



User manual

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1. Introduction

This document is intended as a guide to the use of the **Qualitative Engine** program for the generation, calculation and optimization of models of expert systems.

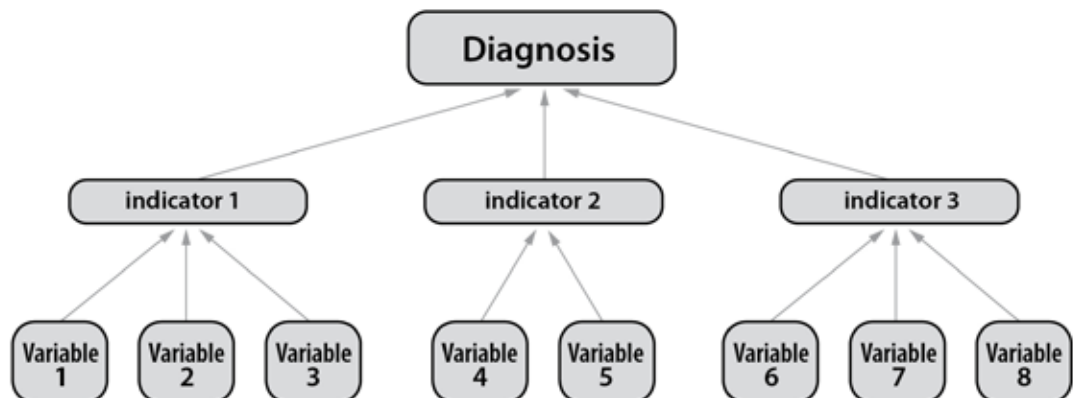
Below is an attempt to explain and list the most essential aspects in order to be able to easily use and understand the **Qualitative Engine** (QE) platform.

2. Description

Qualitative Engine is a tool for the diagnostic and formulation of improvement recommendations for expert systems, based on the techniques of qualitative reasoning.

Definition of model

Models are defined in tree format, where each leaf is a variable, the set of variables form the indicators and, at the same time, the set of indicators provides an overall diagnostic.



GRAPHICAL REPRESENTATION OF A MODEL WITH VARIABLES AND INDICATORS

The variables and indicators are assigned a weighting and a causal operator. The calculation of models is based on causal operations on the variables and indicators. The variables give a value to their indicator and, in turn, the indicators generate a value for their superior, thus obtaining a total value for the system (diagnostic) on the tree root.

The diagnostic for the models allows the determination of the changes necessary to specific variables in order to increase the value of the indicator, and thus be able to predict which variables must be changed in order to modify the total value of a model.

This way, using the QE, it is possible to create and study all manner of models in a vast range of settings and fields.

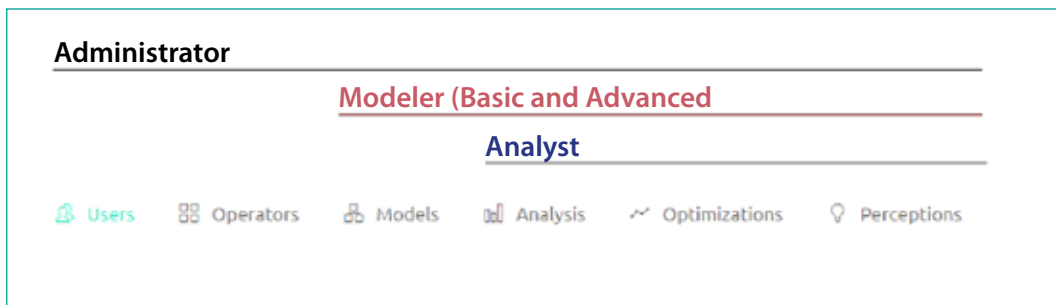
3. Technological requirements

In order for the **Qualitative Engine** application to work correctly, a server featuring the following is recommended:

- **PHP version 5.6 or above.**
- **MySQL version 5.6 or above.**
- **HTTPS support.**

4. Users

The application has three user types, who are granted different capabilities.



ACCESS IS DIFFERENT IN ACCORDANCE WITH USER TYPOLOGY

4.1 - Administrator

The administrator user has all the capabilities available within the application open: management of users, operators, models, analysis, optimizations and perceptions.

The administrator is the sole manager of defined operators, which are assigned to variables and indicators, and is the sole figure with the capability to manage the application users and their assignation of models, analysis and optimizations.

NOTE:

The figure of administrator can see all the records created on the application; in other words, all those models, analyses, optimizations and perceptions created by any user will be visible and may be managed by the administrator.

4.2 - Modelers

Users with the role of moderator can access on the application all the management capabilities for models, analyses, optimizations and perceptions. There are two types of modeler user:

Basic modeler

The basic modeler has restricted use of operators.

Advanced modeler

The advanced modeler has all the activated operators available, and the capacity to customize the matrix of the causal operator.

Modelers will only be able to manage models, analyses or optimizations that they have created, or they have been assigned by an administrator, and which are not blocked.

4.3 - Analyst

Users with the role of analyst can access, in the application, all the management capabilities for analyses, optimizations and perceptions.

Users with the role of analyst may only manage the analyses, optimizations or perceptions that they have created, or they have been assigned by an administrator.

NOTE:

The creation of an analysis is carried out using an existing model, which the user with the role of analyst will need to have assigned by an administrator.

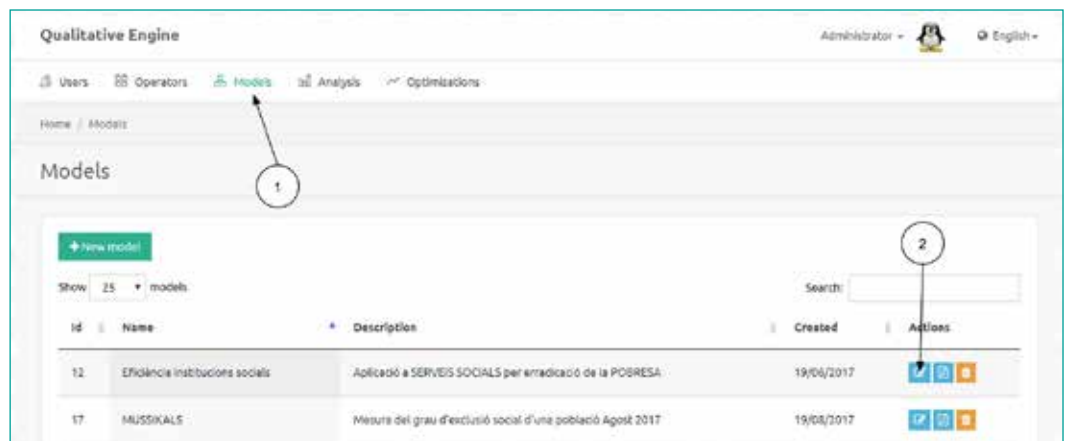
4.4 - Assignment of a model to the user

In order for a user to have access to a specific model that he/she has not created, it must be assigned.

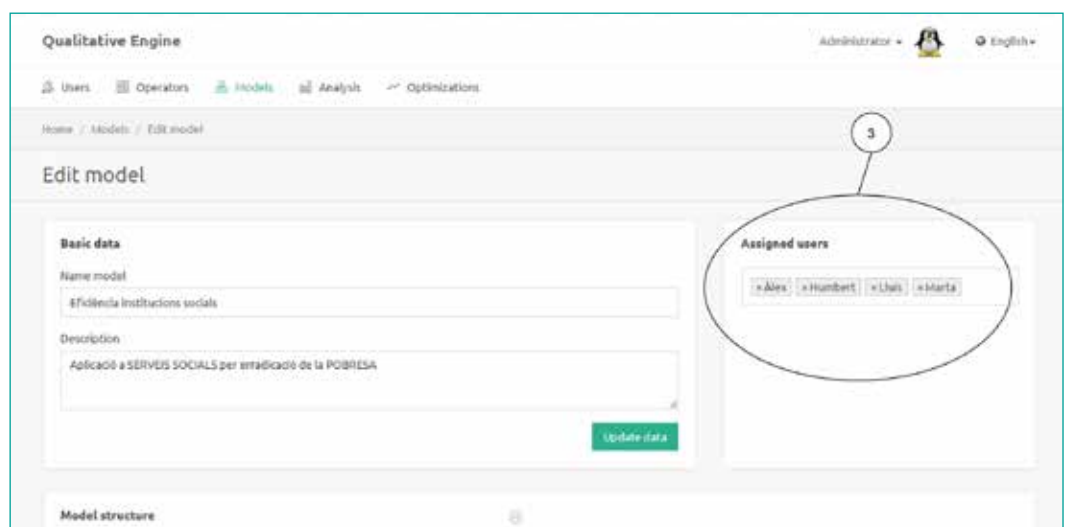
This task may only be performed by a user who is an administrator.

In order to perform the assignment:

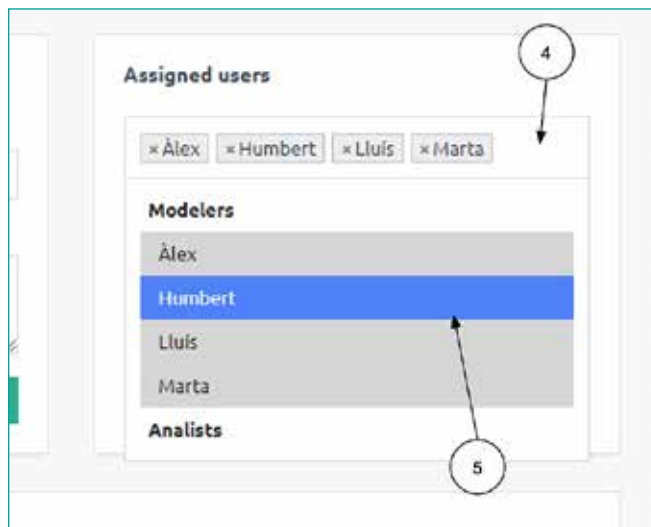
1. We must go to the list of models in the Models section.
2. Once the model we wish to assign has been identified, we can click on the edit button.



3. On the edition panel, on the right of the basic information block, there is a user assignment block, where users who have a model assigned are listed.



4. Clicking on the text box, a drop-down menu containing a list of existing users on the application appears; they have a dark background if they already have an assignment.
5. Assignment is carried out by clicking on any user; otherwise, if the user was already on the list, he/she will disappear.

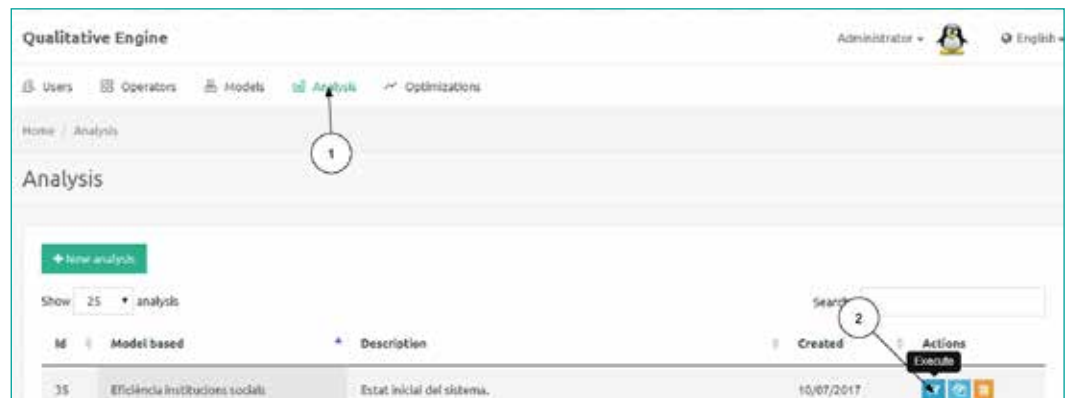


4.5 - Assignment of analysis to the user

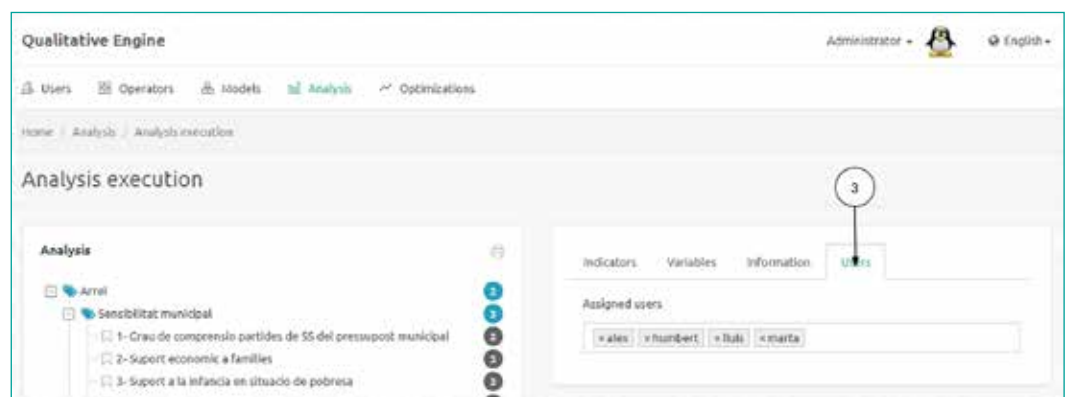
In order for a user to have access to a specific analysis that he/she has not created, it must be assigned. This task may only be performed by a user who is an administrator.

In order to perform the assignment:

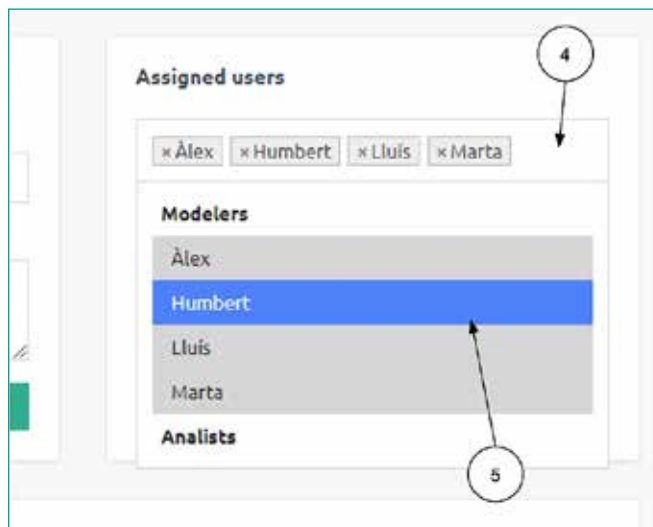
1. We must go to the list of analyses from the **Analysis** section.
2. Once the analysis we wish to assign has been identified, we can click on the execute button.



3. We can find the user assignment area in the **Users** tab, which is located on the right.



4. Clicking on the text box, a drop-down menu containing a list of existing users on the application appears; they have a dark background if they already have the assignation.
5. Assigantion is carried out by clicking on any user; If the user was already on the list, he/she will disappear.

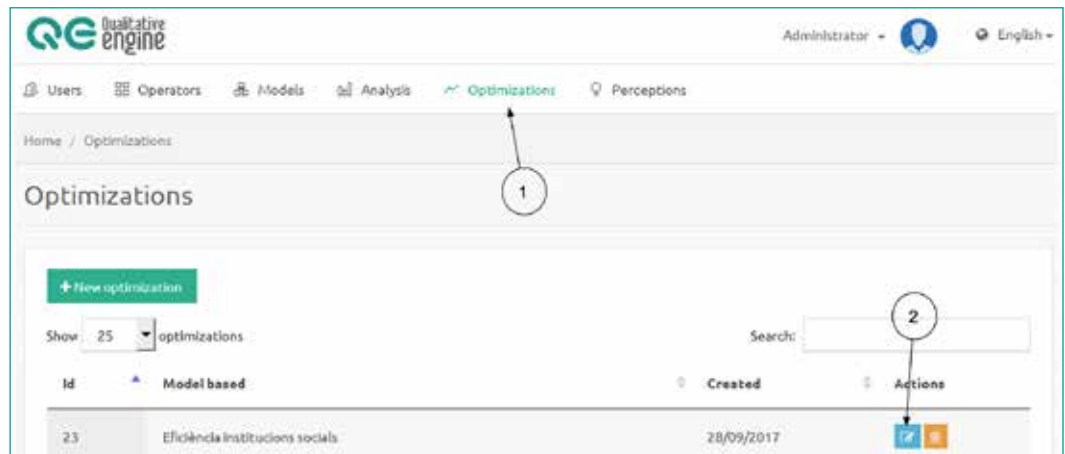


4.6 - Assignment of optimization to the user

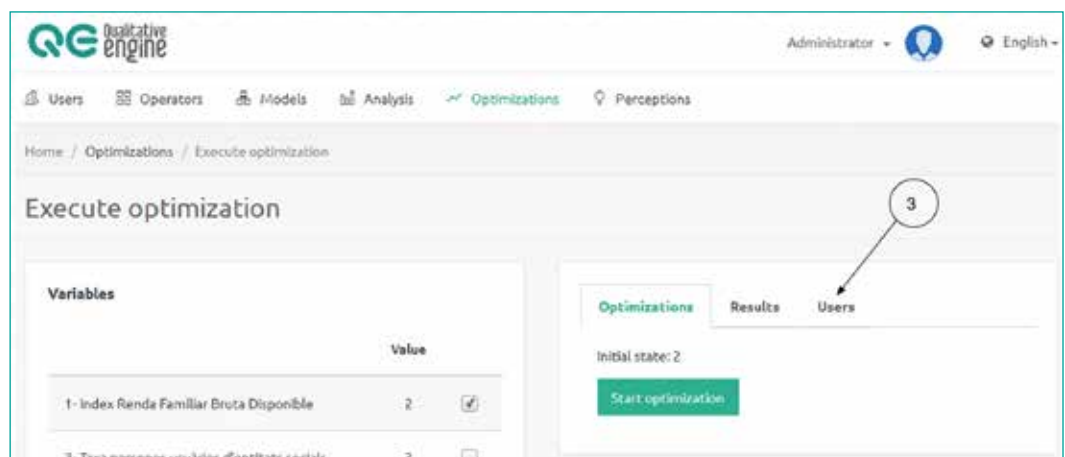
In order for a user to have a specific optimization assigned that he/she has not created, it must be assigned. This task may only be performed by a user who is an administrator.

In order to perform the assignment:

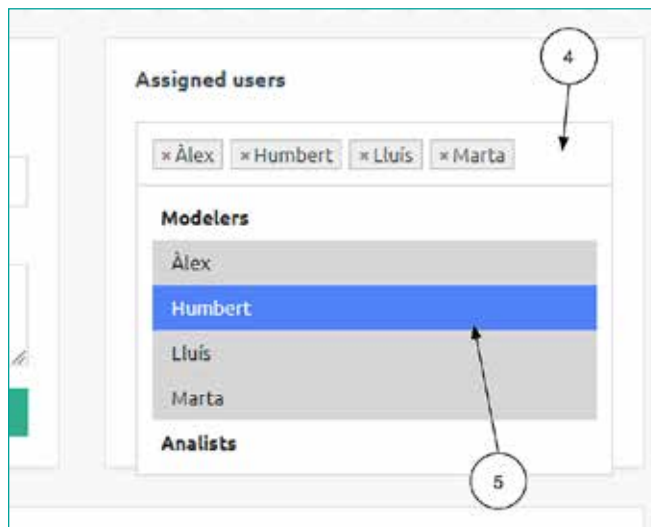
1. We must go to the list of optimizations from the **Optimizations** section.
2. Once the optimization we wish to assign has been identified, we can click on the execute button.



3. We can find the user assignment area in the **Users** tab, which is located on the right.



4. Clicking on the text box, a drop-down menu containing a list of existing users on the application appears; they have a dark background if they already have an assignment.
5. Assignment is carried out by clicking on any user. If the user was already on the list, he/she will disappear.



5. Screens

The application consists of six manageable sections: models, users, operators, analysis, optimizations and perceptions.

NOTE:

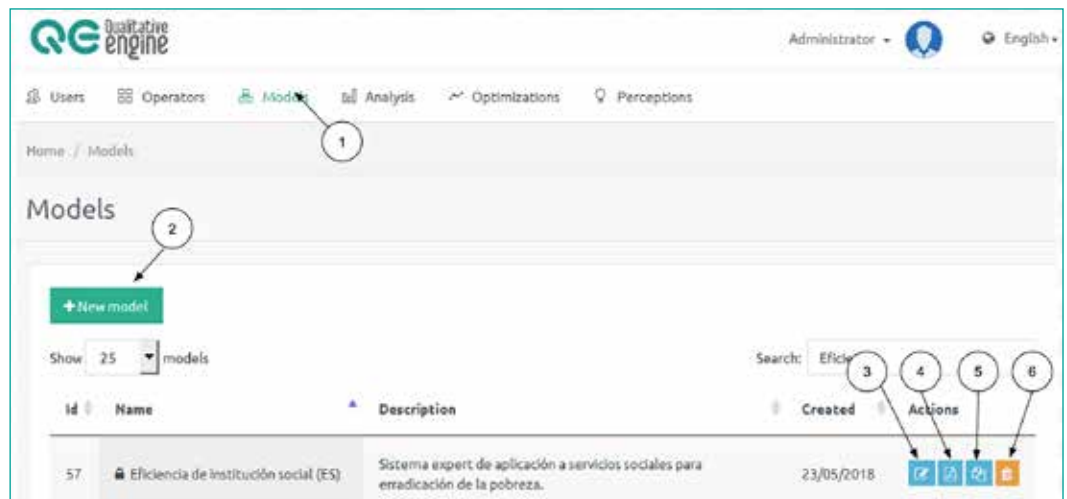
Not all the screens are accessible to all user roles; there are restricted sections in accordance with user access privileges, as mentioned in the previous section.

Below is a description of the sections, and the various buttons which appear in each of them:

5.1 - Models

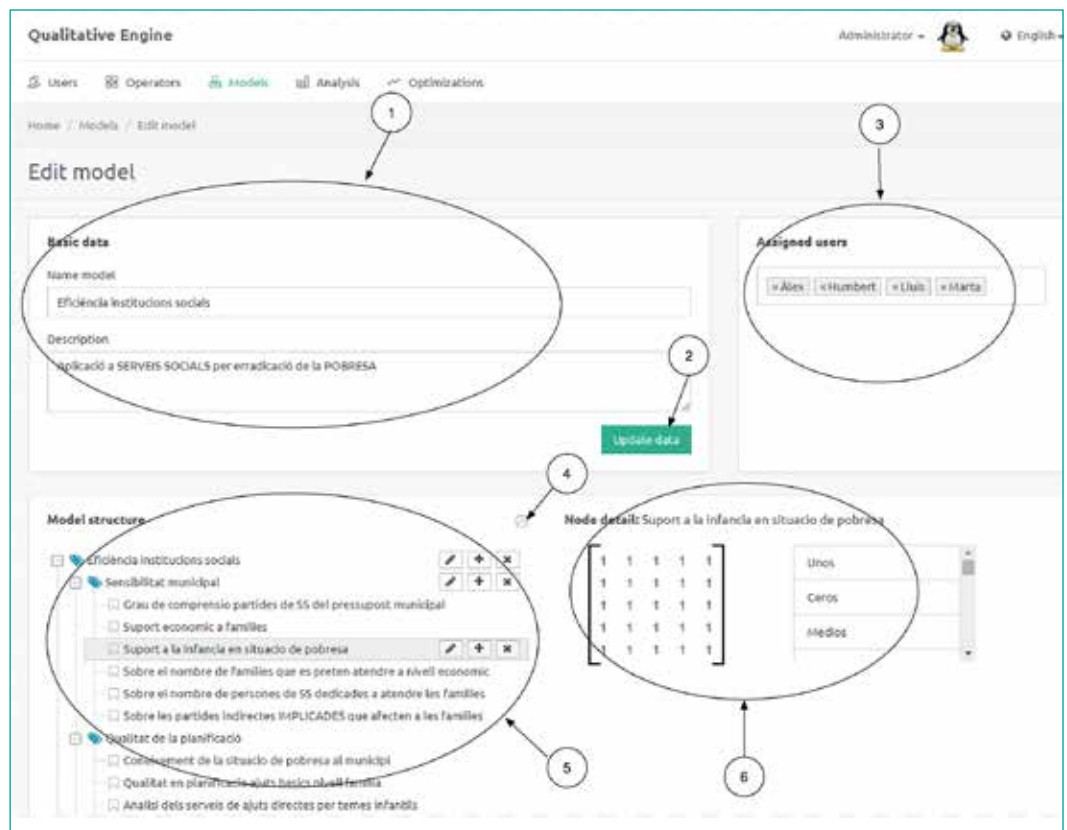
List of models

1. It is a list in the form of a table, where each row represents a system model. Models can be added, edited or deleted.



2. Button to create new model.
3. Button to edit an existing model, and access the edit screen for its structure.
4. Button to export the structure of the model in PDF format.
5. Button to duplicate a model.
6. Button to delete a model.

Editing a model

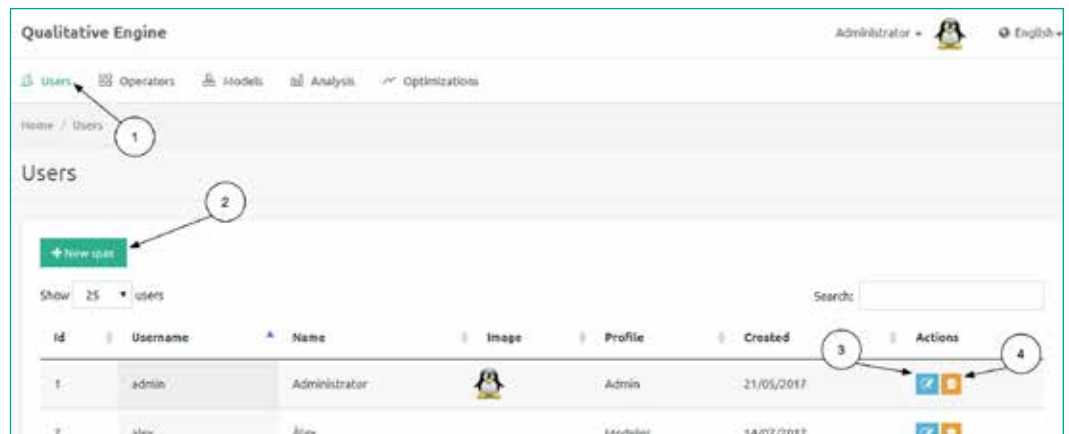


1. Editing area for basic model information.
2. Button to save information entered in the fields of the editing area for basic information for the model.
3. Assignment area for model users.
4. Button to print the structure of the model in PDF format.
5. Editing area for the structure and nodes forming the tree.
6. Editing area for the operator of the tree node.

5.2 - Users

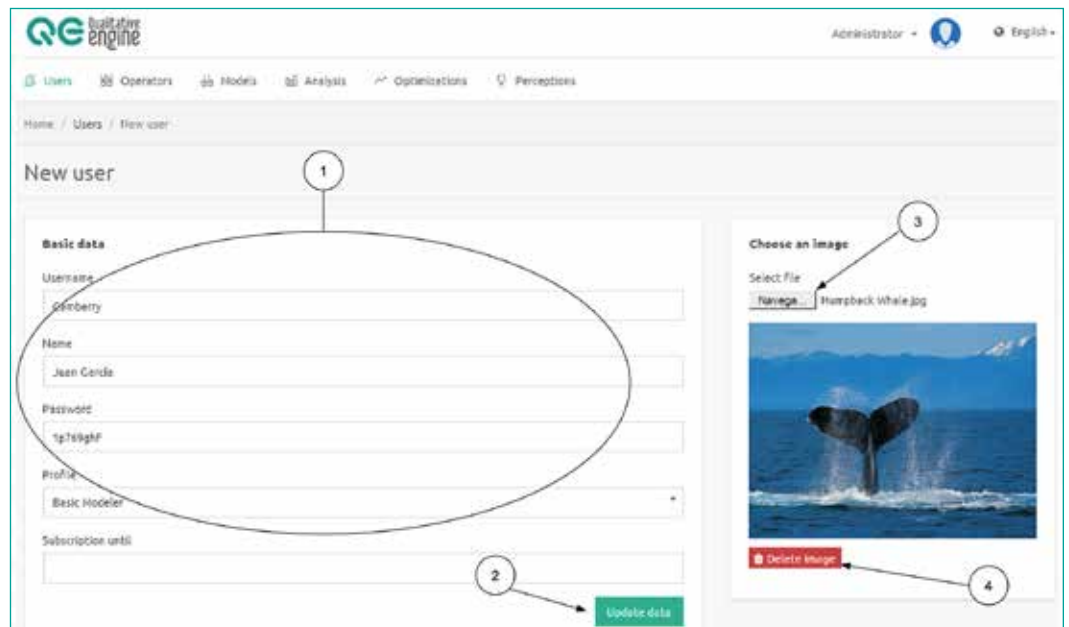
List of users

1. It is a list in the form of a table, where each row represents a system user. Users can be added, edited or deleted.



2. Button to create a new user and access the editing screen.
3. Button to access the editing of users.
4. Button to permanently delete a user and all related information.

Editing users

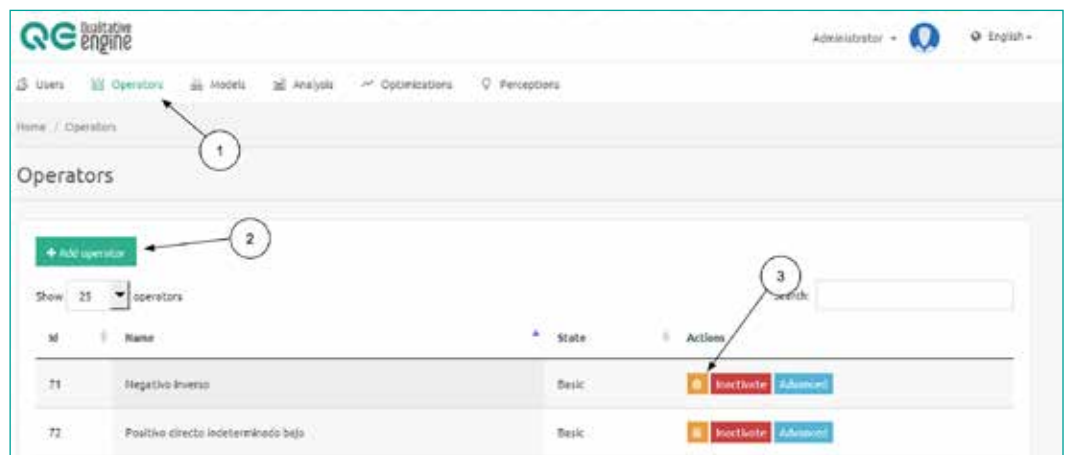


1. Editing area for basic user information.
2. Button to save the fields containing basic user information.
3. Button to add a new image.
4. Button to delete the existing image associated with a user.

5.3 - Operators

List of operators

1. It is a list in the form of a table, where each row represents a predetermined operator. New operators may be added, or they may be deleted.

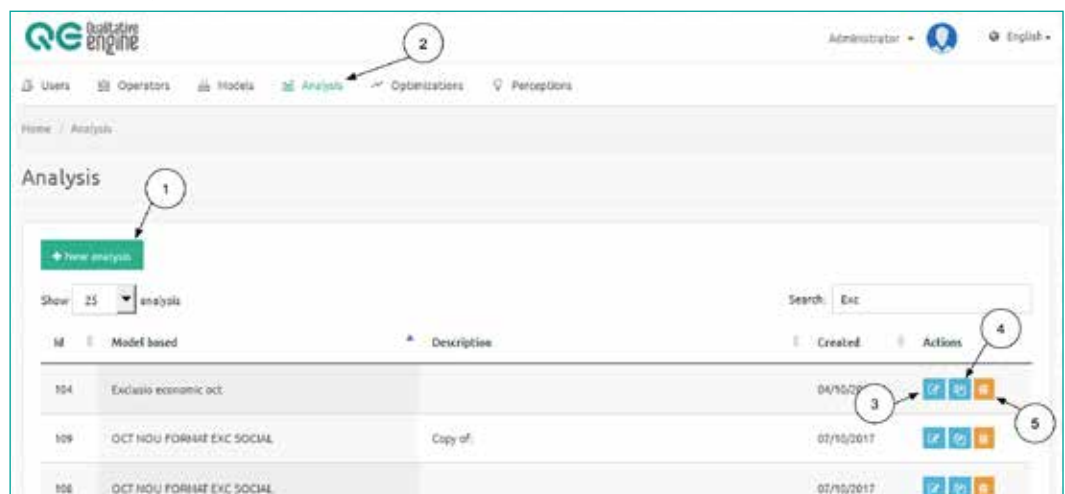


2. Button to create a new predetermined operator within the system.
3. Button to delete an operator from the list.

5.4 - Analysis

List of analysis

1. It is a list in the form of a table, where each row represents an analysis from a model. Analyses can be added, edited or deleted.



2. Button to create a new analysis.
3. Button to edit the data in an analysis.
4. Button to create a duplicate of an analysis.
5. Button to delete an analysis.

Execution of an analysis



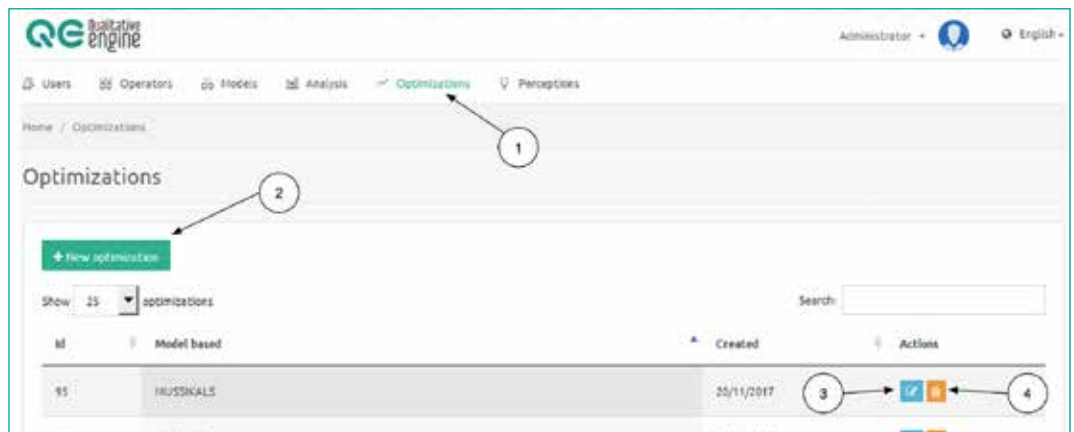
	Weight	Value
1- Grado de comprensión partidas 55 del presupuesto municipal	1	2
2- Soporte económico a familias	3	3
3- Soporte a la infancia en situación de pobreza	1	2
4- Sobre el número de familias que se pretende atender a nivel económico	3	1
5- Sobre el número de personas de 55 dedicadas a atender familias	1	3
8- Sobre las partidas indirectas implicadas que afectan	1	2

1. Information area from the result of the model calculations.
2. Button to print the model with calculations in PDF format.
3. Tab to view information on the indicators contained within the model.
4. Tab to view information on the variables contained within the model.
5. Tab to view the editing of the basic information associated with the model.
6. Tab to view the users assigned to the analysis.

5.5 - Optimizations

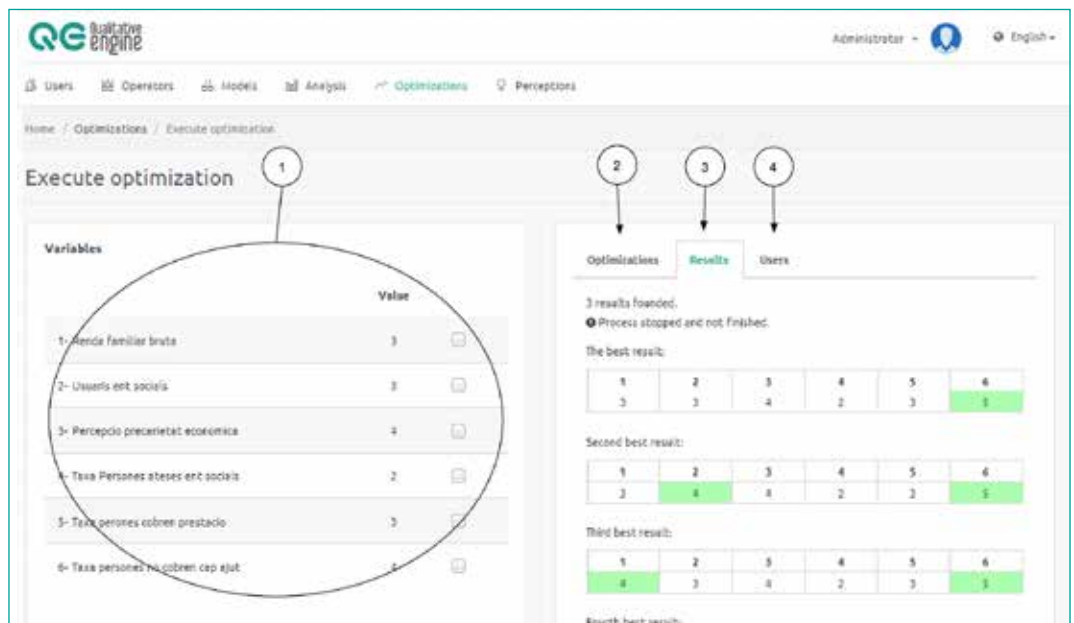
List of optimizations

1. List in the form of a table, where each row represents an optimization based on an initial state (analysis). Optimizations can be added, edited or deleted.



2. Button to create a new optimization.
3. Button to access the execution screen for the optimization.
4. Button to eliminate an optimization.

Execution of the optimization

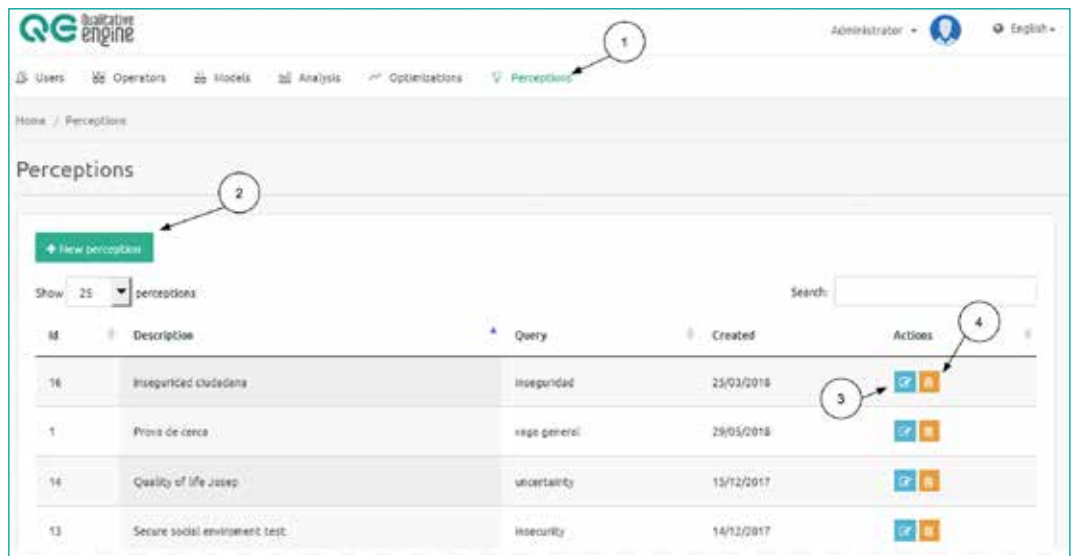


1. Area where the variables are listed, and can be set.
2. Start tab for the optimization process.
3. Tab where the results of a proposed optimization are shown.
4. Tab where the users assigned to an optimization can be viewed and managed.

5.6 - Perceptions

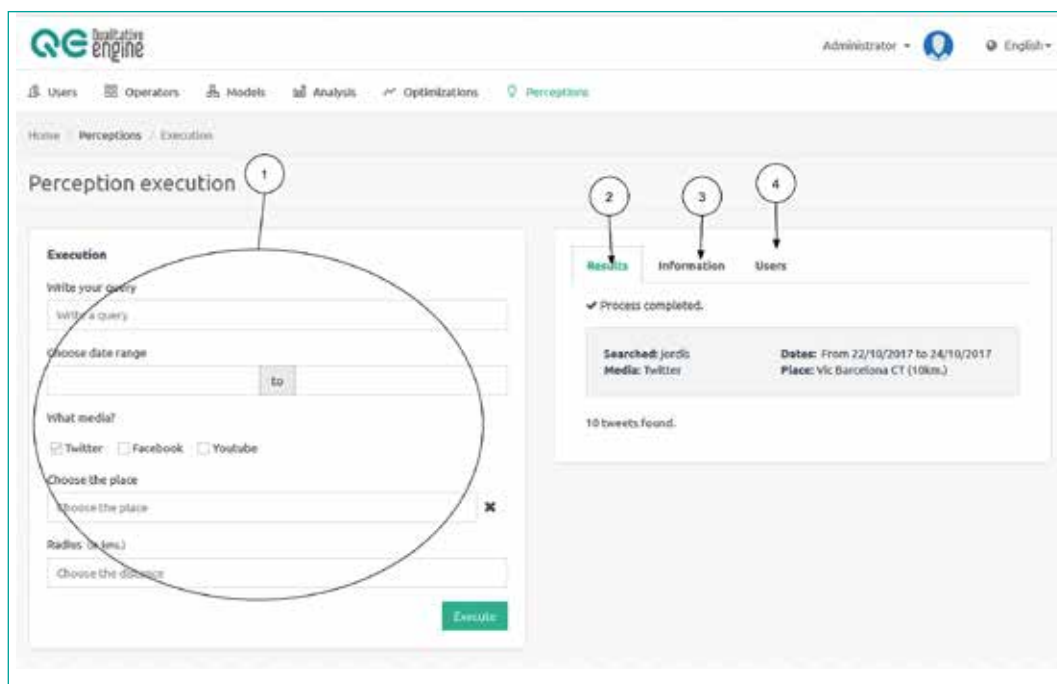
List of perceptions

1. It is a list in the form of a table, where each row represents a created perception. Perceptions can be added, edited or deleted.



2. Button to open the window for a new perception.
3. Button to go to the execution of the perception.
4. Button to delete the perception corresponding to the row.

Execution of the perception



1. Area to introduce data requested for the execution of the perception.
2. Tab where the results of the process are displayed.
3. Tab where the perception information can be edited.
4. Tab where the users assigned to a perception can be managed.

6. Working with the QE

In the following sections there is a step by step explanation, including visual support, of all actions that may be taken using the **QE application**:

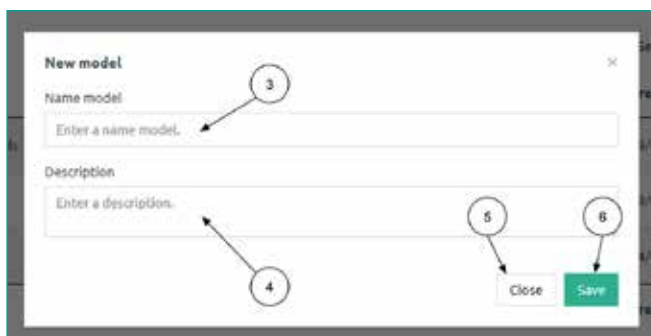
6.1 - Models

Creating a model

1. To create a model, we must go to the **Models** section.
2. Click on the **New model** button.



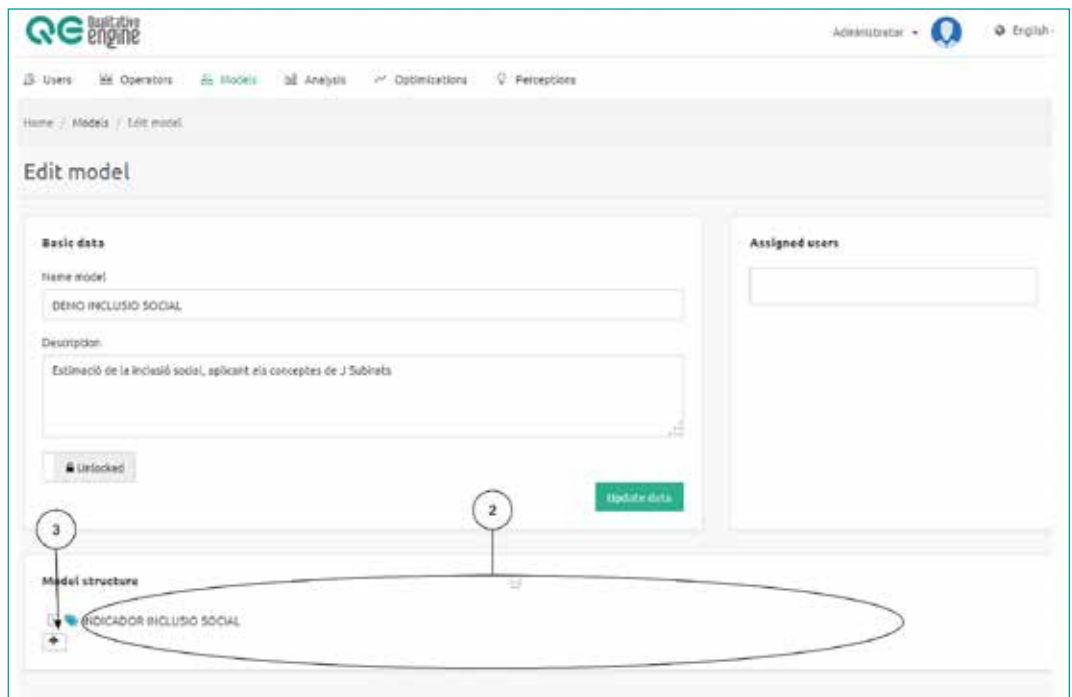
A window will appear where you are asked to complete some fields with the basic information:



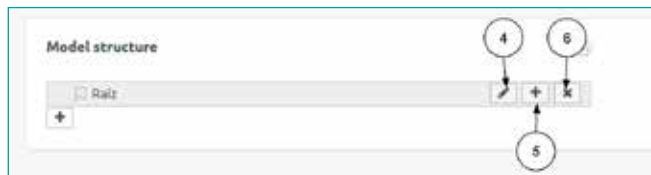
3. Field for the model name.
4. Field for the model description (not obligatory).
5. Button to cancel the creation and close the window.
6. Button to accept the creation of a model.

Changing the structure of the model

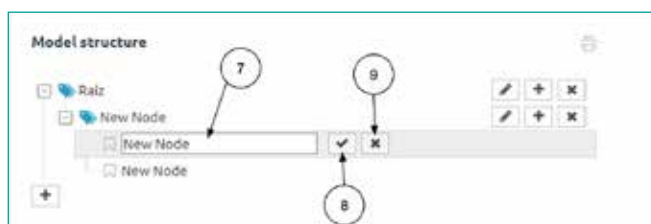
1. To edit a model, we must go to the editing screen for the model.
2. Area where the structure of the nodes for the model to be changed can be found.
3. Button to create the tree root on which to attach the other nodes.



4. Button to edit the node text.
5. Button to attach a new node, as a child.
6. Button to eliminate the node and its children.



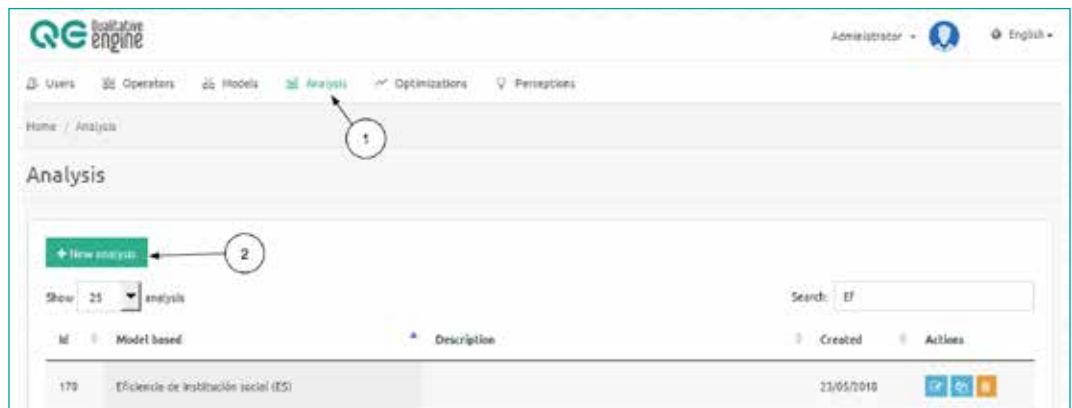
7. Field where the text can be modified.
8. Button to accept the text changes to a node.
9. Button to cancel the editing of the node.



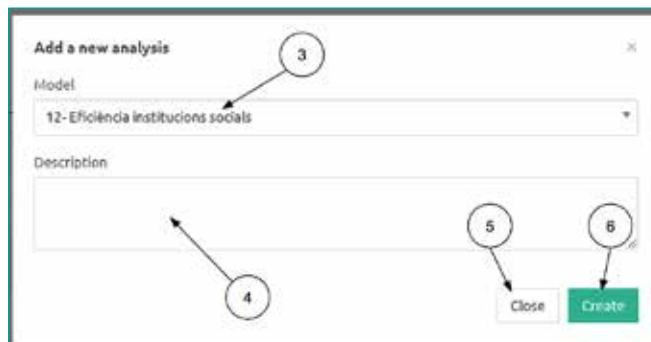
6.2 - Analysis

Creating an analysis

1. To create an analysis, we must go to the **Analysis** section.
2. Click on the **New analysis** button.



A window will appear where you are asked to complete the basic information.



3. Select the model on which the analysis is based.
4. Field to include the description of an analysis.
5. Button to cancel the creation and close the window.
6. Button to confirm the creation.

Executing an analysis

1. To work with an analysis, we must go to the **analysis creation** screen.
2. Area where the values of the results of the model calculation are displayed; the tree can be seen on the drop-down window and, the values of the variables and the indicators, on the right.
3. It is possible to move between indicator and variable tabs, to see the list of all indicators for the model, or all the variables listed.
4. It is possible to modify the weighting, by clicking on the weighting number underlined for each variable or indicator on the list.
5. It is possible to modify the value, by clicking on the number underlined for each variable or indicator on the list.

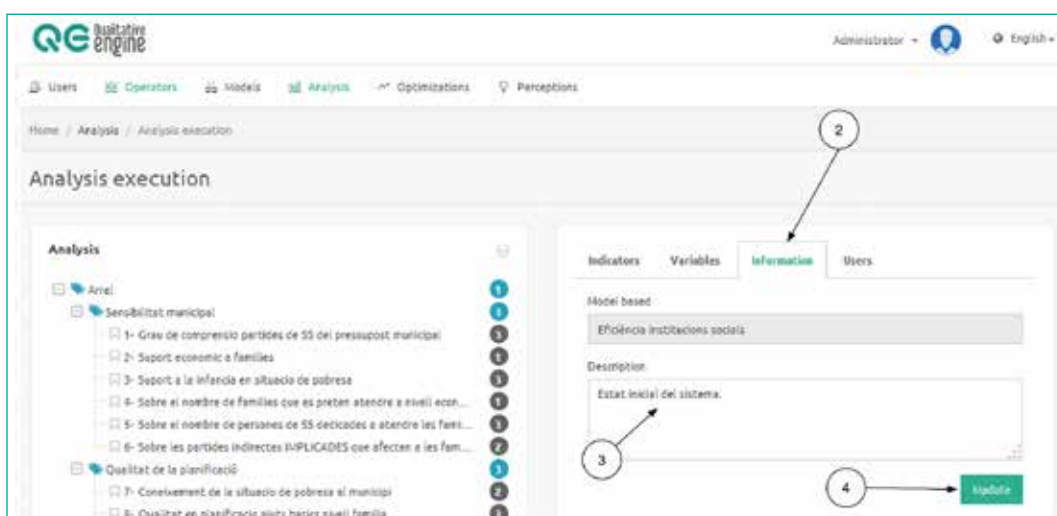


NOTE:

The tree values are automatically recalculated for each change made to the indicators or variables.

Editing the basic information for an analysis

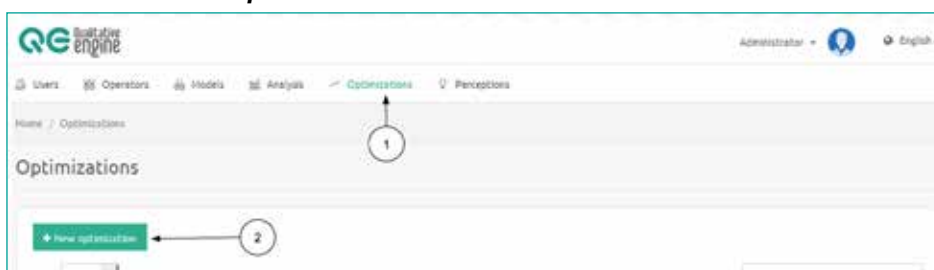
1. To do this, we must go to the **Execution of the analysis** screen.
2. Click on the **Information** tab to view the basic information associated with the model.
3. Field to modify the description of the analysis.
4. Click on this button to update the modified data.



6.3 - Optimizations

Creating an optimization

1. To create an optimization, we must go the **Optimization** section.
2. Click on the **New optimization** button.

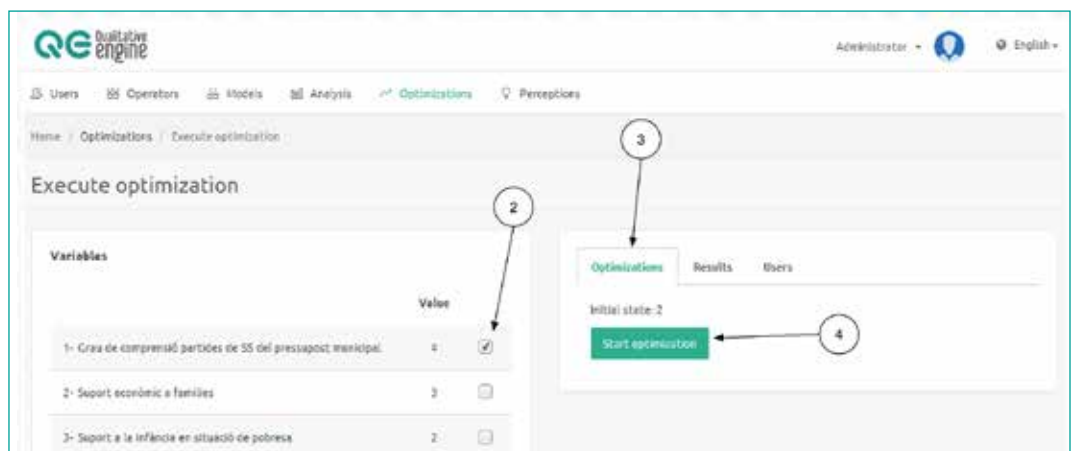


3. From the drop-down list, select the initial state for the diagnostic based on an existing analysis.
4. Button to cancel the action.
5. Button to create the optimization and accept changes.



Executing an optimization

1. To do this, we must go to the **Execution of the optimization** screen.
2. In the list of variables, the values they have will be set when the optimization is calculated, and a solution in which these variables change will not be sought.
3. The first tab displays the initial state, and the diagnostic will look for solutions to improve the initial state by a degree.
4. Button to activate the optimization.



Interpreting results

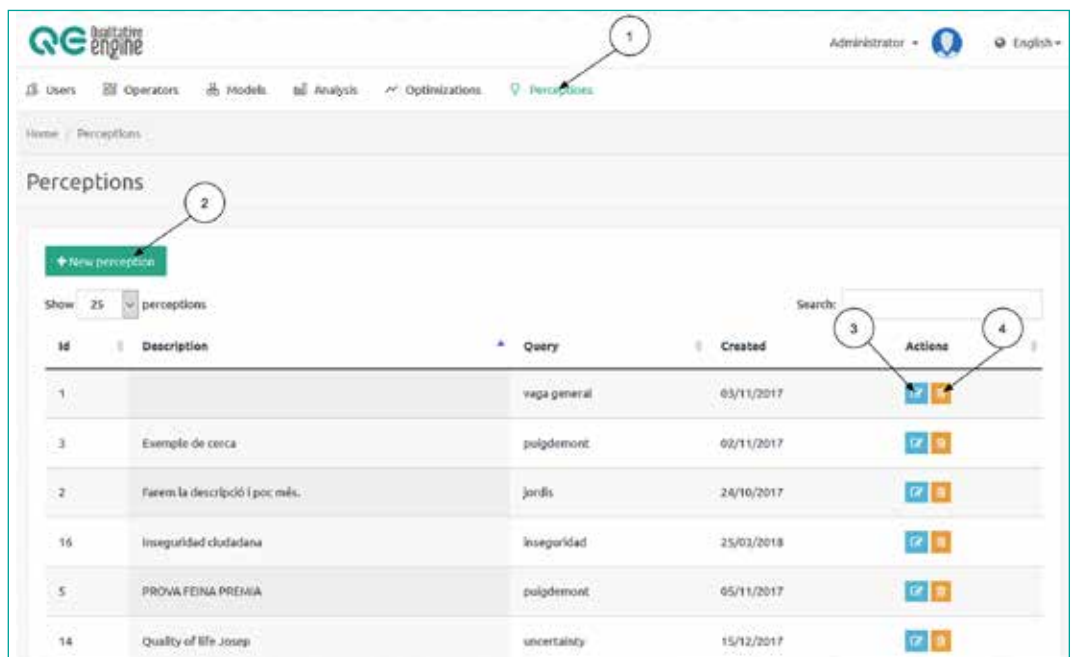
1. On the **Results** tab, the best proposals for changing variables in order to optimize the system are given.
2. Indication that the process has concluded.
3. The results for optimizations are displayed in the form of a table, where the first row in the number of the variable, and below the value it must take is shown. The variables which have changed are displayed with a green background.



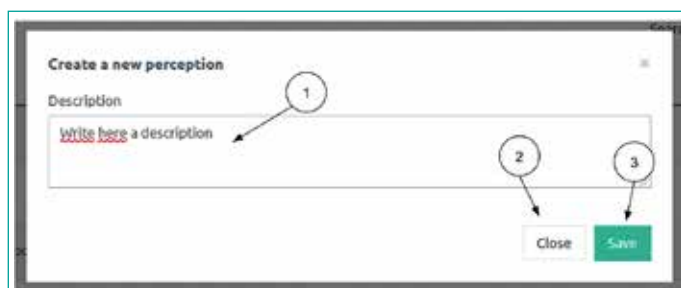
6.4 - Perceptions

Creating a perception

1. To create a perception, we must go to the **Perceptions** section.
2. Click on the **New perception** button.
3. Button to go to the execution of the perception.
4. Button to delete the perception.



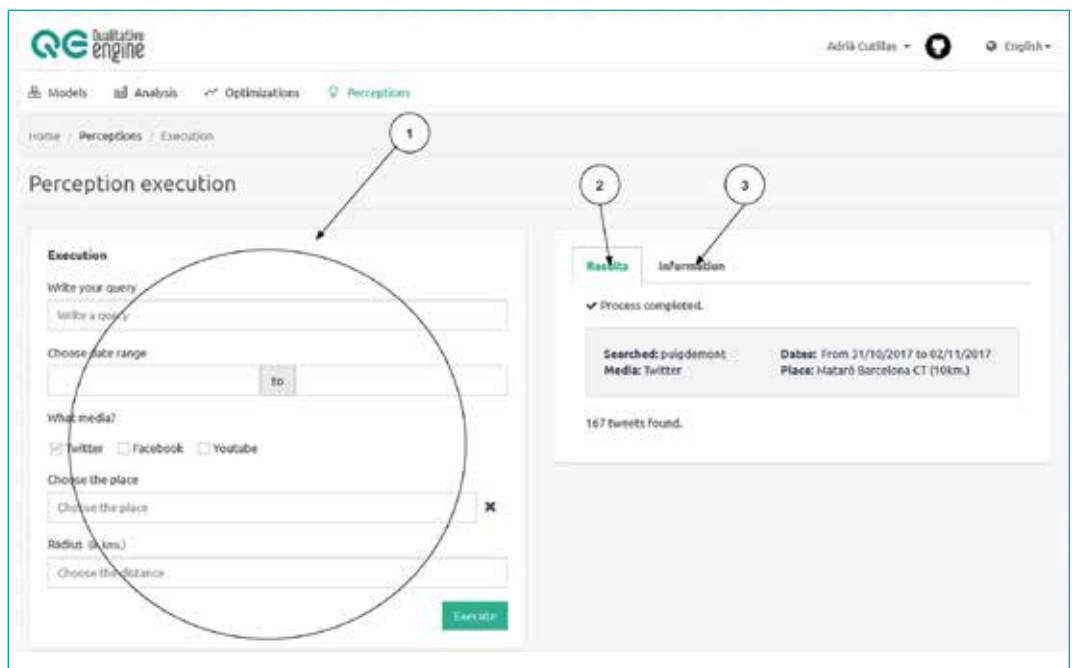
1. Field to write a short text which identifies the perception.
2. Button to cancel the action.
3. Button to create the perception and implement execution.



Executing a perception

To do this, we must go to the **Executing a perception** screen.

1. The block on the left reveals the form to execute the perception.
2. The **Results** tab displays the results of the execution of the perception.
3. The **Information** tab can be used to edit the basic information of the perception.





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