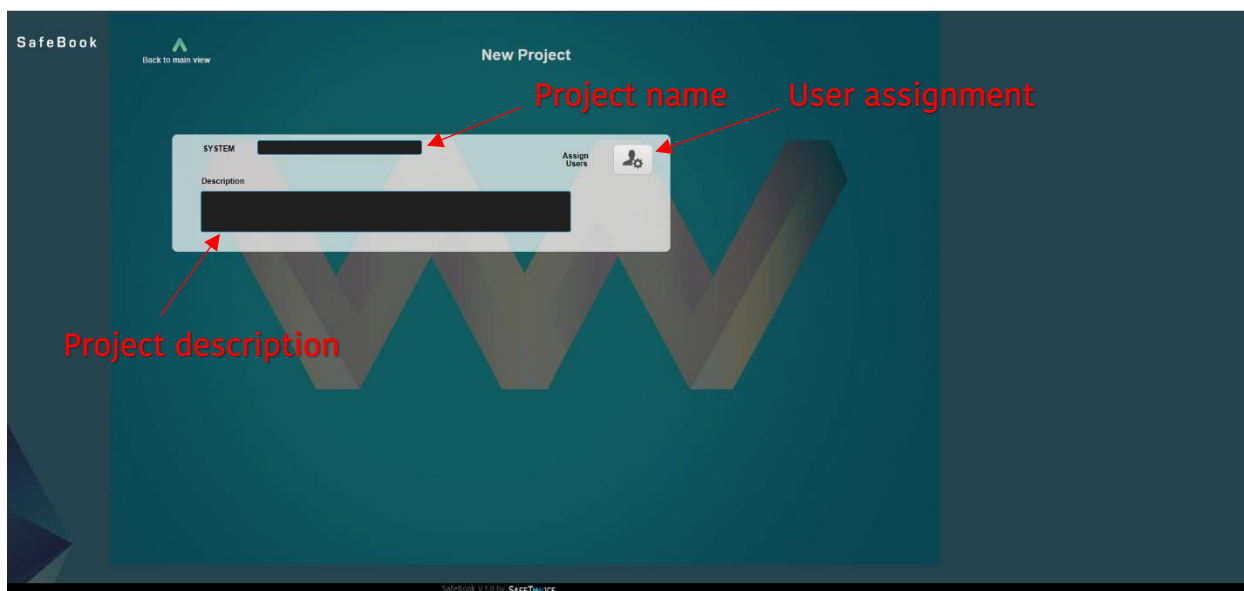

Figure 5. Project creation screen

For user management, we shall click user icon, so the Permissions window opens (figure [6]). Users that need to have access granted to the project can be easily selected in a checklist.
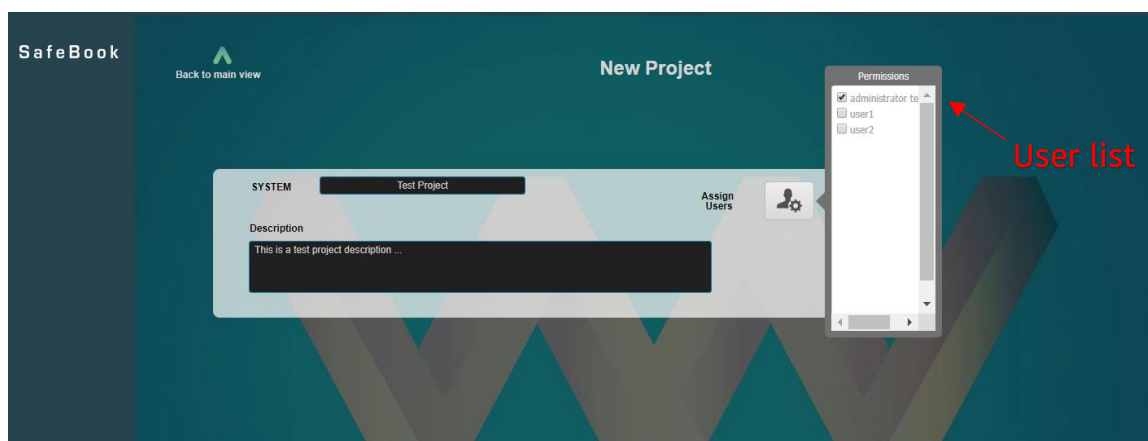
Figure 6. User adding to the project

We shall click the **Back to main view** button to return to the main screen. The recently created project is now loaded as current project, as shown in figure [7].
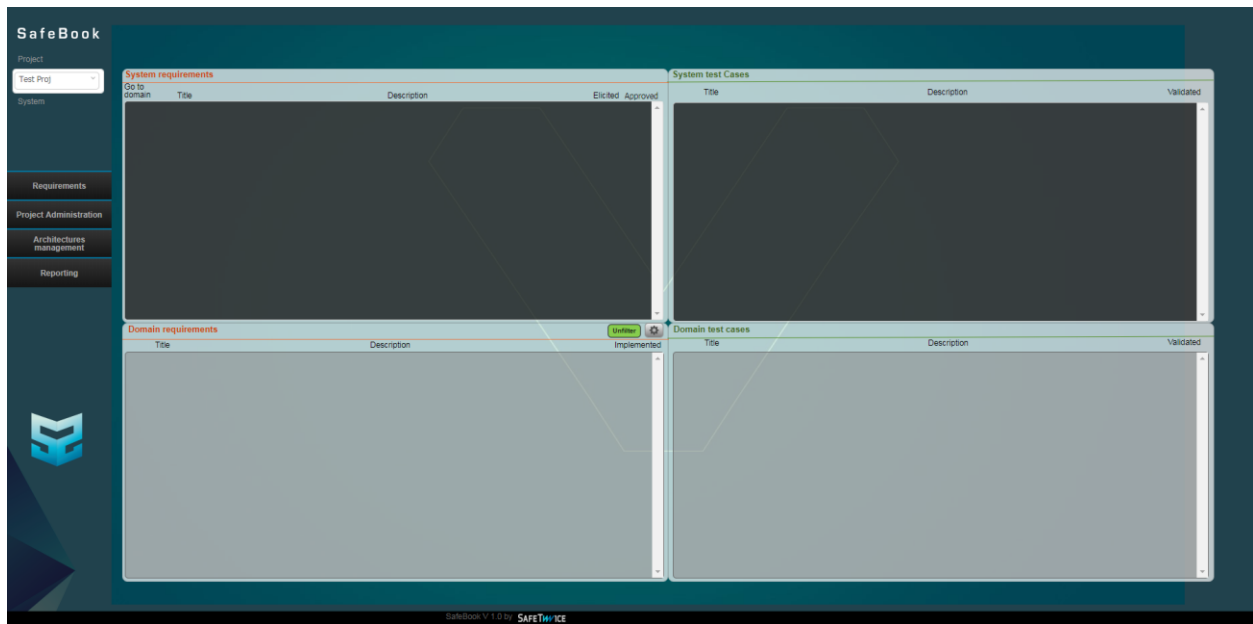
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Figure 7. Main screen after project creation

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2.2   Current project main screen: Administrator and User modes

New buttons will appear in main screen menu after the project is created: the layout will be different according to the user type. Figure [8] shows the button layout for the Administrator, editor user and reader user. In this guide, there are going to be widely explained the admin and editor users as the reader privilege allows the user to see all the project data using the same layout the admin user has.
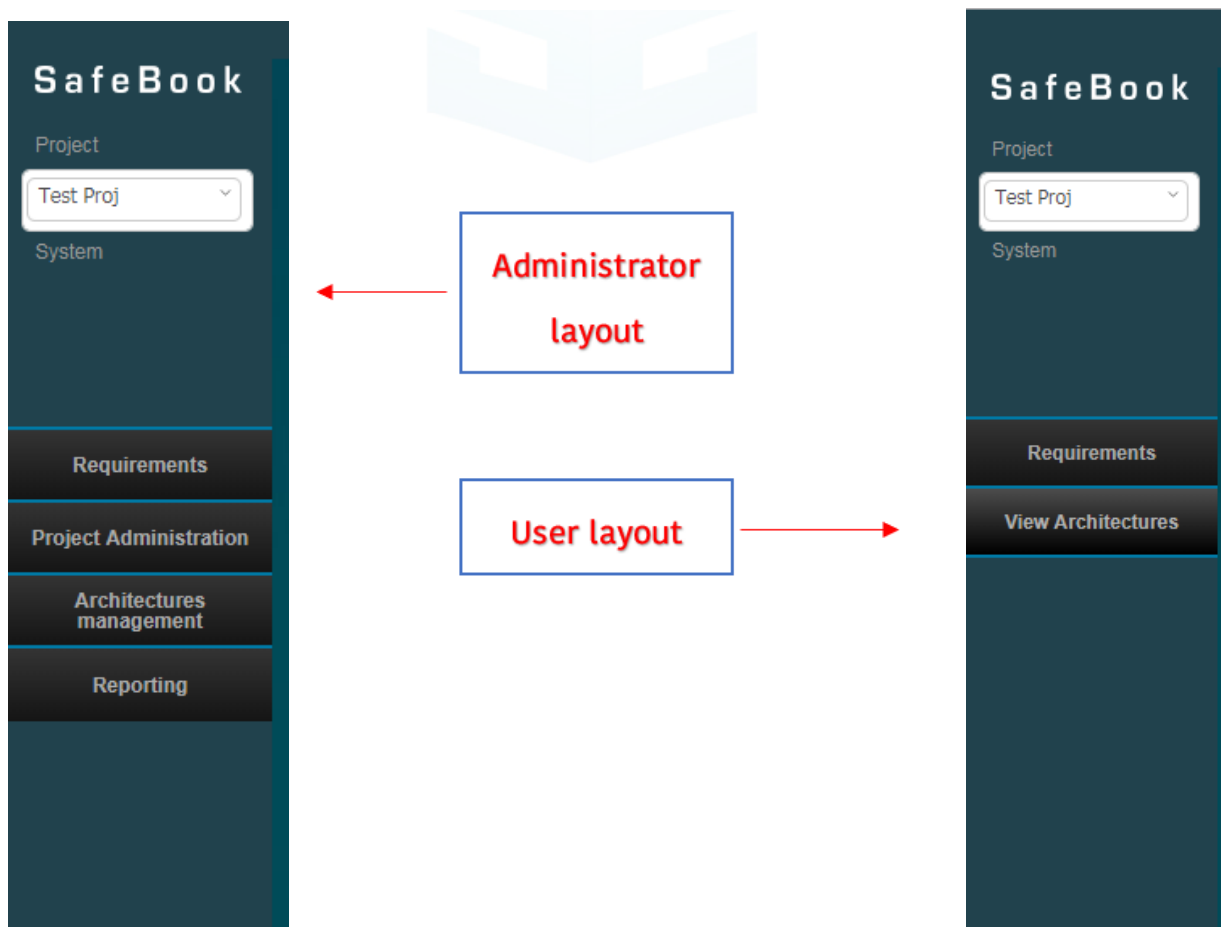

Figure 8. Layout difference between Administrator and Normal User

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The four buttons in the main screen menu are:
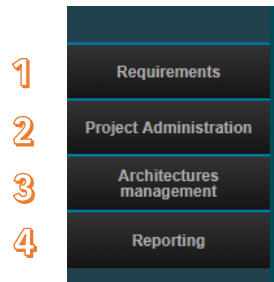

Figure 9. Layout description

1. Requirements: in this section, both the Administrator and the editor user can add and modify the requirements for all the three stages of the V-process.
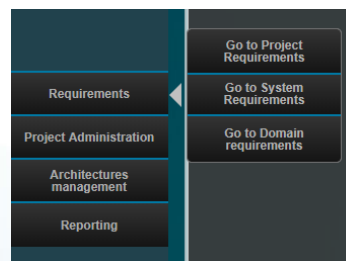

Figure 10. Requirements menu

2. Project Administration: in this section, the Administrator can either 1) Create other new project; 2) Configure the current project; 3) View existing projects; 4) Manage project releases.
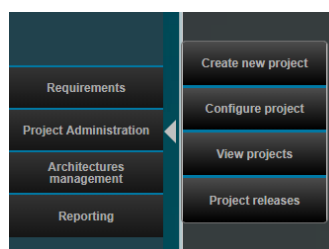

Figure 11. Project Administration menu

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3. Architectures Management: in this section, the Administrator can create, view and modify the architectures for current project, systems and domains.
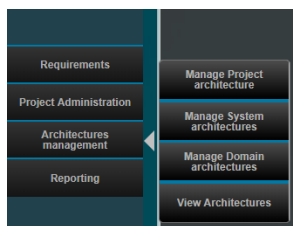

Figure 12. Architectures management menu

4. Reporting: in this section, the Administrator can generate different project reports (warning report, lifecycle project indicators and traceability matrix) and download the requirements of the project as a docx file.
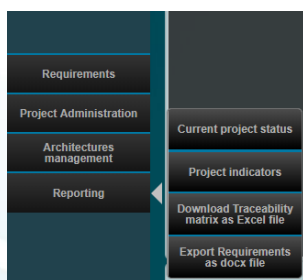

Figure 13. Reporting menu

The editor user can only edit the requirements data (for the three stages) and see the architectural models implemented in the application.

3 System creation and management

3.1 Project prefixes configuration

In the Project administration screen the Administrator can either 1) define the default prefixes for the ID of each type of requirement; 2) create the systems included in the project; 3) manage the configuration of both project and systems; 4) Display or not the project requirement in the homepage.

> NOTE: To define requirements in SafeBook, the project needs a minimum of one system: the core unit of the workflow is the system requirement.

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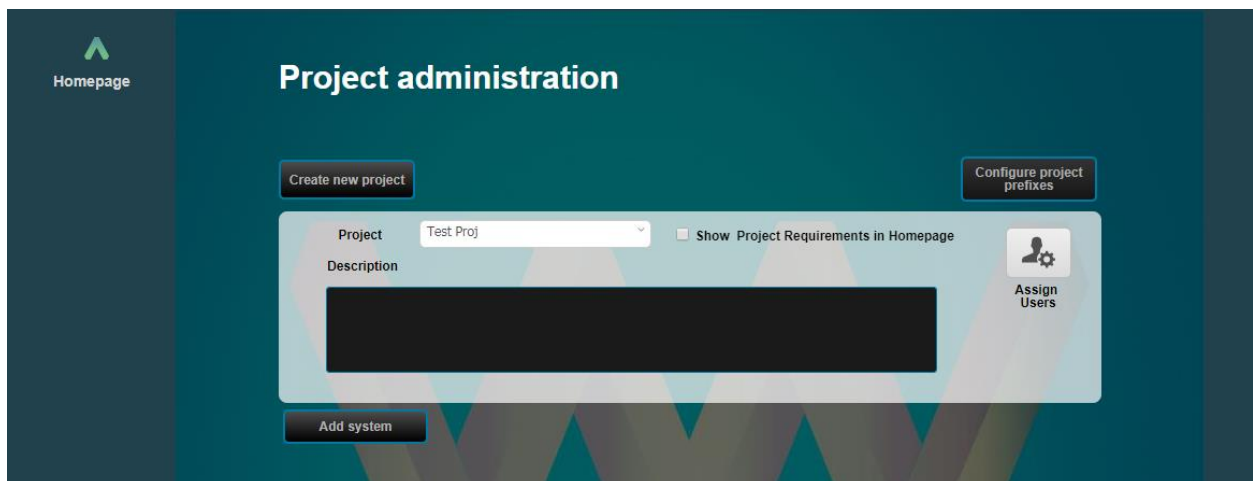SAFETWICE.COM

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Figure 14. Project administration screen

When the user clicks the **Configure project prefixes** button, the Project prefixes window opens: prefixes for the system requirements, validation requirements can be determined, as well as the numerical spacing between automatic ID assignments.

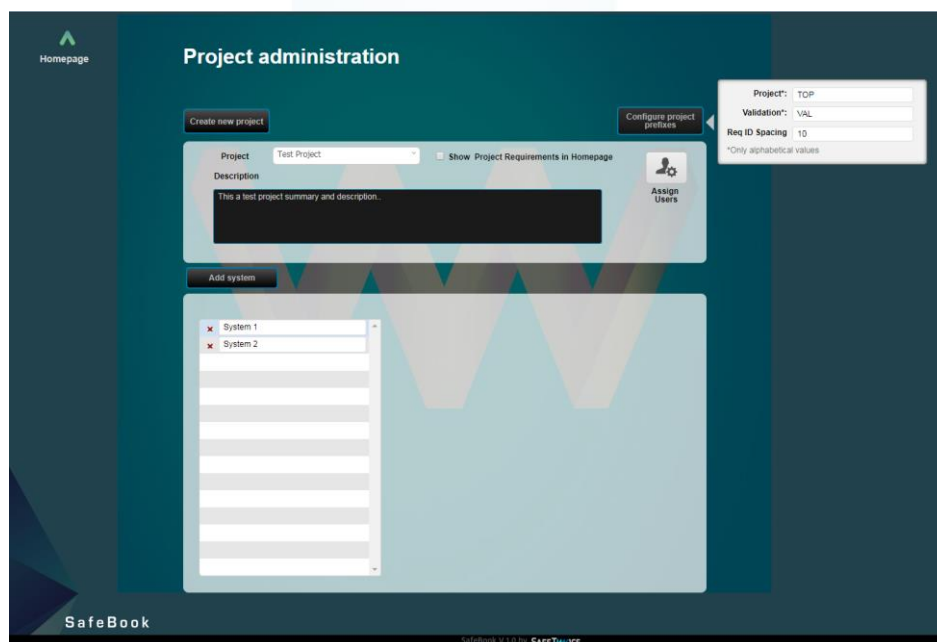Figure 15. Configuration of the Project prefixes

3.2 System creation

Clicking on the **Add System** button below the box for description, we will jump to New System screen (figure [16]) where a new system can be created and included in the current project, assigning to it a name and a description.

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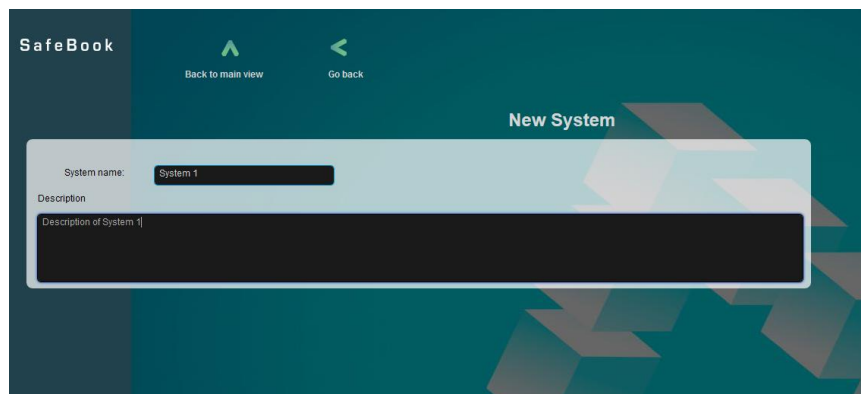
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Figure 16. New System screen

After the creation of the new system, we click the **Go Back** button to return to the Project administration screen. Now the recently created system is added to the systems list for the current project. This process can be repeated to add further systems to the project.

3.3   System configuration

When a system is selected in the systems list, the System configuration menu comes up. Here, the Administrator can either 1) Configure which users can edit the project and systems 2) Define the default prefixes for system and domain requirements; 3) Copy/move system to another project; 4) Edit the description of the selected system.
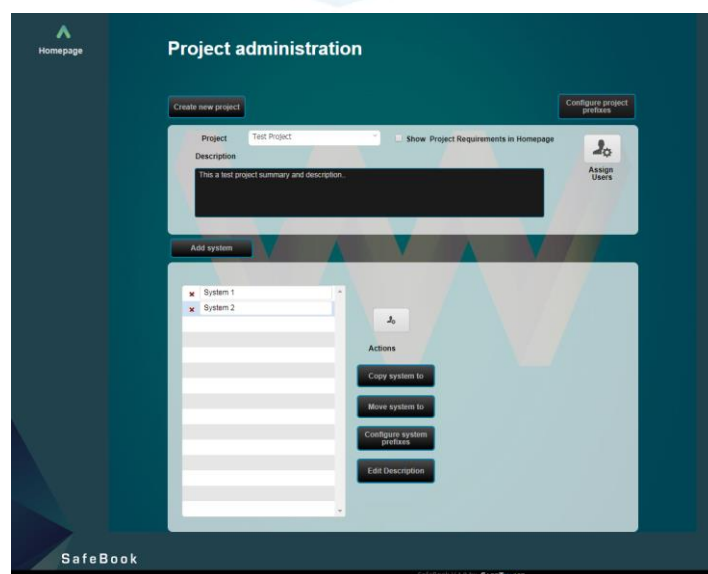
Figure 17. System configuration menu

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User configuration button: The Administrator can use it to configure which users can see and edit the system (figure [18]).

Figure 18. User access configuration for each system.

System prefixes button: The Administrator can use it to configure the prefixes and the ID default spacing for each type of system and domain requirements and validation test cases.

Figure 19. Prefixes and numerical ID spacing configuration for each system.

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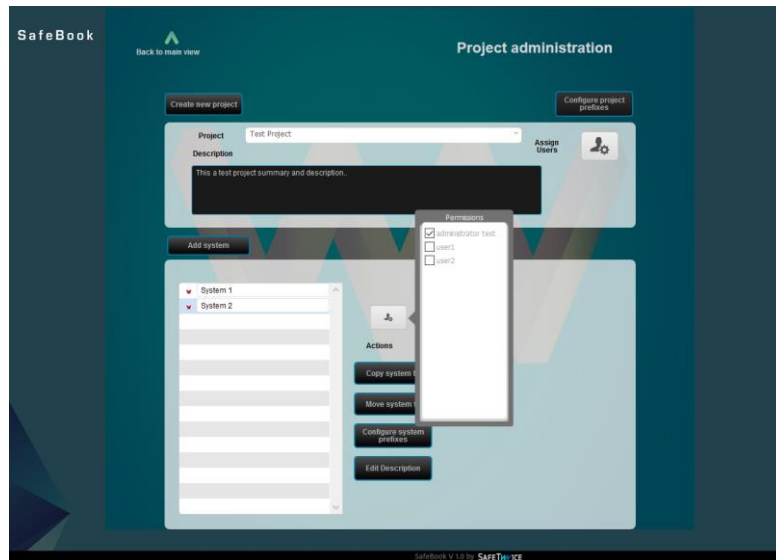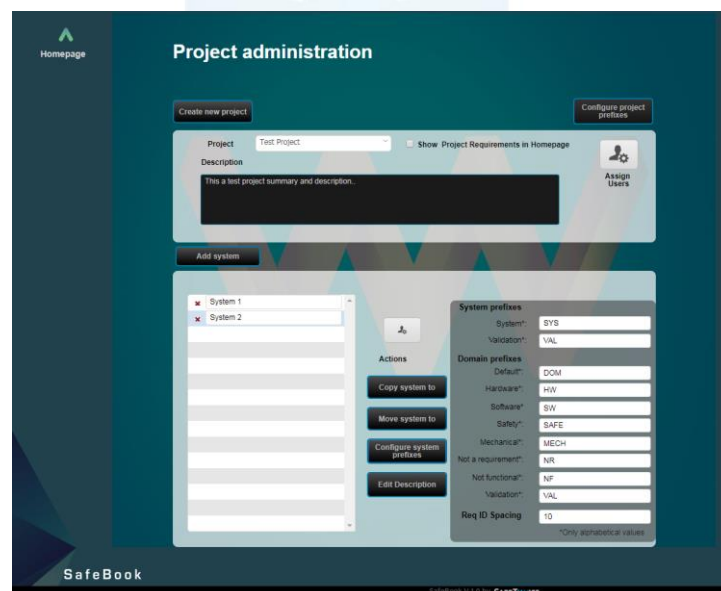**Copy system to button:** The Administrator can copy any system in the current project to another project. The copy process preserves all the system configuration, system requirements, domain requirements, domain test cases and system test cases (see Figure [20]).

Move system to button: The Administrator can move any system in the current project to another project. The copy process preserves all the system configuration, system requirements, domain requirements, domain test cases and system test cases (see Figure [20]).

> NOTE: These copy/move functionalities will also preserve system and domain architectures, but it will NOT preserve architectural links (i.e. between blocks and interfaces, between requirements and blocks/interfaces).
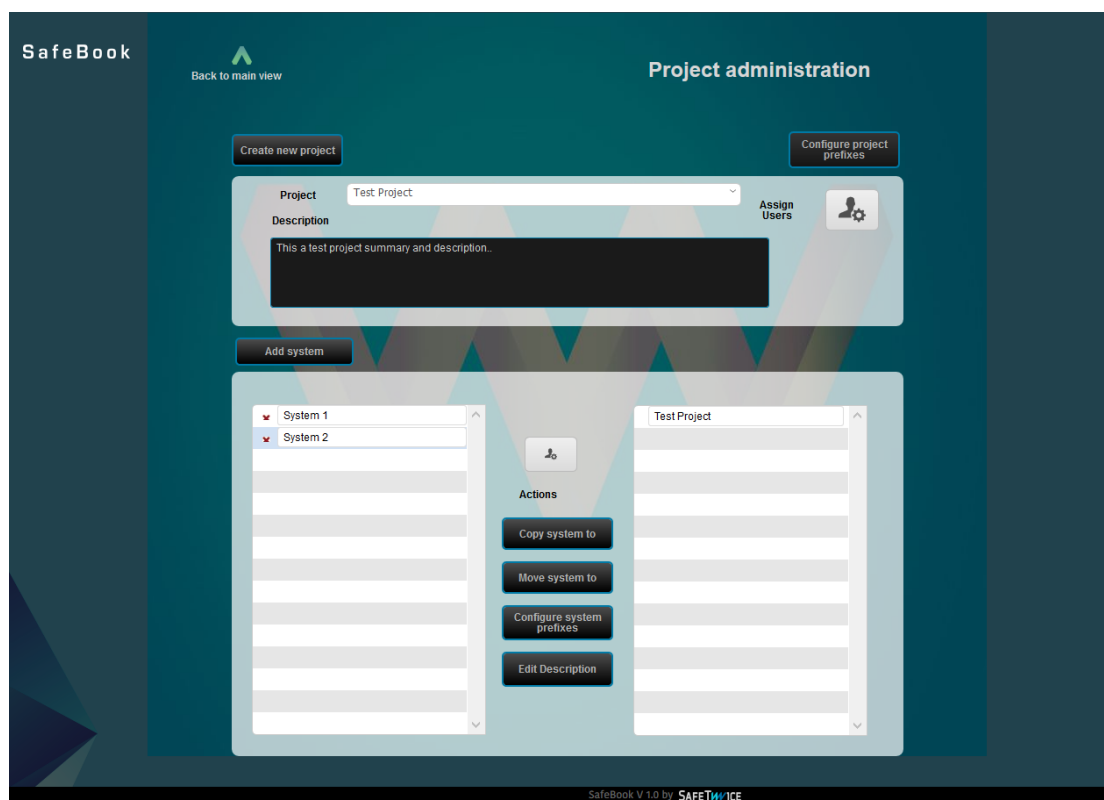

Figure 20. Copy and Move system to a Project.

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4　Architecture creation and management

> PLEASE NOTICE: In SafeBook's workflow, the creation and management of architectures is NOT mandatory. Requirements for project, system and domain levels can be created and managed independently from any architectural consideration. To learn more about the creaton and management of requirements in SafeBook, please see Chapter 5 in this manual.

In this Architectures management section (figure [21]) in the main screen menu, the Administrator can manage project, system and domain architectures.
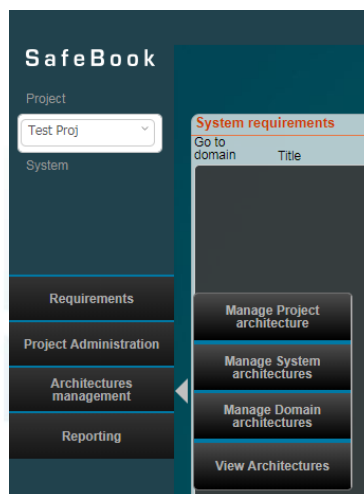

Figure 21. Architectures management menu

4.1　Project architecture creation and management

The **Manage Project Architecture** button leads to Project Architecture screen, as shown in figure [23], where we have:

1. **Block list visualizer:** this visualizer shows all the blocks that exist in our architecture definition.

2. **Interface list visualizer:** this visualizer shows all the interfaces that exist in our architecture definition.

3. **Architecture visualizer:** this area is a drag and drop, where the administrator load a drawing of the architecture. Also, after loading the drawing of the architecture, if the image is clicked, it will show and enlarged image for details.

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4. **Visualization options:** these buttons remark all the blocks that are related to each interface defined.

> NOTICE: The architecture drawing uploaded to the Architectures visualizer has only illustrative purposes, and has no impact whatsoever in the block or interface definition in SafeBok.

> NOTICE: SafeBook only supports JPEG, PNG and PDF, with a maximum size of 5 [Mb] per file, to be uploaded to the Architecture visualizer.
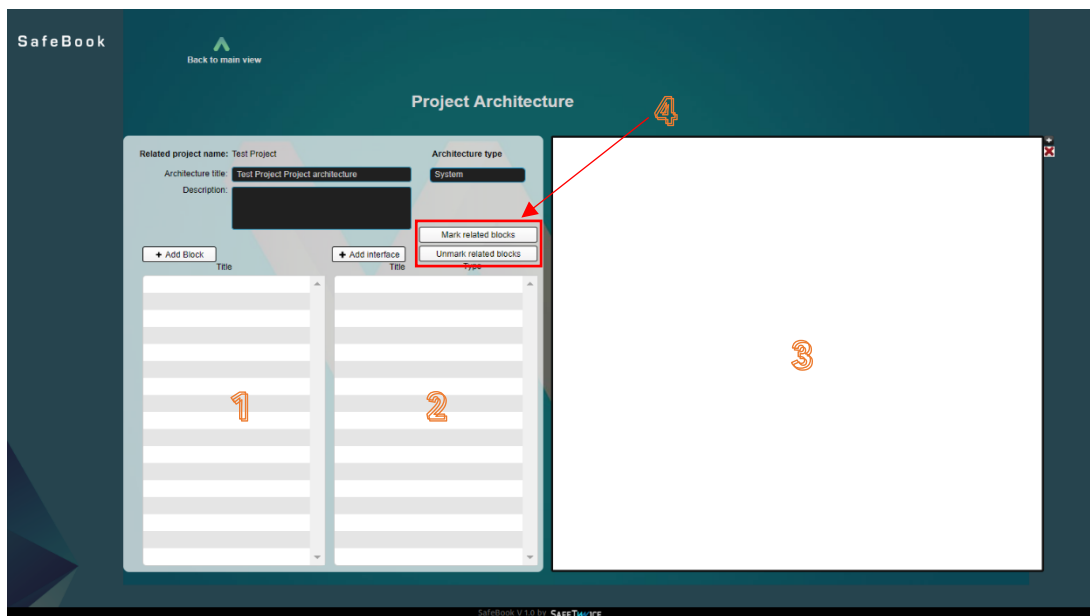

Figure 22. Project Architecture screen

4.1.1   Blocks creation

The Administrator can use the **Add Block** button to create a new block for the current project architecture: a blank item is created in the block list so the Administrator can assign a name (figure [23]).
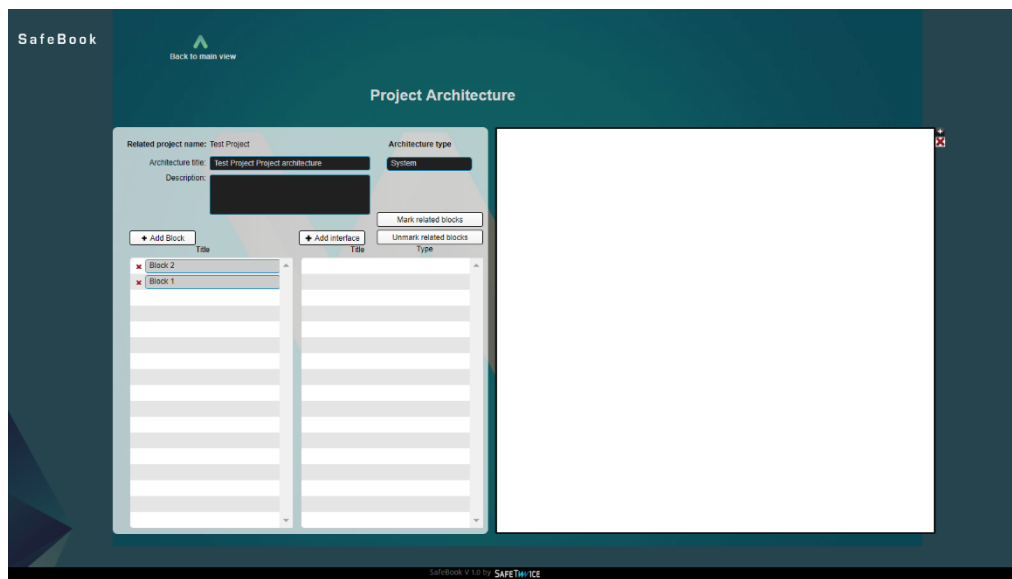
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Figure 23. Creation of architecture blocks

4.1.2   Interfaces creation

The Administrator can use the **Add interface** button to create a new interface for the current project architecture: a blank item is created in the block list so the Administrator can assign a name (figure [24]). For each interface, it can be selected a type (Internal/External). Besides, it can be linked to one or several architectural blocks by using the Block linker button (figure [25]).
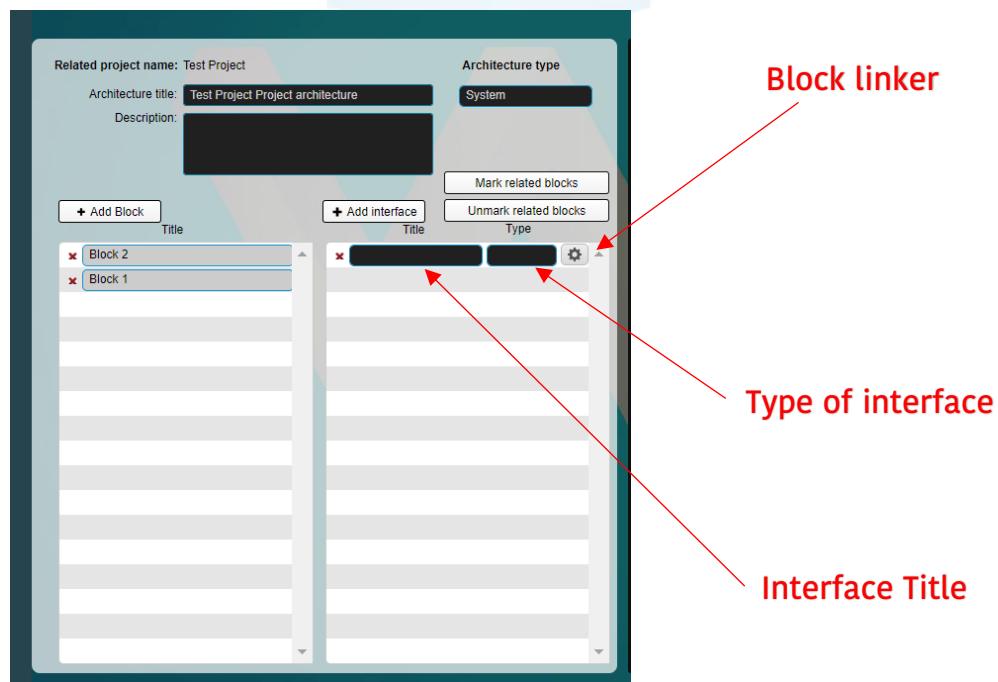

Figure 24. Interface creation layout

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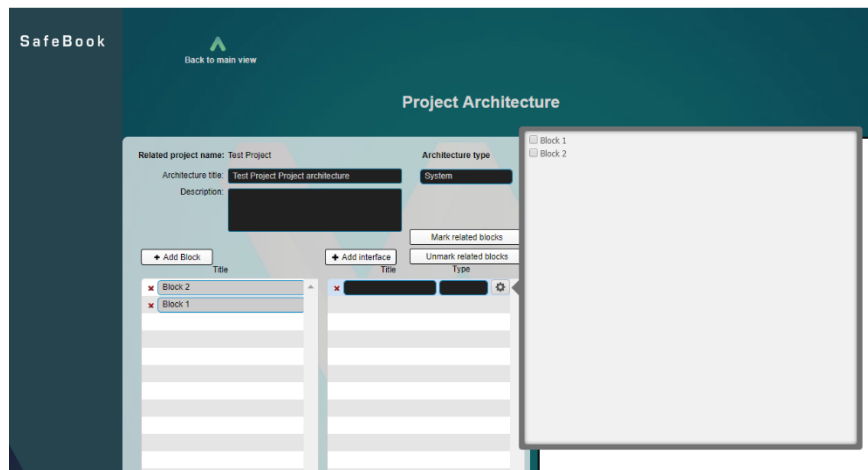
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Figure 25. Interface linking to a block from the architecture definition

Any block or interface can be deleted at any moment by clicking in the red X icon at the left of each block/interface, as shown in figure [26].

Figure 26. Delete icon for each block or interface

4.2   System architecture creation and management

Back to the the main screen menu, the **Manage System Architectures** button leads to System Architectures screen, as shown in figure [27].

The process for adding blocks and interfaces and linking them together is the same as described in Chapter 4.1 in this manual for Project architecture creation and management. Please notice, though, that the Administrator shall scroll from one system architecture to another (in the case that several systems have been included in current project). To do so, the scroll-down list shall be used, as shown in figure [27].

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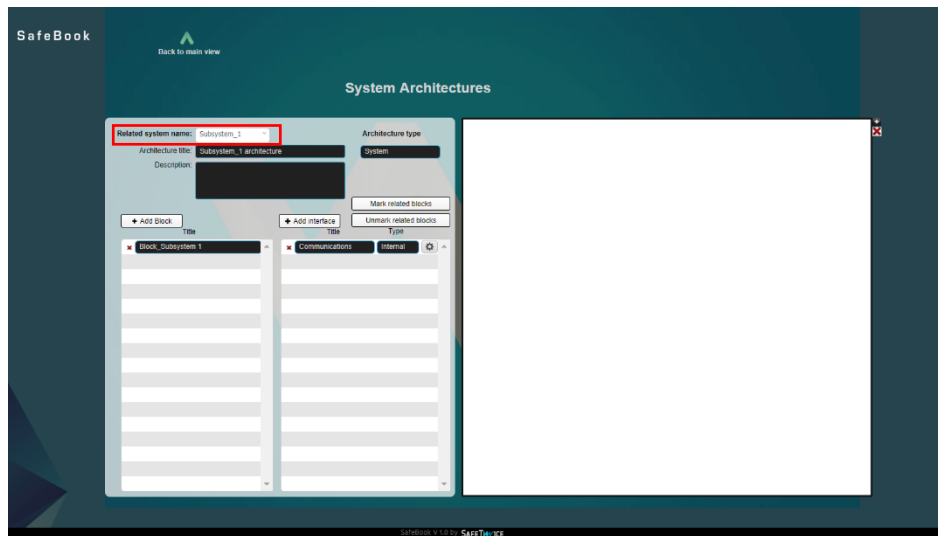
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Figure 27. System architecture screen layout

4.3   Domain architecture creation and management

Back to the the main screen menu, the **Manage Domain Architectures** button leads to Domain Architectures screen, as shown in figure [28].

The process for adding blocks and interfaces and linking them together is the same as described in Chapter 4.1 in this manual for Project architecture creation and management. Please notice, though, that the Administrator shall scroll from one system architecture/domain to another (in the case that several systems have been included in current project). To do so, the scroll-down lists shall be used, as shown in figure [28].
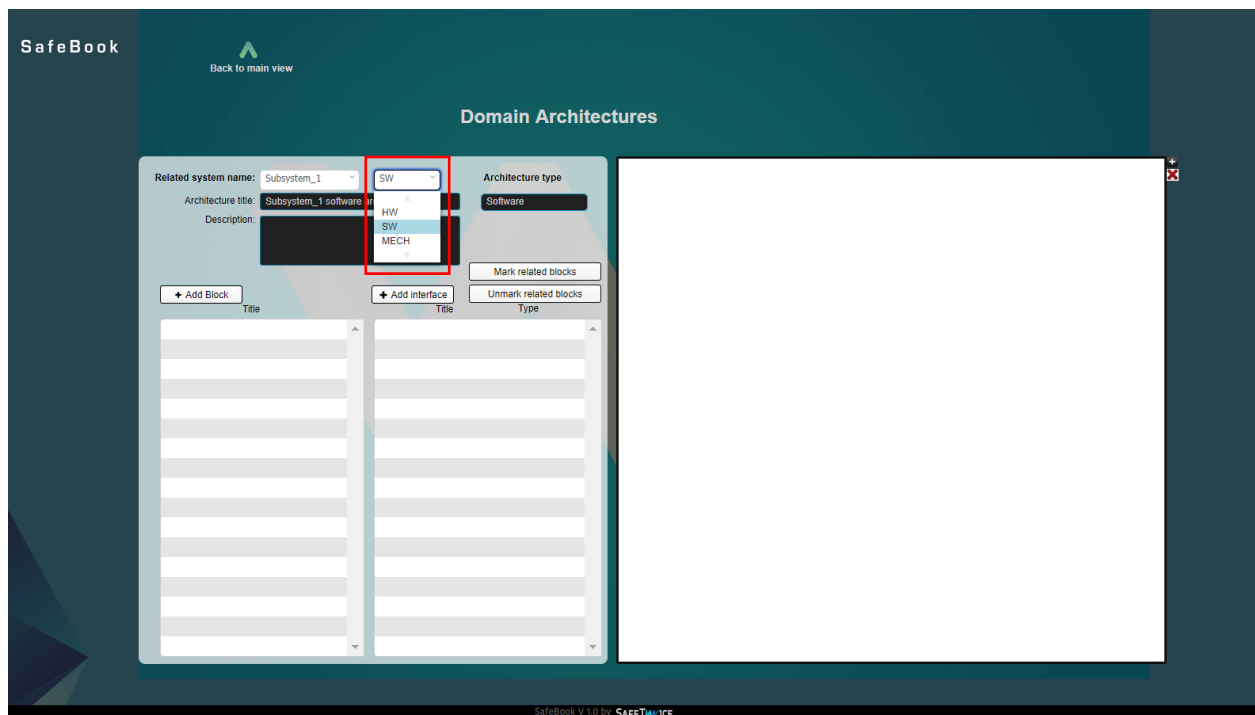
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Figure 28. Domain Architecture screen layout

4.4   View Architectures

Back to the the main screen menu, the **View Architectures** button leads to View Architectures screen, as shown in figure [29]. This screen allows the Administrator to easily navigate through the architectural diagram for the current project.
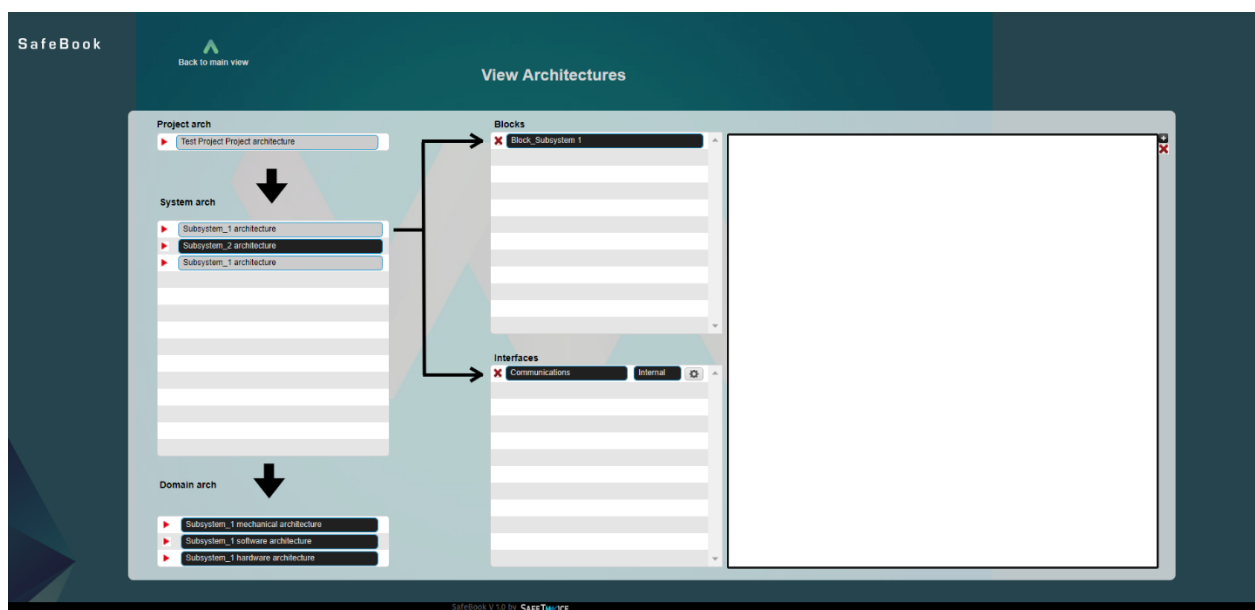

Figure 29. View Architectures screen

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5   Requirements creation and management

NOTICE: This chapter describes the core functionality of SafeBook: creation and management of requirements. These are distributed according to the three levels of the project, so we can have project, system and domain requirements.

NOTICE: IN SAFEBOOK's WORKFLOW, THE BASIC LOGIC UNIT IS THE SYSTEM REQUIREMENT: any system requirement can be traced to a project requirement: and any system requirement can be implemented with one or several domain requirements.

5.1   Project Requirements creation and management

Back to the the main screen menu, the Requirements →Go to Project Requirements button leads to Project Requirements screen, as shown in figure [30].
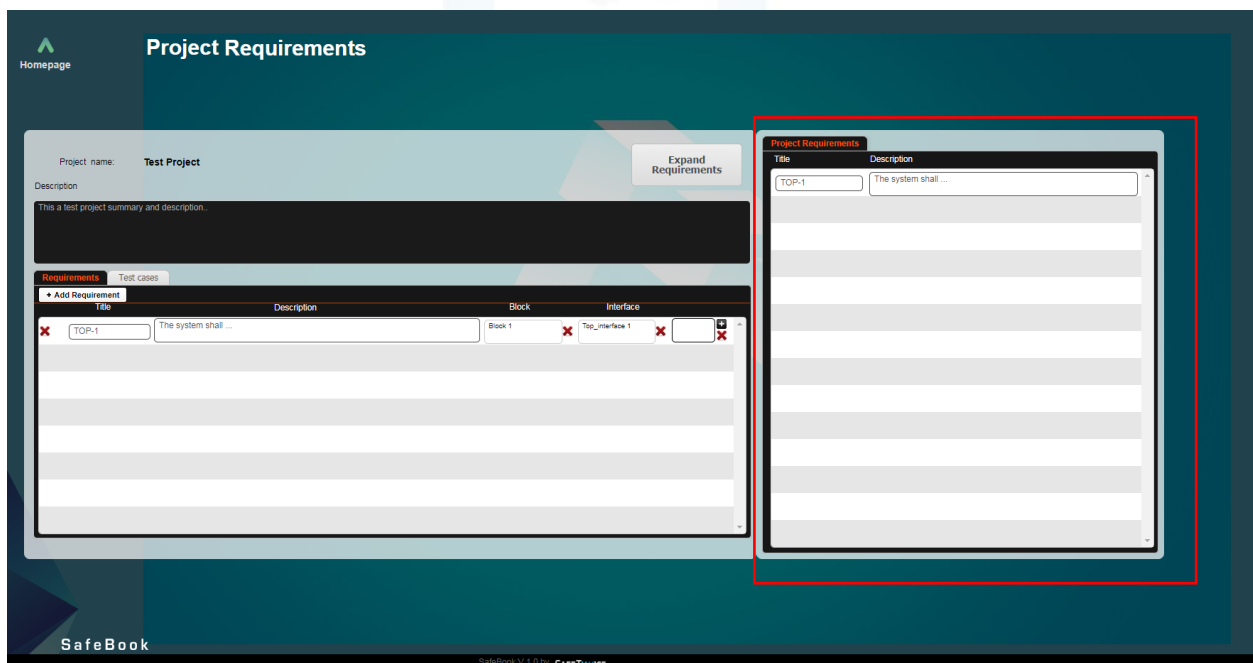

Figure 30. Project Requirements screen

The section highlighted in red has only informative purposes: at any moment Project Requirements are displayed to the requirements engineer, so the linkage between requirements and validation test cases is easy and straight-forward.

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A new requirement can be created by clicking on **Add Requirement** button: a new blak line will be added to the list of project requirements, where it can be edited the following information related to the requirement:

1. ID number. Automatic ID formation and spacing is configured in Project Administration (please see Chapter 3.1 in this manual) but can be edited by the user at any moment.

2. Description.

3. Architectural block linked to the requirement. Architectural blocks shall be previously defined in Architectures Management (please see Chapter 4 in this manual). Blocks can be unlinked from the requirement at any moment, by clicking on the red cross button next to it.

4. Architectural interface linked to the requirement. Architectural interfaces shall be previously defined in Architectures Management (please see Chapter 4 in this manual). Interfaces can be unlinked from the requirement at any moment, by clicking on the red cross button next to it.

5. Documentation attached to the requirement. Files can be added by clicking on the "+" button next to it or deleted at any time by clicking on the red cross button. Files can also be added using drag-and-drop functionality.

Note: For documentation attachments, SafeBook only supports JPEG, PNG and PDF, with a maximum size of 5 [Mb] per file.
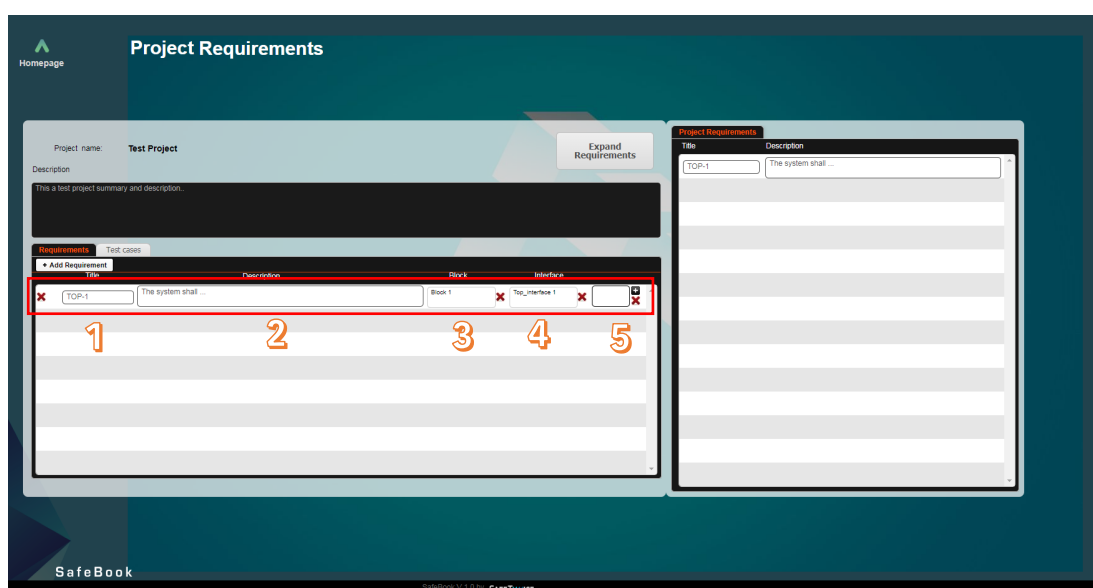

Figure 31. Project requirement layout description

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The visualizer for system requireménts can be expanded to fit full screen by using the Expand Requirements button.

5.2   Project Validation test cases

In Project Requirements screen, Test cases can easily be managed by clicking on the **Test cases** tab and a list of the test cases will be displayed. Click on the **Add Validation** button, a new blak line will be added to the list of project test cases, where it can be edited the following information related to the test case (see figure [32]):

1. ID of the project requirement to be validated. User can easily check the current list of project requirements on the section on the right of the screen.

2. ID number. Automatic ID formation and spacing is configured in Project Administration (please see Chapter 3.1 in this manual) but can be edited by the user at any moment.

3. Description.

4. Documentation attached to the test case. Files can be added by clicking on the "+" button next to it or deleted at any time by clicking on the red cross button. Files can also be added using drag-and-drop functionality.
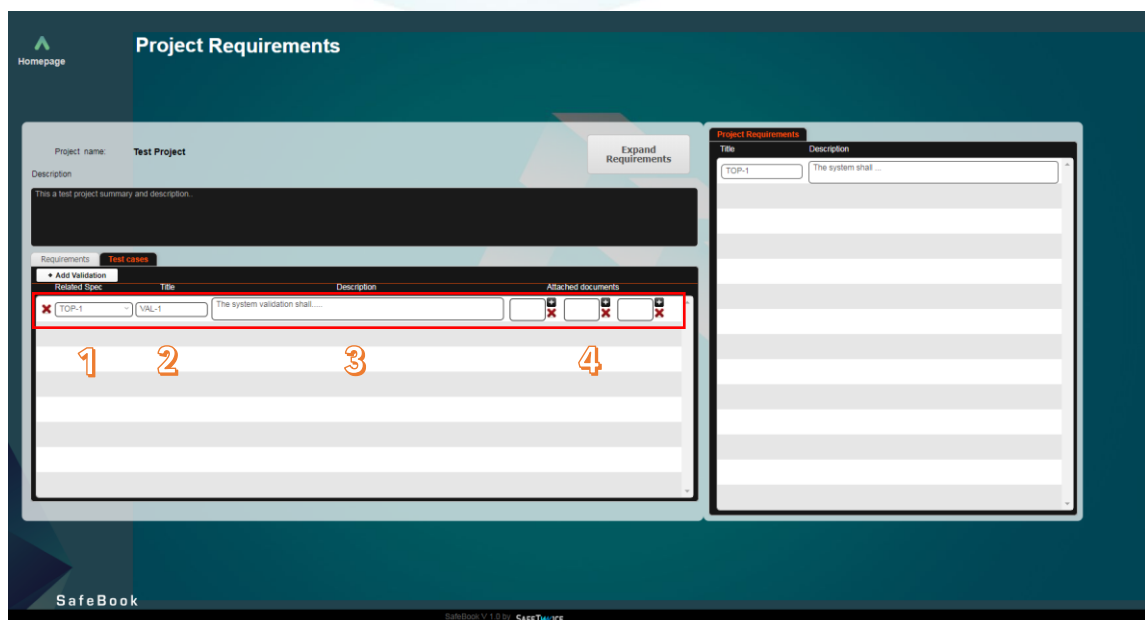

Figure 32. Test case validation for each Project Requirements

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5.3　System Requirements

Back to the the main screen menu, the Requirements → Go to System Requirements button leads to System Requirements screen, as shown in figure [33].
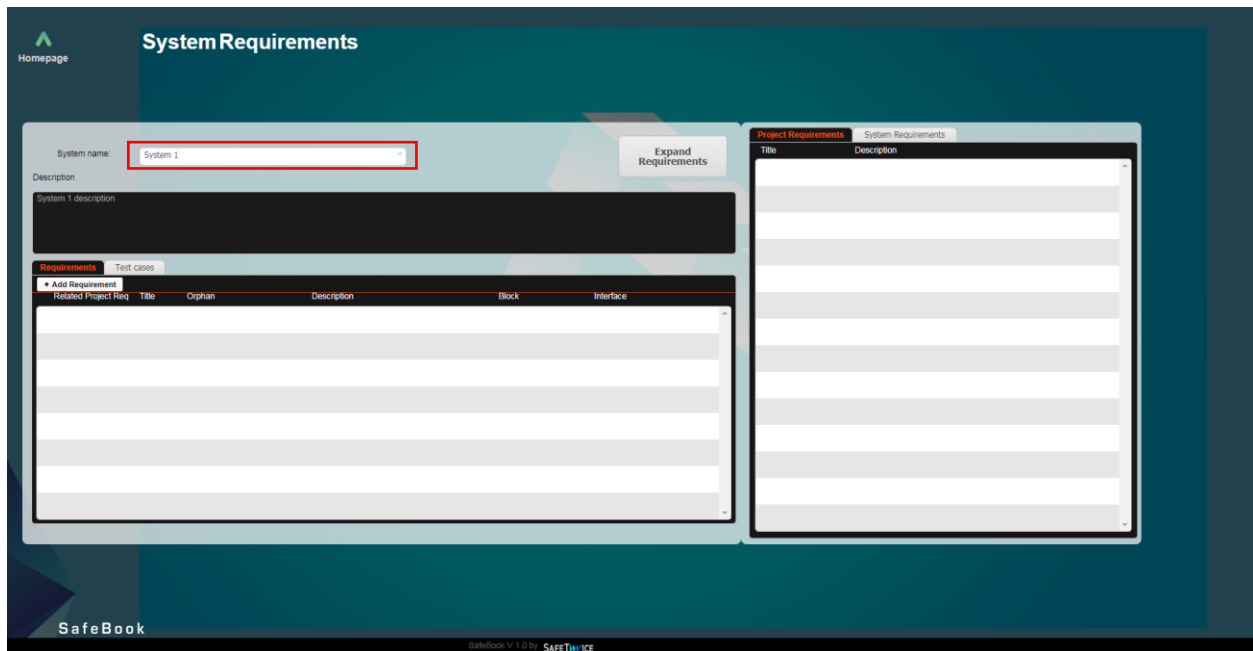

Figure 33. System selection for linking the requirements

> NOTICE: In System Requirements screen, requirements can be added for the different systems in the current project. They can be selected in the scroll-down list highlighted in red in figure [34].

A new requirement can be created by clicking on **Add Requirement** button: a new blak line will be added to the list of system requirements, where it can be edited the following information related to the requirement (see figure [35]):

1. ID of the project requirement which the system requirement is linked to. User can easily check the current list of project requirements on the section on the right of the screen.

2. ID number. Automatic ID formation and spacing is configured in Project Administration (please see Chapter 3.1 in this manual) but can be edited by the user at any moment.

3. Orphan checkbox allows the user to unlink the system requirement from any project requirement.

4. Description.

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5. Architectural block linked to the requirement. Architectural blocks shall be previously defined in Architectures Management (please see Chapter 4 in this manual). Blocks can be unlinked from the requirement at any moment, by clicking on the red cross button next to it.

6. Architectural interface linked to the requirement. Architectural interfaces shall be previously defined in Architectures Management (please see Chapter 4 in this manual). Interfaces can be unlinked from the requirement at any moment, by clicking on the red cross button next to it.

7. Documentation attached to the requirement. Files can be added by clicking on the "+" button next to it or deleted at any time by clicking on the red cross button. Files can also be added using drag-and-drop functionality.

> Note: For documentation attachments, SafeBook only supports JPEG, PNG and PDF, with a maximum size of 5 [Mb] per file.
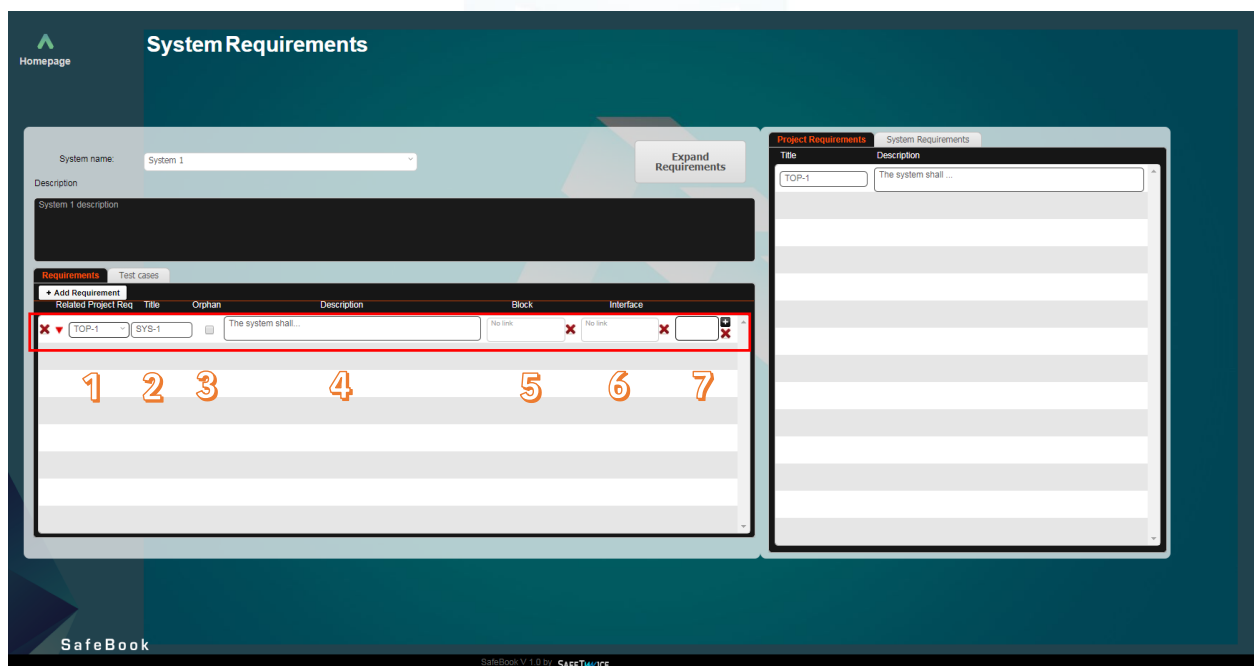

Figure 34. System Requirement layout description

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5.4   System Validation test cases

In System Requirements screen, Test cases can easily be managed by clicking on the **Test cases** tab and a list of the test cases will be displayed. Click on the **Add Validation** button, a new blank line will be added to the list of project test cases, where it can be edited the following information related to the test case:

1.   ID of the system requirement to be validated. User can easily check the current list of system requirements on the section on the right of the screen.

2.   ID number. Automatic ID formation and spacing is configured in Project Administration (please see Chapter 3.1 in this manual) but can be edited by the user at any moment.

3.   Description.

4.   Documentation attached to the test case. Files can be added by clicking on the "+" button next to it or deleted at any time by clicking on the red cross button. Files can also be added using drag-and-drop functionality.

Back in the main screen, System Requirements and Validation Test cases are now added and can be easily navigated though, as shown in figure [35].
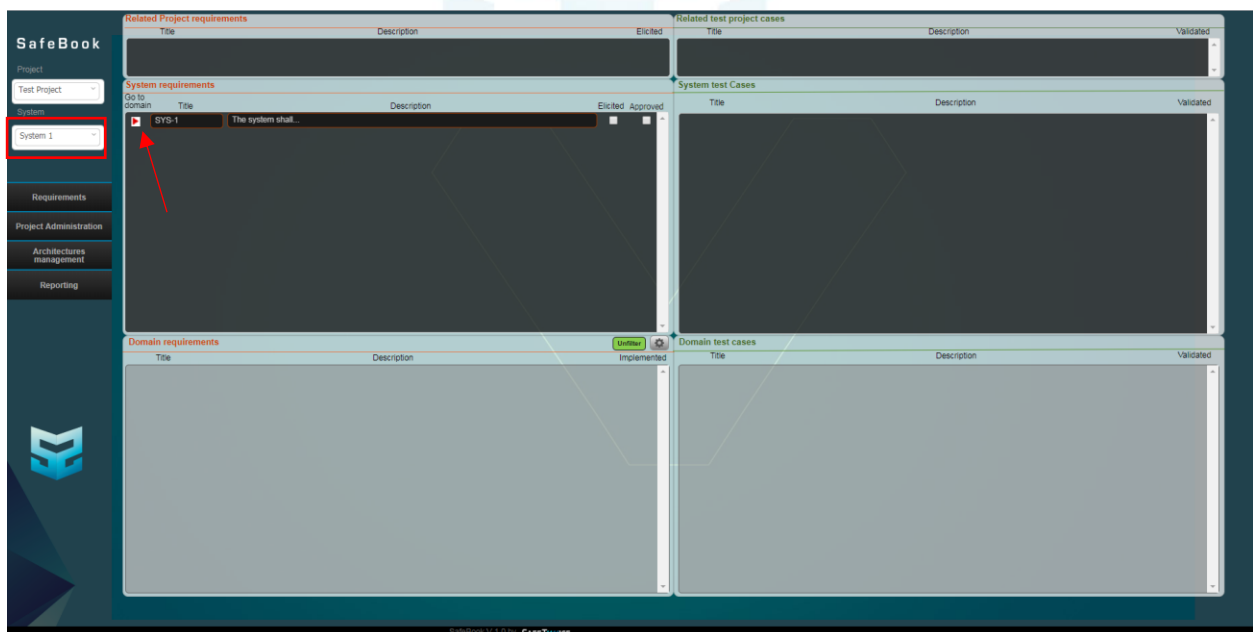

Figure 35. Main screen after the definition of the systems requirements

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5.5   Domain Requirements

The domain requirements can be accessed from two locations. First, if the user wants to edit the related domain requirements to a system requirement, they can be accessed by clicking on the red triangle next to each requirement. In Domain Requirements screen (see figure [36]), domain requirements under a particular system requirement can be created and managed.
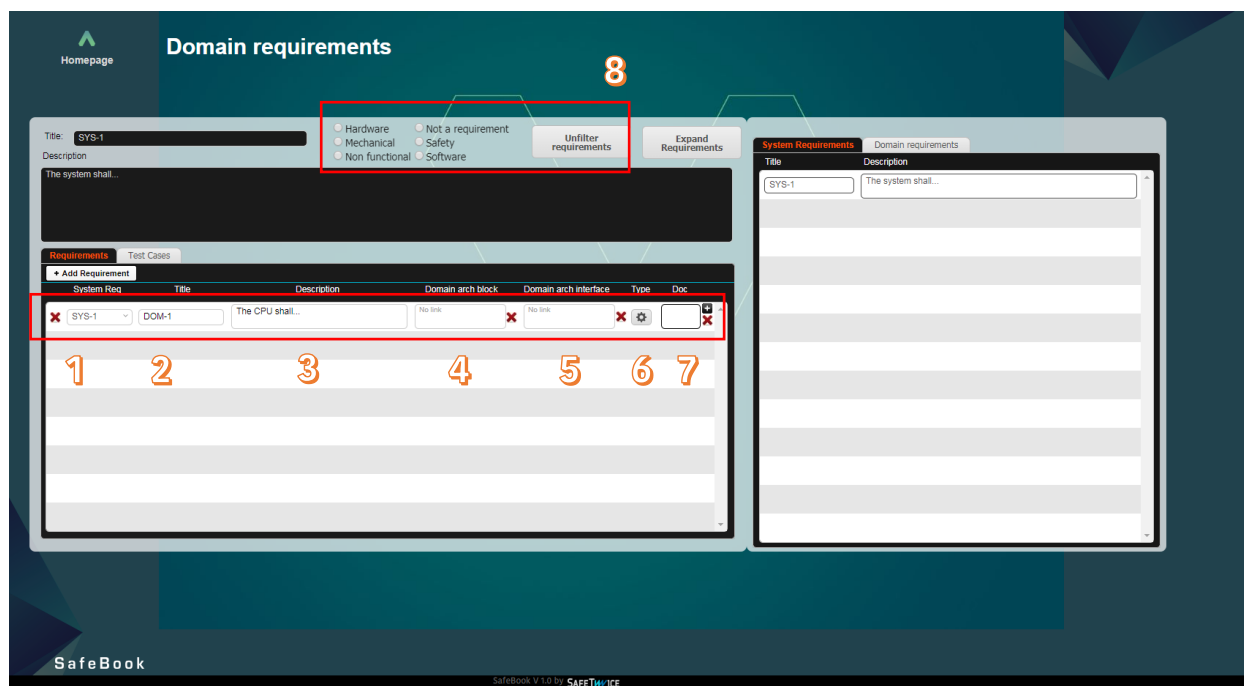

Figure 36. Domain requirements layout description

A new requirement can be created by clicking on **Add Requirement** button: a new blank line will be added to the list of system requirements, where it can be edited the following information related to the requirement (see figure [36]):

1. ID of the system requirement which the domain requirement is linked to. User can easily check the current list of system requirements on the section on the right of the screen.

2. ID number. Automatic ID formation and spacing is configured in Project Administration (please see Chapter 3.1 in this manual) but can be edited by the user at any moment.

3. Description.

4. Architectural block linked to the requirement. Architectural blocks shall be previously defined in Architectures Management (please see Chapter 4 in this manual). Blocks can be unlinked from the requirement at any moment, by clicking on the red cross button next to it.

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5. Architectural interface linked to the requirement. Architectural interfaces shall be previously defined in Architectures Management (please see Chapter 4 in this manual). Interfaces can be unlinked from the requirement at any moment, by clicking on the red cross button next to it.

6. Domain type: user can specify the domain in which the requirement is to be implemented in: Hardware, Mechanical, Non-functional, Not a requirement, Safety, Software, as shown in figure [37].

7. Documentation attached to the requirement. Files can be added by clicking on the "+" button next to it or deleted at any time by clicking on the red cross button. Files can also be added using drag-and-drop functionality.

> NOTICE: For documentation attachments, SafeBook only supports JPEG, PNG and PDF, with a maximum size of 5 [Mb] per file.
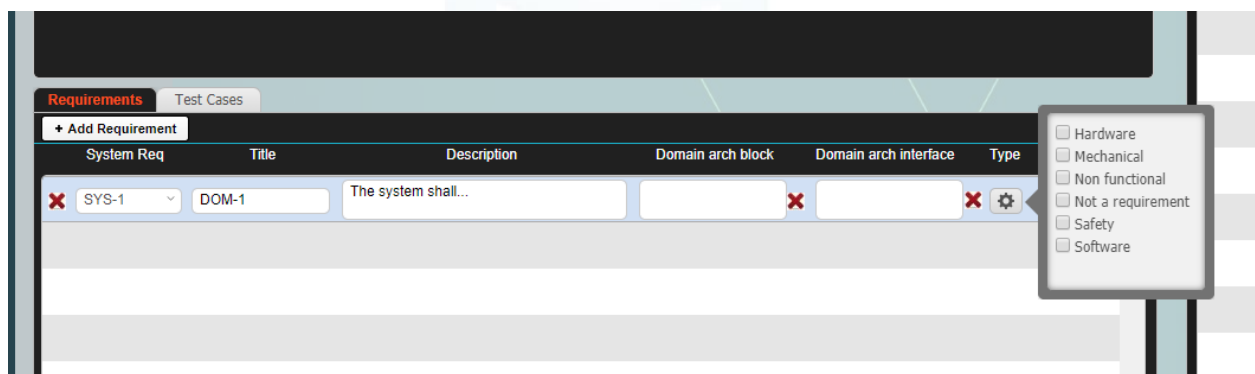
Figure 37. Domain requirement classification

5.6 Domain Validation test cases.

In System Requirements screen, Test cases can easily be managed by clicking on the **Test cases** tab and a list of the test cases will be displayed. Click on the **Add Validation** button, a new blank line will be added to the list of project test cases, where it can be edited the following information related to the test case (see figure [40]:

1. ID of the domain requirement to be validated. User can easily check the current list of domain requirements on the section on the right of the screen.

2. ID number. Automatic ID formation and spacing is configured in Project Administration (please see Chapter 3.1 in this manual) but can be edited by the user at any moment.

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3. Description.

4. Domain type: user can specify the domain in which the validation test case is to be implemented in: Hardware, Mechanical, Non-functional, Not a requirement, Safety, Software.

5. Documentation attached to the test case. Files can be added by clicking on the "+" button next to it or deleted at any time by clicking on the red cross button. Files can also be added using drag-and-drop functionality.
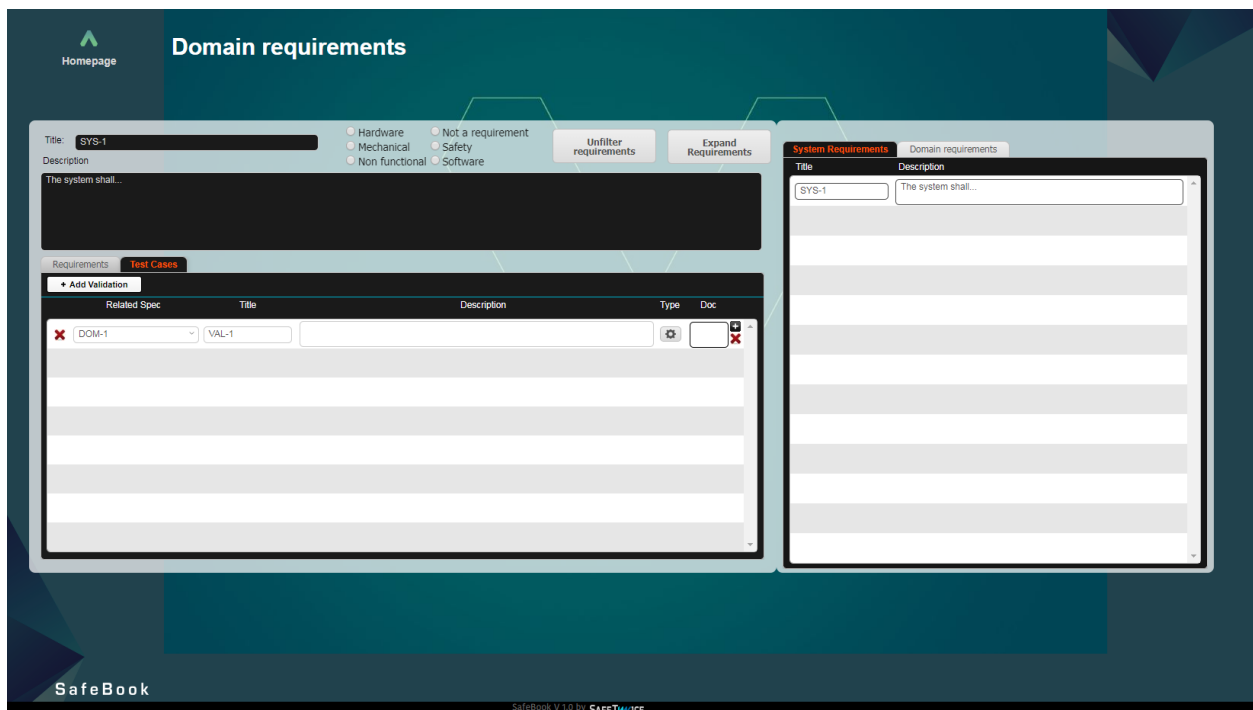
Figure 38. Test Cases for each domain requirement

NOTICE: If the requirement filter is used, the new created requirements will use the related prefix regarding to the type selection.

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If the user is interested in managing all the created domain requirements and test cases (without being restricted by the related system requirement), it can use the all the domain requirements view by clicking on Requirements → Go to Domain Requirements on the main page. This procedure will guide the user to the following layout:
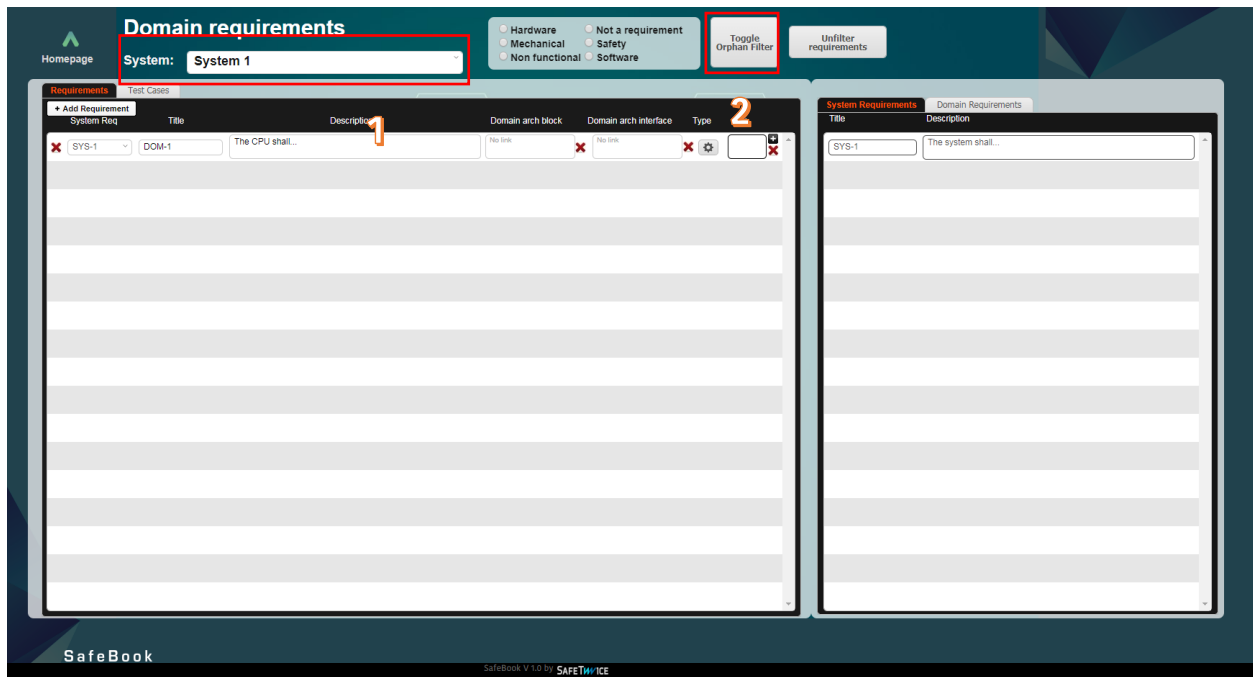
Figure 39. Domain Requirements related to a system req layout

As it is given in Figure [39], this layout is similar to the domain layout structure, but it adds two additional features:

1. Selection of the system in order to preview the related domain requirements.
2. Activate or deactivate the orphan filter of the selected requirements.

Here the user can create and edit the domain requirements related to a system, allowing to change the related system links of these requirements.

> NOTICE: The Orphan filter only works for the domain requirements and not for the test cases. The requirement filter will work for both and it will use the proper prefix in the auto-generation of requirements when selected.

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6. Project Releases

> NOTICE: A Project Release is a frozen state of the project which is backed up by SafeBook and can be restored at any moment.

Back to the the main screen menu, Project Administration section, the Project Releases button leads to Project Releases screen, as shown in figure [40].

Figure 40. Project Releases screen

6.1. Creation of a new release

A new release can be created by clicking on the **Create new Release** button: an empty form is displayed so the user can configure and save the current state of the project, as shown in figure [45]. The following information shall be enterered:

1. Name of the release.
2. Description of the release.

After filling the information and checking it, click the **Export Release** button to save the current state of he project as a new release. When the export operation has been properly saved, the Release migration status will change, form 'NOT OK' to 'OK'.

> NOTICE: If the user does not click the Export Release button before exiting the screen, the release will be not saved.
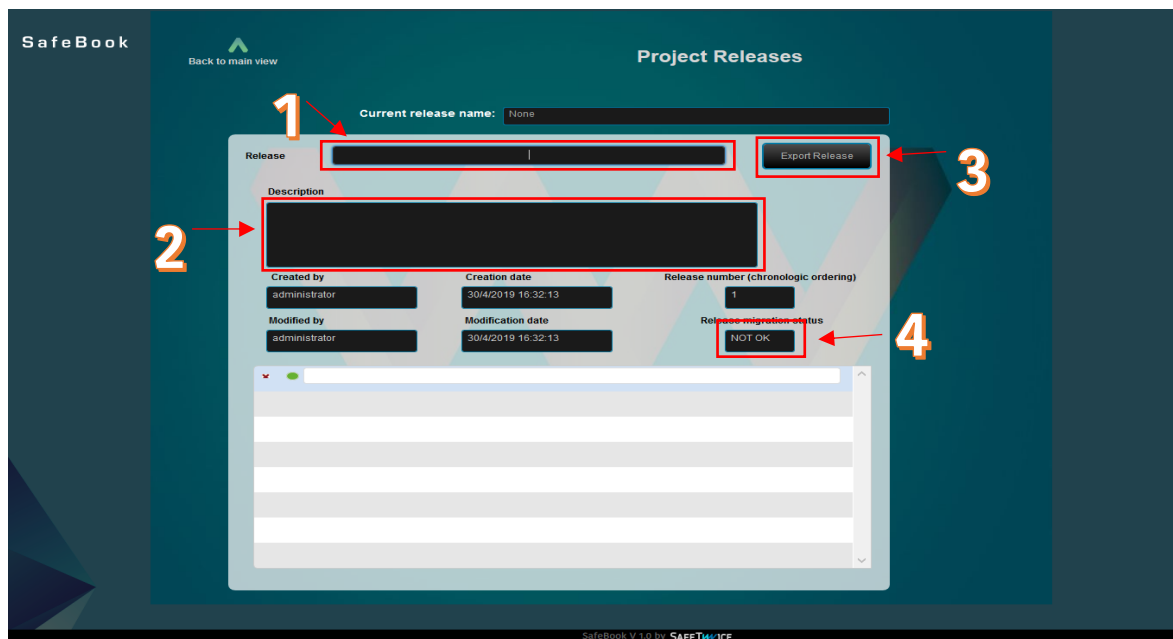
Figure 41. Project Releases screen layout description

The box at the bottom of the layout shows the created releases during the history of the project. It can also be used to select a release in order to apply some operation.

6.2. Restoration of previous releases

The current state of the project can be overwritten at any moment with a previously saved release.

> IMPORTANT: if not exported as a new release, the status of the project will be permanently lost after a the restoration of a previous release.

All the previously created releases can be visualized by scrolling down in the Release list: an form is displayed for each release so the user can check the related information, as shown in figure [42].

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After selecting the release to be restored, click on the **Import Release** button. After the operation is complete, the selected release will be restored as the current state of the project.

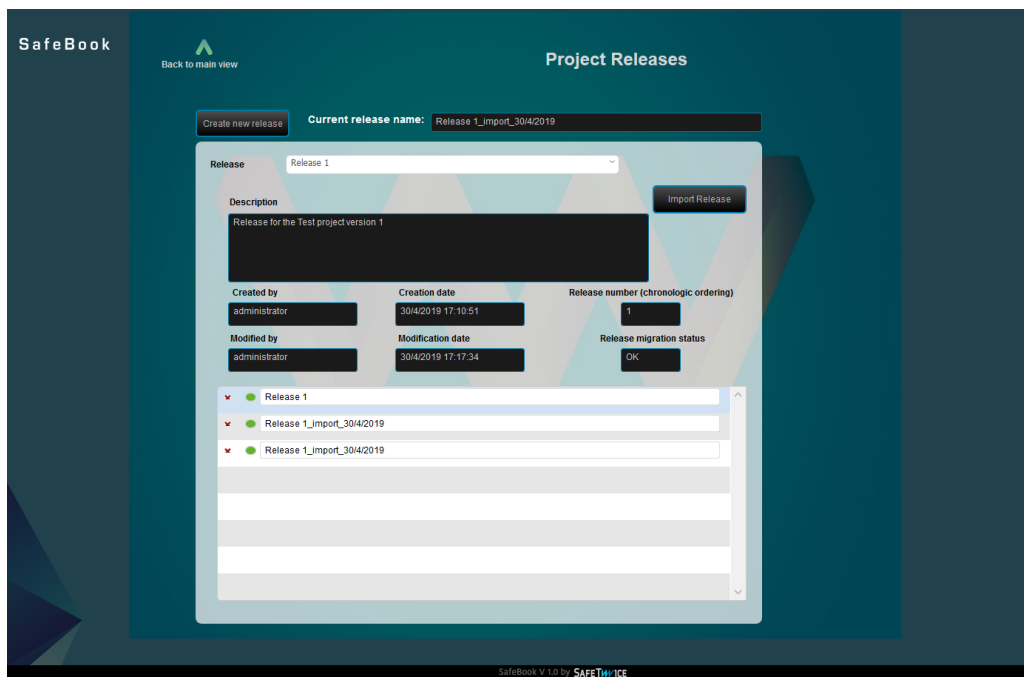IMPORTANT: the restoring operation may take up to some minutes, depending on the state of the service.
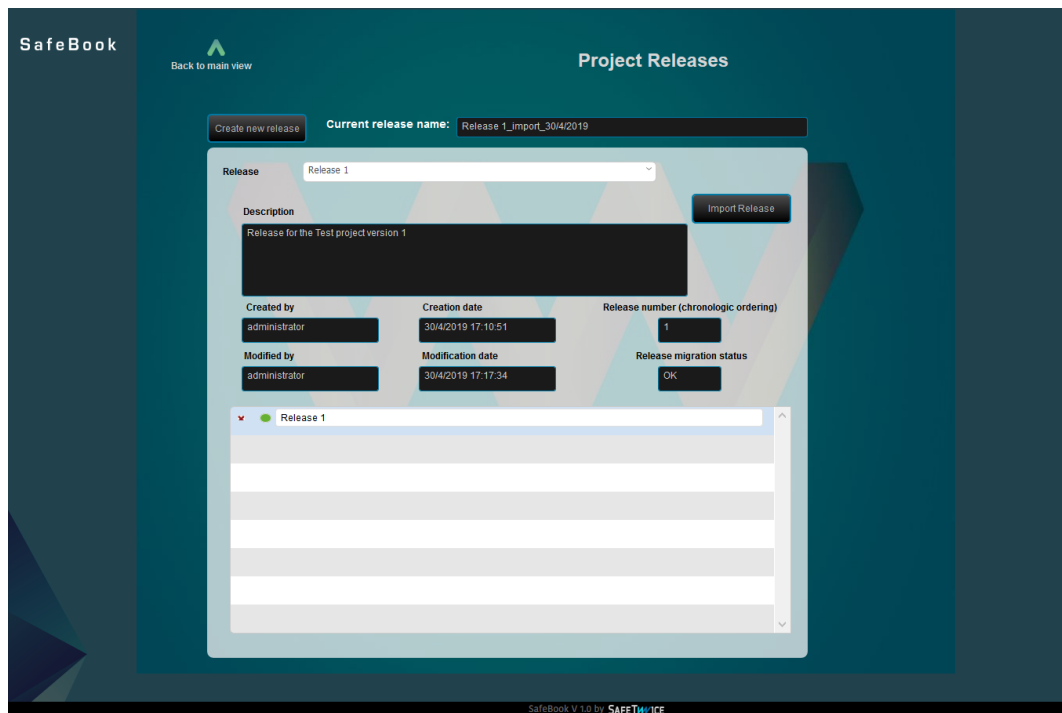
Figure 42. Restore previous releases screen

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Figure 43. Project release window

NOTICE: a history of all existing releases is displayed at every moment on the bottom section of the Project Releases screen.

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7. Reporting

7.1. View project status

Back to the main screen menu, Reporting section, the Current project status button leads to Project Status screen. This procedure will load a report for the current project status, as shown in in figure [41].

Figure 41. Project status visualizer

When all the project data is collected, a dialog pops up informing the user hat the result of the report are available, as shown in figure [42].
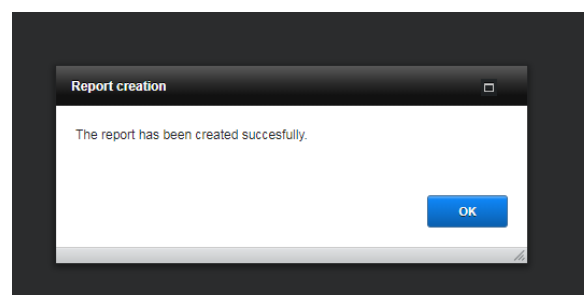

Figure 42. Message for the error and/or missing information report generation

NOTICE: Project status report has only informative purposes: it warns about systems, requirements or validations without any description, unlinked domain requirements and unlinked validation test cases.

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7.2. Project Indicators

The application can also create some indicators regarding the requirements lifecycle of the project. In this case, the user shall go to **Reporting → Project Indicators**. This will lead the user to the layout given in Figure [43]. This will compute the indicators for the current selected project.
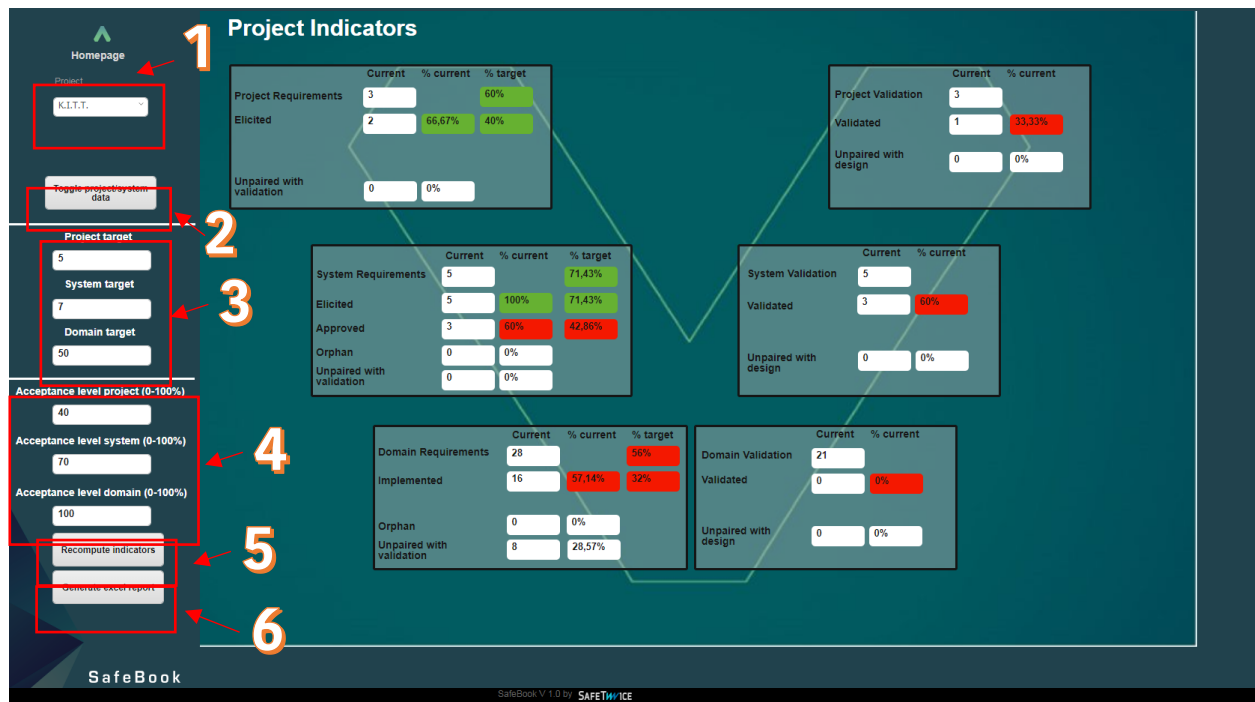

Figure 43. Project Indicators Layout

The application embeds the calculation of a few indicators using the lifecycle checks of the requirements. It also uses the link information in order to compute some traceability indicators (as the number of orphan requirements or the number of unpaired requirements, design – validation in both directions). It generates three types of indicators: absolute (total number of requirements in the database that accomplish this feature), percentual against the current total and percentual against the targeted total.

The layout allows to configure the following data:

1. Select the project for computing and displaying the indicators.
2. Toggle between displaying all the project data (with all the system information added) or displaying one system data. When the user pushes the button, the layout will change as given in Figure [44].

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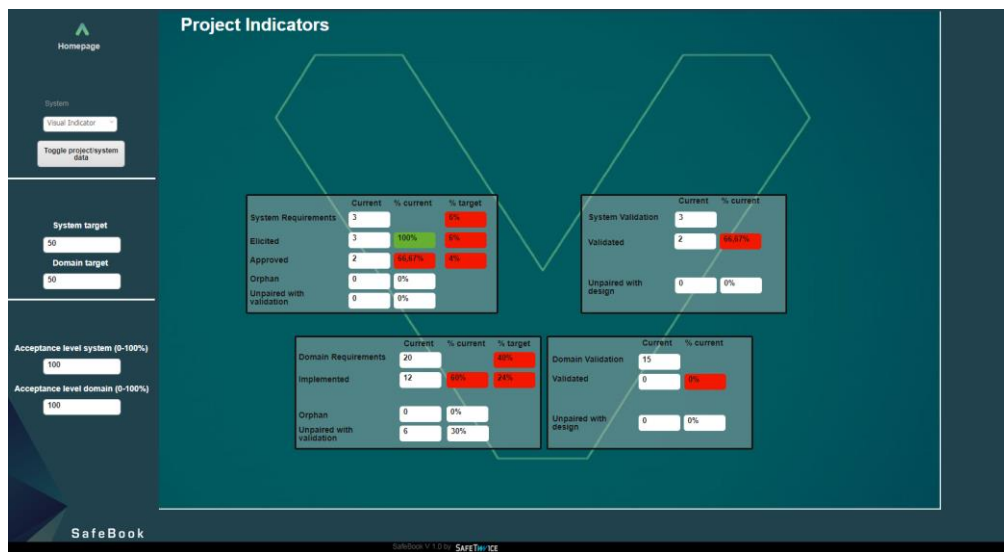
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Figure 44. Project Indicators Layout

In this layout, the application will only show the system related data (both indicators and to-configure data).

3. The user can configure the target levels in order to compute the percentual values for the indicators. These values represent the theoretical number of requirements per stage that the project shall have.

4. These levels configure the minimum percentage number to accept as valid the computed value (thus, mark the value with green color).

5. This button recomputes the indicators values.

6. This button generates an excel report summarizing all the indicators data and then it allows the user to download it. The report will be shown as given in Figure [45]. It can be download by clicking the icon and following the instructions.
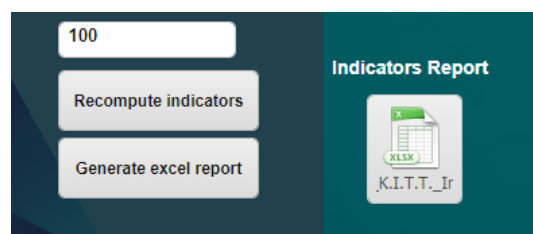

Figure 45. Project Indicators Layout

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> NOTE: The excel reports will not be saved in the database in order to assure that the user is not downloading an outdated report. For a proper generation, all the users (except for the administrator) shall be disconnected.

7.3.   Download Traceability matrix

SafeBook also generates the traceability matrix of the **current selected system.** In order to generate the matrix report the user shall go to **Reporting → Download Traceability matrix as Excel file.** The window will change to the Project Indicators layout where a new download button will appear as marked in Figure [46].

Figure 46. Traceability matrix generation

This excel report can be downloaded by clicking on the button and following the instructions. The report will show all the system requirements inserted in the project with its related requirements (both project and domain stages), test cases for every stage and architectural links (block and interface names).

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7.4. Export requirements as docx file

Finally, the software allows to export all the requirements inserted in the project in several docx files. The user shall go to **Reporting → Export Requirements as docx file**. This procedure will create a new compressed file that can be downloaded in the homepage as shown in the following image.
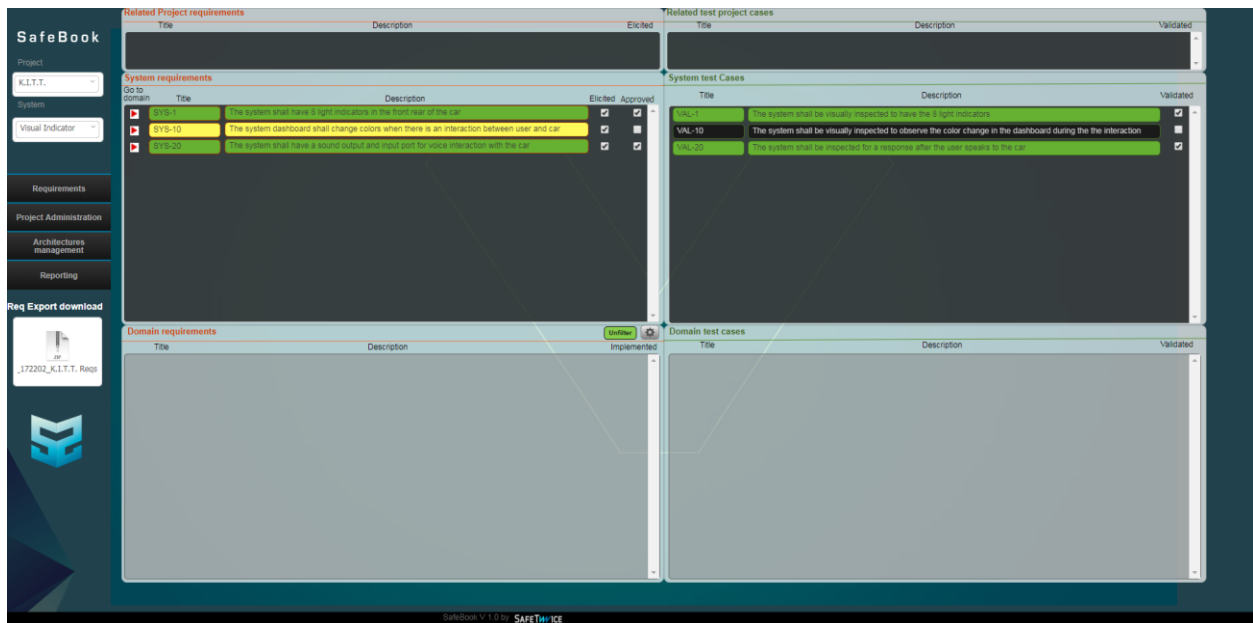

Figure 47. Requirements export in docx

This file can be downloaded by clicking on it and following the instructions. The compressed file will contain at least one Project folder (with the Project requirement and test cases) and a global project requirement document with all the requirement and test cases information contained in it. If the project has related systems, the file will also contain subfolder for each defined system as shown in Figure [48].
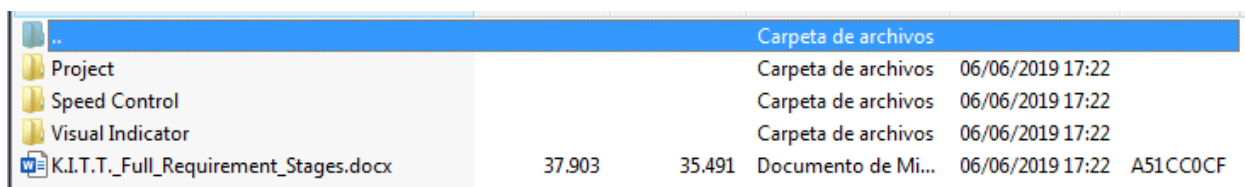

Figure 48. Compressed document files

Each system folder will contain the system and domain data for all the requirements and test cases. Thus, each system folder will be conformed by two subdirectories with the related data.

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