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Getting Started

Expert Choice Comparion® is a collaborative decision-making solution that focuses on the achievement of objectives (gains) from a decision to choose one or a combination of *alternatives.* Comparion is typically used by professionals responsible for strategic or tactical decision-making activities involving the choice of one or a combination of alternatives.

Why use Comparion for important decisions?

According to Herbert Simon, [1] decision-making is at the core of all managerial functions. Decision-making is undoubtedly the most difficult and most essential task a manager performs. Executives rate decision-making ability as the most important business skill, but few people have the training they need to make good decisions consistently. Planning, for example, involves deciding what should be done as well as when, how, where, and by whom. Other managerial functions, such as organizing, implementing, and controlling rely heavily on decision-making. Decision-making is part of almost all human endeavors. While most decisions are connected with problem solving, many are not. Managers may decide to take actions that will set entirely new standards of performance or decide to attain some new goal or establish a new direction for their companies. Most managerial activities such as problem solving, strategic planning, and resource allocation, involve one or more components of what we now define as the decision-making process.

Process Overview

- structure the decision model by identifying the objectives and alternatives, contributions, and other model definition and evaluation settings
- accurately measure the importance of competing objectives and alternatives with respect to the objectives
- synthesize information, expertise, and judgments, and conduct what-if and sensitivity analyses
- allocate resources to a combination (portfolio) of alternatives if desired
- generate and download reports of the judgment data, model definition, etc.

After logging in to Comparion, you will be redirected to the Models list tab as shown below. If you have existing Comparion

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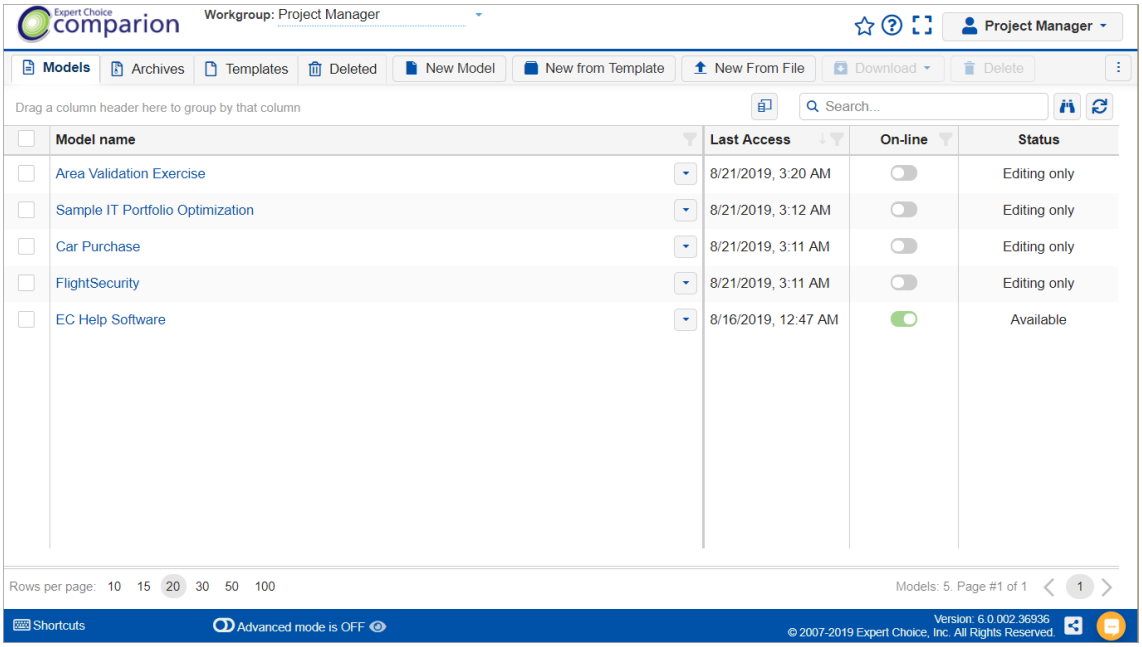
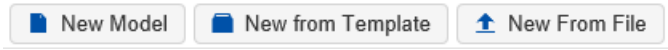
models, you will see the active models on this page.



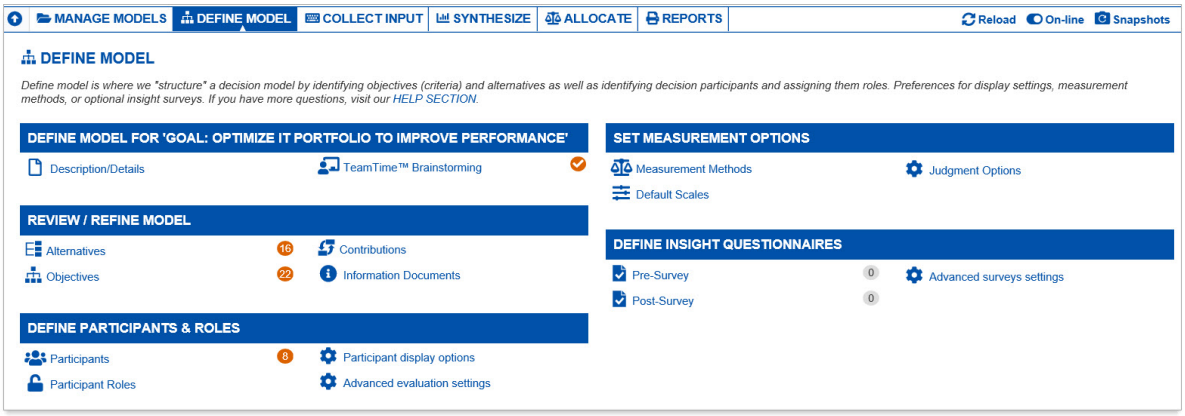
You can open an existing model by clicking on the model name. You can see several commands by clicking the arrow icon to the right of the model name, or by simply right-clicking a model row.

You can create a new model in various ways:



- New Model-- creates a new model using the default options set.
- New from Template -- creates a model from one of the stored Comparion templates.
- New From File -- creates a project from a file previously downloaded from a Comparion model and stored on your computer.

When a Comparion model is open, the top-level menus (see Process Overview) described above are displayed:



Clicking on a top-level menu will open its overview page which displays the sub-pages you can go to. From above, the Define Model overview page is displayed. Clicking a sub-page will redirect you to that page. You can go back to the overview page by

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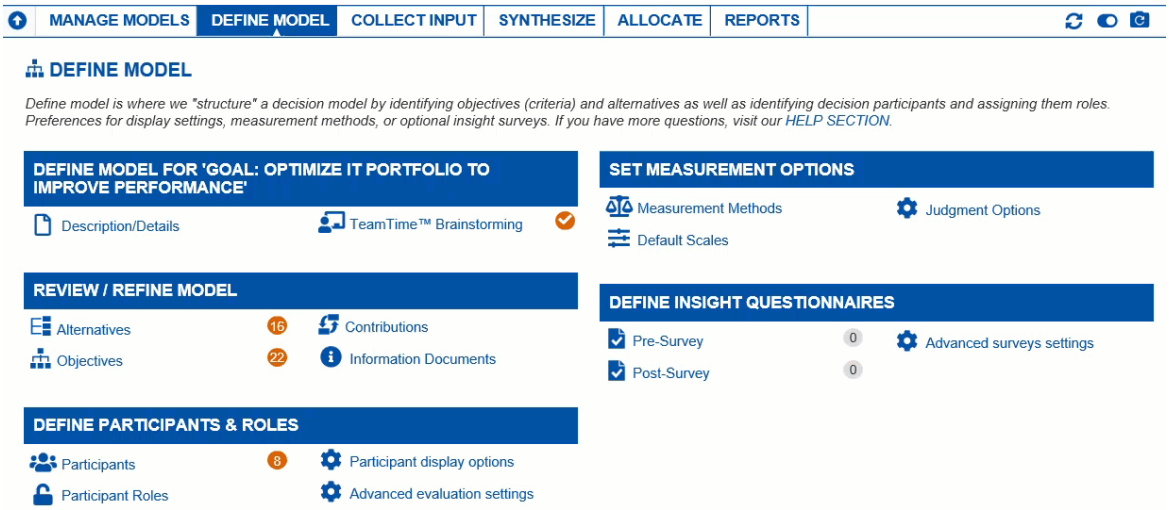
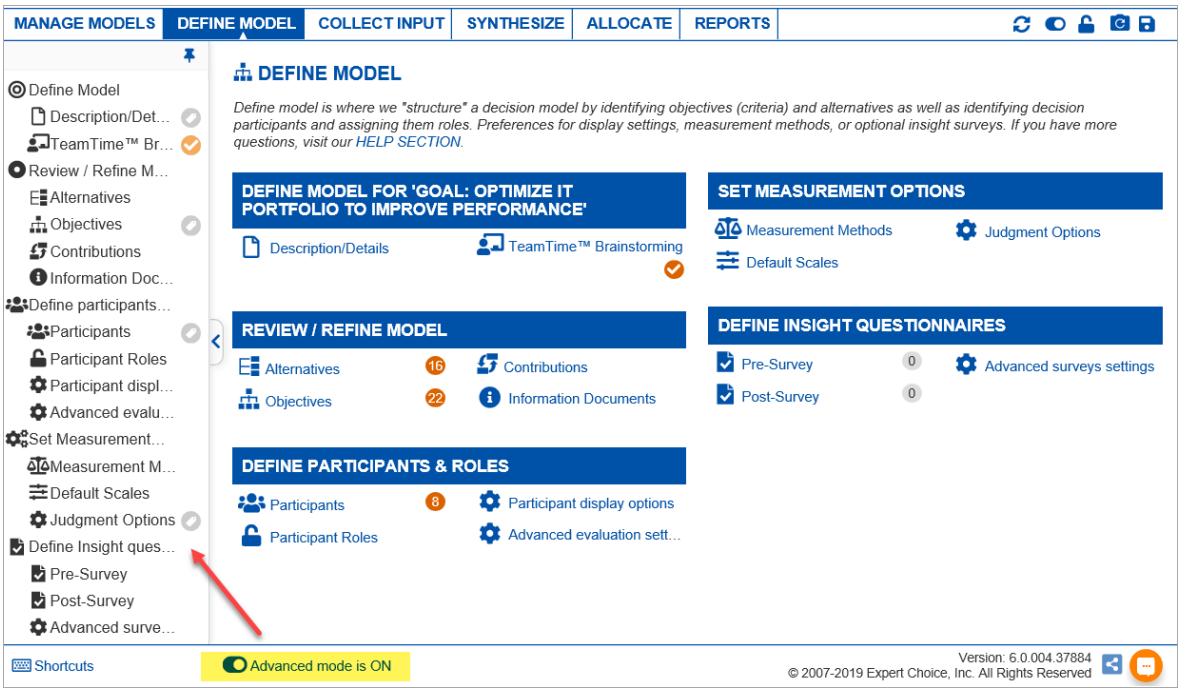
clicking again the top-level menu as shown below:



Alternatively, you can use the left menu which displays the same sub-pages on the overview page, but this is only available when the Auto-Advanced option is enabled.



For smaller screens, some of the buttons may be hidden in the toolbar. You may see the hidden buttons by clicking the ellipses ⋮ icon at the top right.

You can view a more detailed help specific to each Comparion screen by clicking the "?" icon at the top right of each screen, or you can navigate our Full Help Center.

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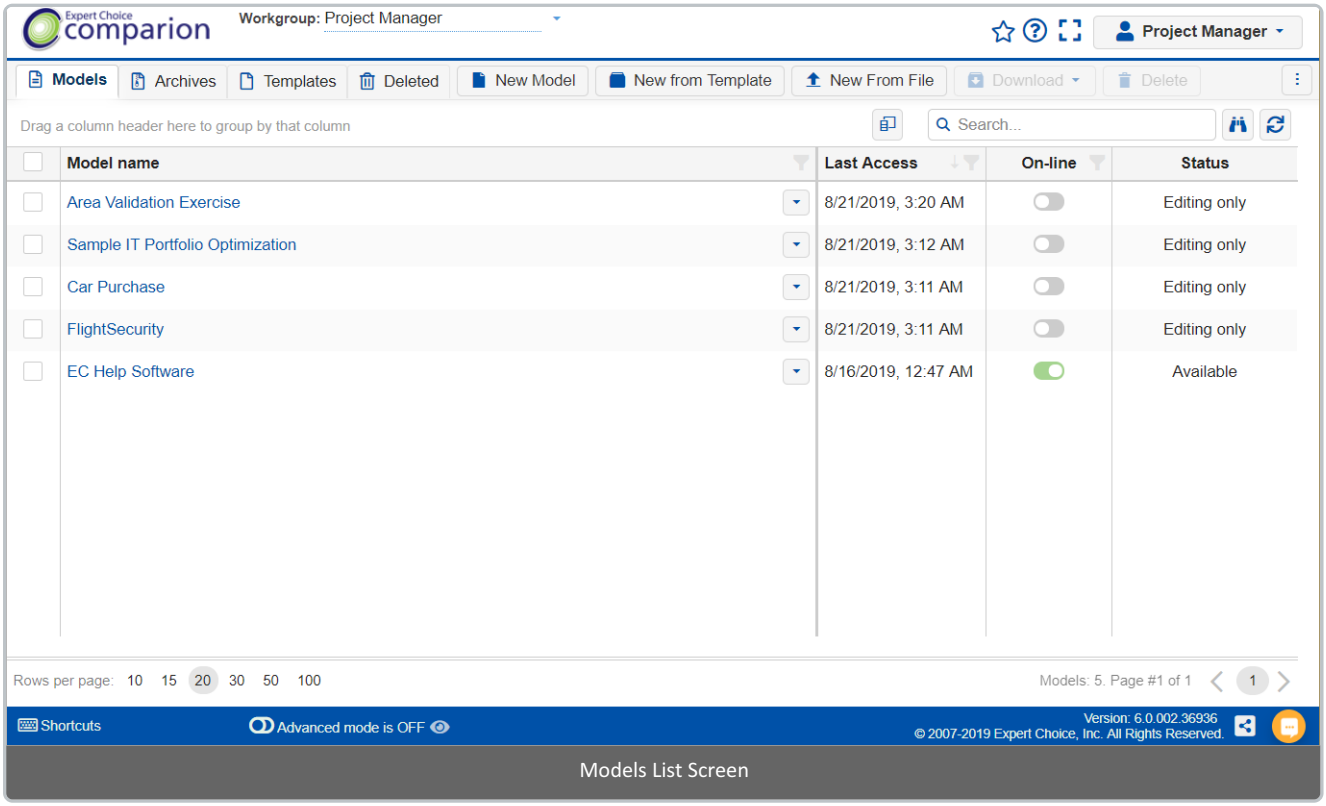
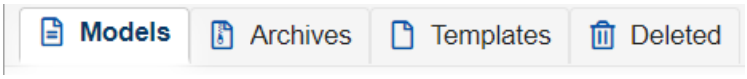
Models List Overview

Comparion® models exist within workgroups. Most users will be members of only one workgroup. If you are a member of more than one workgroup, then you will be able to select which workgroup you want to work with using the select Workgroup drop-down menu.



Models List Screen

By default, the active Comparion models are displayed. You can view **Archives**, **Templates,** and **Deleted** projects by clicking on the respective tab names.



You can see several commands by clicking the arrow icon to the right of the model name, or by simply right-clicking a row:

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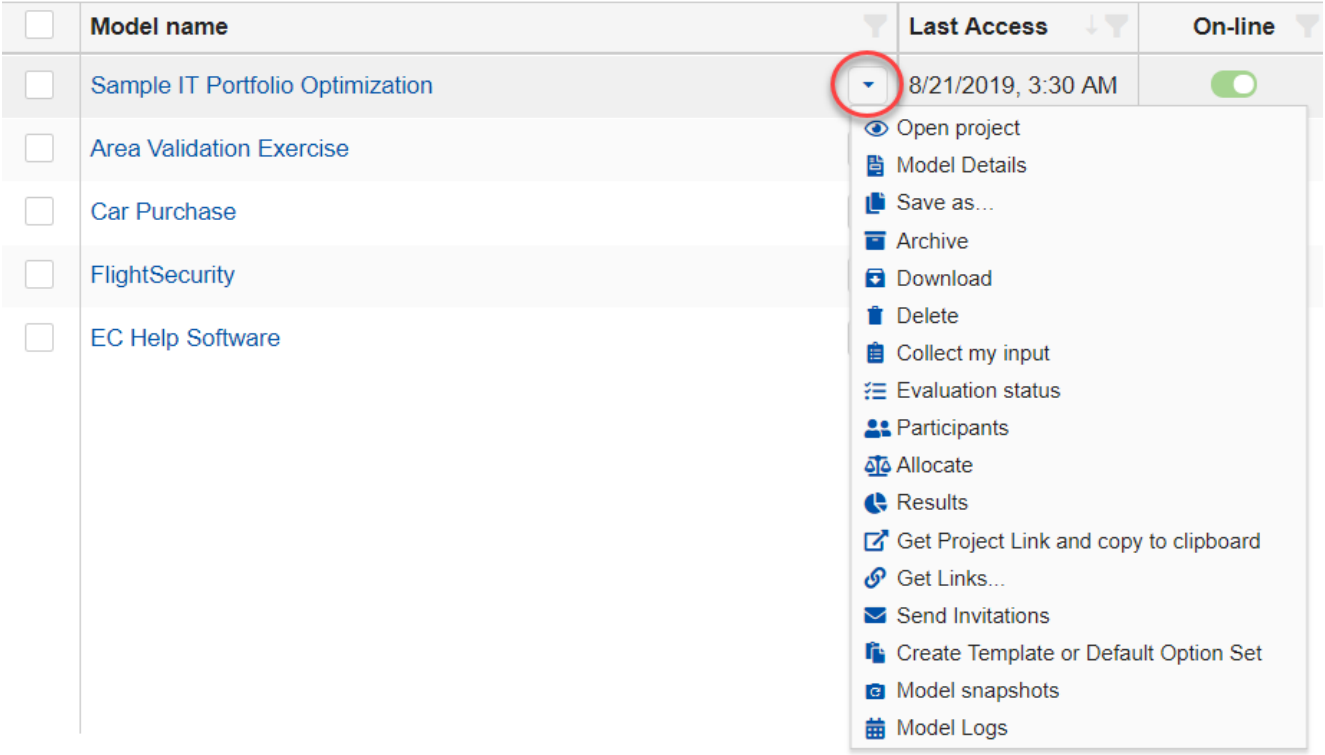

Learn more on Models Lists Commands.

The checkboxes to the left of the model names allow you to select one or more models and do specific actions such as Download, Delete, and Archive.

Deleted models go to the Deleted tab which can be restored or deleted permanently.

Archived models go to the Archives tab which can be activated or deleted.

The models list page shows the following columns by default:

- Online/Offline **Online status** toggle**,**
- **Last access date** and **time,** and
- the **Status** column which shows the project availability and additional details and actions, in addition to being Online or Offline:

Status	Description	Display (PM who triggered the status, if applicable)	Display (another PM or user)
Available	Available for evaluation The model is Online and not locked	Available	(same)

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Status	Description	Display (PM who triggered the status, if applicable)	Display (another PM or user)
Editing only (Project Manager) or **Not Available** (Evaluator)	Model is Offline Not available for participant's evaluation	Editing only (PM) Not available (Evaluator)	(same)
Locked or Being edited	The model is Online but temporarily unavailable for evaluation	Status Locked by Me Unlock	Status Being edited By j.doe@eci.com On-line users: 1
TeamTime Evaluation in Progress	TeamTime Evaluation meeting is in Progress	Status Your TeamTime™ Evaluation is in progress Continue Stop Session	Status j.doe@eci.com TeamTime™ Evaluation is in progress Join Stop Session On-line users: 1 (Stop is not available for Evaluator)
TeamTime Brainstorming in Progress	TeamTime Brainstorming meeting is in Progress	N/A (Brainstorming ends when PM leaves the brainstorming page)	Status j.doe@eci.com brainstorming session is in progress On-line users: 1

You can perform actions, if applicable, such as **Join or Stop session** (for TeamTime meeting).

The number of online users in the model is also displayed (not including the user currently logged in). Clicking the number link will open the online user's list.

You can select or deselect columns by clicking the column chooser icon

DIDN'T SEE WHAT YOU ARE LOOKING FOR? Try enabling the Advanced Mode switch at the bottom of the page; this will show more columns as well as advanced options on this page.

HINT: For smaller screens, some of the buttons may be hidden. You may see the hidden buttons by clicking the ellipses icon at the top right.

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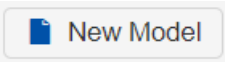
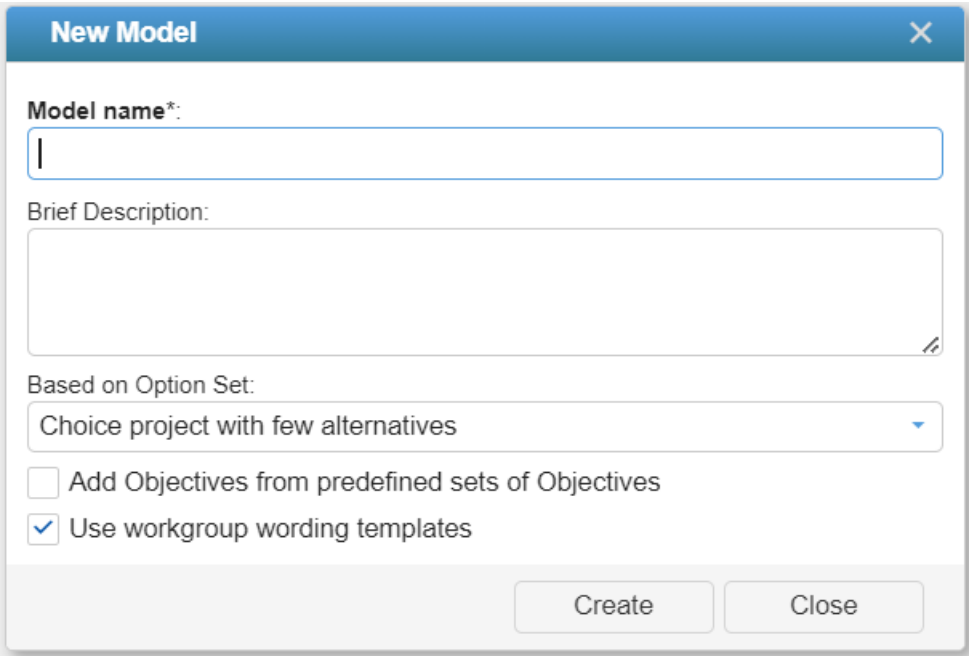
Create New Model

Create new models to begin new decisions.

Click the **New Model** button to create a new Comparion model.

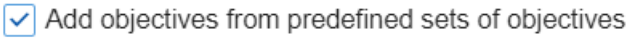




Depending on the model you will create, you can select from the Default Option Sets dropdown:

Checking the "**Use workgroup wording templates**" checkbox will use the "Workgroup Wording Templates" instead of the selected Option Sets wording.

You can still change the wording for an existing model on the Judgment Options page.

Checking  will redirect the user to the Objectives screen with the "Add predefined Objectives sets" dialog open where the user can select from a predefined list of objectives.

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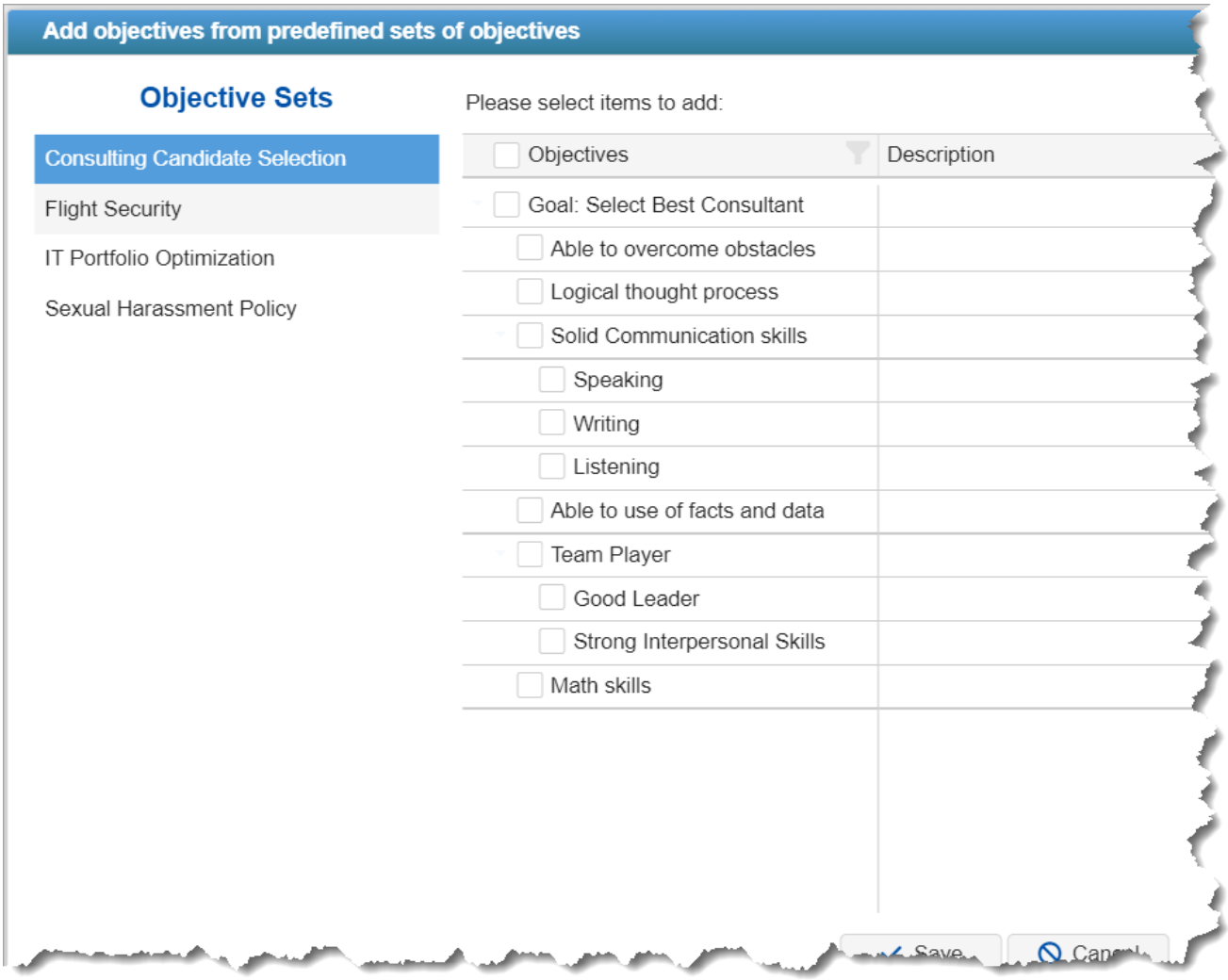

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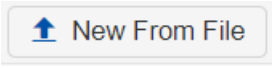
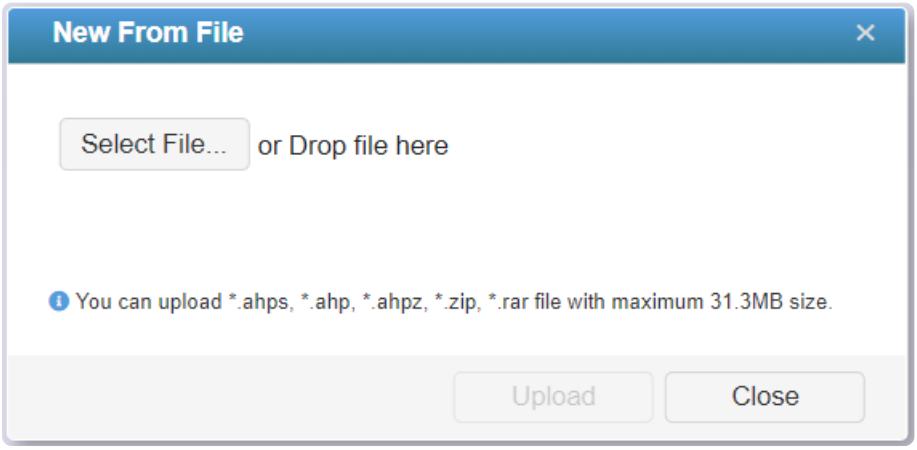
Create New Model From File

Create new model from file if you had previously downloaded models that you want to use again, or if you want to utilize sample models that come with Comparion.

Clicking the 

button will open a window as shown below:



Click "Select File..." to browse for the file on your computer that you want to upload as a new Comparion model. The Model name is just the same as the file name, so you can change this as desired.

You can create a new model from:

- a file previously downloaded from a Comparion model and stored on your computer (.ahps)
- an Expert Choice Desktop file (.ahpz)
- an archived file (.zip or .rar) containing one .ahps or .ahpz model
- a text file containing textual information about the model to be created (.txt)

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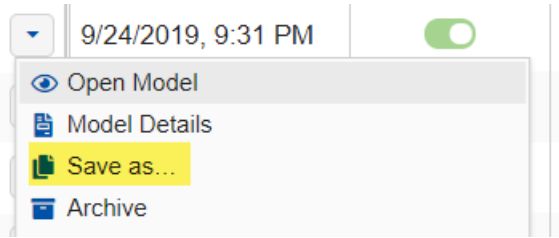
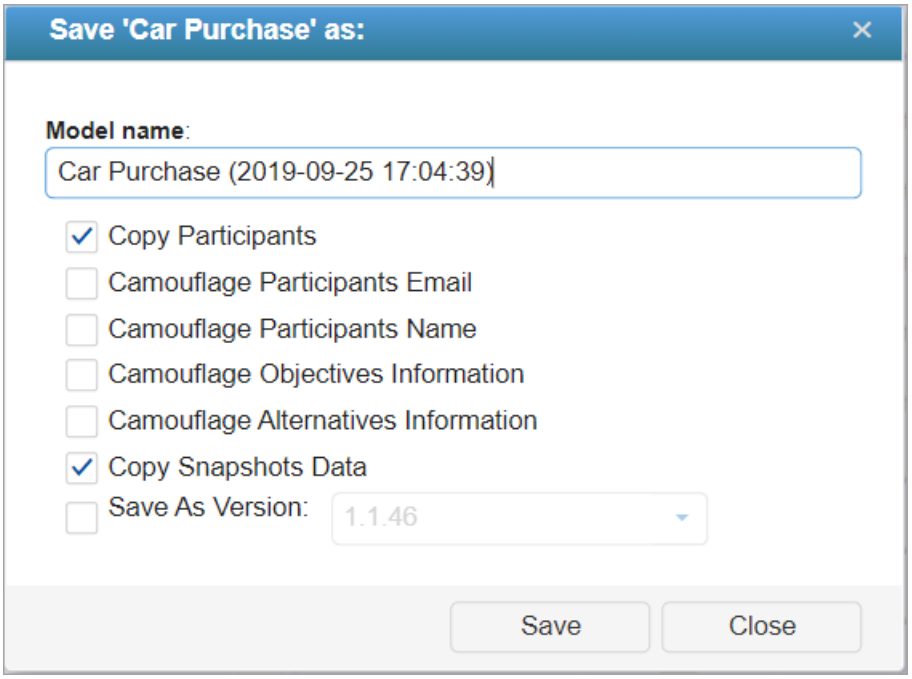
Create a copy of the model (Save as)

Creating a copy of your model (Save as) is helpful if you want to experiment with some changes but want to keep a copy of your model before making any changes. See also Snapshots

To make a copy of a Comparion model, simply go to the Models list, right-click the model or click to the right of the model you want to copy, and then select "**Save as...**"



A dialog box prompt will be displayed as shown below:



By default, the Model name is just the same as the original model name with the date and time stamp appended as shown above.

There are also options available:

- Copy Participants - copy the participants with their judgments (if any)
- Camouflage Participants Email - assign a random email name
- Camouflage Participants Name - assign a random participant name

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	Email	Participant Name
☐	user_f50cf01b@ec.com	User f50cf01b
☐	user_f3da31a6@ec.com	User f3da31a6
☐	user_76ab5f96@ec.com	User 76ab5f96

- Camouflage Objectives Information - (Objective2, Objective3...)
- Camouflage Alternatives Information - (Alternative1, Alternaive2...)
- Copy Snapshot data - include snapshot data of the original model in the new copy.
- Save as Version - save the model into an earlier Comparion database version. This is helpful if you want to downgrade your model in case you want to use it on a site with an earlier database version.

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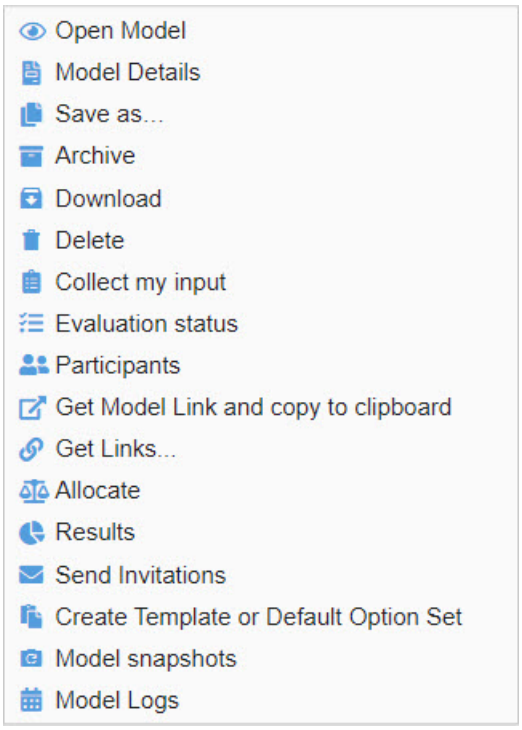
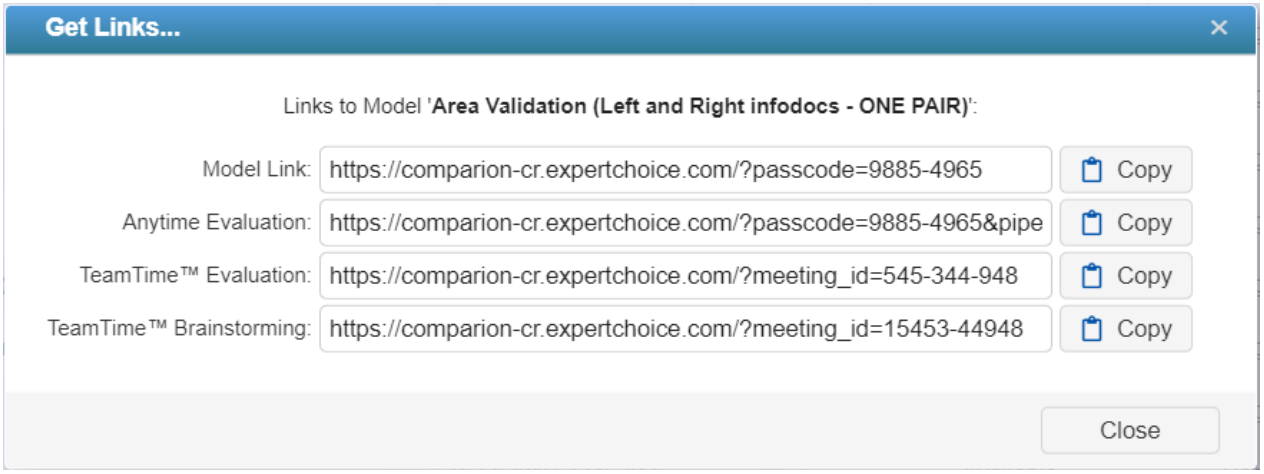
Models List Commands (Archive, Download, Delete etc.)

When you right-click the model name or click to the right of the model name, a list of options will appear:



1. Open model
2. Save as - to save a copy of the model with a different name
3. Archive - to archive a model
4. Download
5. Delete
6. Get Model link and copy to clipboard - model link with a passcode
7. Get links... - shows a dialog box where you can copy the Model link, Anytime evaluation link, TeamTime Evaluation link, or TeamTime Brainstorming link.



8. Create Template or Default Option Set
9. Model Snapshots - open the model snapshots. This will work even when the model is closed

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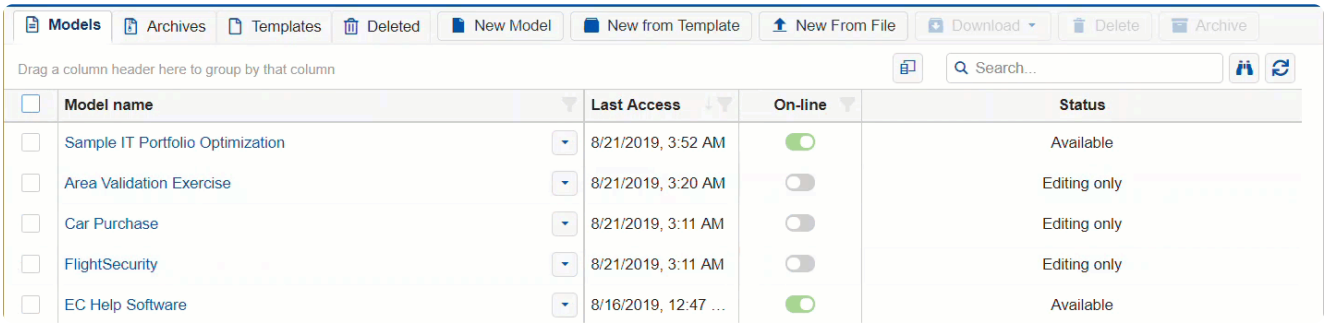
10. Model Logs

You can also go to a specific page inside the model by clicking the corresponding option on the menu:

- Model Details
- Collect my input
- Evaluation Status
- Participants
- Allocate
- Results
- Invites

If you want to **download, delete** or **archive** several models at once, you can use the checkboxes at the left of the screen to select the models and then select the action you want to perform:



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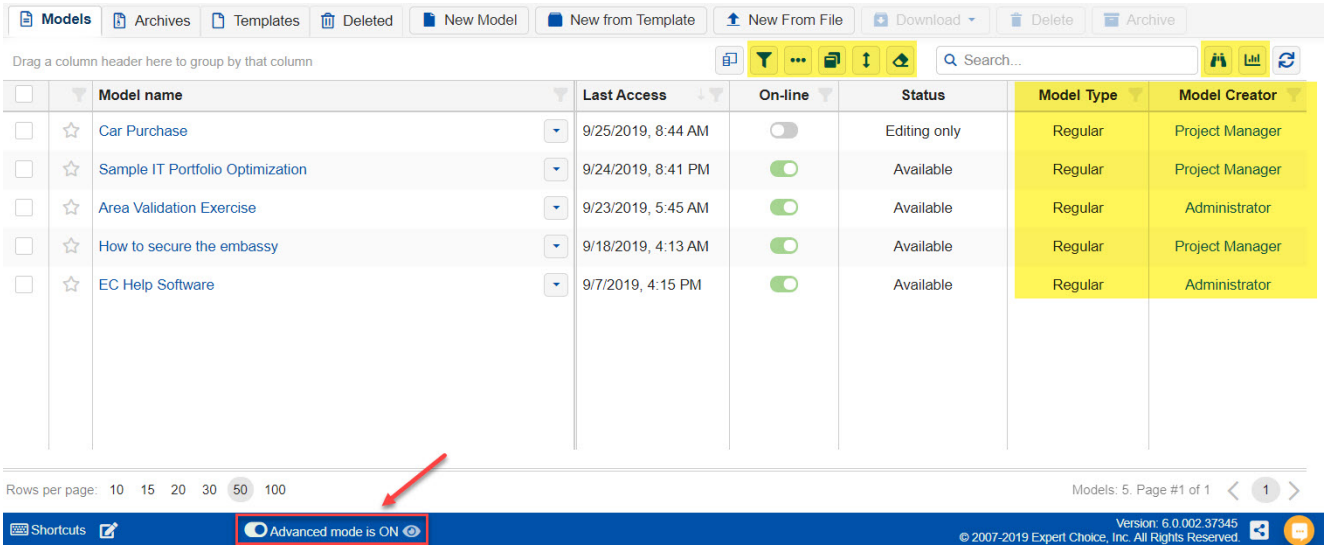
Advanced Mode: Models (Column Filtering, Auto-Hide etc..)

Some columns and features are hidden by default when Advanced Mode is on. Turn on advanced mode to see these hidden columns and features.

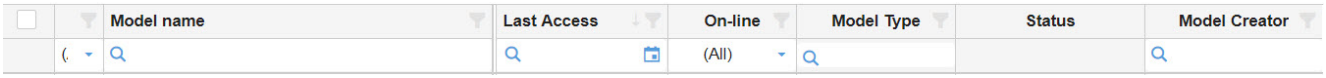
When the Advanced mode is ON, you will see the advanced options and additional columns on the Models list page *(see highlighted):*



Column Filtering

Use Column Filtering for the Model List to narrow down the visible rows (models) based on values in an column or columns.

Add a row to the grid where you can search or specify the conditional statement(s) to filter the model list.



Click the magnifying glass icon to show the conditional expressions:

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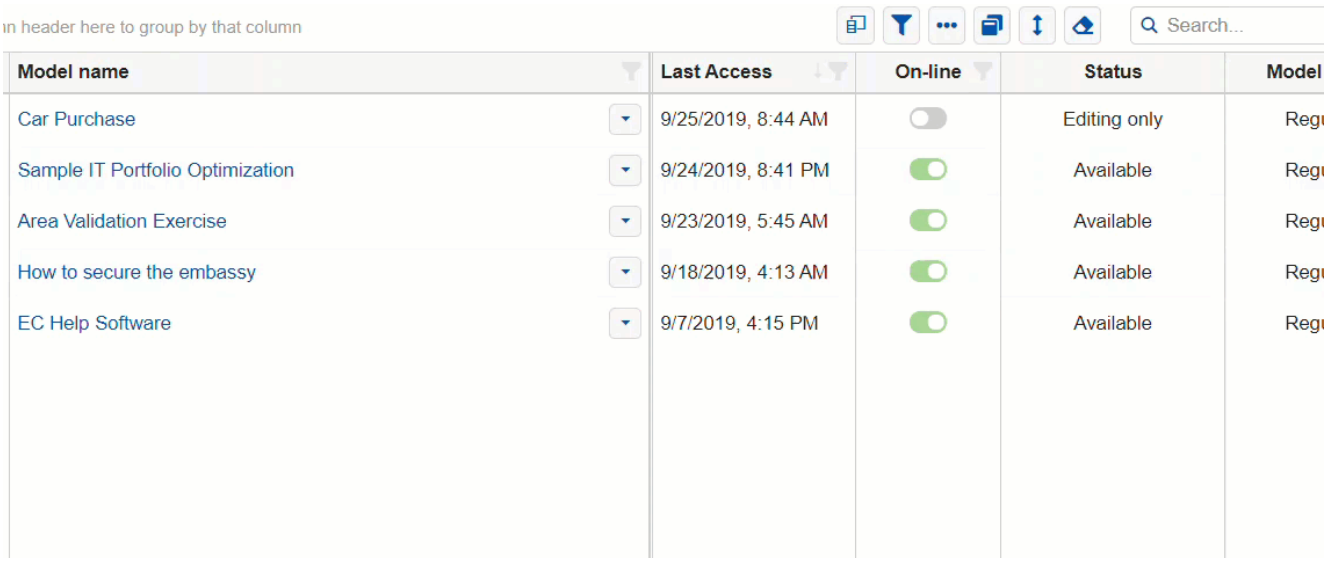
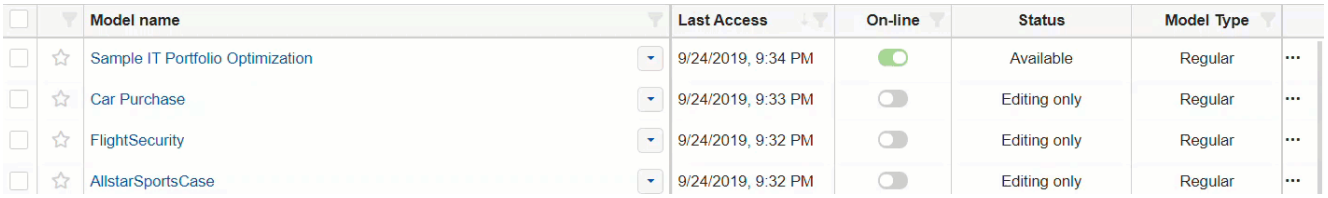


Auto-hide Columns

Automatically hide columns to fit the page and show the hidden columns using the ellipses (...) displayed on the last column.



Auto-page Size

Automatically assigns the pagination (number of models per page) based on screen size (to minimize scrolling).

Infinite Scrolling

Displays all the models in the list (no pagination).

Model Statistics

Opens the Model Statistics page.

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Models Statistic – Comparion®

Search model by name, description or access code: Show by pages

Model name	Access code	Model	Snapshots	Total	Manual	Auto	Total	Status	Created	Visited	Modified
Sample IT Portfolio Optimization	9605-8104	254.9Kb	1.9Mb	2.2Mb	2	48	50	Active	2019-08-13 02:55:42	2019-09-24 21:34:54	2019-09-23 21:38:24
Car Purchase	8134-3039	131.3Kb	22.0Kb	153.3Kb	0	1	1	Active	2019-08-26 03:55:37	2019-09-24 21:33:49	2019-09-24 21:24:53
Risk of the Brady Campaign alternatives to Prevent Gun Violence	4636-0791	235.8Kb	177.5Kb	413.2Kb	0	4	4	Active	2019-09-08 23:06:13	2019-09-24 21:32:02	2019-09-24 21:32:02
IT Portfolio Optimization Sample (2019-09-04 12:19:52)	2747-0471	247.6Kb	606.1Kb	853.7Kb	0	18	18	Active	2019-09-04 00:19:54	2019-09-24 21:32:02	2019-09-24 21:32:02
Comparion 2020 Name	7693-4330	31.5Kb	23.1Kb	54.6Kb	0	2	2	Active	2019-08-28 00:04:38	2019-09-24 21:32:02	2019-09-24 21:32:02
AllstarSportsCase	1964-7291	183.4Kb	0.0Kb	183.4Kb	0	0	0	Active	2019-08-25 23:50:45	2019-09-24 21:32:02	2019-09-24 21:32:02
Area Validation (Left and Right infodocs - ALL PAIRS)	2842-2637	603.5Kb	16.8Mb	17.4Mb	0	45	45	Active	2019-08-19 02:17:00	2019-09-24 21:32:02	2019-09-24 21:32:02

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Lock or Unlock Model

A model can be Online but temporarily unavailable for evaluation when it is **locked or being edited** by the Project Manager.

The model's lock status can be seen from the Model list status column or from the Lock toggle icon available at the top right of every page when the model is open.

A model can be locked in two ways:

1. **Manually** by the Project Manager using the Lock toggle button Lock . A manually locked model will remain locked until the Project Manager unlocks it using the Lock toggle button Lock , or automatically after **20** minutes of inactivity in the model, see (2).
2. **Automatically** when the Project Manager is editing the model or simply on a page that can modify the evaluation (usually from the Define Model pages; e.g., Alternatives, Objectives, Contributions, etc.). The model will be automatically unlocked **1-3** seconds after the Project Manager leaves any of these pages.

Evaluators who try to access the Evaluation while the model is locked will see this message:

Sorry, you cannot access this project at the moment — it is being modified by the project manager. You can try again in a few minutes, or contact the decision project manager for more information.

Reload

If an Evaluator is already on the evaluation page and the model is suddenly locked, the Evaluator will see the same page above as soon as the evaluation page is refreshed.

Comparion checks the model's lock status from time to time and will automatically redirect the user to the evaluation page as soon it is detected to be unlocked. The Evaluators can also click the **Reload** button to manually check the lock status.

Locking a model is helpful to avoid losing any evaluation data and to make sure that the Evaluators will see the most updated version of the model's evaluation pages.

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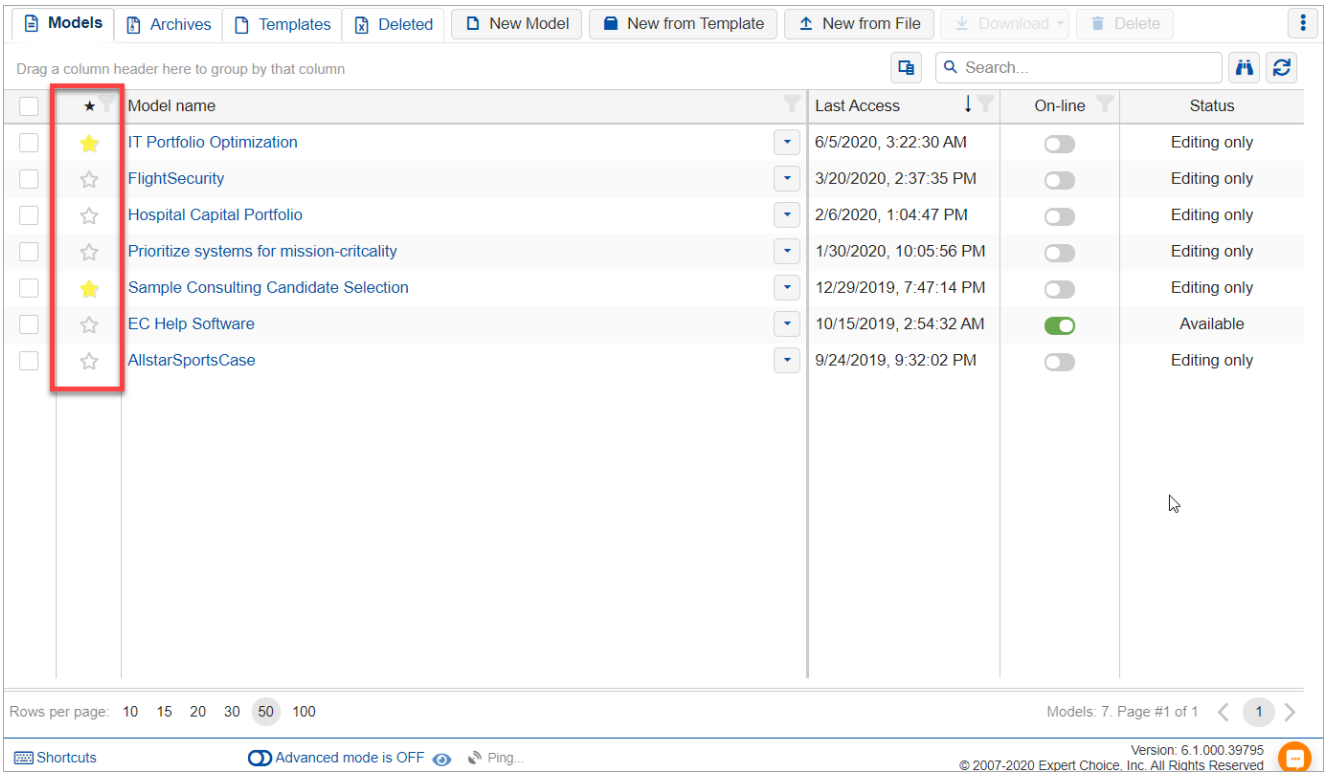
Favorite Models

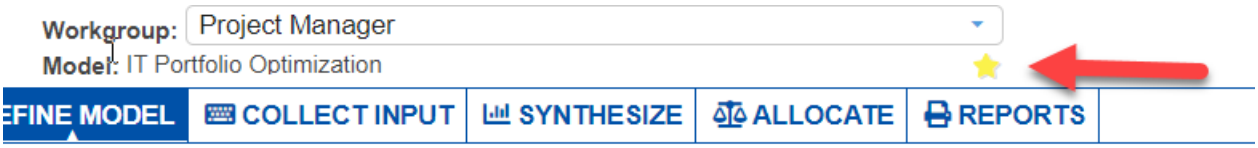
Another way to filter the model rows you'll see on the Models List is to tag models as FAVORITES from the Models list.

Simply click the star icon to the left of the model name:



Yellow star indicates that a model is a "Favorite."

When a model is open, you can also access the same star icon to the right of the model name at the top:



You can then list all your favorite models by clicking your User Name > Manage Models > **Favorites** as shown below:

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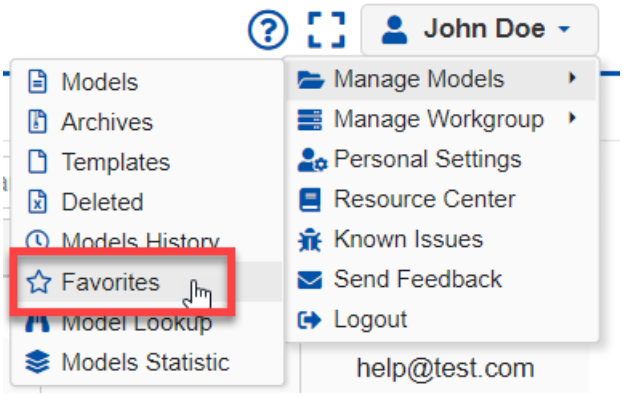
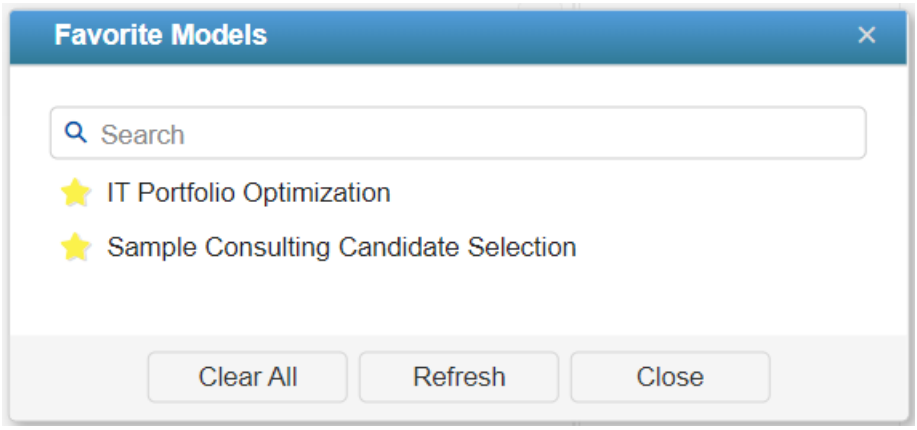


The "Favorite" models dialog box looks like this:



Clicking the Model name will open the model.

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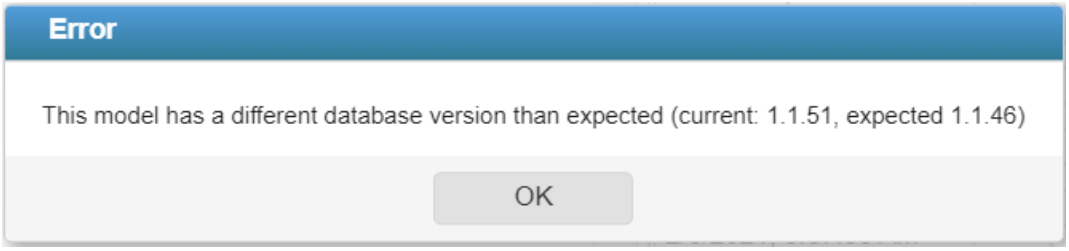
Downgrade Model (Version Not Supported)

Models with later database versions are not supported on sites with earlier database versions. Most people only work on one site, for example comparion.expertchoice.com. Downgrading is only relevant if you work on more than one site.

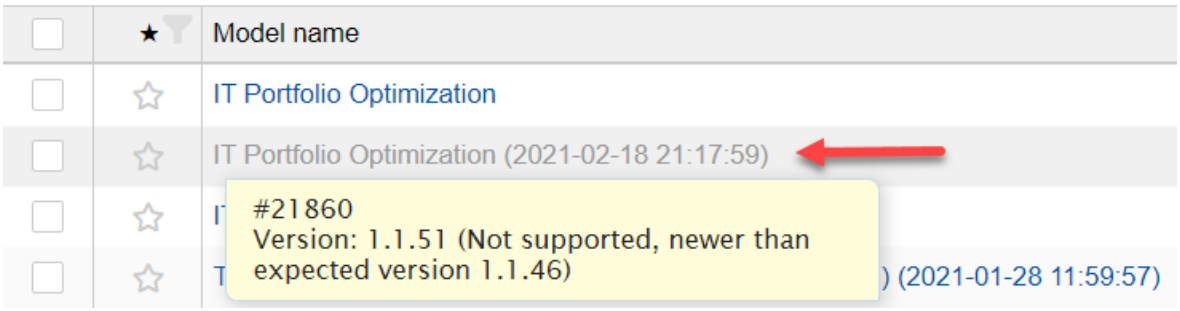
This scenario may occur when a model was created or opened on a Comparion site with a later database version, and you try to access the model on a site with an earlier database version -- either by:

- uploading the model, or
- opening the model when the sites are sharing the same database.

Uploading such a model will show an error:



In case unsupported models are already in the model list, they have a gray font color. You can hover on the model name to see details.



In the examples above, the model version is 1.1.51; however, the site only supports version 1.1.46 (and lower), thus the model is unsupported.

To fix this, you need to create a copy of the model and save it to a lower version (in our example, to 1.1.46). **Downgrading a model should be performed on the site that supports the current model version (1.1.51).**

To downgrade a model:

1. Log in to the site where the current model version is supported (please contact us at support@experchoice.com if you need help).

2. In the Models list, right-click the model to downgrade or click the down arrow.

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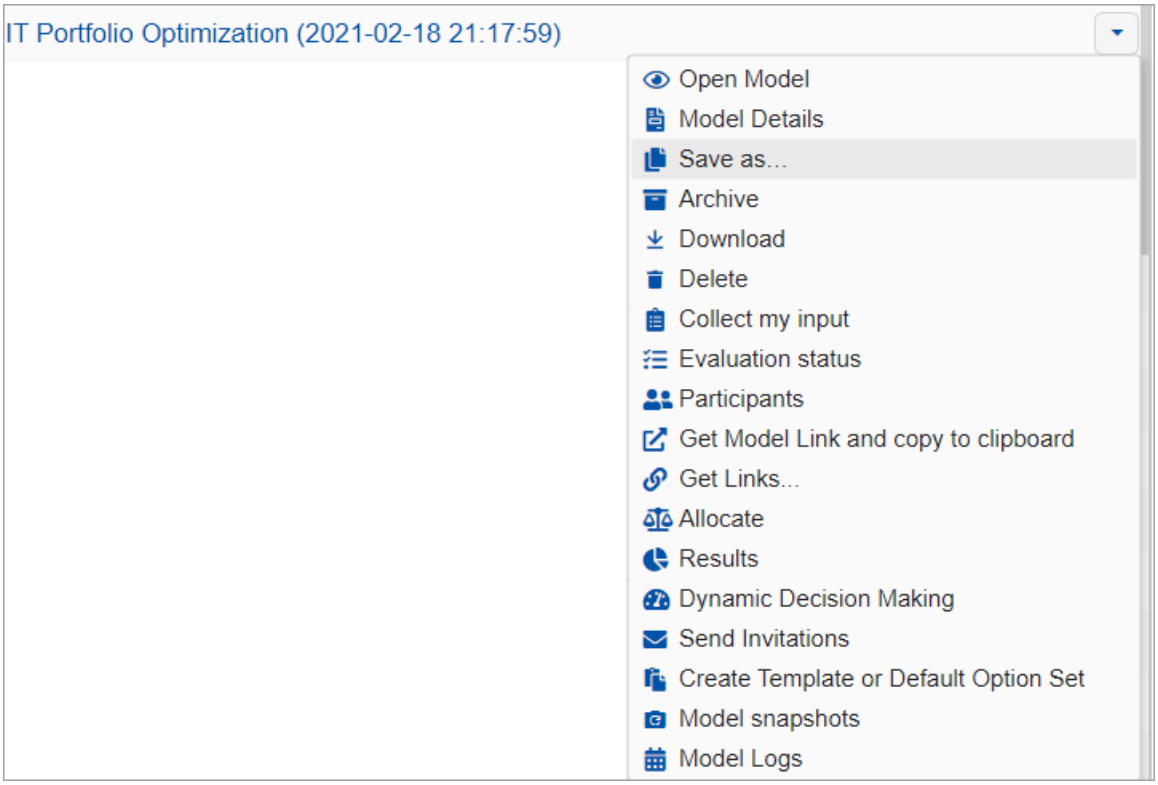
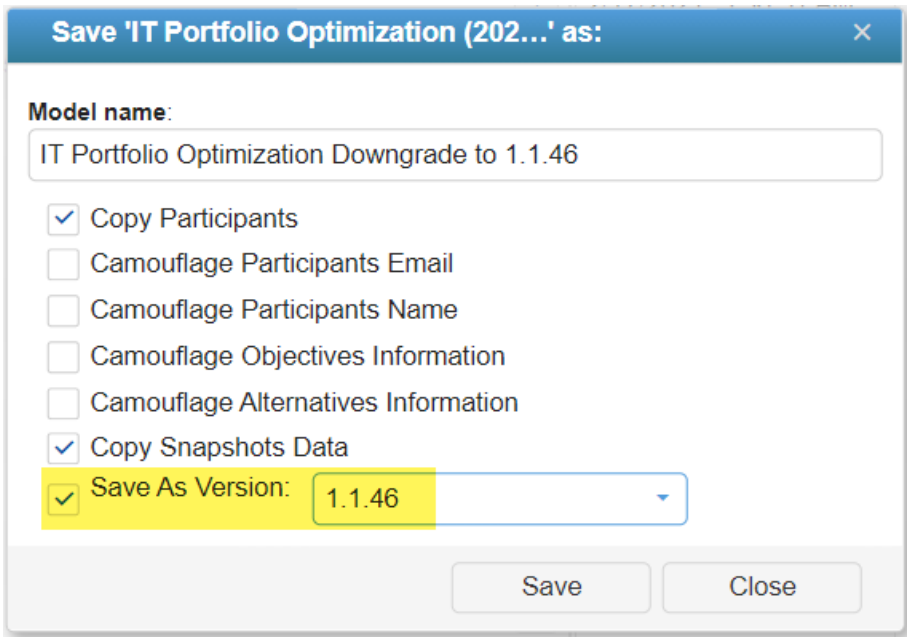
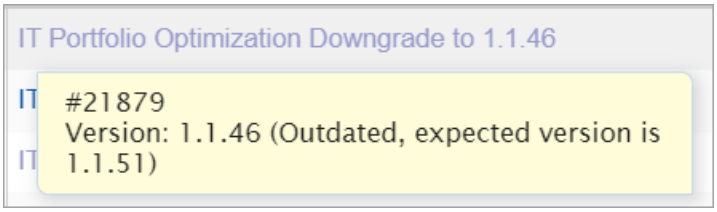


3. Click **Save as...** to open the save as options. Check "Save As Version" and then select the version you want to downgrade the model to, as in our example 1.1.46. You can also rename the model as desired.



4. Click Save. The downgraded model will be at the top of the models list.



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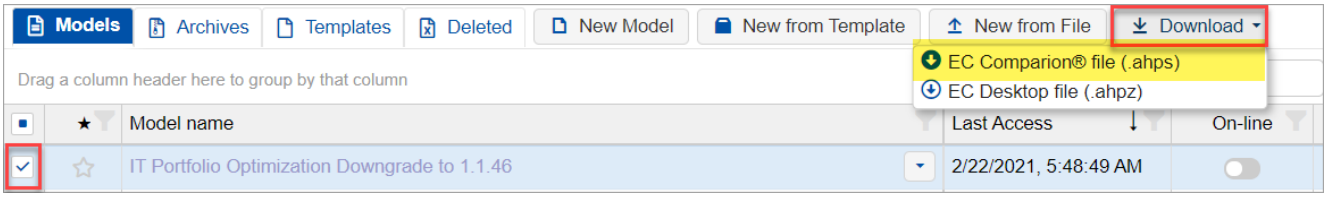
You can hover over the model to see details; here the model is downgraded to 1.1.46 (which is now outdated for this site).

5. Select the downgraded model and download it as a .ahps file from the Download button at the top. Make sure you don't open the model as this will automatically upgrade the model back to the latest version (1.1.51). Instead, upload the downloaded downgraded model directly to a site that is running the earlier software version.



You can then upload the downloaded model to the site that only supports 1.1.46 and lower, or you can open it directly in case the database is being shared.

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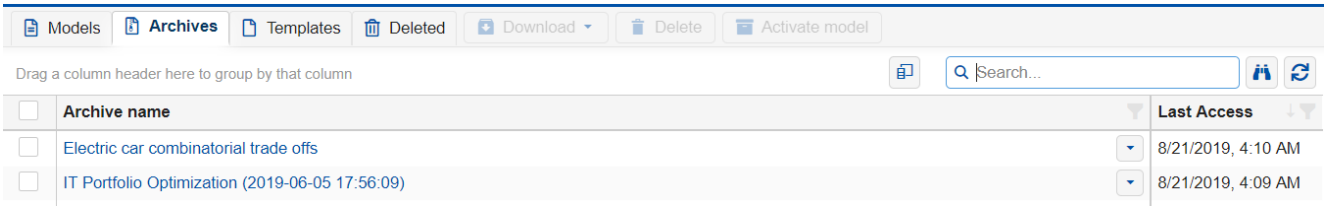
Restore and Delete Archived Models

Archiving a model moves it from the Models List tab to the Archives tab. Archived models cannot be opened.

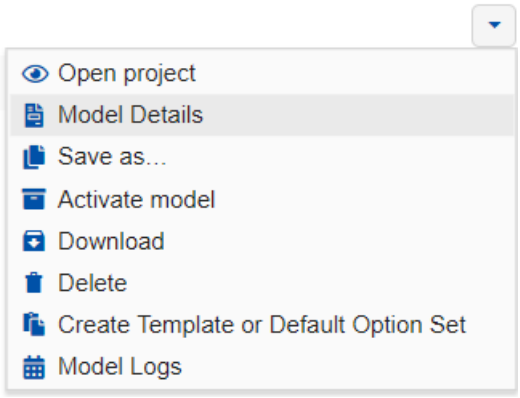
The **Archives** tab lists the models that have been archived from the Models tab. Archived models contain all the model information and participants' judgments.



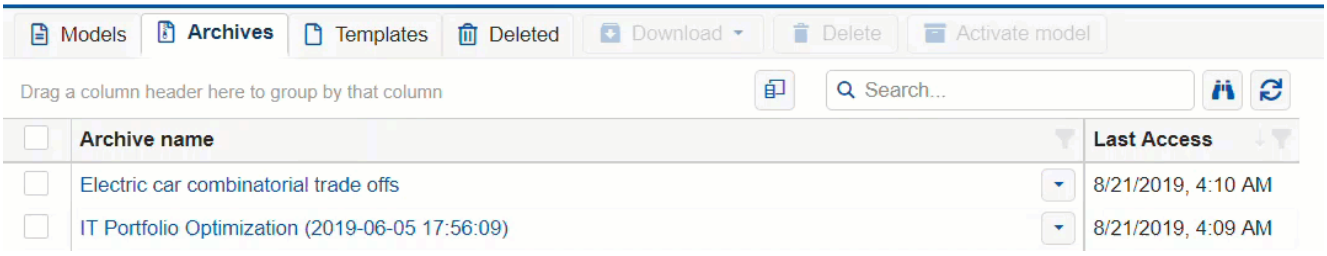
Archived models can be **deleted** or **activated**.

Activating an archived model removes it from the Archives list and adds it to the Models tab.

Click the arrow icon to view commands you can choose from.



To **download**, **delete**, or **activate** several archived models at once, use the checkbox to the left to select the models you want, then click the download, delete, or the activate button.



DIDN'T SEE WHAT YOU ARE LOOKING FOR? Try enabling the Advanced Mode switch at the bottom of the page; this will show more columns as well as advanced options on this page.

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HINT: For smaller screens, some of the buttons may be hidden. You may see the hidden buttons by clicking the ellipses icon at the top right.

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Create and Delete Templates

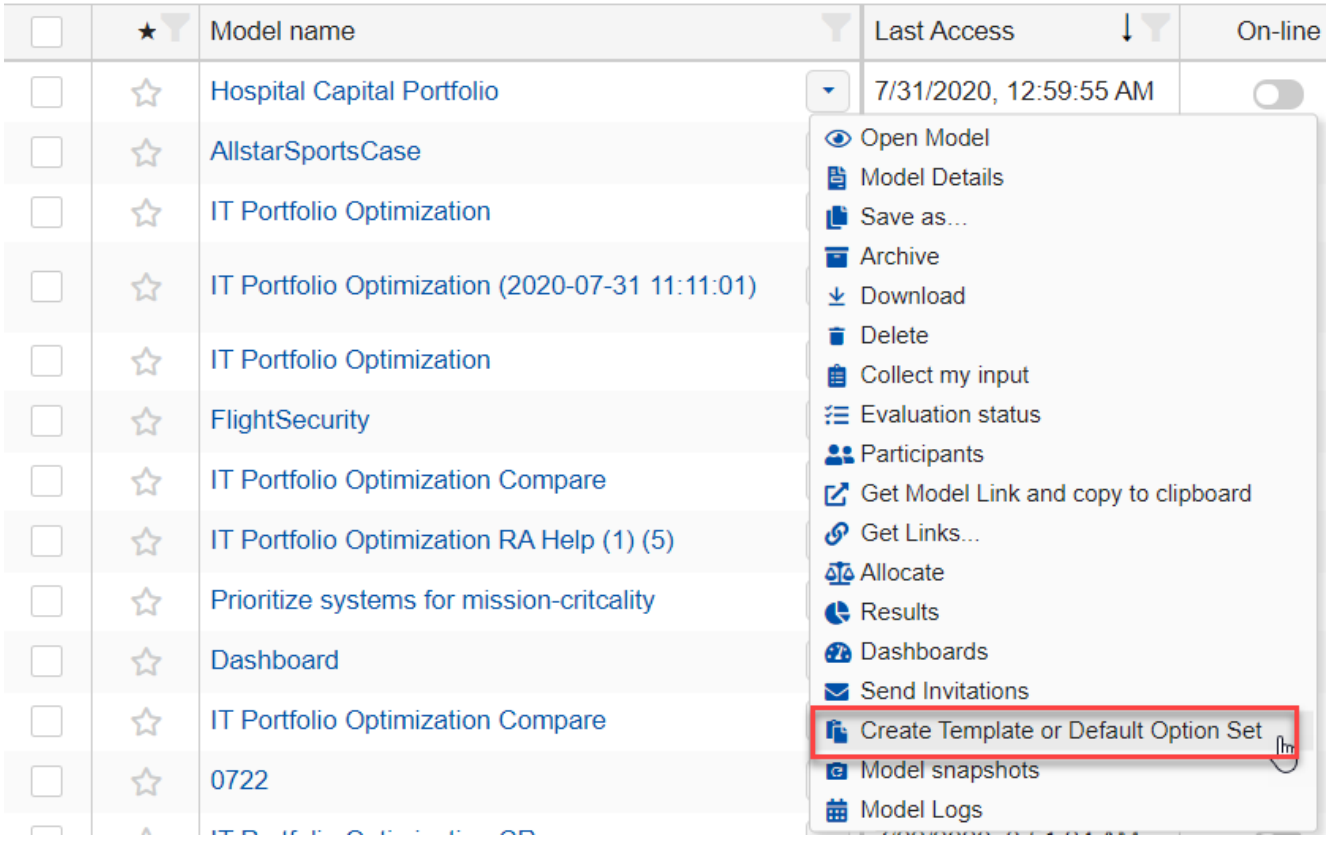
When you have a favorite model structure that you want to re-use, you can create a template from it and use it when creating new models.

A **Template is** used to create a new Comparion model with predefined:

- objectives hierarchy,
- alternatives,
- information documents,
- contributions,
- groups and their evaluation roles,
- evaluation and measurement settings

Templates are created from an existing Comparion model in the Models tab:

Click the arrow icon to the right of the model you want to save as a template, and then Create Template or Default Option Set:



You can rename the model and then click Create.

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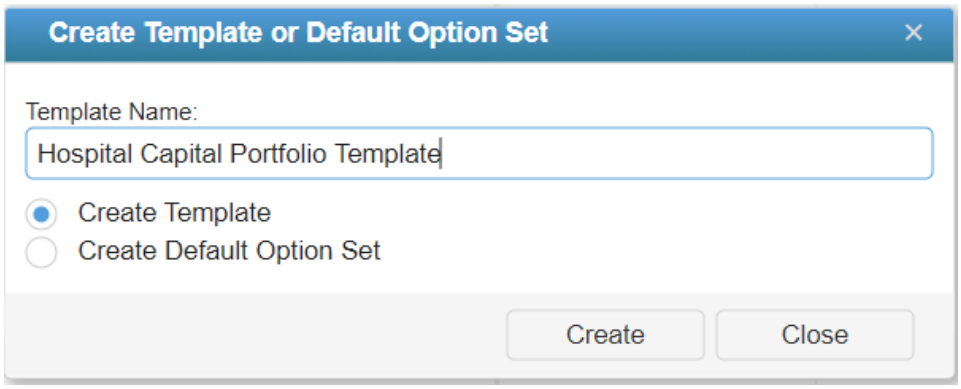
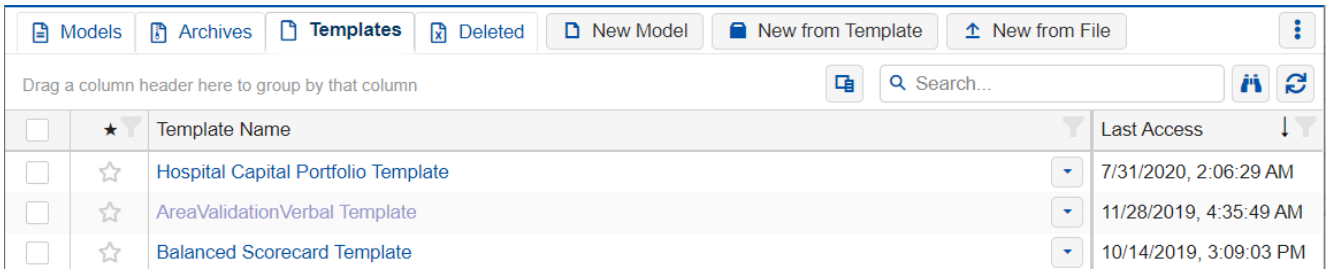
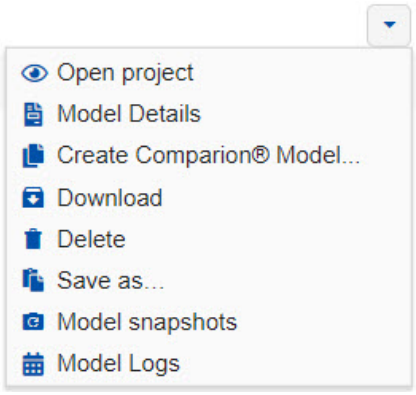


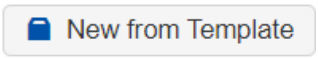
Templates only have the DEFINE MODEL tab available.

The created template is added to the **Templates** tab:



To create a Comparion model from a template, click the arrow icon to the right of the template name and then click "Create Comparion Model."



Alternatively, you can use the  button.

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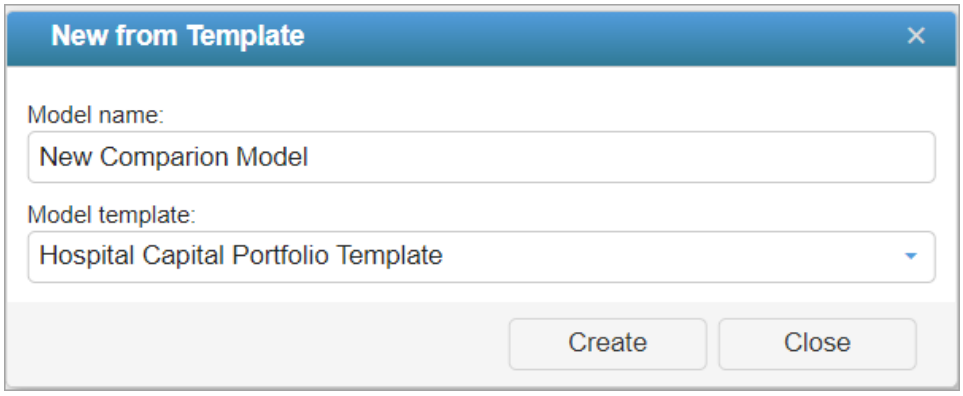

To **delete** a template, simply click the Delete option from the same menu above.

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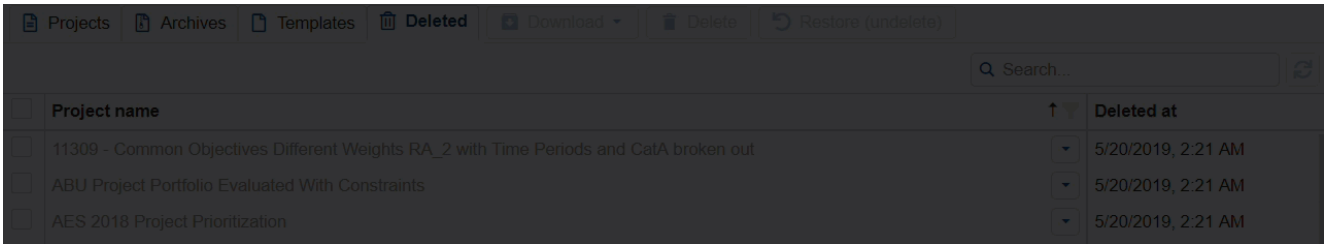
Permanently delete or restore deleted models

Models that are deleted are moved to the deleted tab and remain there until:

(1) they are restored by pressing the Restore (undelete) option,

(2) they are permanently deleted by pressing the Delete option,



or (3) some period of time has elapsed and the projects are permanently deleted.

Permanently deleted models do not count against the workgroup license models limit.

Warning: Make sure that you really intend to permanently delete your project(s) as this action can't be reversed. Before permanently deleting a model, you might want to download it first, just in case you want to upload it back into a workgroup later.

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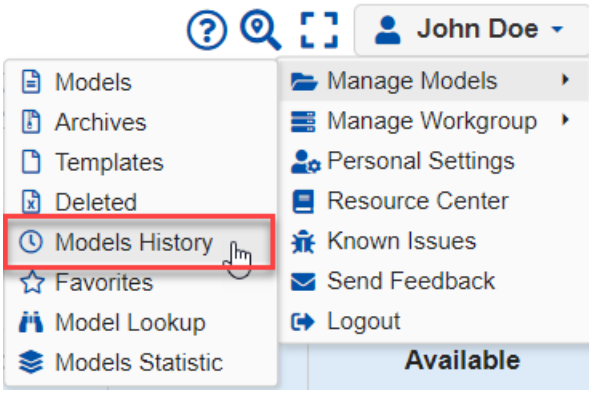
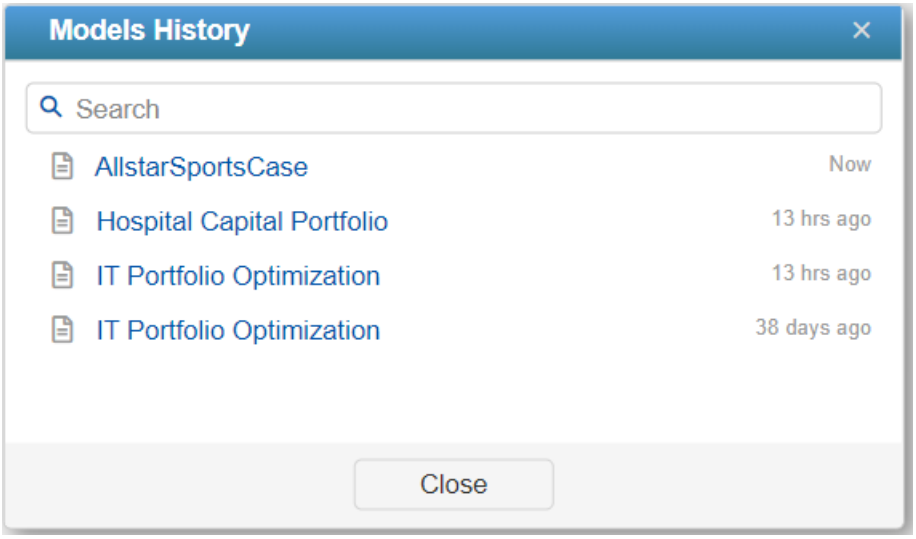
Models History

Models History lists the history of models opened by the currently logged-in user.

This can be found by clicking your Name > Manage Models > Models History:



Clicking the Models History will open a prompt as shown below:



You can search and click on the model name to open the model.

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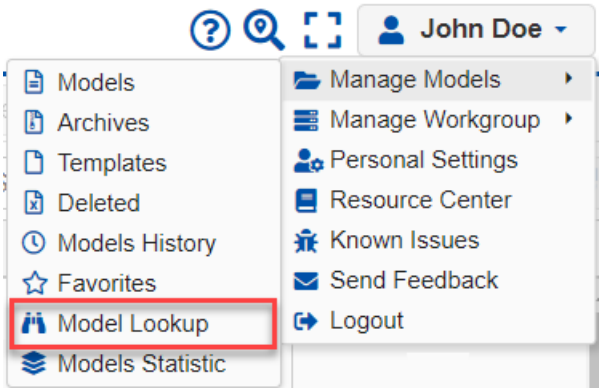
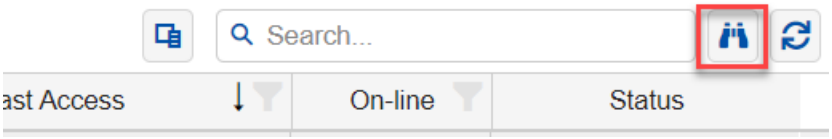
Model Lookup

Model Lookup allows you to list all the models your user is in (active, templates, archived, and deleted) across all the workgroups you have access to.

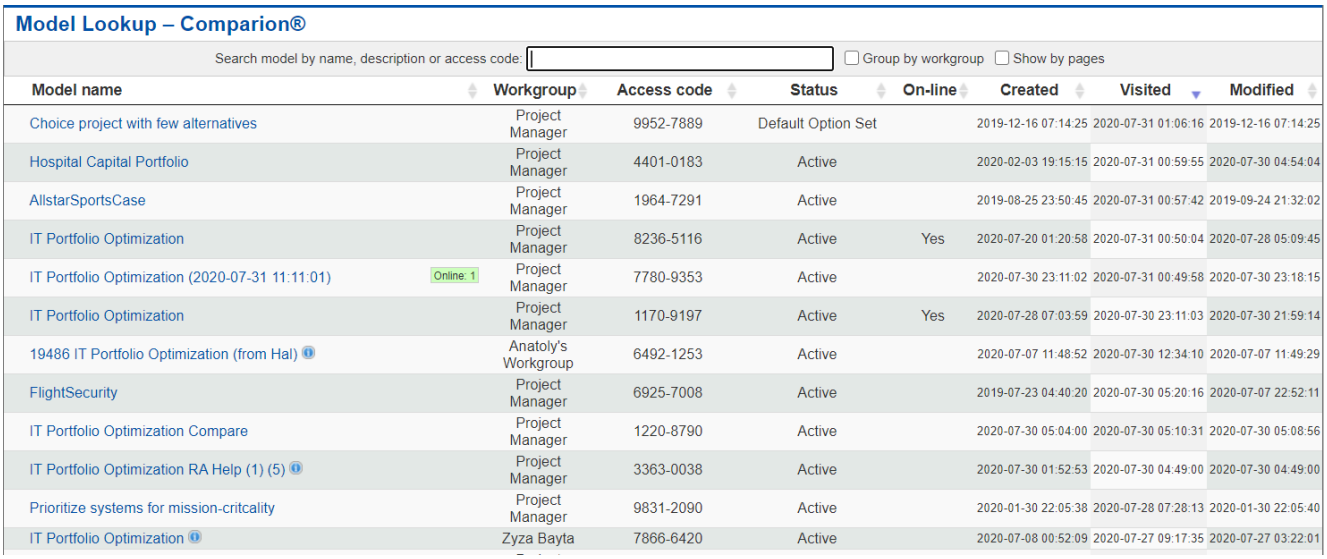
Model Lookup is executed by clicking your name > Manage Models > Model Lookup:



or by clicking the magnifying icon at the top of the models list:



The Model Lookup page is shown below:



Here you can search a model by name, description, or access code by typing in the text box provided.

Clicking the Model name will open the model.

You can sort by column by clicking the column heading.

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Check the "Group by workgroup" checkbox to group the models by workgroup.

You can also show the models by pages by checking "Show by pages."

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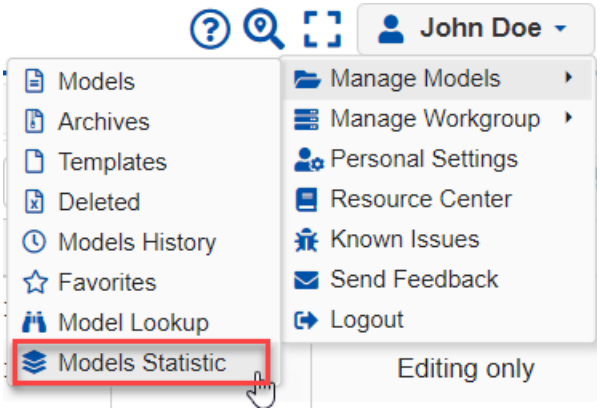
Models Statistics

The Model Statistics page includes:

- Access Code
- Model size
- Snapshots size and count (Manual and Auto)
- Status
- Dates (Created, Last Visited, and Modified)



The Model Statistics page is shown below:

Models Statistic – Comparion®

Search model by name, description or access code: Show by pages

Model name	Access code	Model	Snapshots	Total	Manual	Auto	Total	Status	Created	Visited	Modified
Choice project with few alternatives	9952-7889	21.6Kb	0.0Kb	21.6Kb	0	0	0	Default Option Set	2019-12-16 07:14:25	2020-07-31 01:06:16	2019-12-16 07:14:25
Hospital Capital Portfolio	4401-0183	350.8Kb	1.1Mb	1.4Mb	0	17	17	Active	2020-02-03 19:15:15	2020-07-31 00:59:55	2020-07-30 04:54:04
AllstarSportsCase	1964-7291	183.7Kb	58.0Kb	241.7Kb	0	2	2	Active	2019-08-25 23:50:45	2020-07-31 00:57:42	2019-09-24 21:32:02
IT Portfolio Optimization	8236-5116	252.1Kb	1.8Mb	2.0Mb	0	50	50	Active	2020-07-20 01:20:58	2020-07-31 00:50:04	2020-07-28 05:09:45
IT Portfolio Optimization (2020-07-31 11:11:01) Online: 1	7780-9353	246.9Kb	1.2Mb	1.4Mb	0	35	35	Active	2020-07-30 23:11:02	2020-07-31 00:49:58	2020-07-30 23:18:15
IT Portfolio Optimization	1170-9197	248.2Kb	1.0Mb	1.2Mb	0	29	29	Active	2020-07-28 07:03:59	2020-07-30 23:11:03	2020-07-30 21:59:14
FlightSecurity	6925-7008	401.2Kb	467.1Kb	868.3Kb	0	9	9	Active	2019-07-23 04:40:20	2020-07-30 05:20:16	2020-07-07 22:52:11
IT Portfolio Optimization Compare	1220-8790	238.8Kb	33.2Kb	272.0Kb	0	1	1	Active	2020-07-30 05:04:00	2020-07-30 05:10:31	2020-07-30 05:08:56
IT Portfolio Optimization RA Help (1) (5)	3363-0038	594.3Kb	6.5Mb	7.0Mb	0	37	37	Active	2020-07-30 01:52:53	2020-07-30 04:49:00	2020-07-30 04:49:00
Prioritize systems for mission-critcality	9831-2090	137.3Kb	5.9Mb	6.0Mb	1	47	48	Active	2020-01-30 22:05:38	2020-07-28 07:28:13	2020-01-30 22:05:40
Dashboard	5916-7878	31.3Kb	521.1Kb	552.4Kb	0	50	50	Active	2020-07-17 04:43:28	2020-07-26 07:38:11	2020-07-24 16:35:56
IT Portfolio Optimization Compare	1006-7515	242.5Kb	331.9Kb	574.4Kb	0	10	10	Active	2020-07-22 23:27:30	2020-07-23 08:04:08	2020-07-23 02:52:54

You can search a model by name, description, or access code by typing in the search text box.

Clicking the Model name will open the model.

You can sort by column by clicking the column heading.

You can also show the models by pages by checking "Show by pages."

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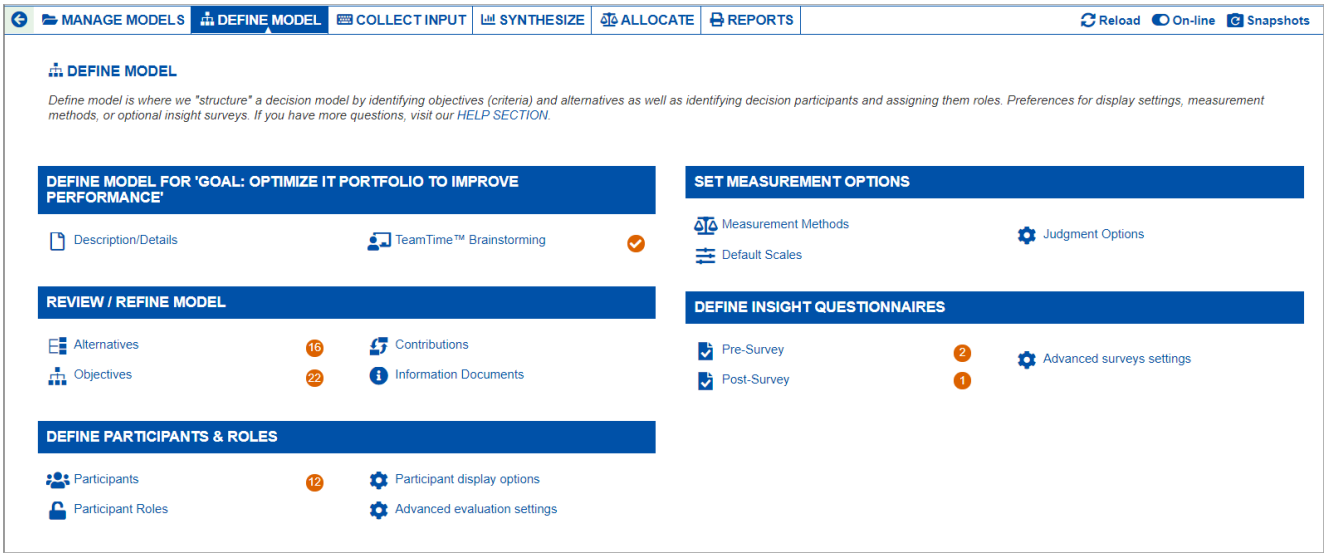
What is Define Model?

DEFINE MODEL is the first step in the decision process where we "structure" a decision model by identifying objectives, alternatives, and participants, and assigning roles to participants for providing judgments or data. After structuring the hierarchy of objectives and identifying alternatives, we can define the measurement methods and measurement scales.



DEFINE MODEL

Defining the **Model name and description** , viewing or managing the **project details** (access code, get links, etc.), as well as identifying the Objectives and Alternatives in a **top-down** structuring begins with the identification of the objectives and sub-objectives; or **bottom-up** fashion begins by first identifying the alternatives and their pros and cons.

REVIEW / REFINE MODEL

Structuring and defining the decision model by identifying **objectives** (criteria) into a hierarchy, identifying **alternative** courses of action, determining which objectives each of the alternatives **contributes to,** and defining the **information documents.**

DEFINE PARTICIPANTS AND ROLES

Identify decision **participants and** participant **groups.** Participant groups are recommended if the model will have more than a few participants. **Roles** for providing judgments or data can be assigned at the participant group level and then tweaked for individual participants.

SET MEASUREMENT OPTIONS

Defining how priorities are to be derived for the relative importance of the objectives as well as the relative preference of the alternatives with respect to the objectives. This involves identifying the **measurement methods** and **scales**, **display,** and **judgment preferences.**

DEFINE INSIGHT QUESTIONNAIRES

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Identifying optional **insight surveys** which can be presented to the participants at the beginning of the input collection process, at the end of the input collection process, or both.

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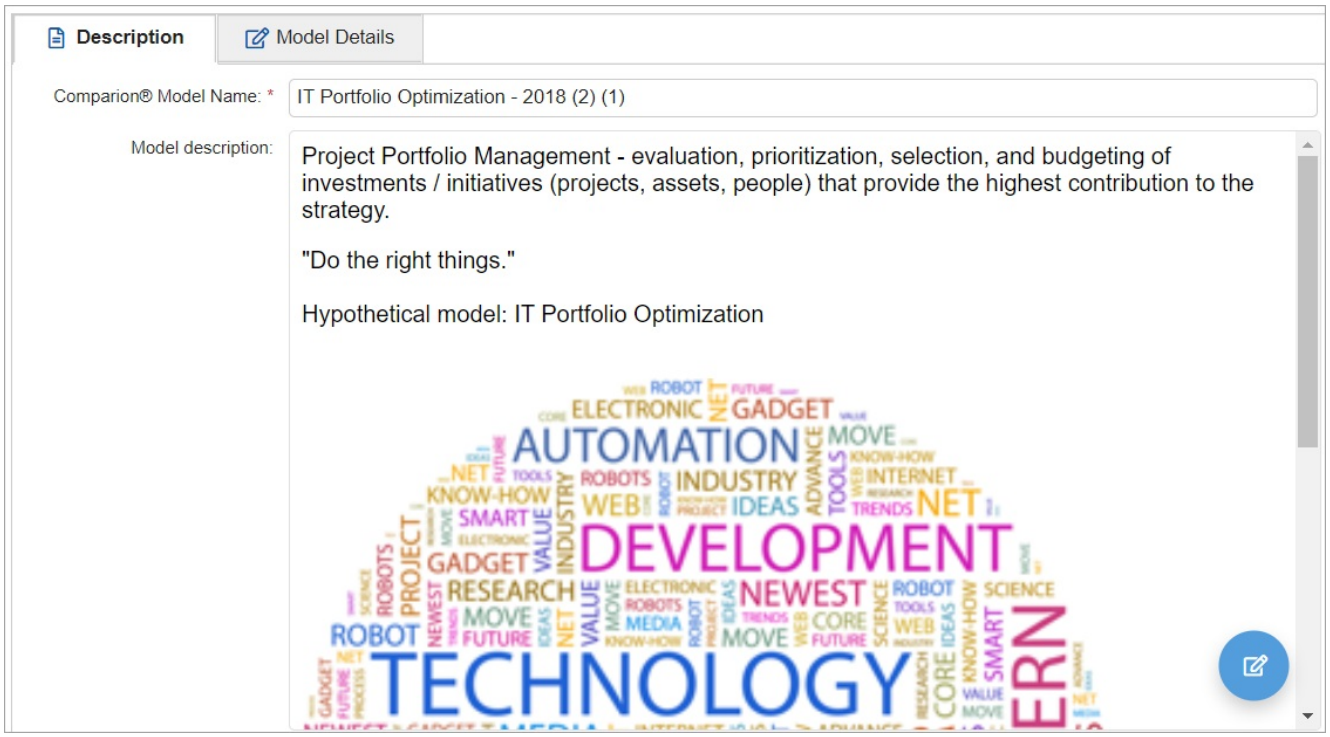
Edit Model Name and Model Description

The **Description** tab allows you to edit the Model Name and the Model Description. This can be found on the **DEFINE MODEL > Description/Details** page.



Click to edit the model description. A rich text editor will be opened where you can add rich texts, images, links, etc.

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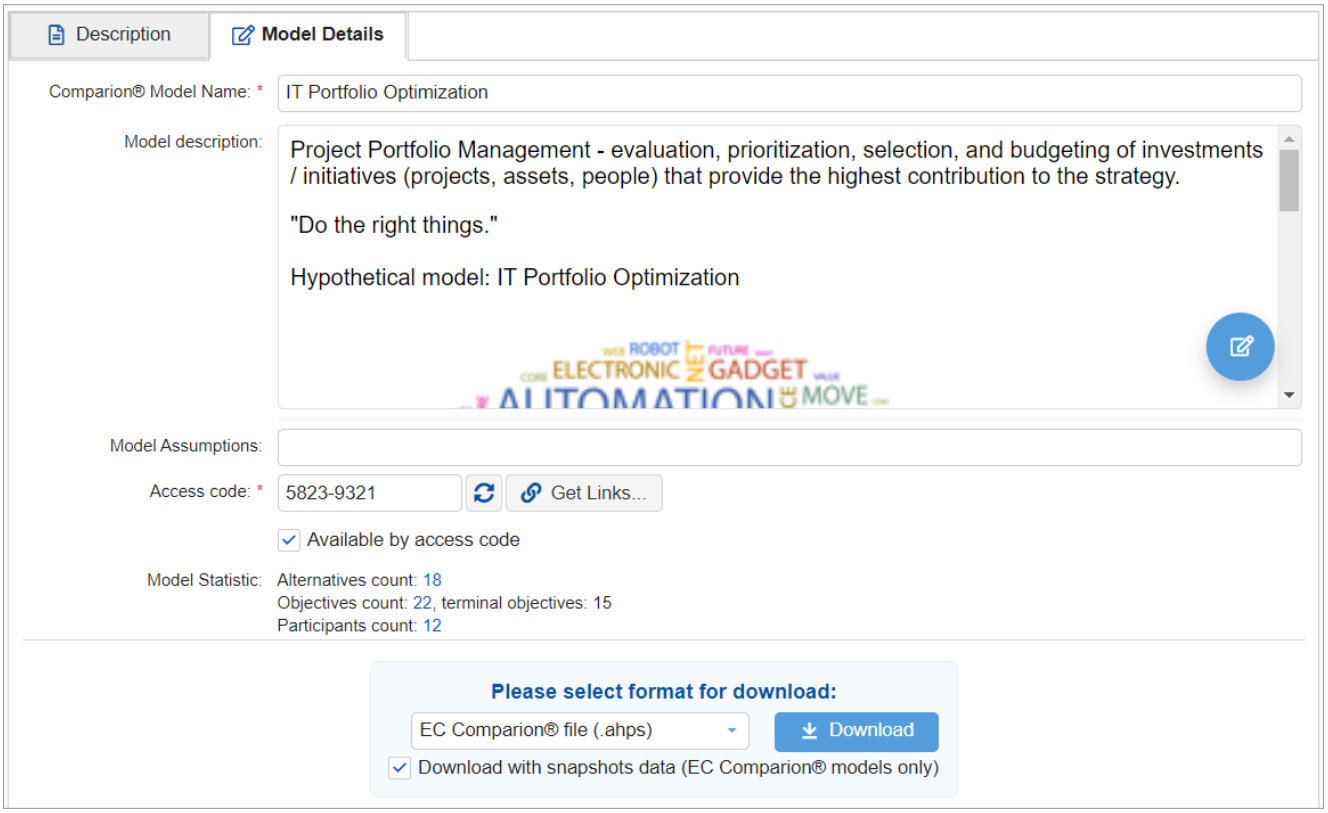
Model Details (Access Code, Get Links, Model Statistic)

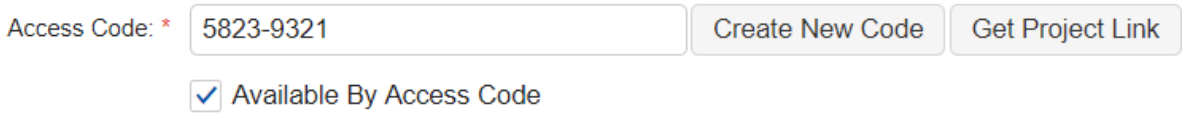
The **Model Details** show the same information as in the Description tab with more details and project settings: Model Acess Code, Links, Model Statistic, and Download. This can be found on the **DEFINE MODEL > Description/Details** page.



Model Access Code

The **model access code** is a unique code that is useful when the evaluators may be unknown beforehand (for example, in a model where participants are not known during the creation of the model), or if the Project Manager does not know the email address of one or more evaluators. In such cases, the Project Manager can enable the use of an access code using the "**Available by Access Code**" checkbox.

When "Available by Access code" is disabled, new users will not be able to join the evaluation using the access code.



You can generate a new access code by clicking . You can also modify the access code from the text box. Creating a new access code is helpful when you want to save a copy of your model and would like to continue collecting input on a new model using the same evaluation link(s) of the original model.

To copy the model link with access code to your clipboard, simply click the "Get Model Link" button.

How to use the access code:

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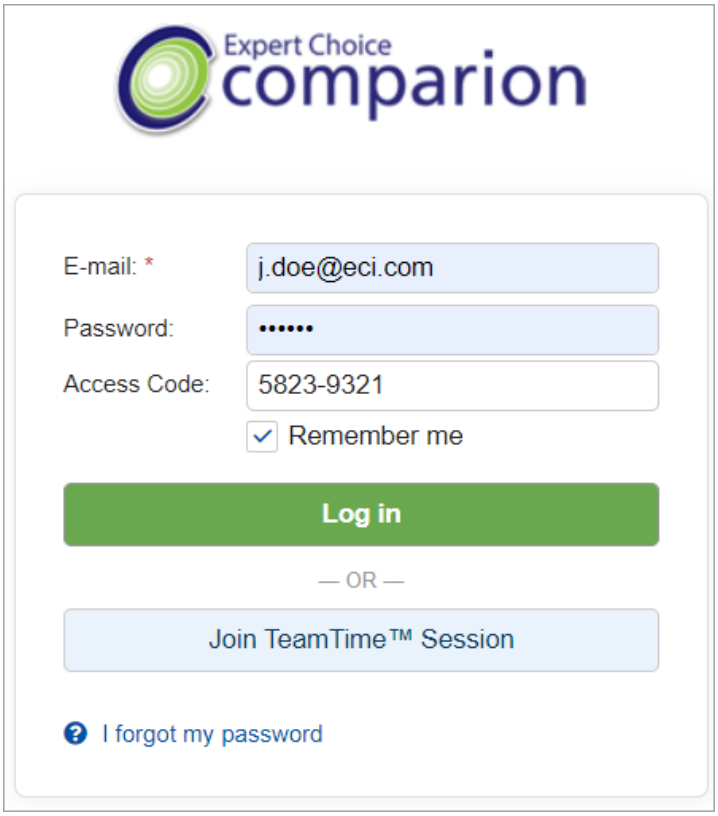
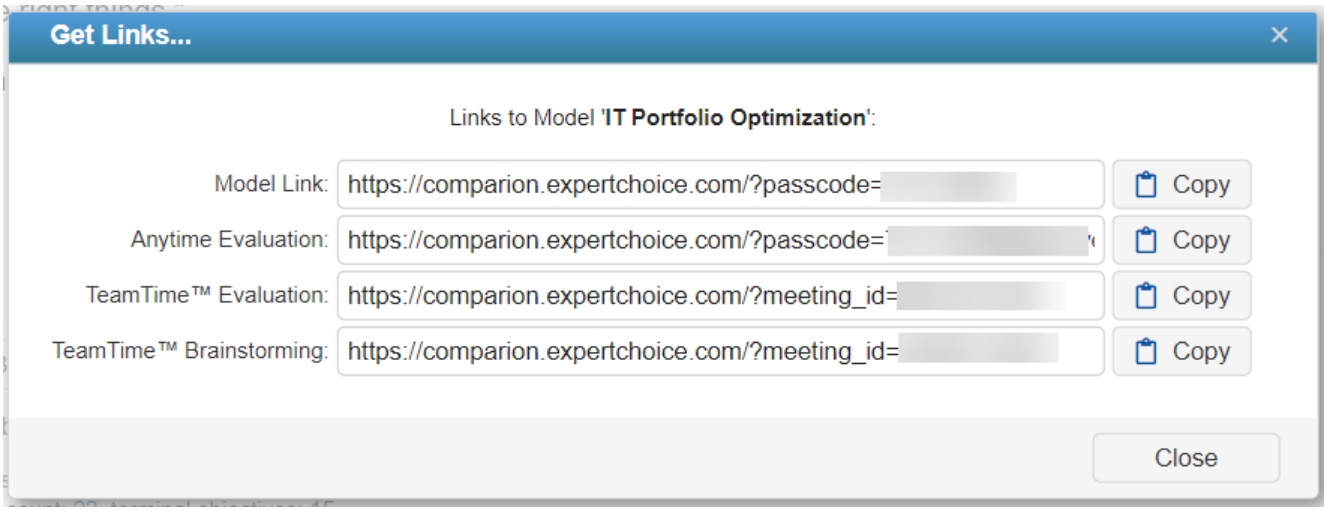
From the Comparion login page, specify email and password, and then enter the access code and click "Log in" (the access code is auto-filled when the Model link is used). Evaluators will be taken directly to evaluation screens where they can begin their evaluation. Project Managers will also open a specific model when using the access code during login.



Get Links

Clicking the Get Links... button will open a dialog box where you can copy the links for the model, Anytime evaluation, TeamTime meeting, and brainstorming.



Model Statistics

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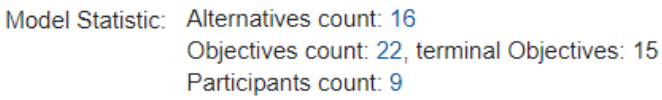
The **Model Statistics** displays the number of objectives, alternatives, participants, and participants with judgments of the model.



Clicking the count will redirect you to the Objectives, Alternatives, and Participants pages.

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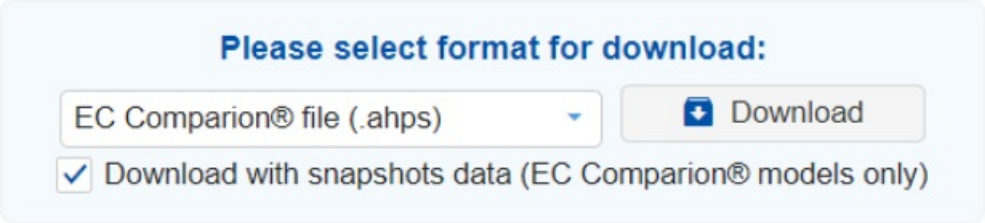
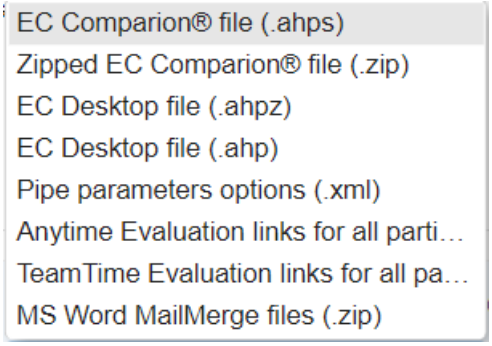
Download Model

The most common use of Download Model is to save a copy of a model locally or in the cloud prior to permanently deleting it from the workgroup. This will allow you to restore it at a later date using New From File.

The Download option is available at the bottom of the **DEFINE MODEL** > **Description/Details >** **Model Details** tab:



Here you can download the model and specific model information:



You can also download one or more models from the Models list page.

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Advanced Mode: Model Timeline

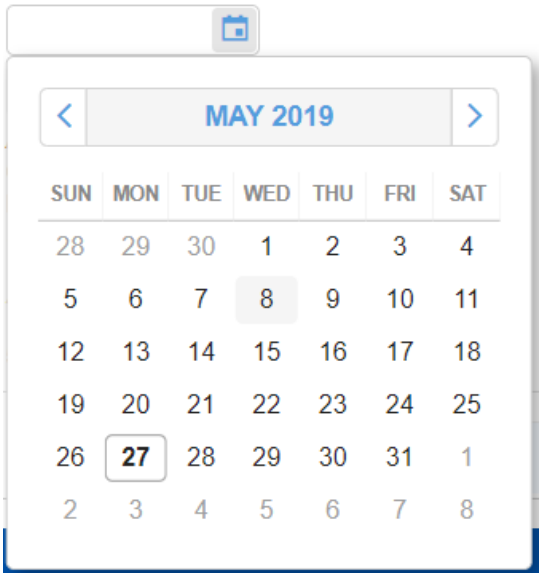
Use the Model Timeline to control the period of time allowed for evaluators to complete their judgments.

When Advanced mode is ON in the **DEFINE MODEL > Description/Details >** Model Details tab, you will see the advanced option:

- **Model Timeline**

The Model Timeline is the evaluation period set by the Project Manager.

Click the calendar icon to open the date picker, then enter or select the begin and end dates for the model:



Alternatively, you can enter the date in the text box in **mm/dd/yyyy** format.

Participants can do their evaluation only on the dates covered by the evaluation period; otherwise, a message that the model is already expired and will no longer accept judgments will be shown on the evaluation page.

Even if a model is online, participants can do their evaluation only on the dates covered by the evaluation period.

If the Project Manager did not set the model timeline, participants can do their evaluation without any date constraints.

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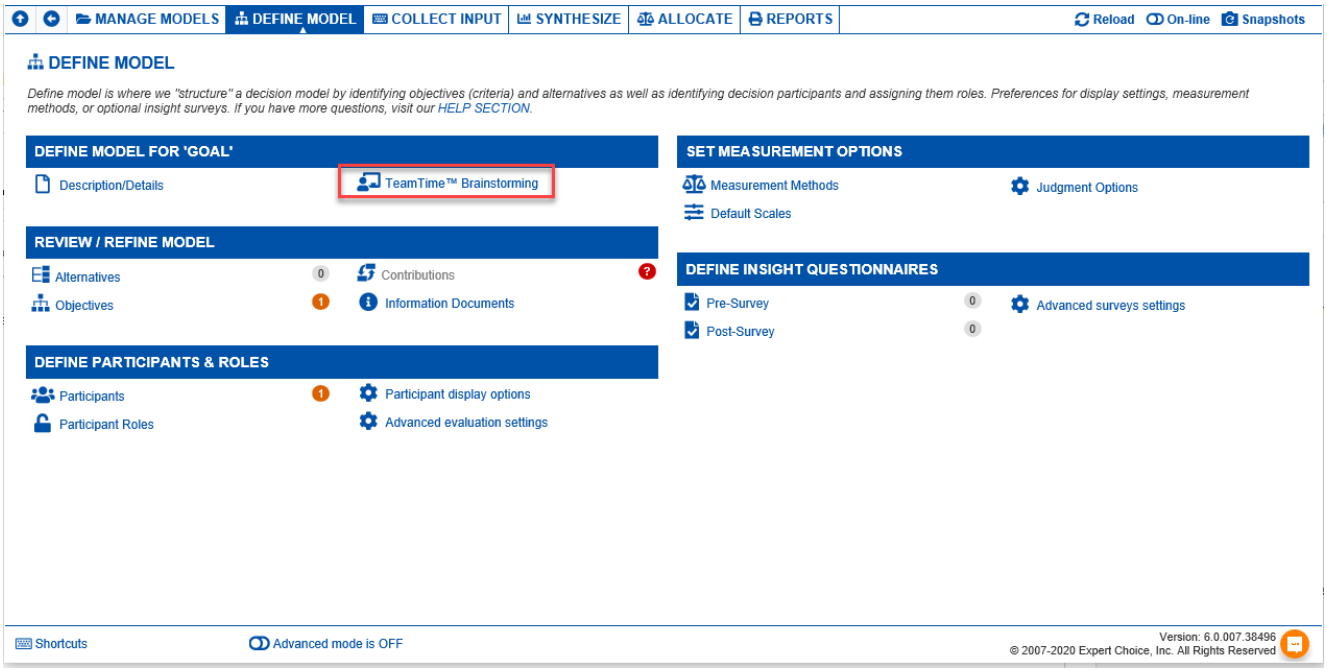
TeamTime Branstorming Overview

Collaboration encourages problem-solving, allows participants to learn from each other, increases productivity, makes problem-solving easier, increases the capacity for change and increases buy-in. With TeamTime Brainstorming, you can collaborate with others in the same room or on the other side of the world.

TeamTime Brainstorming allows the Project Manager to start a Collaborative session to:

1. Structure the Objectives (in top-down or bottom-up approach)
2. Identify the Alternatives
3. Identify the Alternatives Pros and Cons - to justify a decision by showing that all pros and cons were taken into account.
   A second purpose is to help identify objectives, from a bottom-up perspective (1)

TeamTime Brainstorming is launched by the Project Manager from DEFINE MODEL > TeamTime Brainstorming page:



Clicking the TeamTime Brainstorming link will show the page below:

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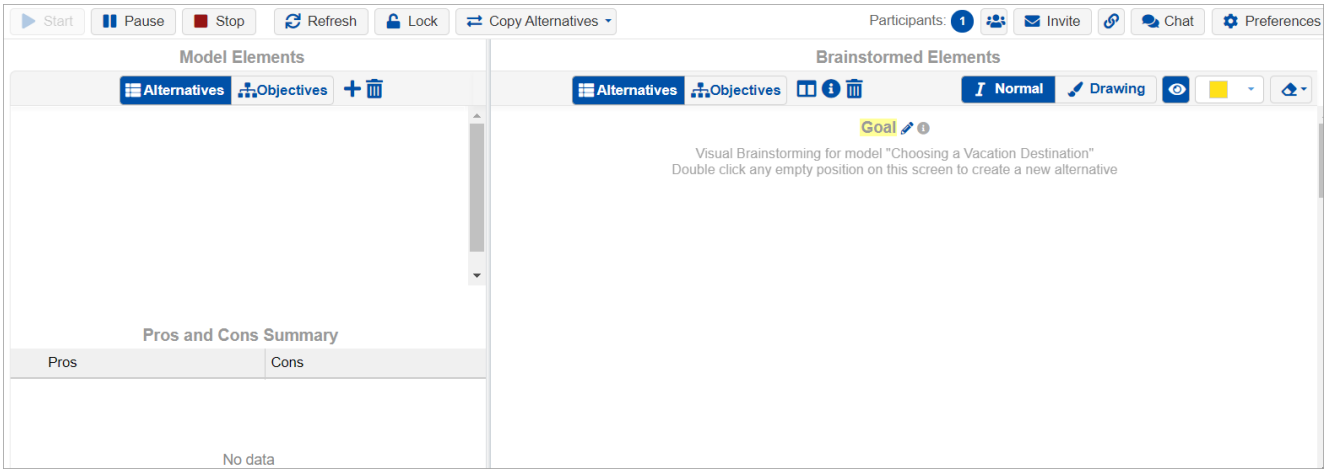
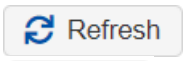
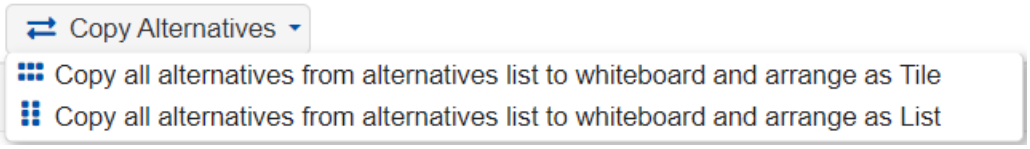


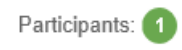
The TeamTime Brainstorming is composed of:

- The **toolbar** displays various options:
  -

Resume, **Pause,** and **Stop** buttons - to resume (when paused), pause, or stop the brainstorming session
  - 

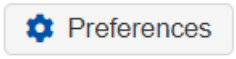
Refresh the meeting
  -

Lock the meeting - only the Project Manager can make changes.
  - 

Copy Alternatives to the whiteboard - when the model has existing alternatives, you can copy the alternatives to the whiteboard and select to arrange them as tiles or as lists.
    - Note: A prompt to copy alternatives to the whiteboard will appear when the Project Manager opens TeamTime Brainstorming.
  - 

Online Participants - displays the number of participants online in the session, including the Project Manager.
  - **Manage Participants** - opens the manage participants dialog box, which lists all participants in the model.
  -

Invite - options to invite participants to the session
  -

Chat - opens the chat box
  - 

Preferences - determine the box sizes, default colors, and titles.
- **Model Elements** (Left Pane) - displays the model's Alternatives OR Objectives, as selected from the Alternatives and Objectives buttons:

  - You can also add or delete elements in the model using the plus and delete buttons.
- **Brainstorming Elements or the White Board** (Right Pane) - is where the brainstorming session takes place to identify the Objectives, Alternatives, and their pros and cons. You can also edit the Goal name and its information documents here.

- **Brainstorming Mode:**

  - **Normal** - default mode where you can modify, add, and edit elements in the whiteboard

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- **Drawing** - freehand drawing in the dashboard.
  - - toggle to hide or show drawing in the whiteboard
  - - select color
  - clear drawing. Note: The clear drawing is only displayed when the drawing is set to stay "Forever" (rather than 15 minutes) in the Preferences.
- **Pros and Cons Summary** - lists the alternatives pros and cons. This is only displayed when the " **Alternatives**" list is activ from the left pane.

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TeamTime Structuring Objectives (Top-down)

Access TeamTime Structuring for Objectives by selecting DEFINE MODEL > **TeamTime Brainstorming**.

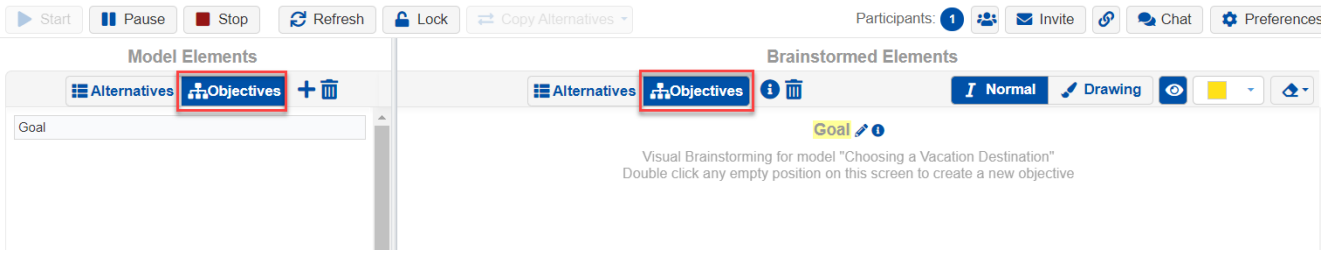
There are two typical ways to use Structuring Objectives as referred to as **Top-Down** and Bottom-Up**.**

Top-Down begins with the identification of the objectives and is best suited for strategic thinking. The **Bottom-Up** approach is however, often easier to understand for many people, especially the first time they participate in a structuring exercise, and we will illustrate this first. Regardless of whether you start top-down or bottom-up, iterating between the two approaches is always recommended.

Top-down Structuring

Top-down structuring begins by identifying and adding objectives, sub-objectives, and so on to the Objectives screen.

To structure in a top-down approach, make sure that the **Objectives** tab is active on both the Model and whiteboard:



You can add, edit, and reposition objectives by clicking on the whiteboard at the right.

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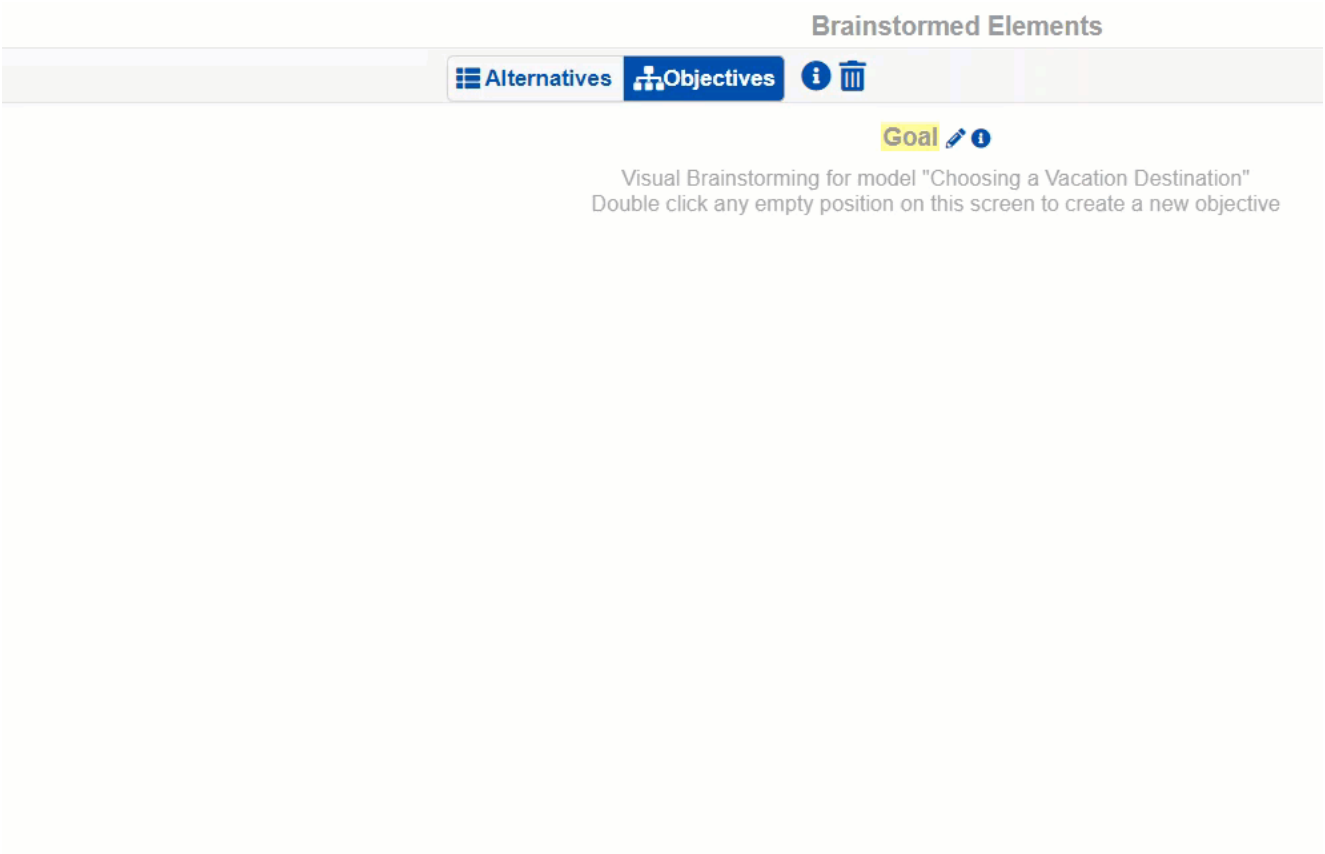
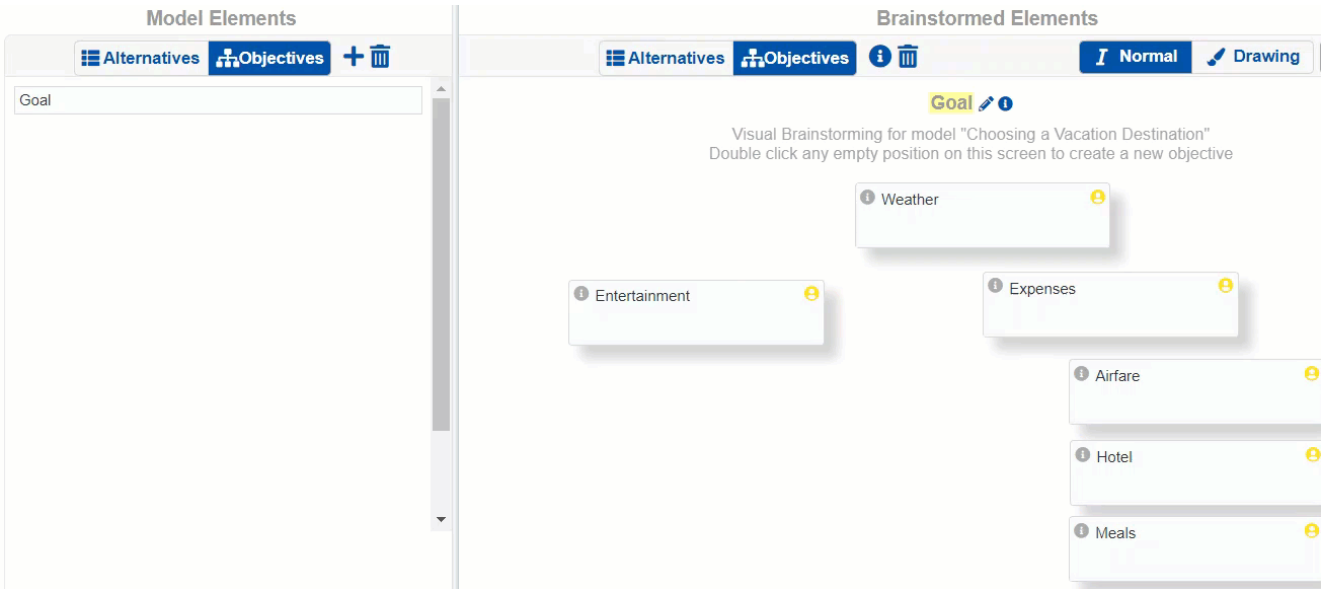


Objectives from the whiteboard can then be dragged and dropped into the Model's objectives hierarchy at the left pane. Objectives are added below the GOAL node.

Below, we added **Entertainment**, **Weather,** and **Expenses** under the GOAL node.



You can add an objective to the same level as the existing objectives on the left pane and position it either at the top or below

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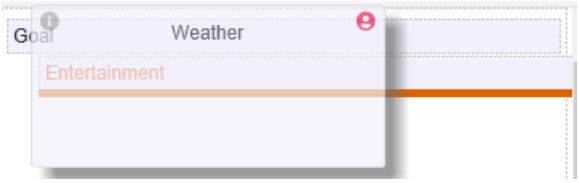
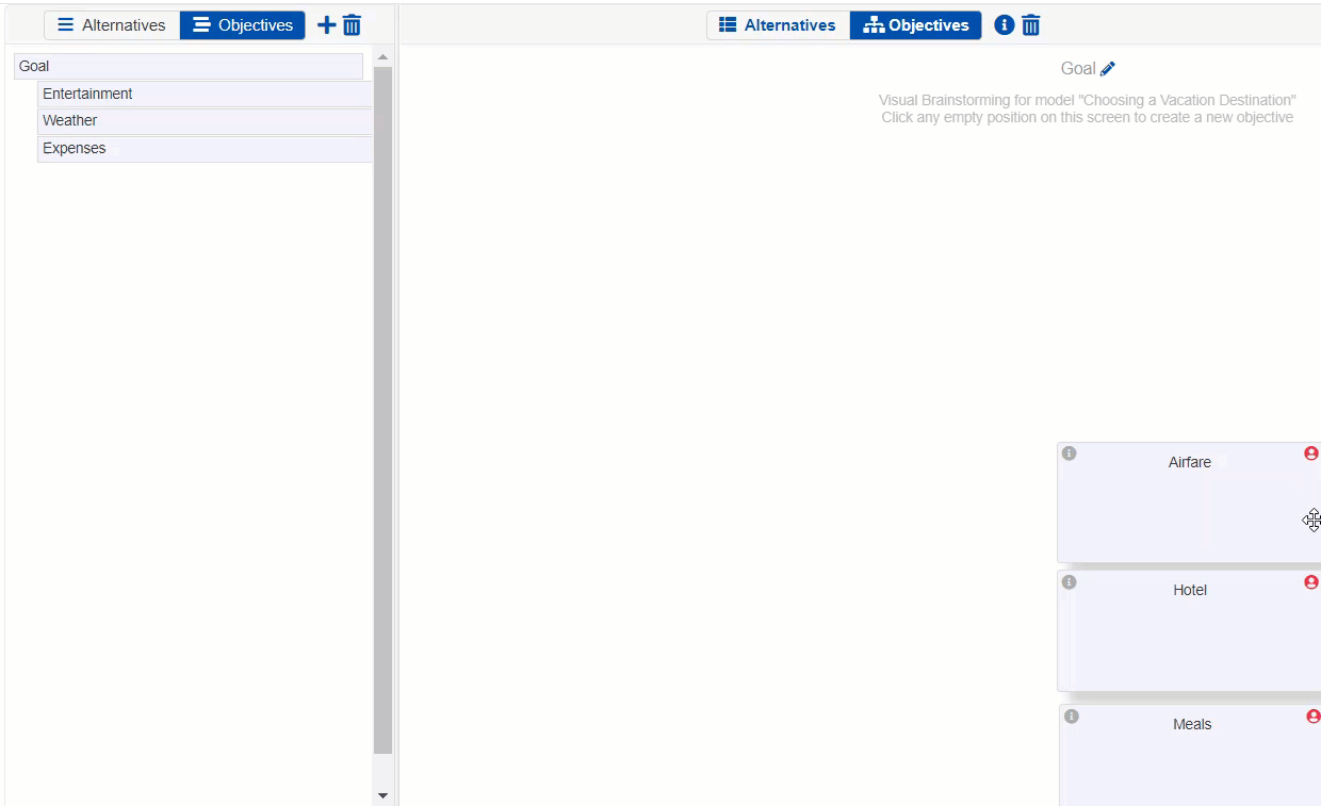
it. From our example, when dragging the "Weather" box to the left pane, we position it below Entertainment -- the orange line indicates that the Weather objective being dragged will be positioned below Entertainment.



You can also position Weather above Entertainment by moving the pointer a little higher until you see the orange line above Entertainment.

You can also drag and drop an objective as a sub-objective of another objective to create a hierarchy of objectives.

Below we will add sub-objectives for the objective "Expenses":



The orange box on Airfare indicates that "Airfare" will be added as a sub-objective of "Expenses":

You can add Objectives directly to the model by clicking the plus icon:

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Click the delete button to delete all the objectives in the model.

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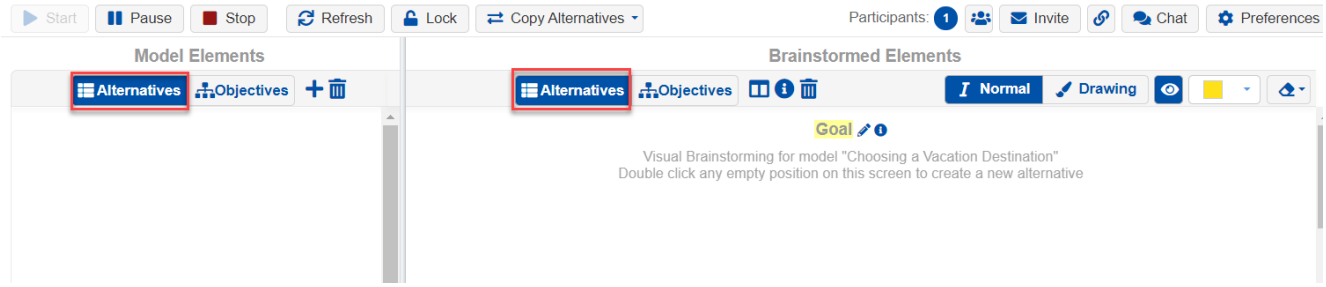
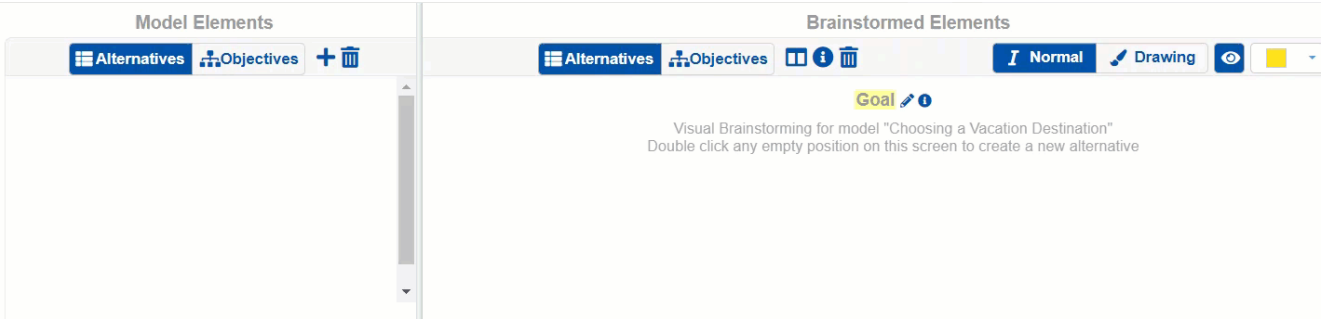
TeamTime Alternatives Brainstorming

TeamTime Brainstorming for Alternatives can be done in DEFINE MODEL > **TeamTime Brainstorming**.

To brainstorm alternatives, make sure that Alternatives is active on the whiteboard:



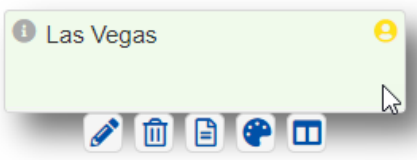
Click on the whiteboard to enter an alternative, such as Las Vegas. Repeat for other alternatives. Alternatives can be moved around the screen as desired.



The icon at the top left of the alternatives indicates the information document. It is gray when the information document is empty and turns blue when it has content. Clicking the icon will open the rich text editor where you can add texts, images, links, etc. When an information document is not empty, clicking the i icon will display the context in a tooltip.

Hovering the colored icon at the top right of the alternative box will show who added the alternative.

If you hover an alternative, you will see options below:



These options are also accessible when you right-click on an alternative, with "Move to Objectives" in addition:

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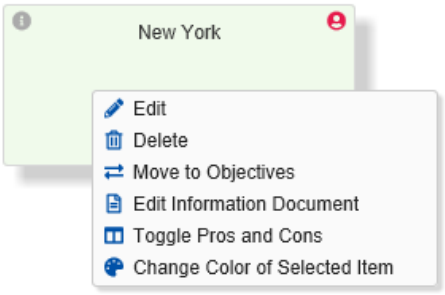
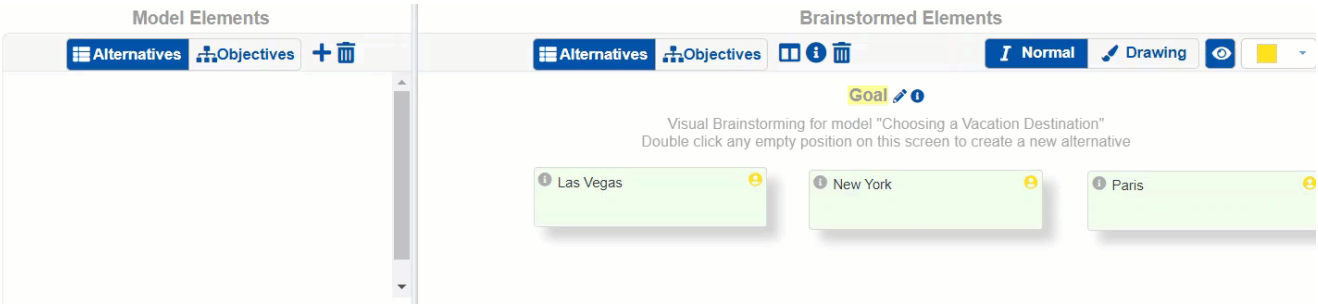
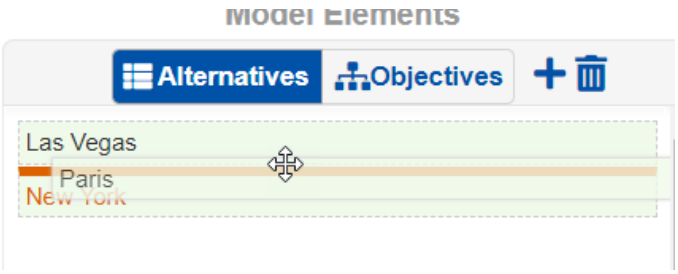


After discussing and agreeing on the alternatives, drag those that are considered "feasible" to the Alternatives pane at the left:



You can reorder the alternatives at the left pane by dragging and dropping. An orange line will appear as a guide:



In addition to adding alternatives to the alternatives list by dragging from the whiteboard, you can also add alternatives directly to the model by pressing the + button on the left pane.

Click the delete button on the left pane to delete all the alternatives in the model.

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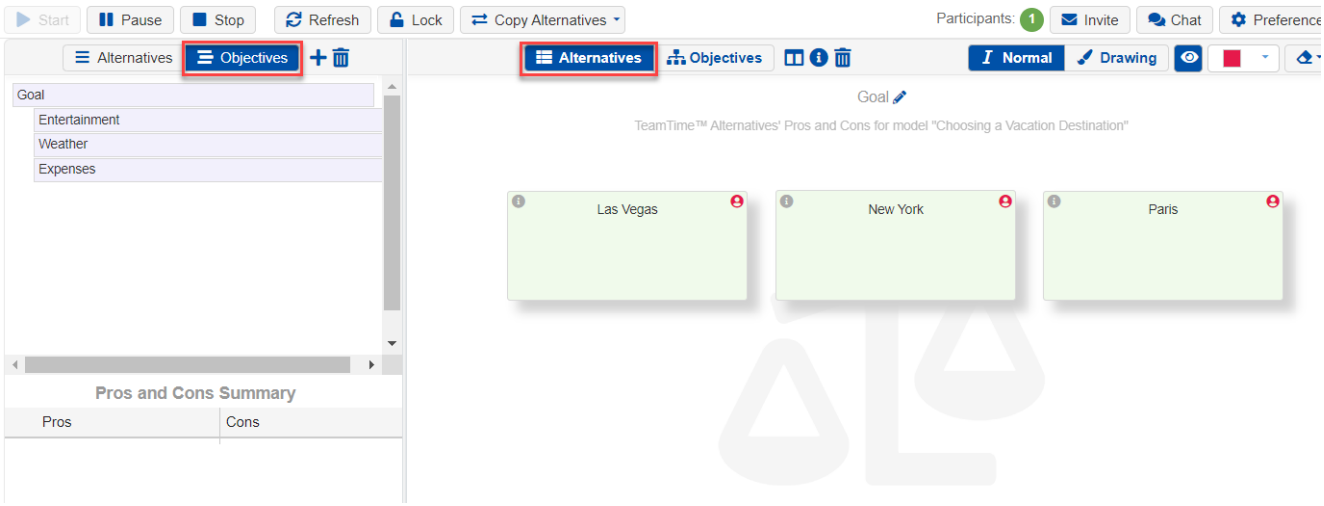
Structuring with Pros and Cons (Bottom-up)

Pros and cons for alternatives can be added to the whiteboard (right-hand panel). Pros and cons are optional and serve two purposes. One is for documentation -- to justify a decision by showing that all pros and cons were taken into account. Another important purpose is to help identify objectives that otherwise may have been missed.

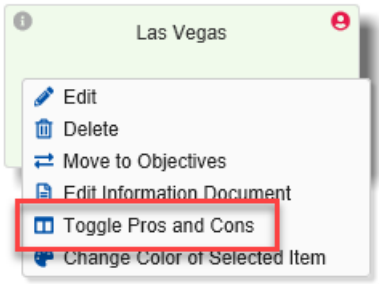
TeamTime Structuring with Pros and Cons can be done in DEFINE MODEL > **TeamTime Brainstorming**.

Bottom-Up Structuring

To begin the process of identifying objectives from the pros and cons of the alternatives, make sure that Alternatives is active on the whiteboard, and the Objectives tab is active in the left panel:



Right-click an alternative to see an option to display a pad for entering pros and cons:



When you click on this option, you will be able to enter the pros and cons of the alternative. The added pros and cons will be listed in the Pros and Cons Summary on the left pane:

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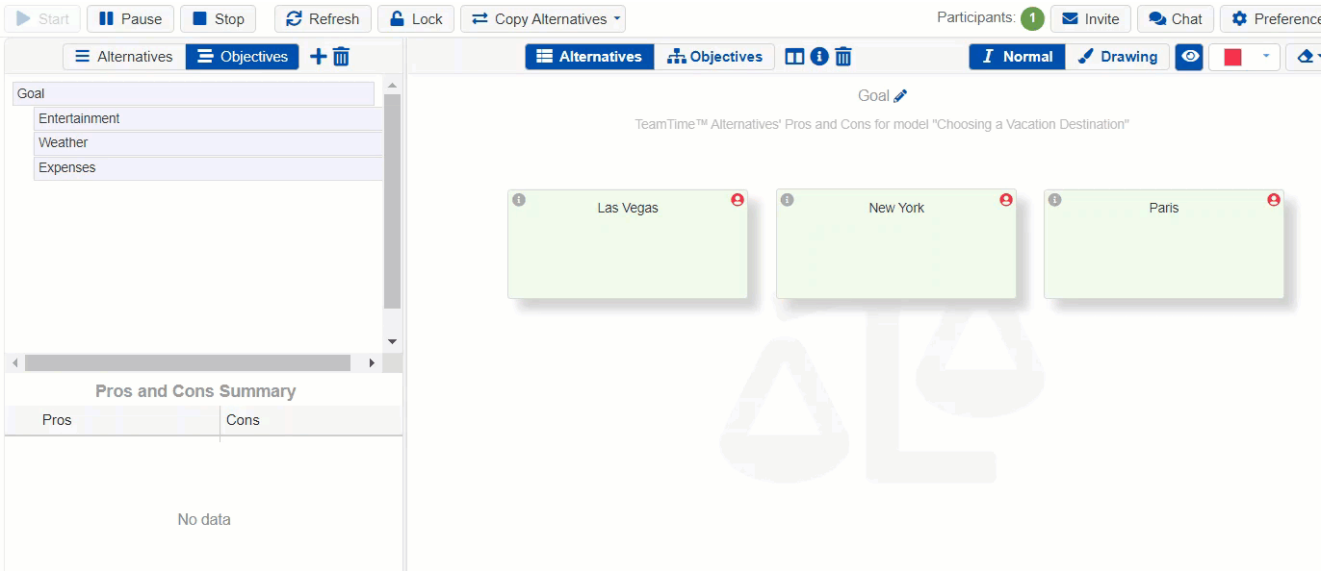
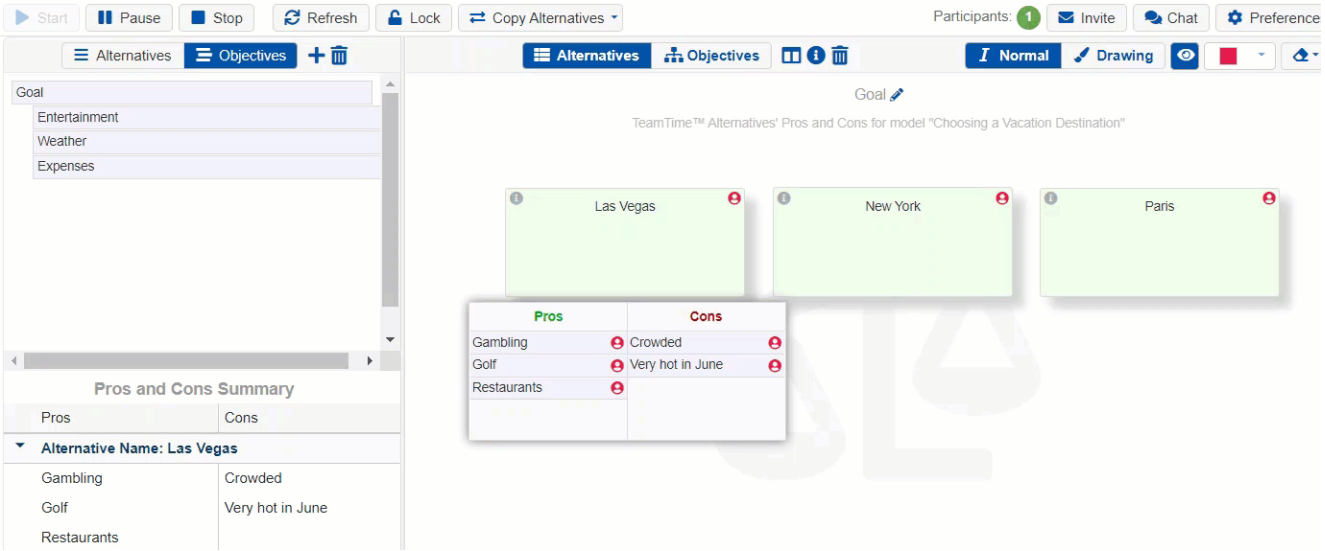


You can move the alternative nodes around on the screen;

You can show or hide the pros and cons of all alternatives by clicking

Pros and cons can be dragged and dropped from the pro/con windows of any alternative to the objectives hierarchy at the top left of the screen. Doing so will cause a dialog box to appear in which you can edit the pro or con name or change it so that it reflects an "objective." For example, when dragging Gambling into the objectives hierarchy, you might call the objective "Entertainment." However, if gambling itself is one of your objectives, you can leave it as "Gambling."

Each time you drag a pro or con to the objectives hierarchy, it will have a checkmark to indicate that you have already considered it. That doesn't mean you can't drag it again.



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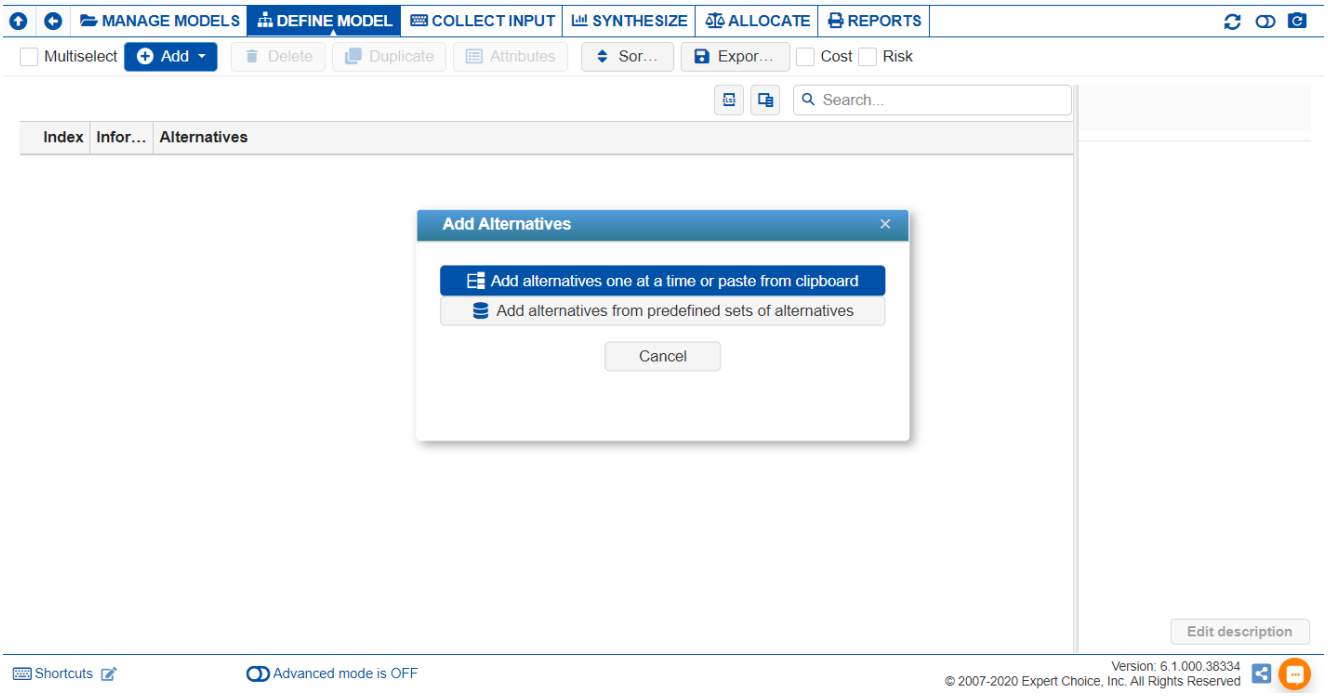
Add, Edit and Delete Alternatives

In a decision model, where one alternative is selected, alternatives represent possible courses of action. In a PPM (project portfolio management) model, alternatives represent candidate projects for funding and execution.

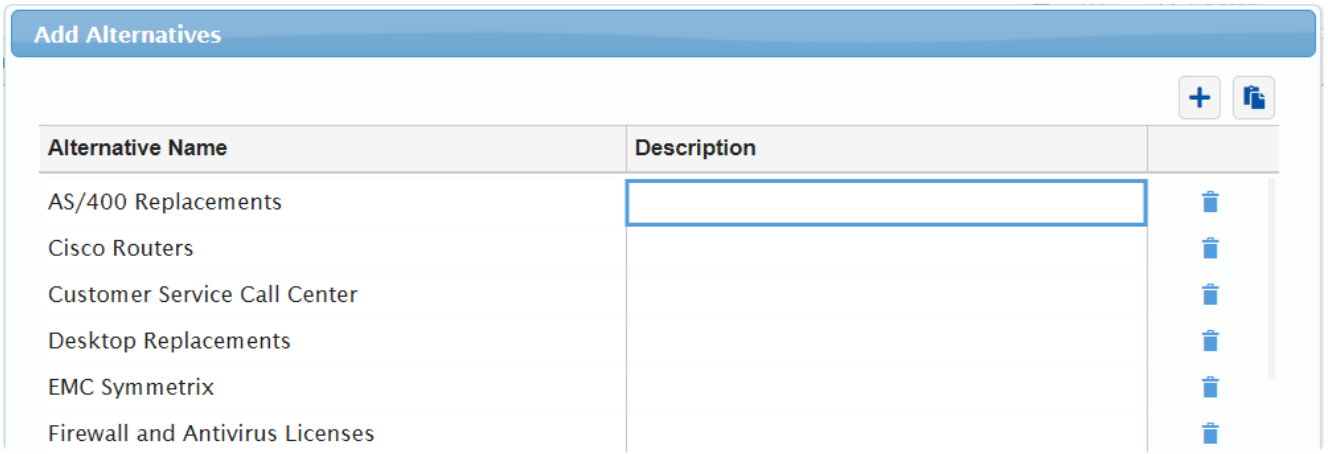
Alternatives can be viewed, added, edited, deleted, sorted, and exported to the clipboard from **DEFINE MODEL > Review/Refine Model > Alternatives** screen.

Add Alternatives

When the alternatives list is empty, the **Add Alternatives** and **Add from predefined sets of Alternatives** buttons are displayed.



Clicking **Add alternatives one at a time or paste from clipboard** will display a dialog box:



Here you can either:

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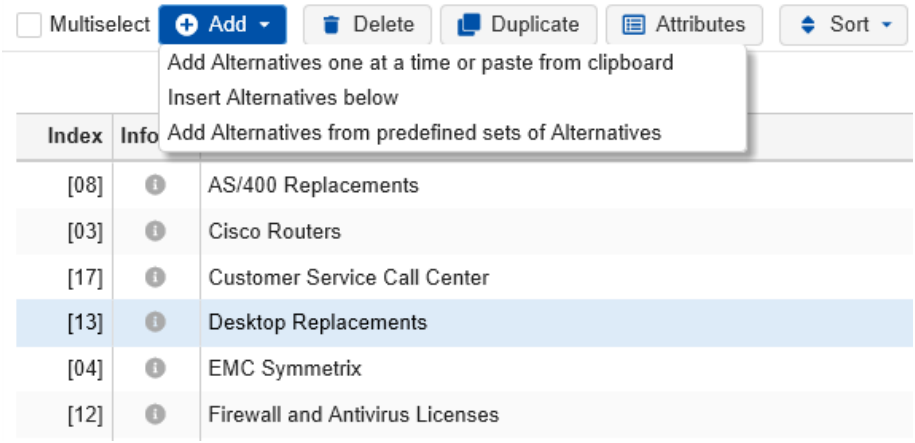
a) enter one or more elements, along with brief descriptions (a simple form of an information document which you can modify later using the Edit description or i buttons).

b) The **Paste from Clipboard** button will paste elements that have been previously placed on the clipboard into the hierarchy. These elements can be placed on the clipboard in a variety of ways:

1. By copying from adjacent rows or columns in an Excel spreadsheet
2. By copying from adjacent rows or columns in a Word document
3. By copying from a tab-delimited text file, where the tab is used to separate the element name from the element description.

If you have existing alternatives, you can position to one of the alternatives and then click Add > **Insert Alternatives Below** to have them appear below the alternative currently selected.



Add Alternatives from predefined sets of Alternatives

Alternatives can also be added from **predefined sets of Alternatives.** This is determined by the site administrator.

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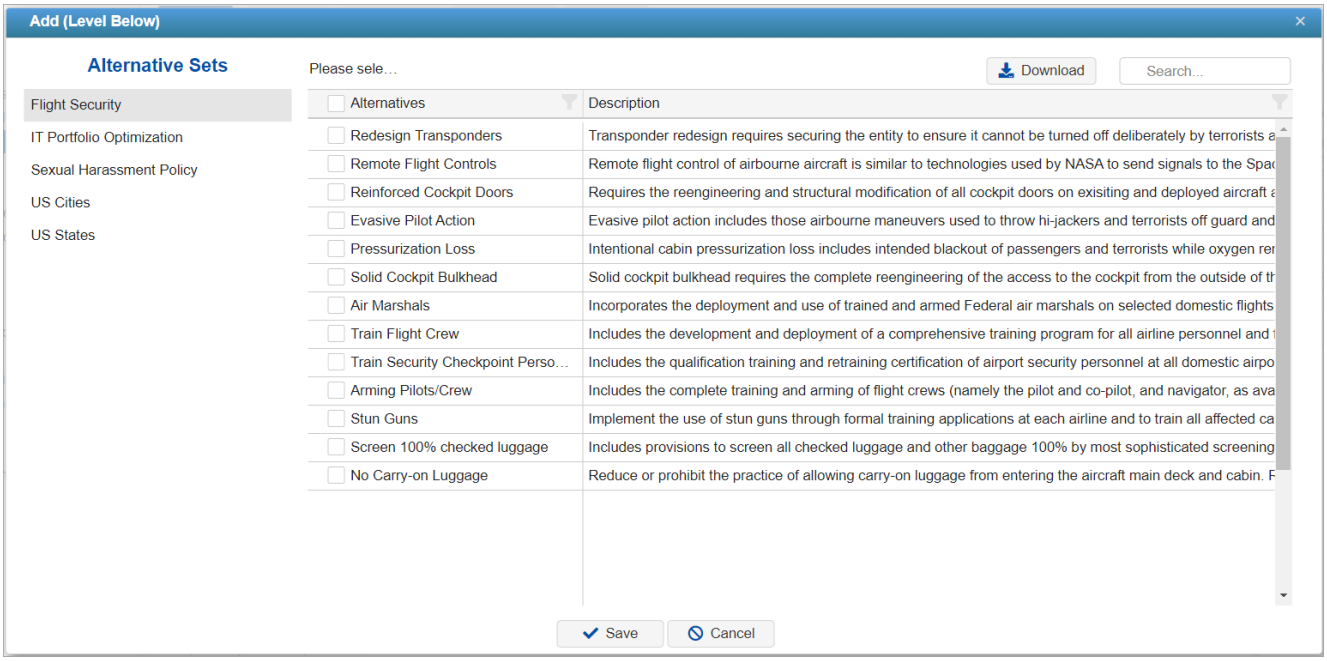

Simply select from the alternative sets at the left and then check the alternatives that you want to add to the model.

Alternatively, you can also create new models from Model Templates which has predefined objectives and alternatives.

Add Alternatives from Datagrid

In addition to adding Alternatives from the Alternatives page, you can upload a .xlsx file with the list of Alternatives to the Datagrid (Collect Input > DataGrid)

See the video below to demonstrate the two ways of adding the alternatives:

Your browser does not support HTML5 video.

Delete Alternatives

Alternatives can be **deleted** one at a time, or, by checking the events to delete, **several at one time**.

HINT: It is advisable to **save a copy of the model** before deleting many elements, in case you want to save a copy of your model before the deletion. However, if saving a copy of the model is not desired and you want to undo some changes, you can use the **Model Snapshots** feature to revert the model to what it was before the changes.

Change Alternatives Color

You can change the Alternatives Color from the DEFINE MODEL >Alternatives page:

1. Click the column chooser

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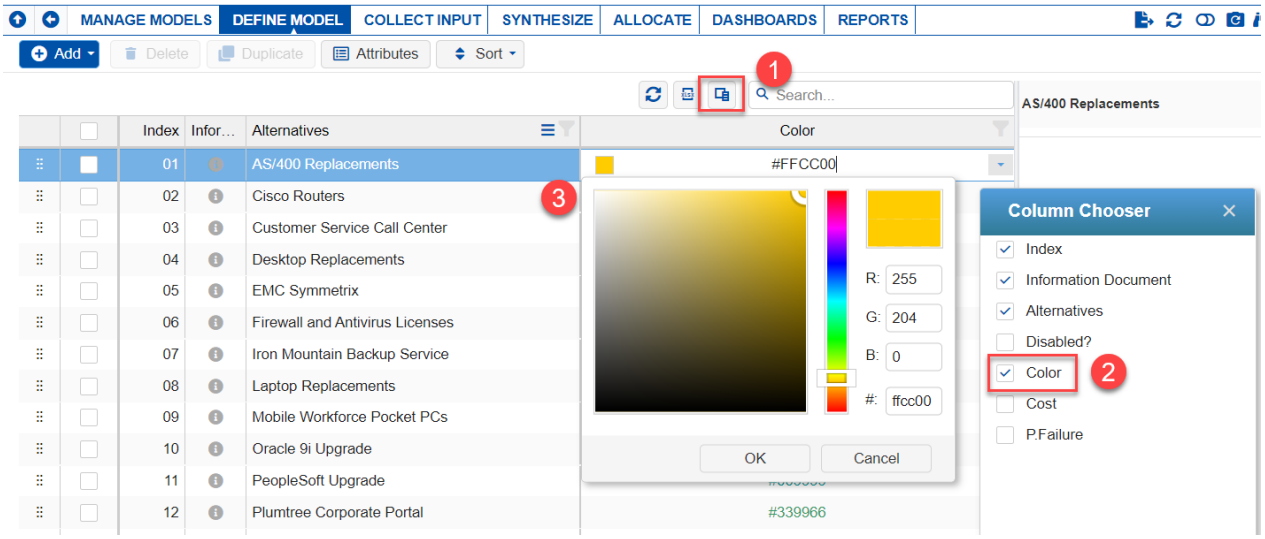
2. Select "Colors" to show the Colors column
3. Type in the HEX color code on the cell or use the color picker for each alternative



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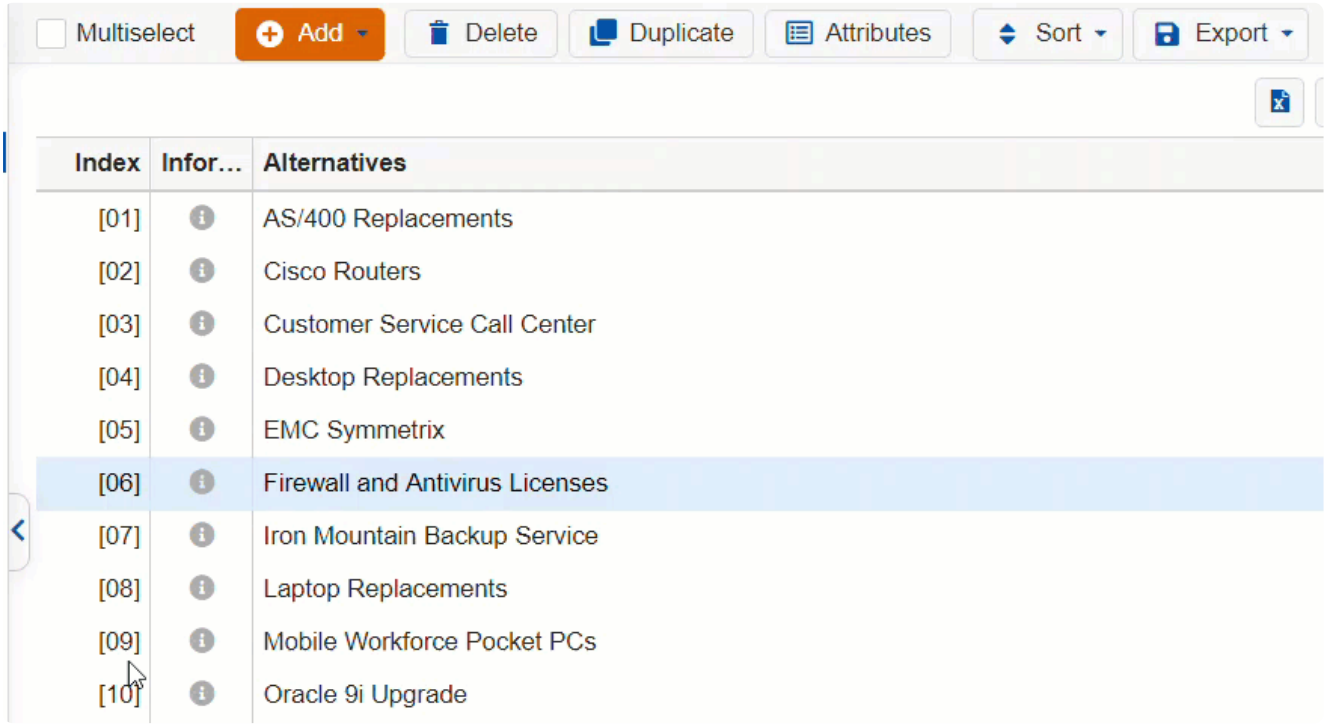
Sort (Re-order) Alternatives

Alternatives can be sorted:

1. **Permanently** where the order will be saved and applied throughout the application; OR
2. **Temporarily** where the sorting is only on the Alternatives screen and can be reset.

Sorting, which can be saved in the model, is done by dragging and dropping an element to the desired position in the list; or by using the **Sort** button where you can sort the elements in the list by name or priority, ascending or descending, as shown below:



Sorting done by clicking the column name on the Alternatives Grid is only temporary and can be reset using the reset button:

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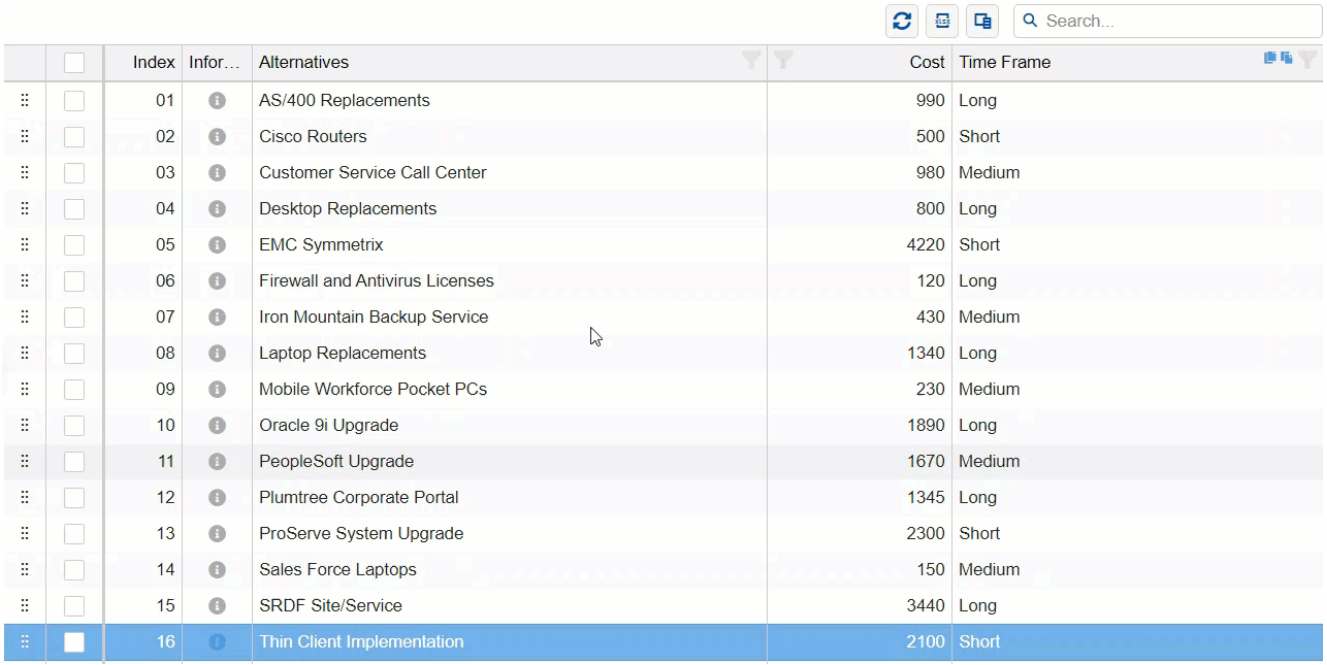

Index	Infor…	Alternatives	Cost	Time Frame
01		AS/400 Replacements	990	Long
02		Cisco Routers	500	Short
03		Customer Service Call Center	980	Medium
04		Desktop Replacements	800	Long
05		EMC Symmetrix	4220	Short
06		Firewall and Antivirus Licenses	120	Long
07		Iron Mountain Backup Service	430	Medium
08		Laptop Replacements	1340	Long
09		Mobile Workforce Pocket PCs	230	Medium
10		Oracle 9i Upgrade	1890	Long
11		PeopleSoft Upgrade	1670	Medium
12		Plumtree Corporate Portal	1345	Long
13		ProServe System Upgrade	2300	Short
14		Sales Force Laptops	150	Medium
15		SRDF Site/Service	3440	Long
16		Thin Client Implementation	2100	Short

Note: Sorting by drag-and-drop is not available when the grid is sorted by column.

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Categorical and Non-categorical Alternative Attributes

Alternatives Attributes can be managed in the **DEFINE MODEL > Review / Refine Model, Alternatives** page.

Alternative attributes allow you to specify text, numeric, Boolean, or **categorical** attributes for Alternatives.

Attributes for alternatives can be specified and used for various purposes, such as filtering the alternatives in the Synthesize results and constraining the solution or managing balance and coverage in portfolio optimization.

Click Attributes to manage alternative attributes.

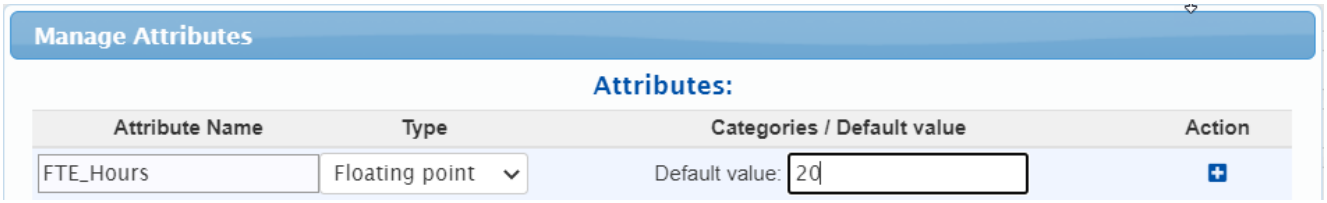
Non-categorical Attributes

You can add non-categorical attributes of type String, Boolean, or Floating point.

Clicking the Attributes button will open the Manage Attributes dialog box as shown below, which lists the alternative attributes in the model.

Here we will enter the Attribute Name, then select the attribute type and (optional) default value. Non-categorical attributes can be String, Floating Point, Integer, and Boolean.

From the example below, we will add an attribute named "FTE_Hours" as a Floating point with a default value 20.



Press the Enter key or click to save. The added attribute is displayed as a row in the Manage Attributes grid shown below. A new row will also be displayed where you can add another attribute.

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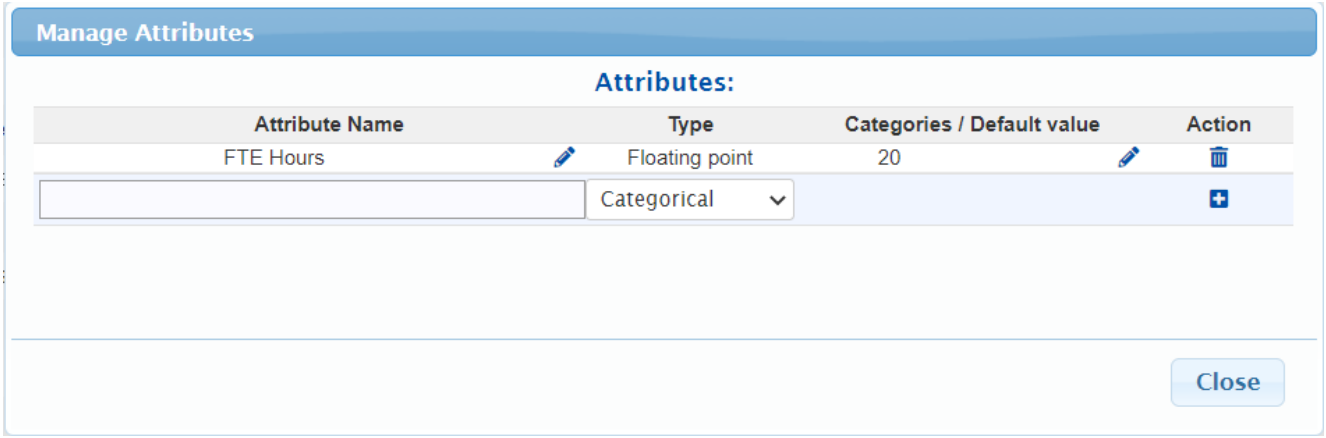
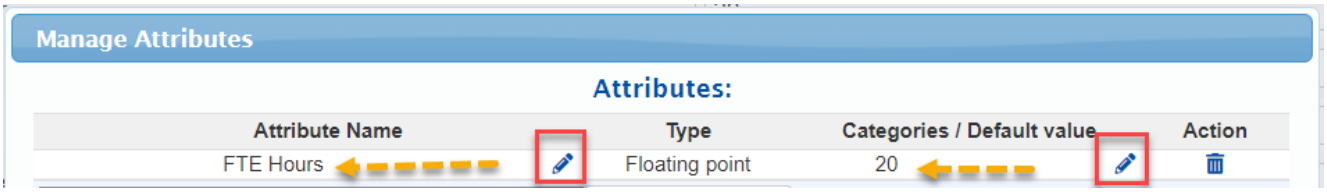


You can edit the added (or existing) non-categorical attribute and its default value by clicking the pencil icon to the right of the element you want to modify.



You can delete an attribute by clicking the delete button.

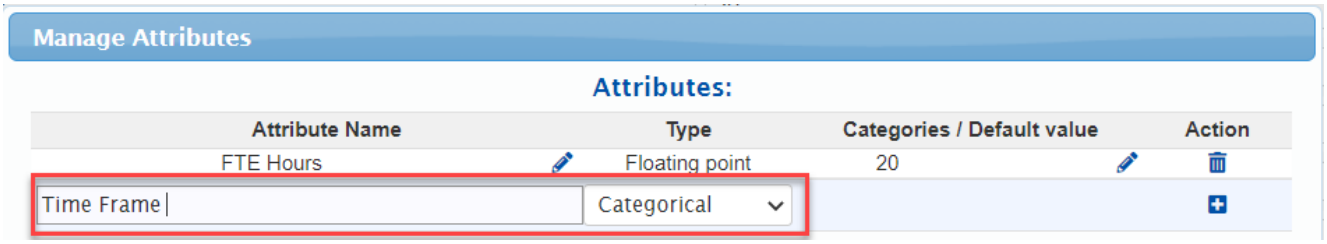
The added attribute is also displayed as a new column in the Alternatives grid. You can change the attribute value for each alternative by clicking on a cell for a given alternative and typing in the desired value.

Index	Information...	Alternatives	FTE_Hours
#01		01. Cloud Migration (Vendor selected in separate model)	20
#02		02. Cisco Routers	20
#03		03. Desktop Replacements	20
#04		04. EMC VMAX Enterprise Storage	20

Categorical Attributes

You can add categorical attributes by clicking the same Attributes button, which will open the manage attributes dialog box.

Enter the attribute name (Time Frame) and select "Categorical."



Pressing Enter or clicking the button will save the attribute and will open another dialog box where you can add the categories (e.g. Long, Medium, Short).

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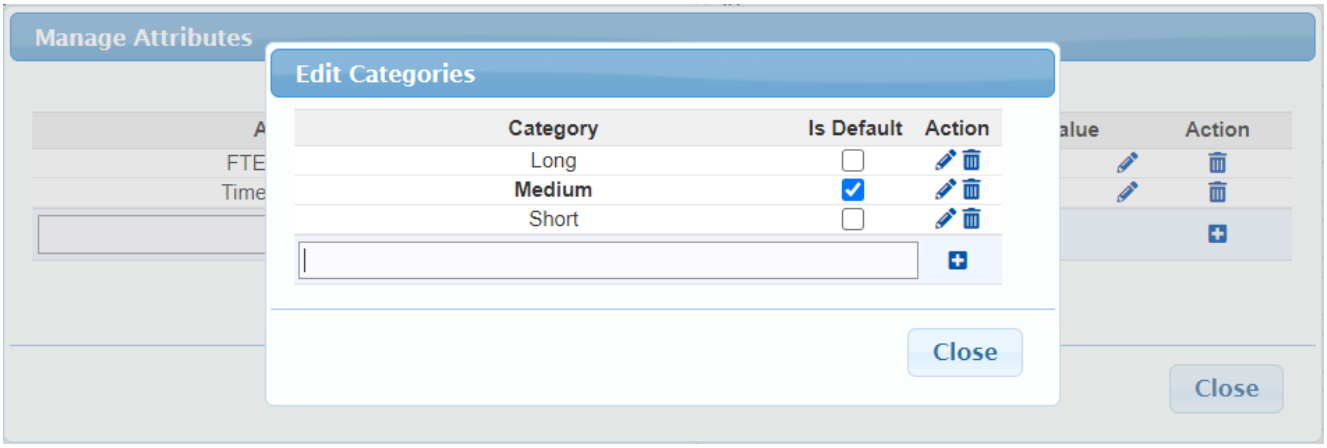
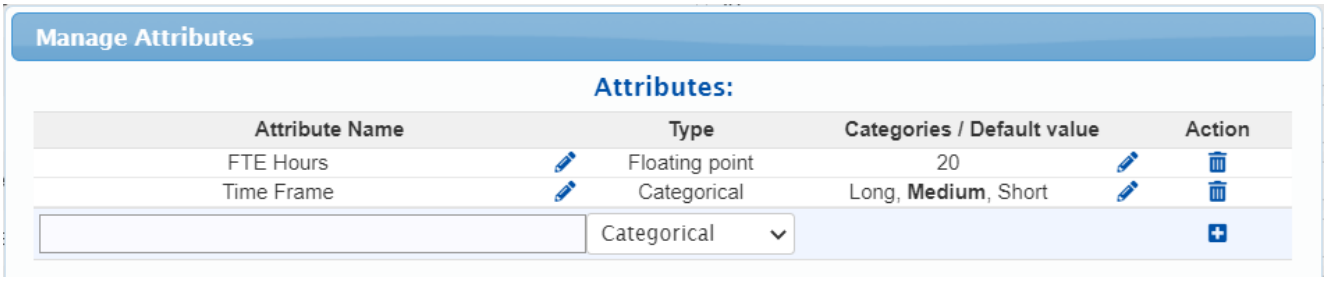
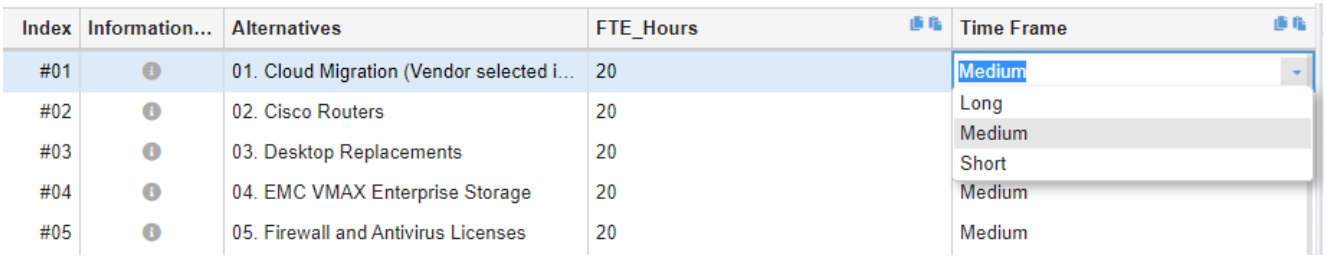


Check the "Is default" check box to specify a default category code for that category.

The added attribute is displayed as a row in the Manage Attributes dialog box as shown below. You can edit the attribute name and the categories by clicking the pencil icon to the right of the attribute name and the categories.

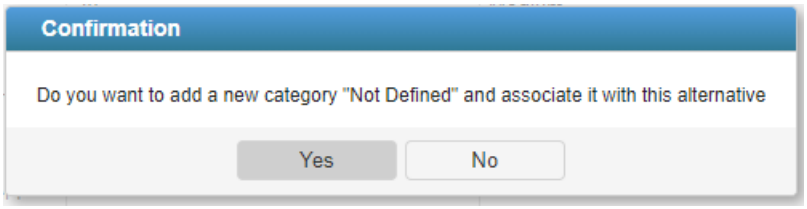


The added category is also displayed as a new column in the Alternatives grid. To assign a category to alternatives, select from the drop-down menu:



You can also add a new category and assign it to an alternative by typing the category name in the combo box and then pressing the enter key.

A confirmation prompt will appear, as shown below. Click Yes.



You can use alternative attributes to filter the Alternatives Grid, Alternatives Chart, Dynamic, Performance Analysis, Gradient,

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2D and Head-to-head sensitivities.

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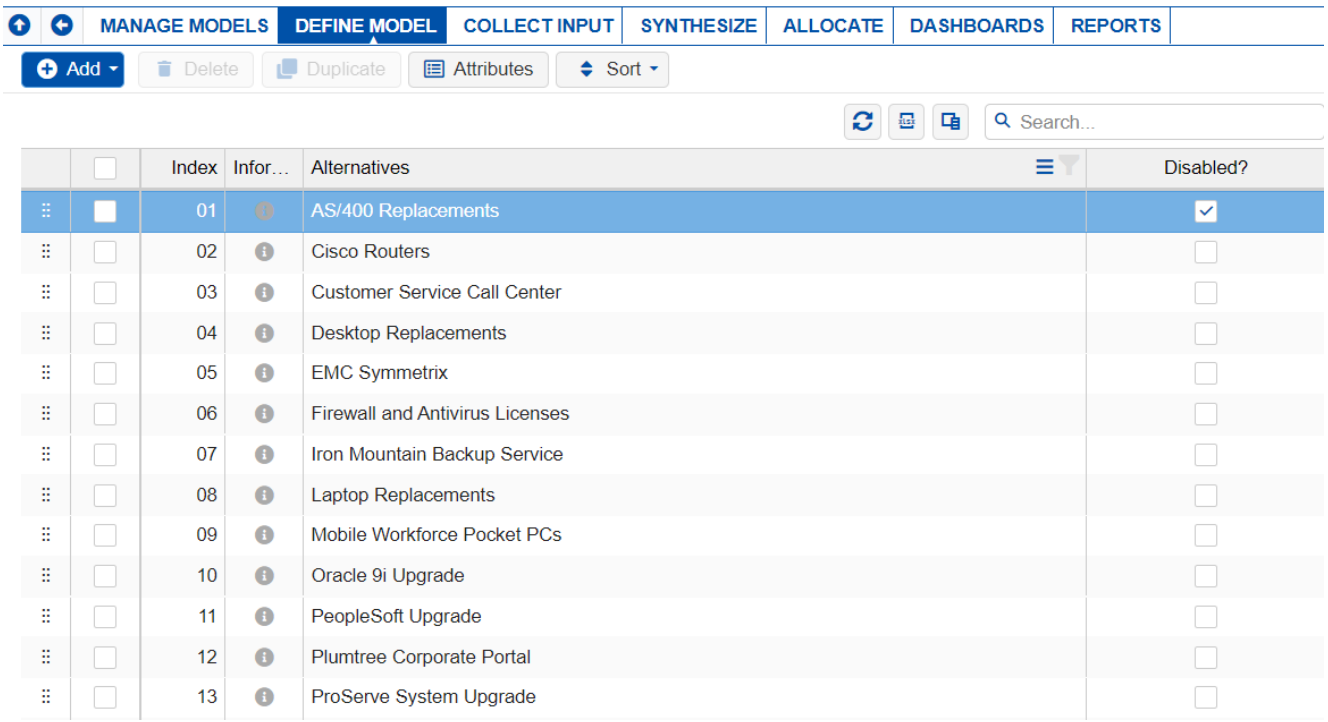
Disable Alternatives

You might want to hide an alternative instead of deleting it. A hidden alternative can be un-hidden. But the ability to restore a deleted alternative is limited. (You may be able to restore deleted alternatives using manual or automatic snapshots, but this is most effective when used immediately after deleting the alternative.)

The Project Manager can disable alternatives from the **DEFINE MODEL > Review/Refine Model > Alternatives** page:



On the "Disabled?" column, check the corresponding checkbox(es) for the alternative(s) you want to disable.

Note: If you cannot see the "Disabled?" column, use the column chooser to show the column.

Disabled alternatives will be excluded from the Evaluation. Any judgments made prior to disabling the alternatives will also be excluded from the calculation of the results.

Note: No judgments will be deleted when an alternative is disabled.

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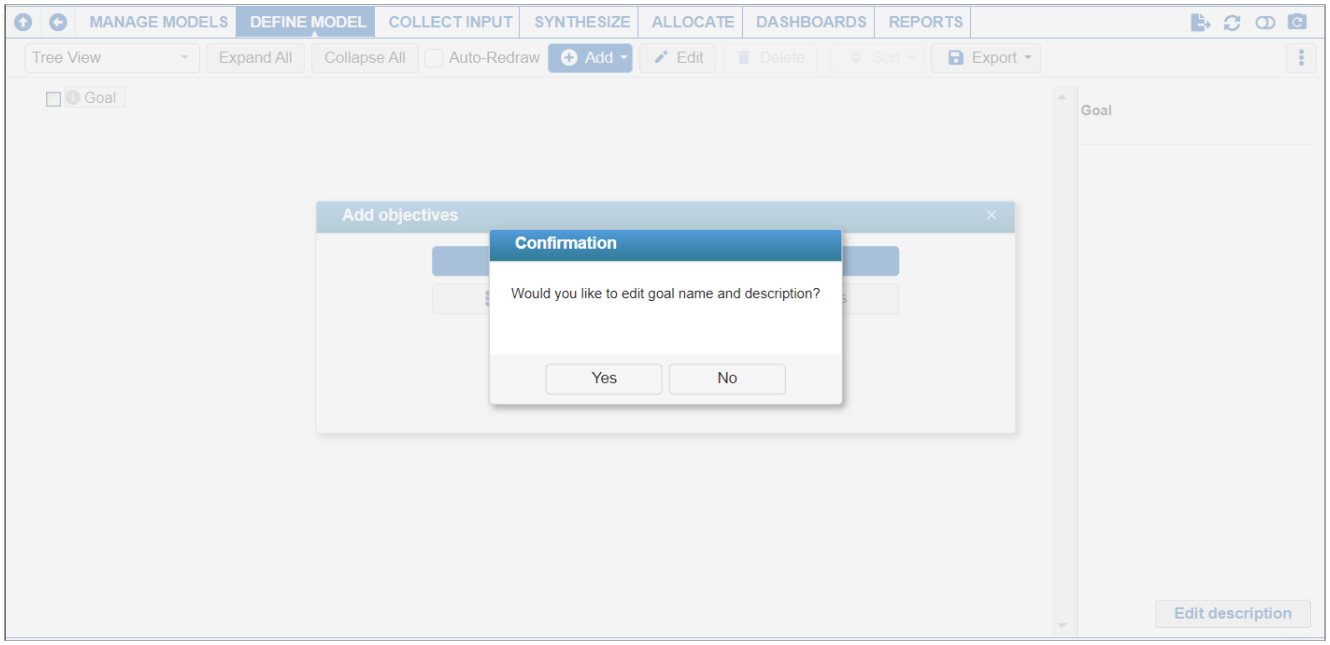
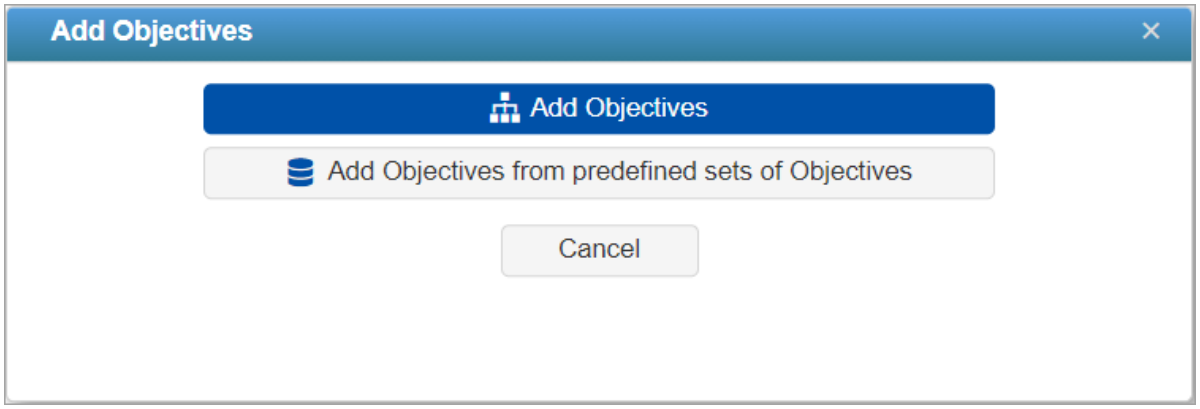
Add, Edit, and Delete Objectives

The objectives hierarchy can be created, viewed, and edited from the **DEFINE MODEL >Review/Refine Model > Objectives** page.



A new model will show only "**Goal**": The "Goal" is an overall statement of the decision and can be edited. The first time you visi this page, a dialog box to edit the Goal name and description will appear as shown above.

After editing the goal name and description, you will see the Add Objectives dialog box:



The "Add Objectives" option adds objectives below the Goal node. The "Add Objectives from predefined sets of Objectives" option allows you to add objectives from the objectives list predefined by the Site administrator; this will be discussed further below.

Add Objectives *(same level or below)*

You can add objectives **below** the Goal node.

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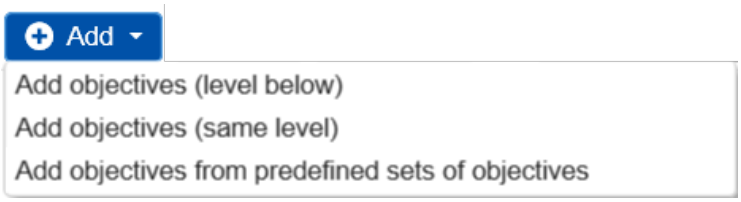
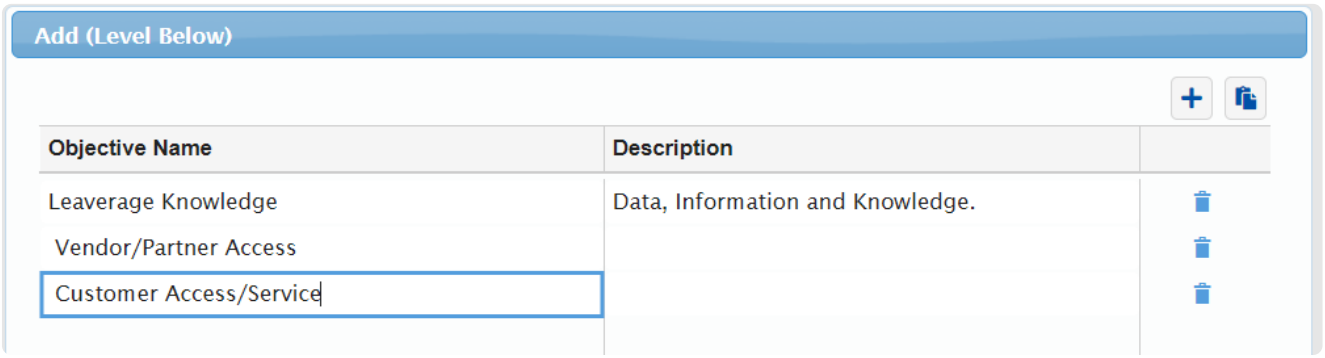
NOTE: It is strongly recommended that the objectives hierarchy consists of homogenous clusters, each of which contains no more than seven elements plus or minus two. If there are more than seven objectives, for example, divide them into separate clusters, such as performance objectives, financial objectives, corporate image, and so on. (Reasons for doing this include short-term memory and channel capacity limitations, and limiting the number of pairwise comparisons.)

Additional elements (objectives, sub-objectives) can be added either at the same level of the currently selected node by pressing **Add Objectives (same level)** button, or below the currently selected button, by pressing **Add Objectives (level below)** button. *(Add objectives on the same level is disabled when the Goal node is selected.)*



Pressing either of the first two options above will open a dialog box that looks like this image.



Here you can either:

a) enter one or more elements, along with brief descriptions (a simple form of an information document which you can modify later using the Edit description or "i" buttons). Adding one or more spaces before an element name will indicate that the element should be added at a lower level in the hierarchy.

b) The **Paste from Clipboard** button will paste elements that have been previously placed on the clipboard into the hierarchy. These elements can be placed on the clipboard in a variety of ways:

1. By copying from adjacent rows or columns in an Excel spreadsheet
2. By copying from adjacent rows or columns in a Word document
3. By copying from a tab-delimited text file that uses tab delimiters to separate the element name from the element description.

Add Objectives from predefined sets of Objectives

The **Add Objectives from predefined sets of Objectives** option allows you to add new objectives below the currently selected node from **predefined objectives** determined by the site administrator.

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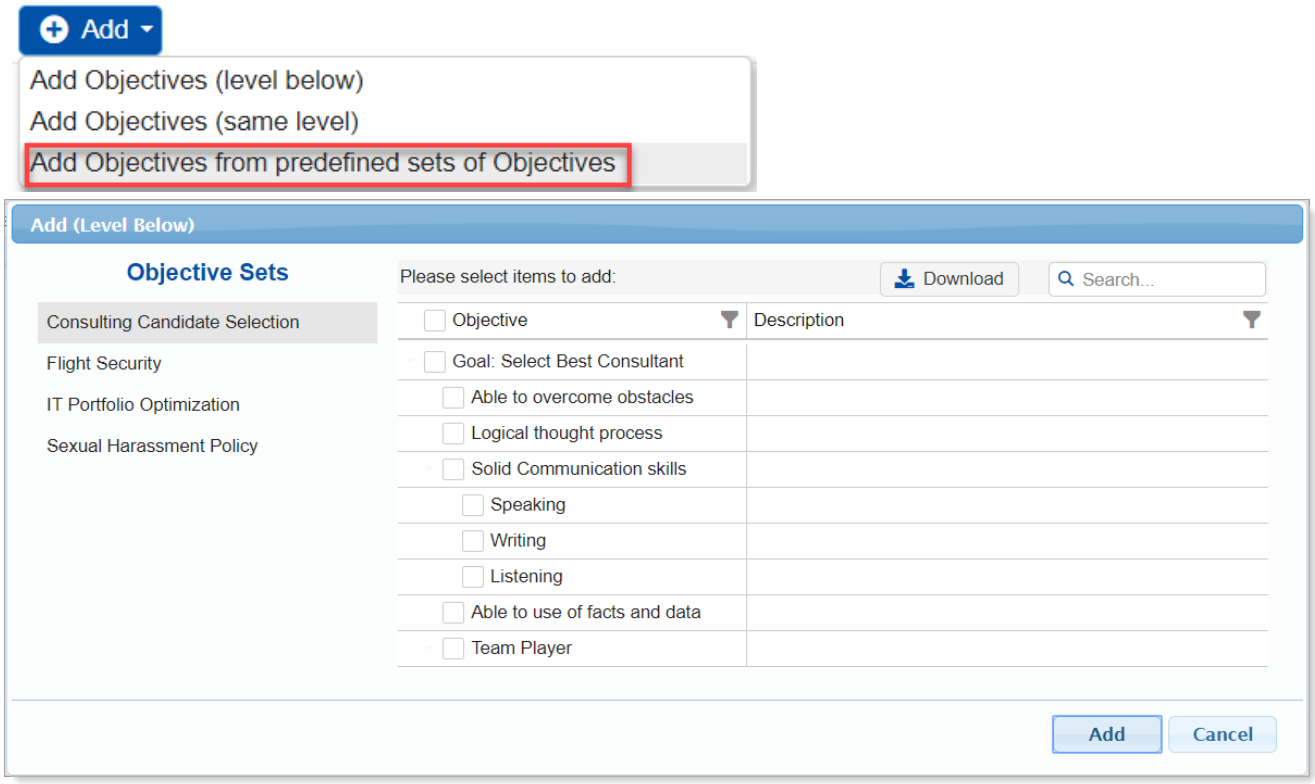

Simply select from the objective sets at the left and then check the nodes that you want to add to the model.

Alternatively, you can also create new models from Model Templates that have predefined objectives and alternatives.

Edit Objectives

The Goal and the objective names can be **edited** by:

(1) selecting them (single-click) and clicking the Edit button

(2) double-clicking

(2) right-clicking, and then selecting Edit from the context menu

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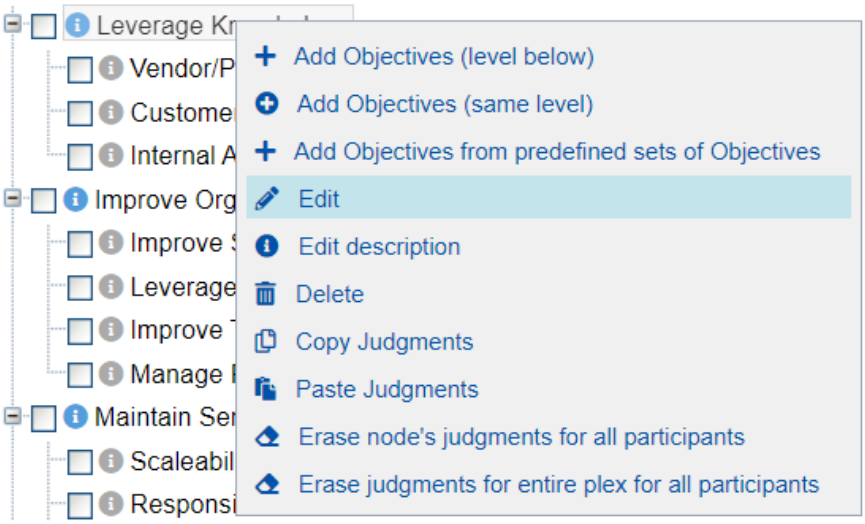
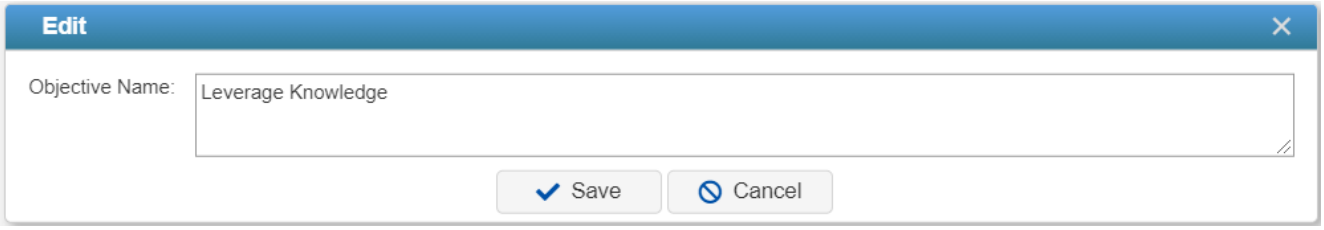


From any of the options above, a dialog box will be opened where you can update the Goal or the objective name.



The options above are applicable both on Tree and Hierarchy Views.

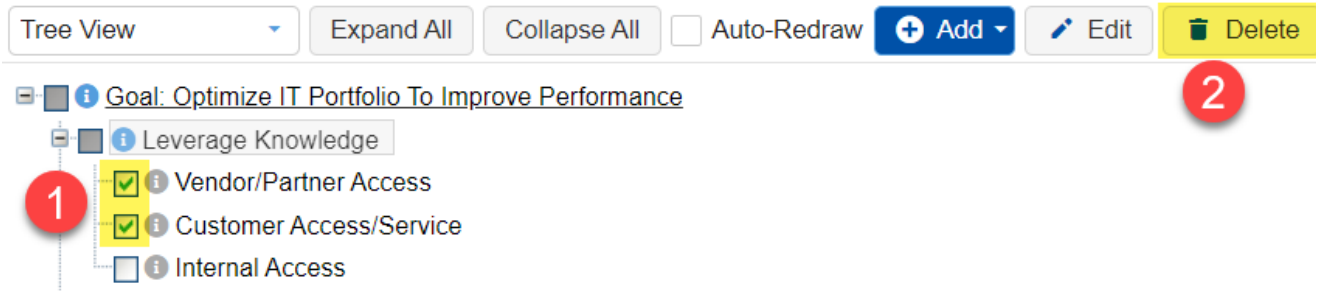
Delete Objectives

You can delete an objective both on Tree and Hierarchy Views.

In Tree View, you can delete one or more objectives by:

(1) checking the checkbox(es) to the right of the objective(s) you want to delete, and then

(2) clicking the Delete button.



You can also delete by right-clicking on the objective that you want to delete and then selecting Delete.

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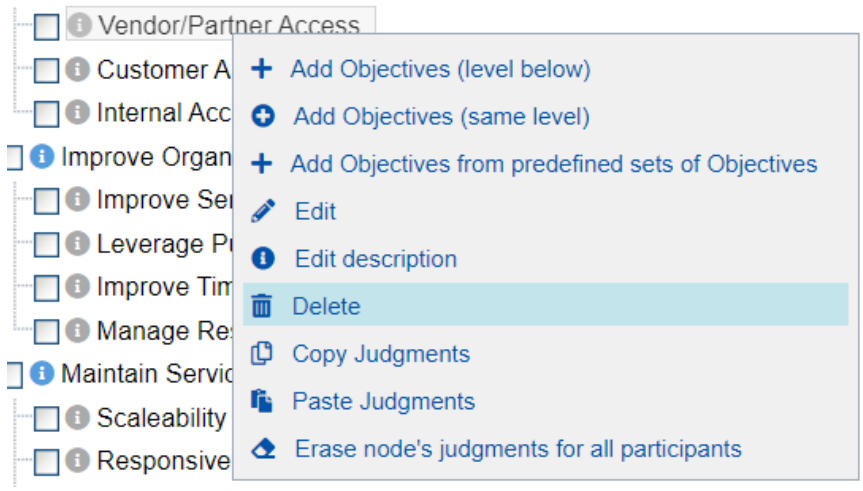

In the Hierarchy View, you can only delete one objective at a time using the same Delete button or by right-clicking as explained above.

You can show the objectives ID (index)

HINT: It is advisable to **save a copy of the model** before deleting many elements in case you want to save a copy of your model before the deletion. You can also use the **Model Snapshots** feature to revert to what you had.

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Move or Copy Objectives

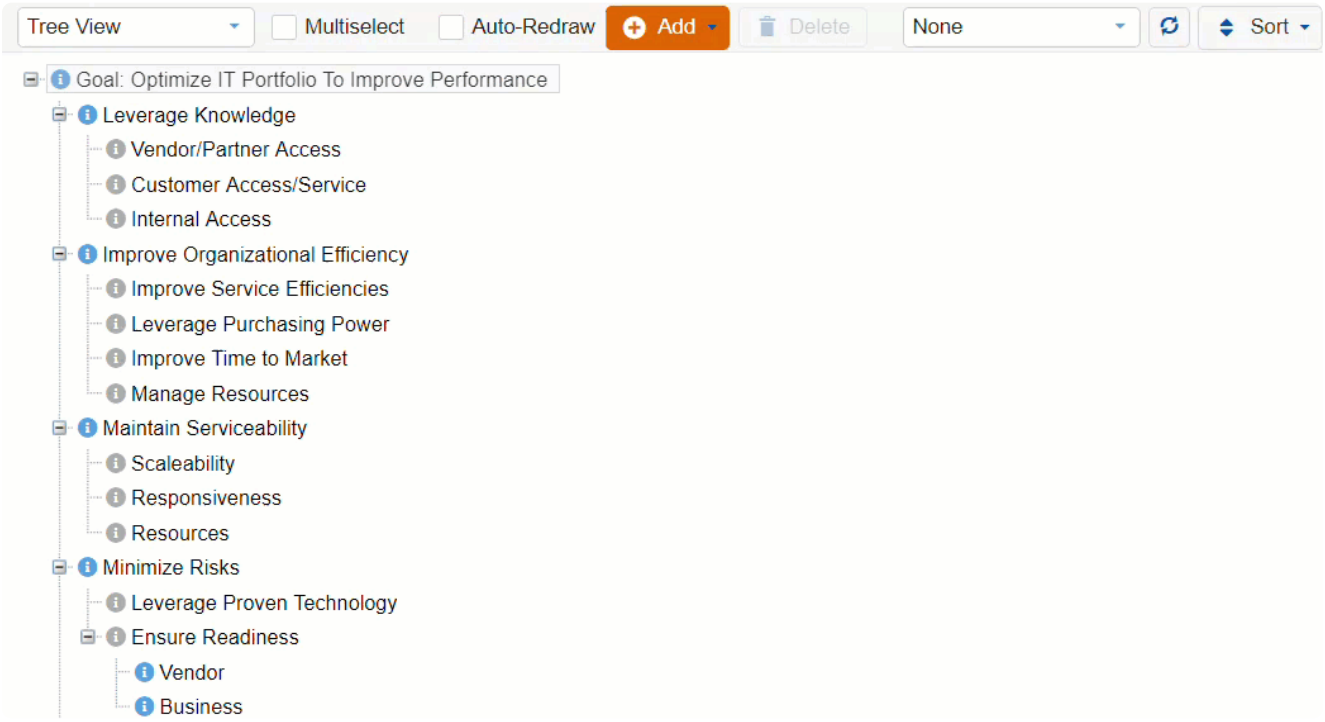
Elements can be moved or copied from one position/level in the objectives hierarchy to another by dragging and dropping to the desired position in the hierarchy.

This can be done from the **DEFINE MODEL > Review/Refine Model > Objectives** page, both in Tree and Hierarchy View.

In Tree View, you can move or copy a node from one position to another by dragging and dropping.

Simply select a node and then hold the left mouse button down while dragging to the position you want the node to be moved or copied to (you will see a blue arrow as a pointer).

When you release the left mouse button, you will then see a dialog box asking whether to copy or move the node. Select and click OK to confirm.



Selecting **Move** will move the objective to the desired position or level on the hierarchy, while **Copy** will create a duplicate objective where you have an option to also copy the judgments and roles from the original node.

Similar drag-drop action can be done on the Hierarchy View.

HINT: You can use the **Model Snapshots** feature in case you want to revert to what you had before the sorting.

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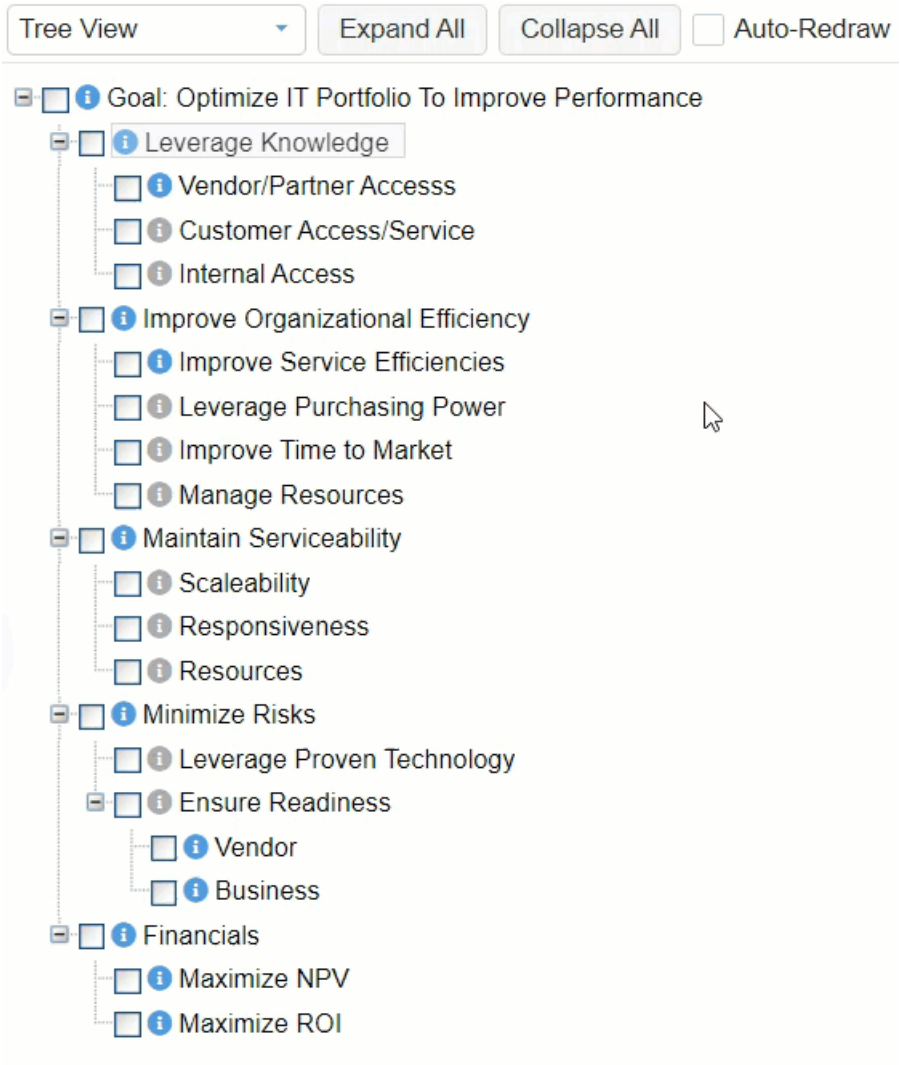
Expand, Collapse and Auto-Redraw the Objectives Hierarchy

Expand All will expand all branches of the hierarchy.

Collapse All will collapse the hierarchy and show only the goal and the first level of elements (objectives).

You can also expand/collapse **sections** of the hierarchy by clicking the same icons at the left of the objective node.

When the **Auto-Redraw** box is checked, clicking on the *name* of any element will not only expand the branches below that element but also will automatically contract the branches in other parts of the hierarchy. This is useful for focusing on a specific part of the hierarchy.



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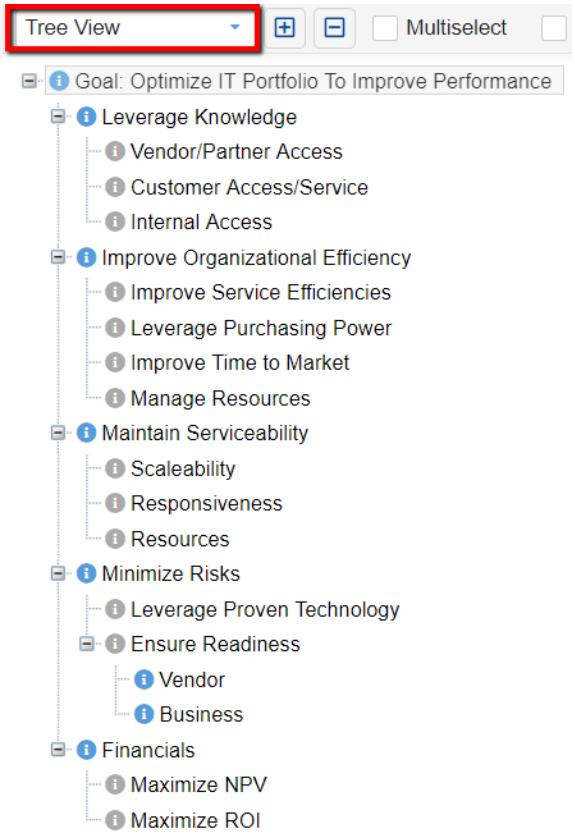
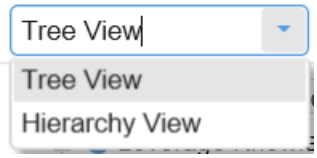
View Objectives (Tree or Hierarchy)

Objectives can be shown in **Tree View** or **Hierarchy View**. By default, the Tree View is displayed as shown below:



You can use the drop-down to select the Hierarchy View:



The Hierarchy View of Objectives is shown below:

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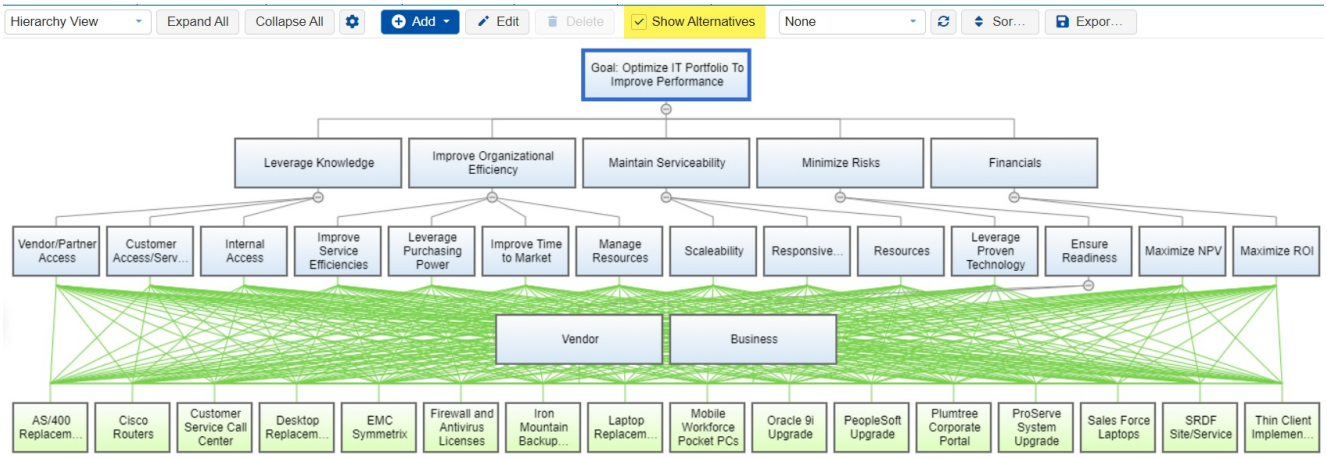
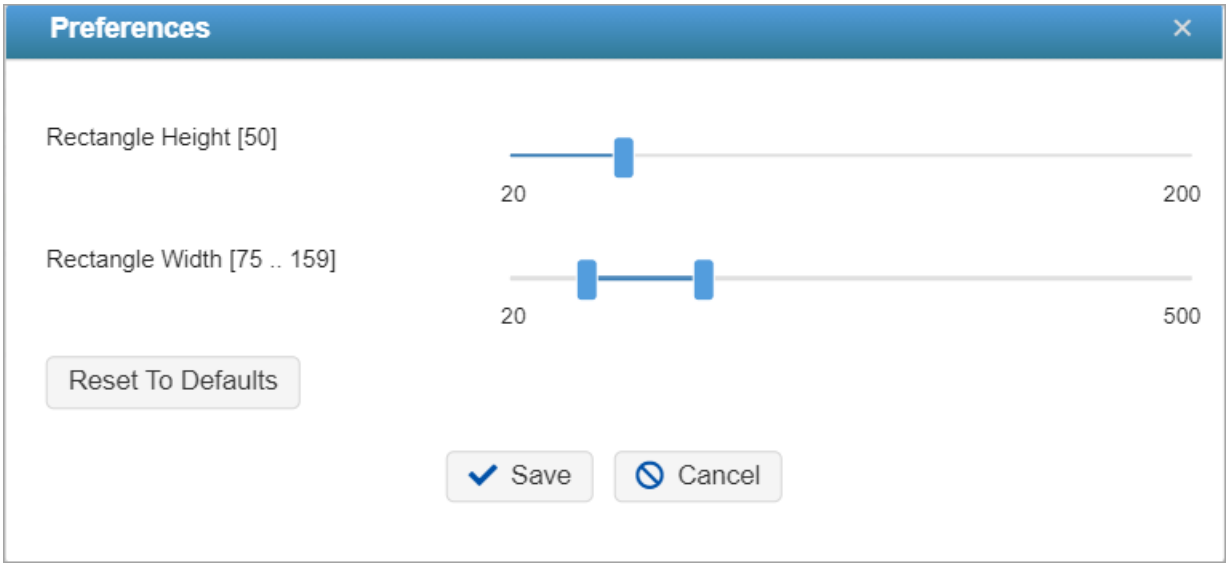
You can add objectives, edit objectives, and sort by name or priority in both the Tree and Hierarchy Views.

You can show or hide the Alternatives in the Hierarchy View by checking the Show Alternatives check box.



You can specify the rectangle length and width by clicking Preferences



HINT: For smaller screens, some of the buttons may be hidden. You may see the hidden buttons by clicking the ellipses ⋮ icon at the top right.

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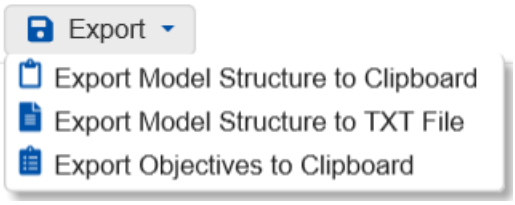
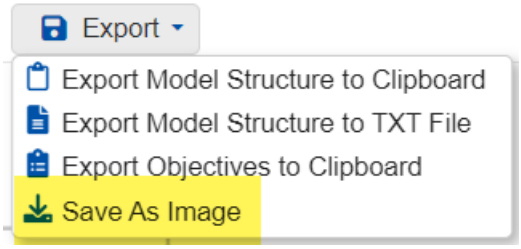
Export Model Structure and Objectives Hierarchy

You can export the Model Structure to the clipboard or TXT and the Objectives Hierarchy in Define Model > Review > Refine Model > **Objectives** page.

Simply click the Export button and select from the options:



For the Hierarchy View, there is an additional option to export the hierarchy in an image format:



HINT: For smaller screens, some of the buttons may be hidden. You may see the hidden buttons by clicking the ellipses ⋮ icon at the top right.

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Sort Objectives by Name or by Priorities

You can **sort** the objectives with various options as shown below:

Sorting by name and priority can be done both in Tree View and Hierarchy Views.

HINT: You can use the **Model Snapshots** feature in case you want to revert to what you had before the sorting.

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Define the Contributions of Alternatives to Covering Objectives

You can define the Contributions of Alternatives to Covering Objectives from the **DEFINE MODEL > Review/Refine Model > Contributions** page.

By default, all alternatives contribute to all covering objectives. In most cases, particularly when the hierarchy represents a broad range of organizational objectives, alternatives may contribute to only a subset of the covering objectives. You can specify which covering objectives each of the alternatives contributes to on this page.

An alternative that does not contribute to a covering objective does not receive any priority for that covering objective. This is equivalent to, for example, saying that it does contribute and then evaluating it with a zero priority rating. If there is some disagreement about whether or not an alternative contributes to a covering objective, it is better to designate it as contributing and allow the evaluators to decide if the priority is zero or not.

Clicking on the row or column heading boxes will select/de-select all of the elements in that row/column.

A full-box mark in a column or row header means that all cells in the column or row contribute.

A half-box mark in a column or row means that some but not all contribute. Blank means that no cells in the column or row contribute.

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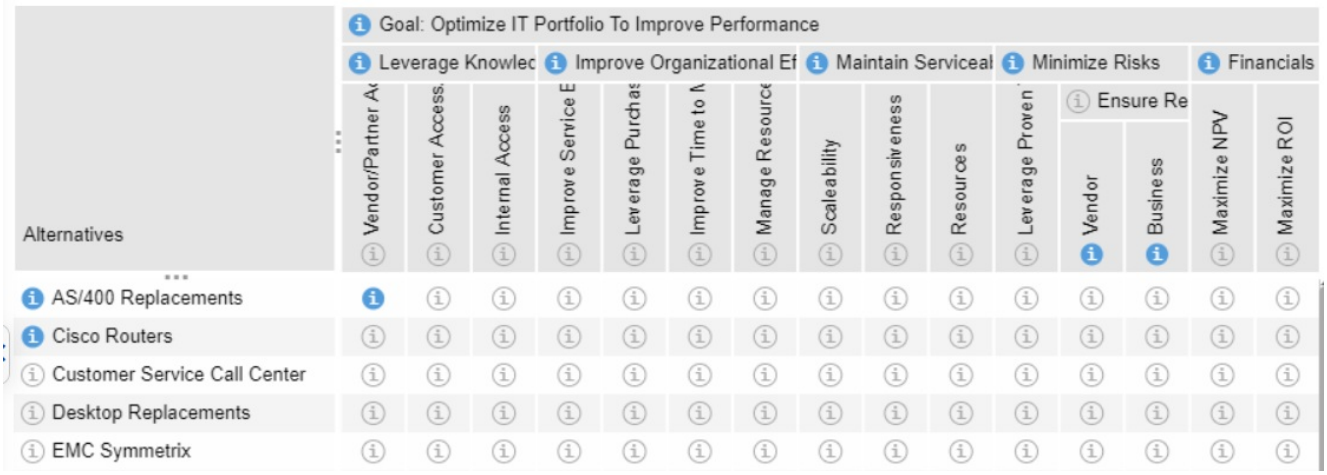
Information Documents

You can define the Information Documents in the **DEFINE MODEL > Review/Refine Model > Information Documents** page.

This screen allows you to create and/or edit information documents for:

- The Goal
- Objectives
- Sub Objectives
- Covering Objectives
- Alternatives with respect to Covering Objectives



Clicking any Edit Information Document button will open the Rich text editor, where the Project Manager can add or edit the **information document** -- which may consist of texts, rich texts, and images.

The blue information document icon means that it has content, while gray means it is empty.

When there is no information document icon in a given cell, it means that the alternative is not contributing to the objective.

NOTE: Due to security reasons, only images are allowed to be attached to the information documents. You can add hyperlinks to link to any external files. Just upload your PDF (or any other file) to any external servers such as Dropbox, GoogleDrive, OneDrive, Amazon, etc., and put the link to this file in the information documents.

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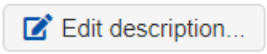
Using the Rich Text Editor

Comparion includes a rich text editor for maintaining information documents. Information Documents can be useful to document the analysis in order to justify the decision (transparency). Information documents can also be used to inform evaluators and viewers of the decision model and subject matter. In addition to information documents, the rich text editor is used throughout Comparion wherever rich text is needed.

How to Use the Rich Text Editor

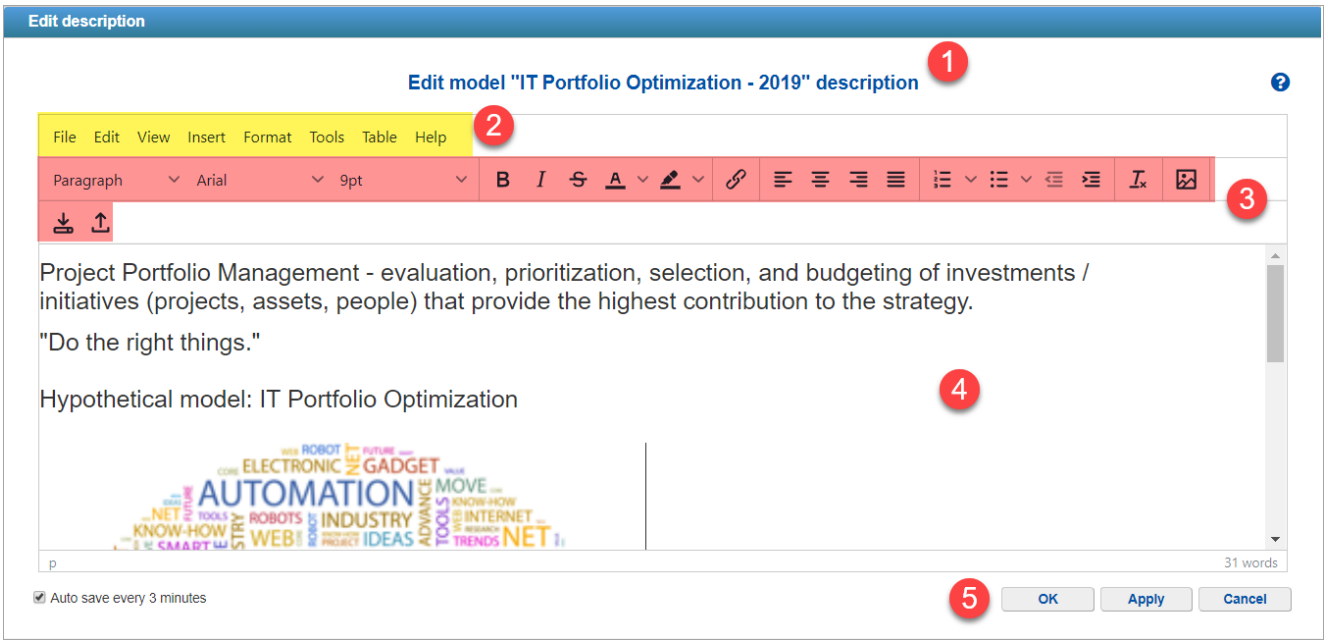
The Rich Text Editor can be opened from the following pages:

- Model Description 

- Objectives or Alternatives pages (using the same Edit description button or icons)
- Information Documents page
- Project Manager's evaluation (Information Documents and Quick Help)
- Welcome and Thank you pages

- Insight Survey questions

A rich text editor is a pop-up window where the Project Manager can add text, rich text, hyperlinks, tables or grids, images, and videos. (Embedding a file is not supported by Information Documents, but you can add hyperlinks to files.)



A sample rich text editor, as displayed above, is comprised of:

1. **Heading** - shows the name of the element the information document is associated with (Model name, Alternative/Objective Name, with respect to Insight Survey).
2. **Main Menu bar** - contains all the options of the editor.
3. **Shortcut toolbar** - below the main menu bar are the options that are commonly used for easy access. These options are also available from the main menu bar (except for Download and Upload).
4. **Rich text area** - where the texts, links, images, etc. are entered or inserted.

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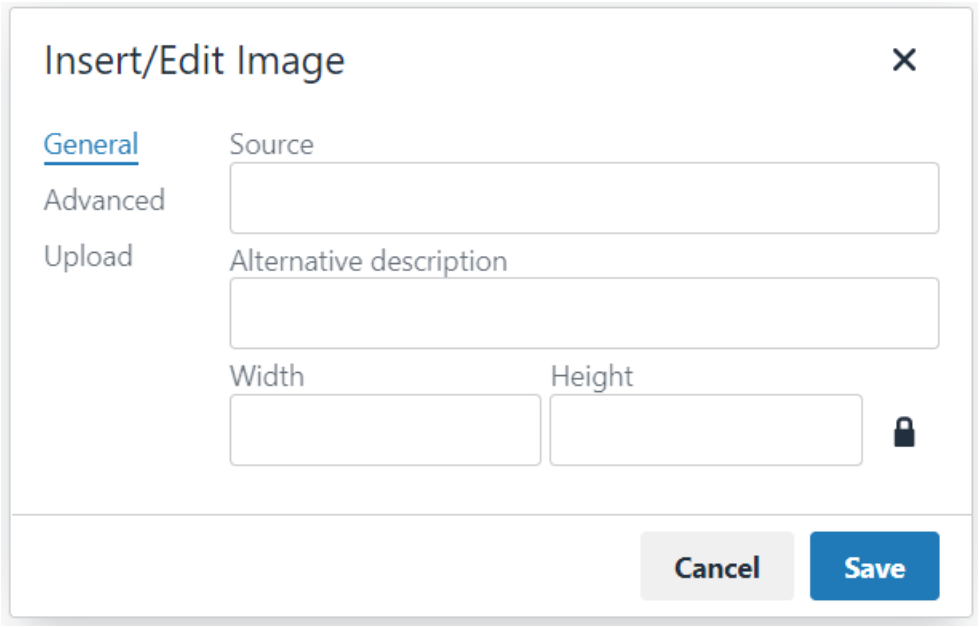
5. **.OK, Apply and Cancel** - are the actions to perform on the changes made:
    - **OK** - to save and close the editor,
    - **Apply** - to save changes and continue editing, and
    - **Cancel** - to cancel or undo the changes that are not yet saved, and then close the editor (*Note: When the PM already clicked Apply, or the Auto-save is already triggered, Cancel won't undo those changes*).

How to Insert image

To insert an image on the text editor:

1. Place the cursor in the position where you want to insert the image.
2. Go to **Insert > Image**, or simply click the Insert image icon . The **Insert/Edit Image** pop-out will be displayed as shown:



3. Enter the public URL of the image on the **Source** field; or **Upload** the image from your machine by clicking the Upload option.
4. Specify the optional image description, width, and height if desired.
5. Click the **Advanced** menu to show more options to format the image.
6. Click Save.

You can also insert an **image by pasting it from the clipboard:**

1. Select the image you want to insert:
    - Right-click and select Copy image, or
    - Using shortcuts:
        - PC: Control + V
        - MAC: Command + V
2. Place the cursor in the position where you want to insert the image.
3. Paste the image to the rich text editor:
    - PC: Ctrl+ V
    - MAC: Command + V

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You can also move the images inside the editor by the drag/drop or copy/paste function.

Image is broken? See How to fix broken images.

How to Edit or Format an image

You can also edit or format the uploaded images. Simply click/select the image from the editor area and you'll see tooltip options:

- Rotate counter-clockwise or clockwise
- Flip vertically or horizontally
- More Edit options will open a pop-out where you can:
  - Crop
  - Resize
  - Change Orientation (same as the rotate and flip options)
  - Change Color options (brightness, sharpness, contrast, etc.)
- The ••• (Insert/Edit Image) icon opens the same pop-out explained above where the Project Manager can:
  - Specify the image description, height, and width
  - Advanced options

How to Insert Video

Videos can't be uploaded to Comparion. Your videos should be uploaded to video hosting platforms such as YouTube, Screencast, Vimeo, etc., and then insert or embed them to the rich text editor.

For YouTube videos, you can simply enter or paste the video URL directly to the text area:

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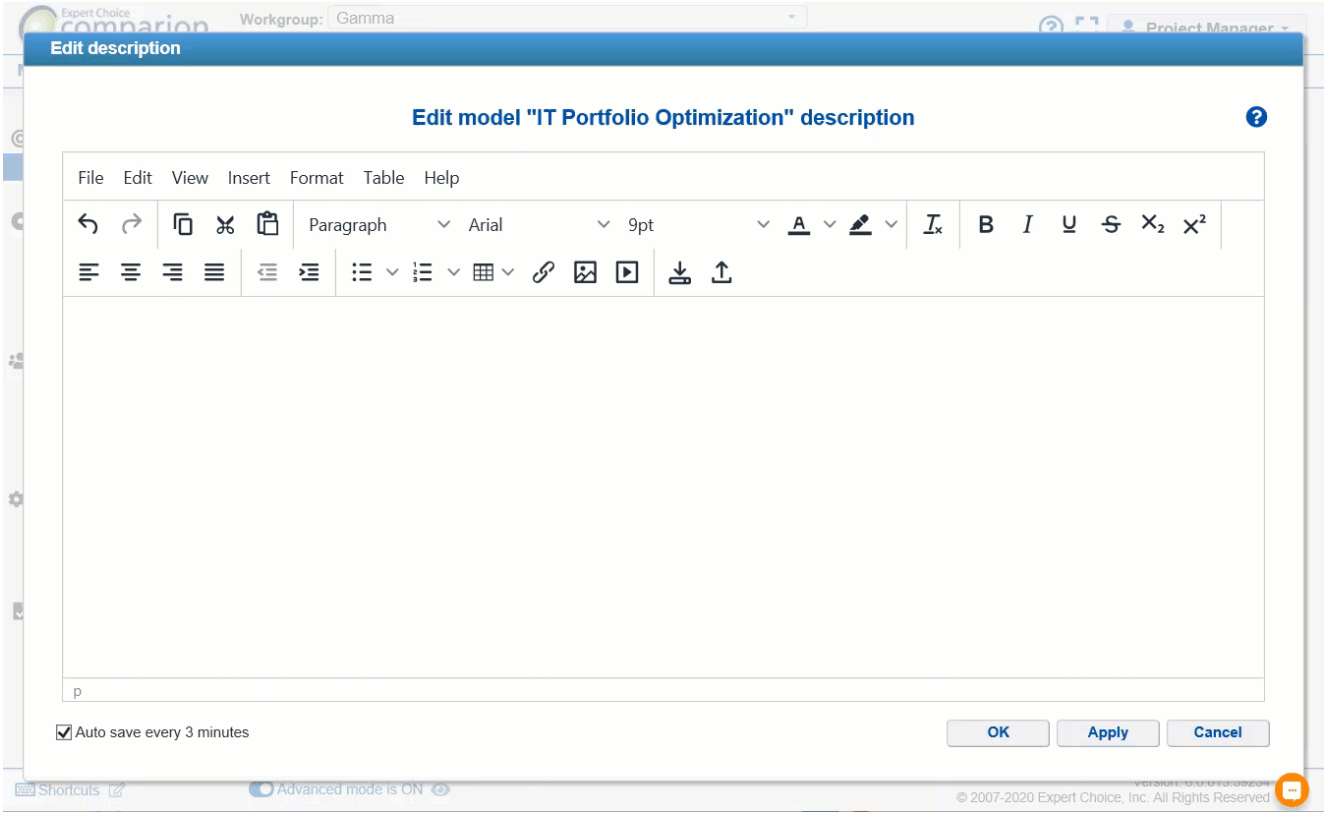
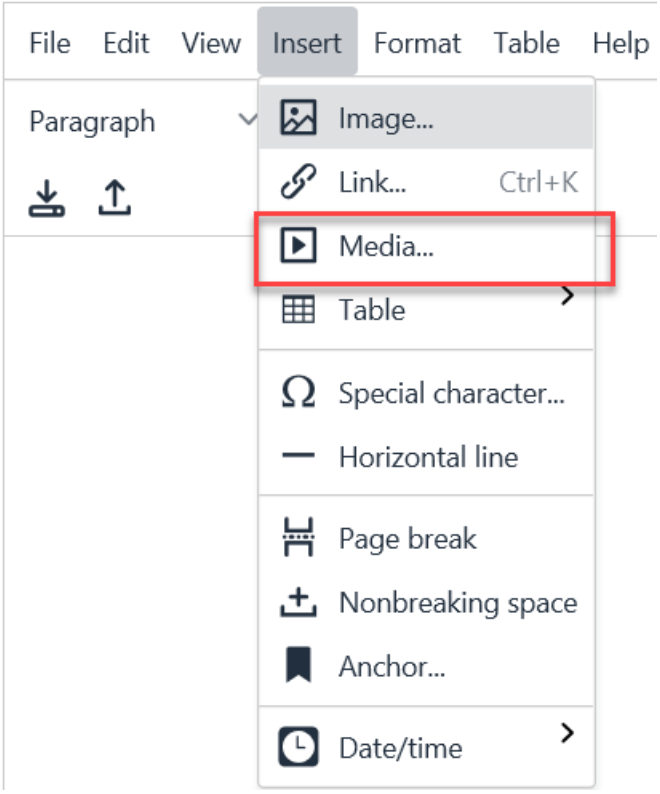


For videos from other sources such as Screencast, Vimeo, etc., you need to embed the video:

1. Click **Insert** > **Media**, or simply click the **Insert Media** icon



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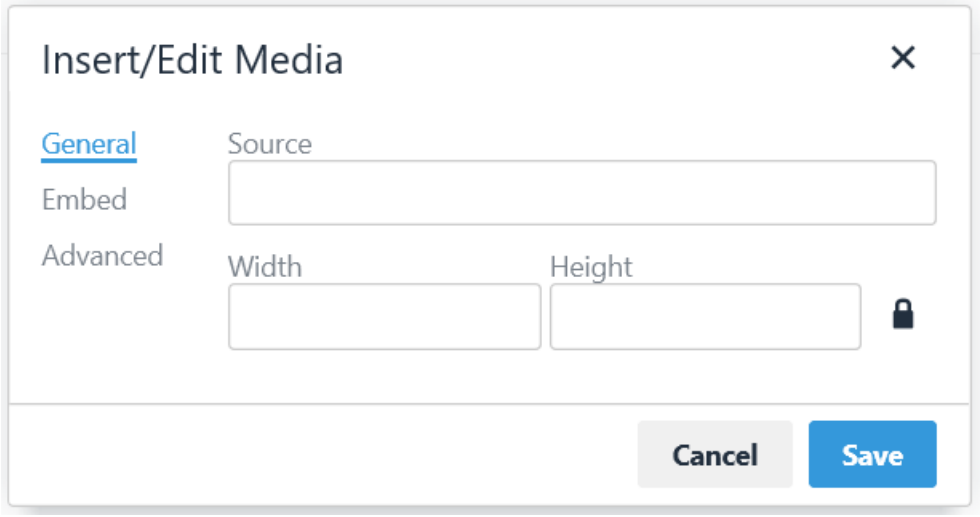
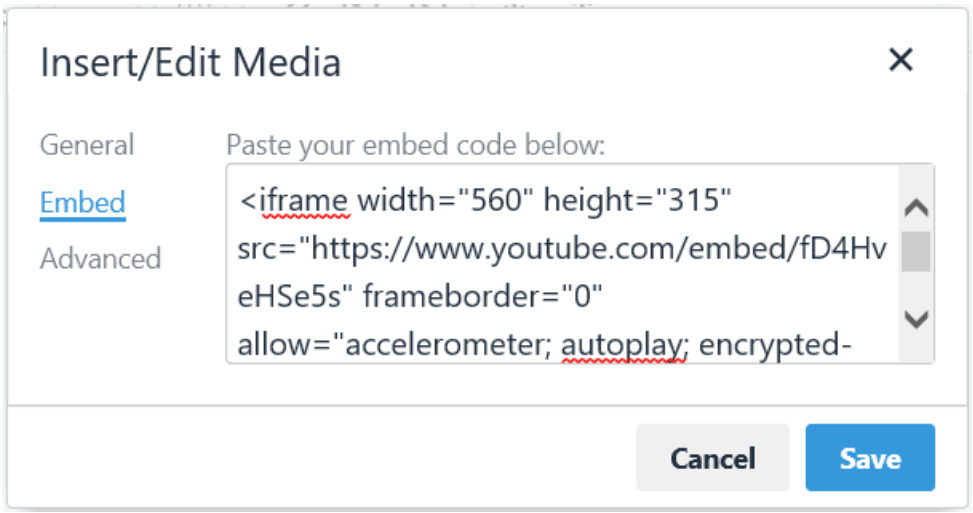
The insert/Edit Media dialog box will open as shown below:



2. Click the **Embed** tab and then enter the video embed code.



Where to get the EMBED Code? Commonly, video hosting providers have a SHARE button with the option to get the embed code (please check your video hosting providers for the embed code instructions).

See instructions below on how to get the embed code for some video hosting platforms:

- **YouTube** - https://support.google.com/youtube/answer/171780?hl=en

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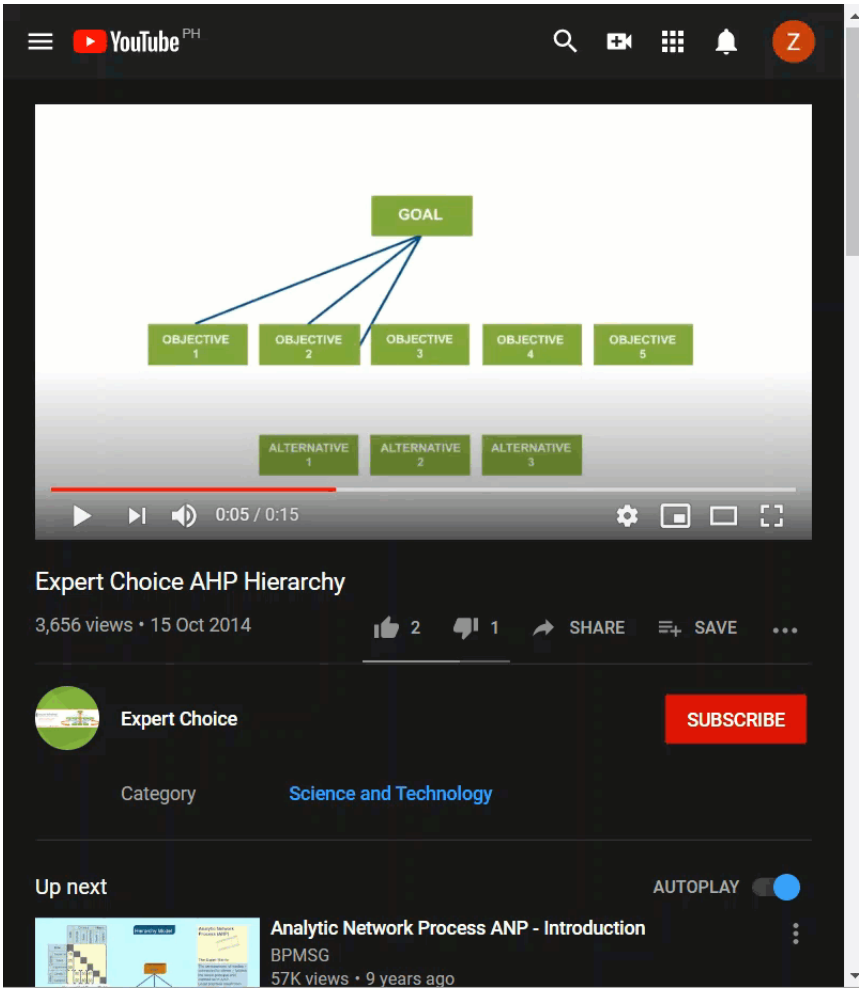
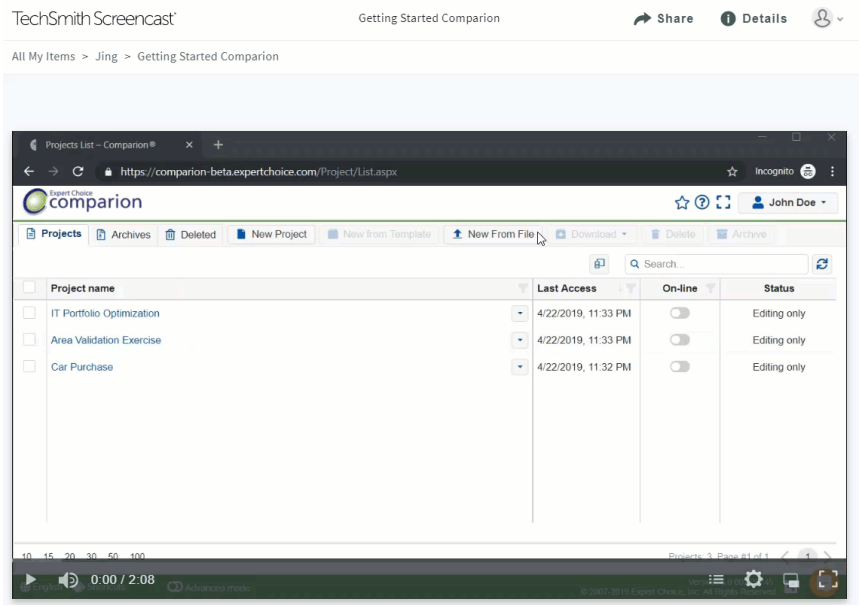


- **Screencast** - https://feedback.techsmith.com/techsmith/topics/absolute-url-link-to-screencast-com-videos



- **Vimeo** - https://vimeo.zendesk.com/hc/en-us/articles/224969968-Embedding-videos-overview

Download/Upload Info docs

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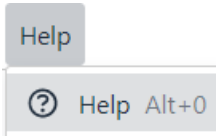
You can download and/or upload the information documents using the download and upload buttons.

The downloaded information document file is in . **mht** format.

Rich Text Editor Shortcuts

You can use the text editor shortcuts to easily perform certain actions within the editor. You can see the complete list by clicking the Help menu on the editor or Alt+0:



Action	Shortcut
Bold	Ctrl + B
Italic	Ctrl + I
Underline	Ctrl + U
Select all	Ctrl + A
Redo	Ctrl + Y or Ctrl + Shift + Z
Undo	Ctrl + Z
Header 1	Shift + Alt + 1
Header 2	Shift + Alt + 2
Header 3	Shift + Alt + 3
Header 4	Shift + Alt + 4
Header 5	Shift + Alt + 5
Header 6	Shift + Alt + 6
Paragraph	Shift + Alt + 7
Div	Shift + Alt + 8
Address	Shift + Alt + 9
Open help dialog	Alt + 0
Focus to menubar	Alt + F9
Focus to toolbar	Alt + F10
Focus on the element path	Alt + F11
Focus to contextual toolbar	Ctrl + F9
Open popup menu for split buttons	Shift + Enter
Insert a link (if link plugin activated)	Ctrl + K
Save (if save plugin activated)	Ctrl + S
Find (if search-replace plugin activated)	Ctrl + F
Switch to or from fullscreen mode	Ctrl + Shift + F

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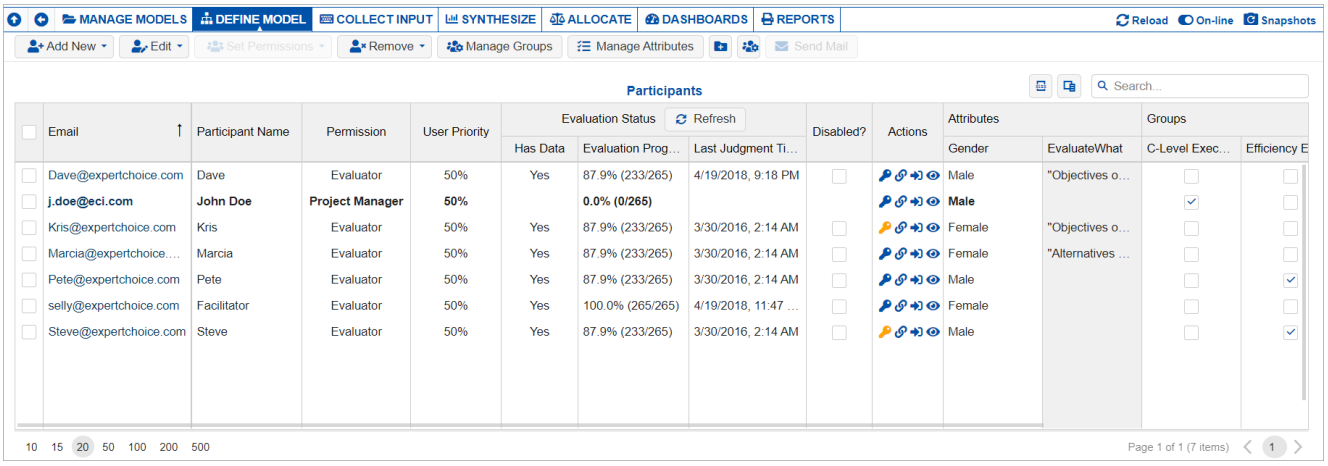
Participants Grid Overview



The Participants Grid consists of the following columns:

- Participant Email - unique identifier and can't be modified
- Model Participant Name - participant name and can be modified

> A participant can have a different name on each Comparion model he/she belongs to. This is useful when the Project Manager wants to add an alias or role to the participant (e.g Executive, Expert, etc.). The participant's "Participant Workgroup Name" is the name displayed at the top right when the participant is logged in on Comparion.

- Permission - Evaluator, Project Manager, Viewer, Evaluator/Viewer
- User Priority - user weights used in the Synthesize Results, this column is hidden by default. Use the column chooser [image needed] to show.
- Evaluation Status:
  - Has Data - Yes if the user has judgments, No if none.
  - Evaluation Progress - percentage; the number of judgments evaluated or a total of judgments to evaluate.
  - Last Judgment Type - date and time the last judgment was made.
- Status (Disabled?) - checkbox to enable or disable a participant from the model.
- Actions - reset password, get link, log in as a participant, view-only evaluation.
- Participant Attributes - attributes are used to assign participants to groups dynamically. Participant Attributes can be dynamic or non-dynamic:

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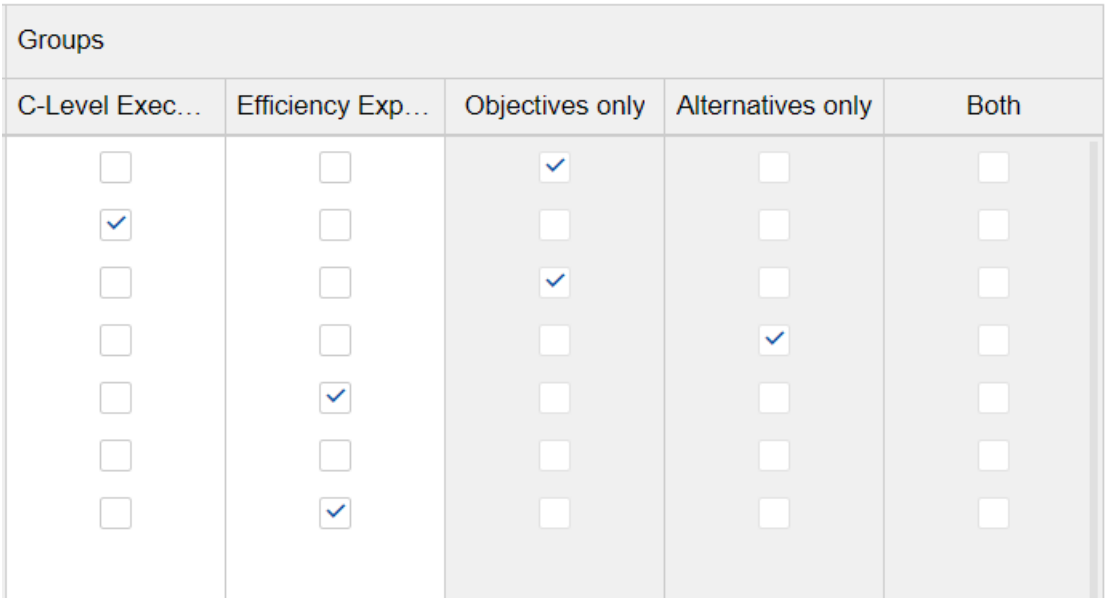
Attributes	
Gender	EvaluateWhat
Male	"Objectives o…
Male	
Female	"Objectives o…
Female	"Alternatives …
Male	
Female	
Male	

- **Non-dynamic Participant Attributes -** are assigned to the participants manually in the Participants grid. These attributes have a white background color and are editable (Gender).
- **Dynamic Participant Attributes** - When a Participant takes an insight survey, their responses can be used to update the participant attributes (and also update participant group membership) of their participant record. These attributes have a gray background color and are non-editable.

- Participant Groups



- **Non-dynamic Groups** - participants are assigned to non-dynamic groups manually in the Participants grid by checking the checkboxes. Non-dynamic groups have a white background (C-Level Executives and Efficiency Experts).
- **Dynamic Groups** - participants are assigned to dynamic groups, as specified by their attributes. Dynamic groups columns have a gray background and the checkboxes are disabled (Objectives Only, Alternatives Only, Both).

You can search by typing in the participant name or email:

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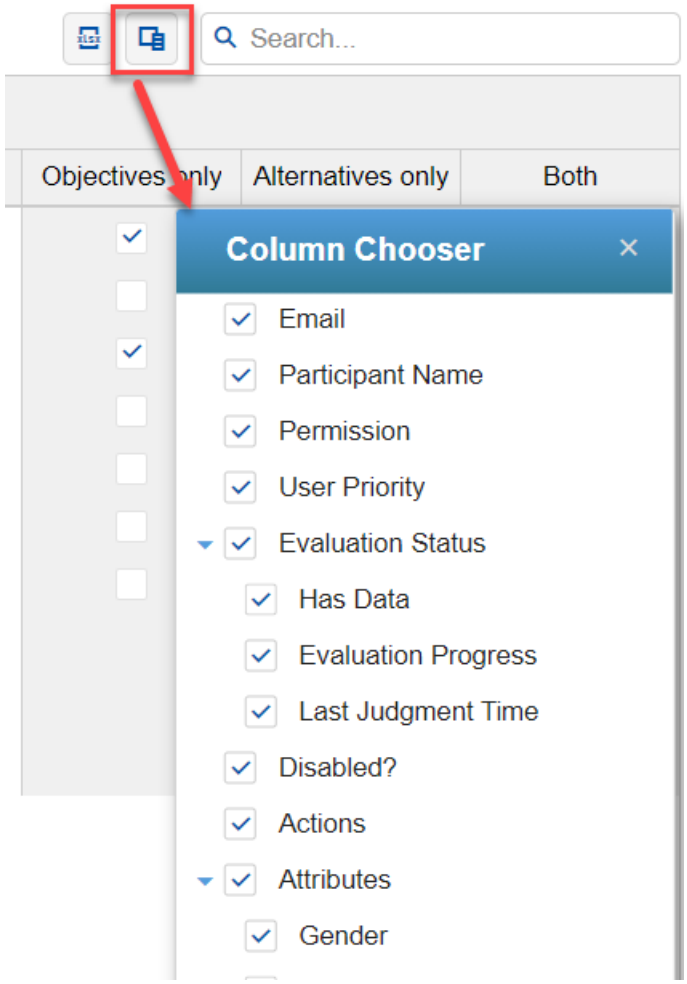
If there are many participants in the list, you can use the pagination at the bottom of the grid.

You can hide or show columns using the column chooser:



Click to export the participants' grid in .xslx format.

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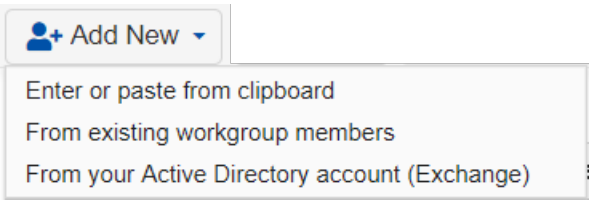
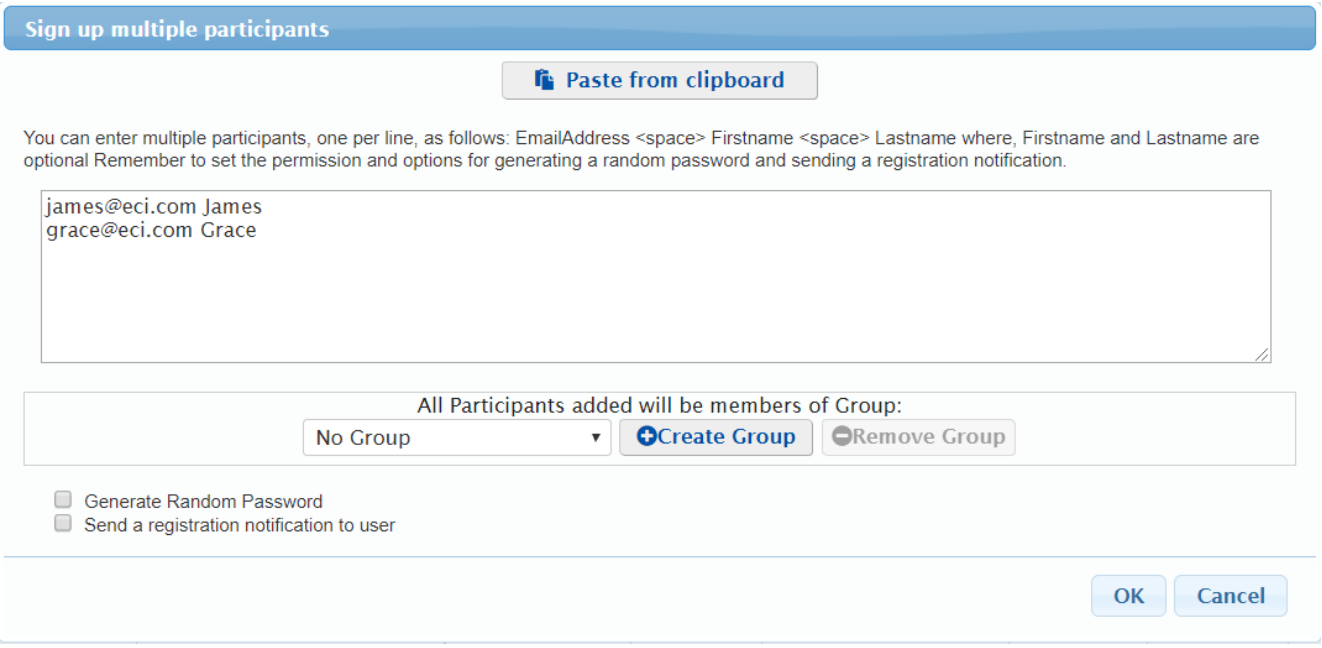
Add Participants

Participants can be added to a model in a variety of ways.

This can be done in **DEFINE MODEL > Define Participants & Roles >** **Participants** page.



1. Enter or paste from clipboard



a) Choose to enter one or more email addresses and corresponding participant names, or

b) Paste one or more email addresses/Names from the clipboard after placing this information on the clipboard from another source, such as an Excel spreadsheet, Word table, or Microsoft Outlook Contact Group.

NOTE: If you have a Microsoft Outlook Contact Group, you can place the names and email addresses in the Contact Group on the clipboard by composing an email to the group, expanding the group name to have the individual entries displayed, copying them to the clipboard, and discarding the email.

A participant can have a different name on each Comparion model that he/she belongs to. This is useful when the Project Manager wants to add an alias or role to the participant name (e.g Executive, Expert, etc.). The "Participant Workgroup Name" is the name displayed at the top right when the participant is logged in on Comparion. The "Participant Workgroup Name," if

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available, will be automatically assigned as the "Participant Model Name" when the name is not specified when adding the participant to the model.

Options include:

- Adding participant as a member of a group. The roles assigned to the new users will be determined by the roles assigned to "All Participants" as well as the group to which they are made a member. Note that participants added via invitations with access code or meeting ID will also be assigned to the selected group. The default group for general links can be defined from the Invite Participants page. By default, participants will be added to the "No Group." The participant is added to the default group that is currently set at the time he/she accesses the invite link. You can also add or remove groups from this screen.
- Generating a random password, and
- Sending a registration notification to new participants. Note: Some mail spam filters may block the reception of such notifications.

2. From existing workgroup members

A dialog box will appear in which you can select from a list of participants in the Workgroup.

3. From your Active Directory account (Exchange)

Applicable only if your site organization has a Microsoft Exchange Active Directory that is accessible via the internet. You may have to ask your IT administrator if this is the case and request a login name and password.

After entering the LDAP Server URL, the Username, and Password, you can enter a search string and click Search. The search string can be part or all of a name or any part of a name or email.

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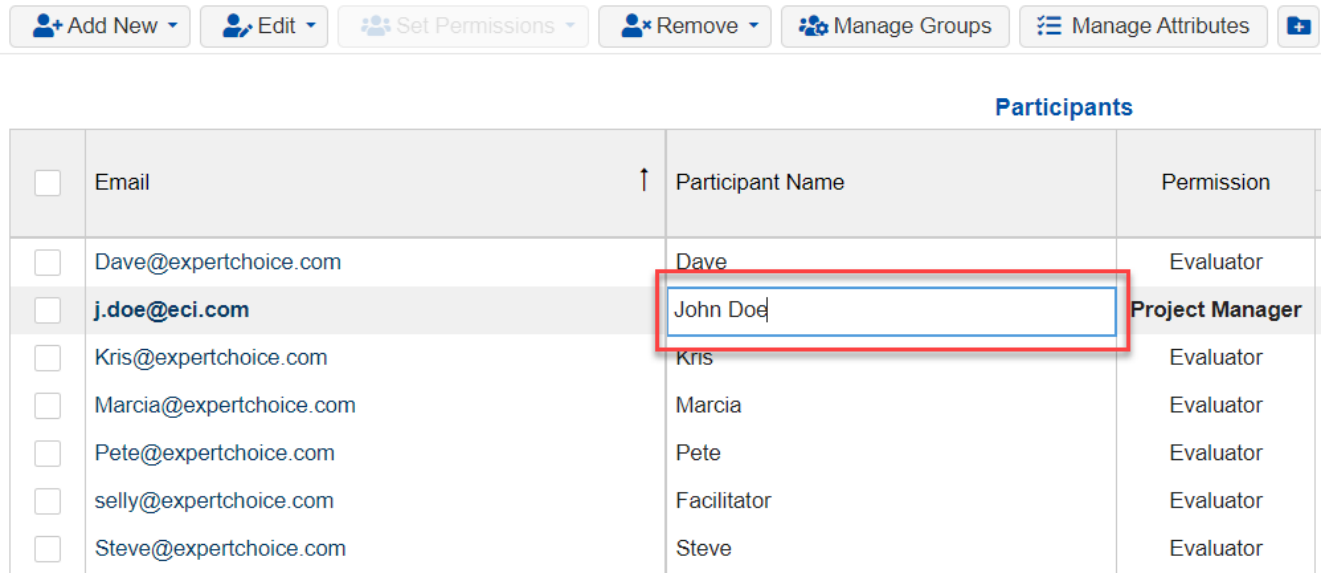
Edit Participant Name

You can edit the participant's model name in **DEFINE MODEL > Define Participants & Roles >** **Participants** screen.

A participant can have a different name on each Comparion model he/she belongs to. This is useful when the Project Manager wants to add an alias or role to the participant name (e.g Executive, Expert, etc.). The "Participant Workgroup Name" is the name displayed at the top right when the participant is logged in on Comparion. The "Participant Workgroup Name," if available, will be automatically assigned as the "Participant Model Name" if the name is not specified when adding the participant to the model.

If you want to edit the participant model name, simply click on the name of the participant you want to modify, do your changes, and then press Enter to save.



Note: Email addresses are unique identifiers and cannot be modified.

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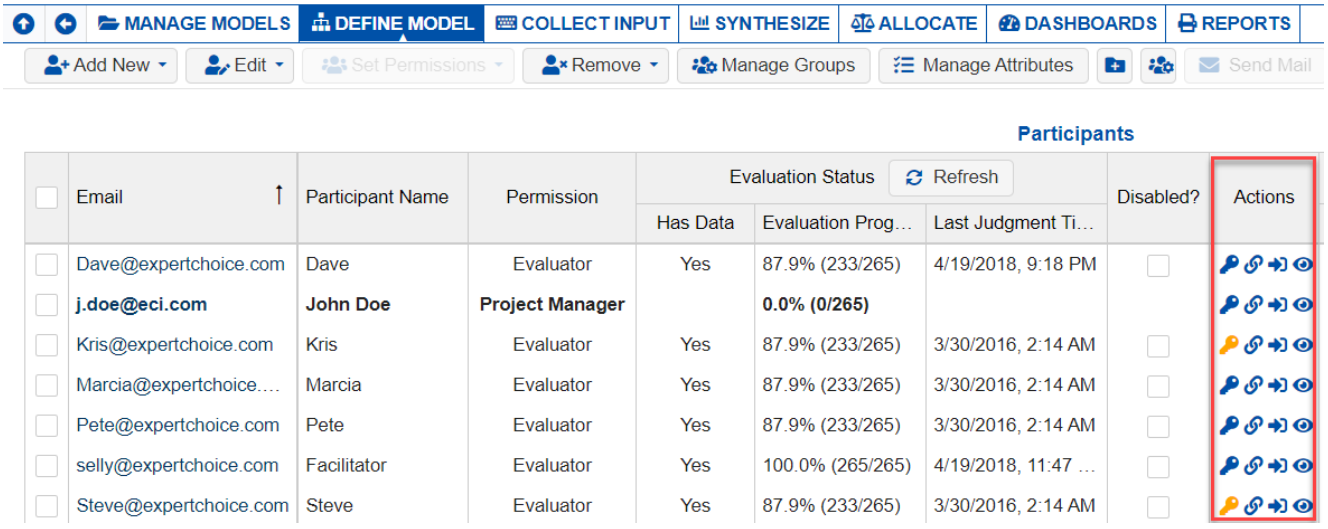
Participants List Actions (Reset Password, Get link etc.)

There are four icons under the Actions column of the Participants table:



1. **Reset Password** sets or resets the password for the participant. Gold key indicates that the user has a password, blue key means user has no password. You can see other options for resetting passwords here.
2. **Copy the evaluator's anytime link** on the clipboard
3. **Log out and log back** in with another user's anytime link
4. **View the evaluation steps** and judgments for any evaluator. This is a "view only" mode so while you can enter or change judgments, they will not be saved.

Note: Actions 2-4 are also available from the Evaluation Progress screen.

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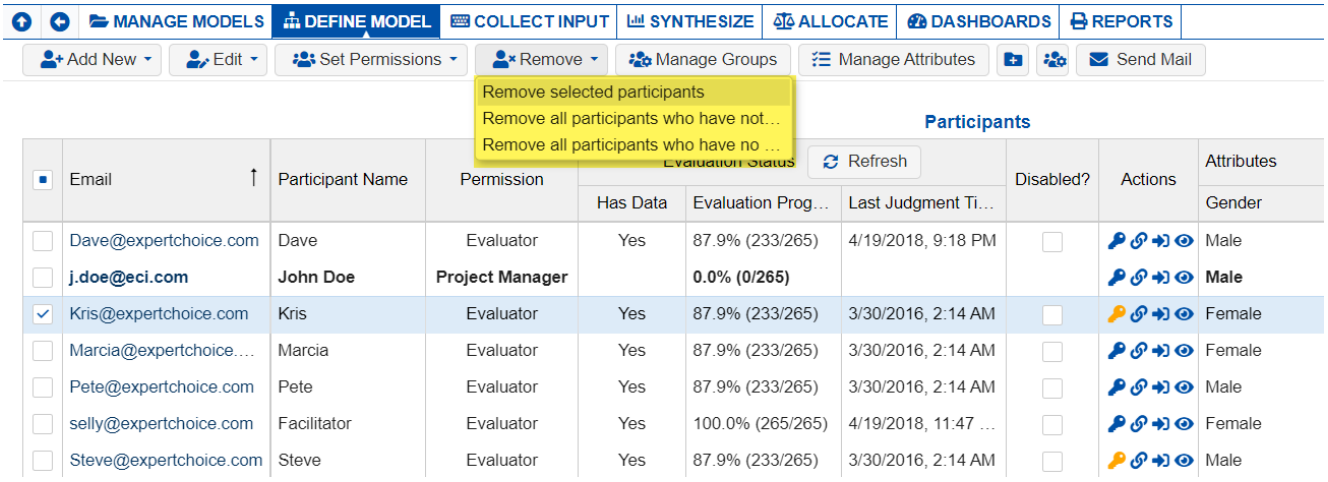
Remove Participants

You can remove or delete participants from **DEFINE MODEL > Define Participants & Roles >** **Participants** page.



Clicking the Remove button displays 3 options to remove the participant(s):

- Remove selected participants. This option is greyed out until one or more participants are selected using the checkboxes to the right of the participants.
- Remove all participants who have not completed their judgments.
- Remove all participants who have no judgments.

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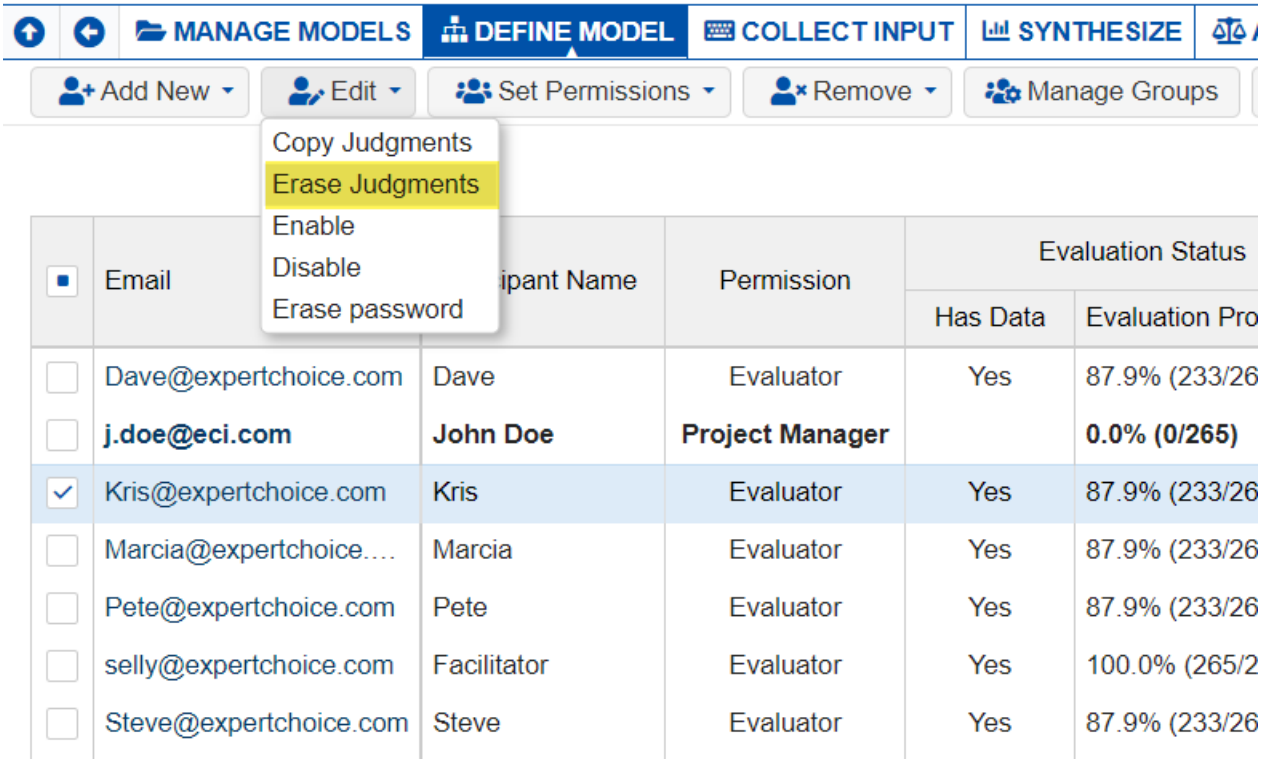
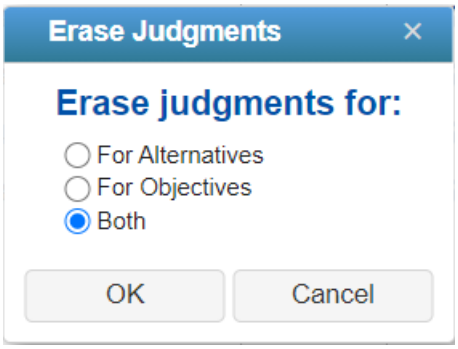
Erase Participant's Judgments

You can erase the participant's judgments in **DEFINE MODEL > Define Participants & Roles >** **Participants** screen.

Simply check the checkboxes to the left of the name of the participant(s) you want to delete judgments, click Edit > Erase Judgments.



A dialog box to delete Objectives, Alternatives, or Both will be displayed. Select and click OK.



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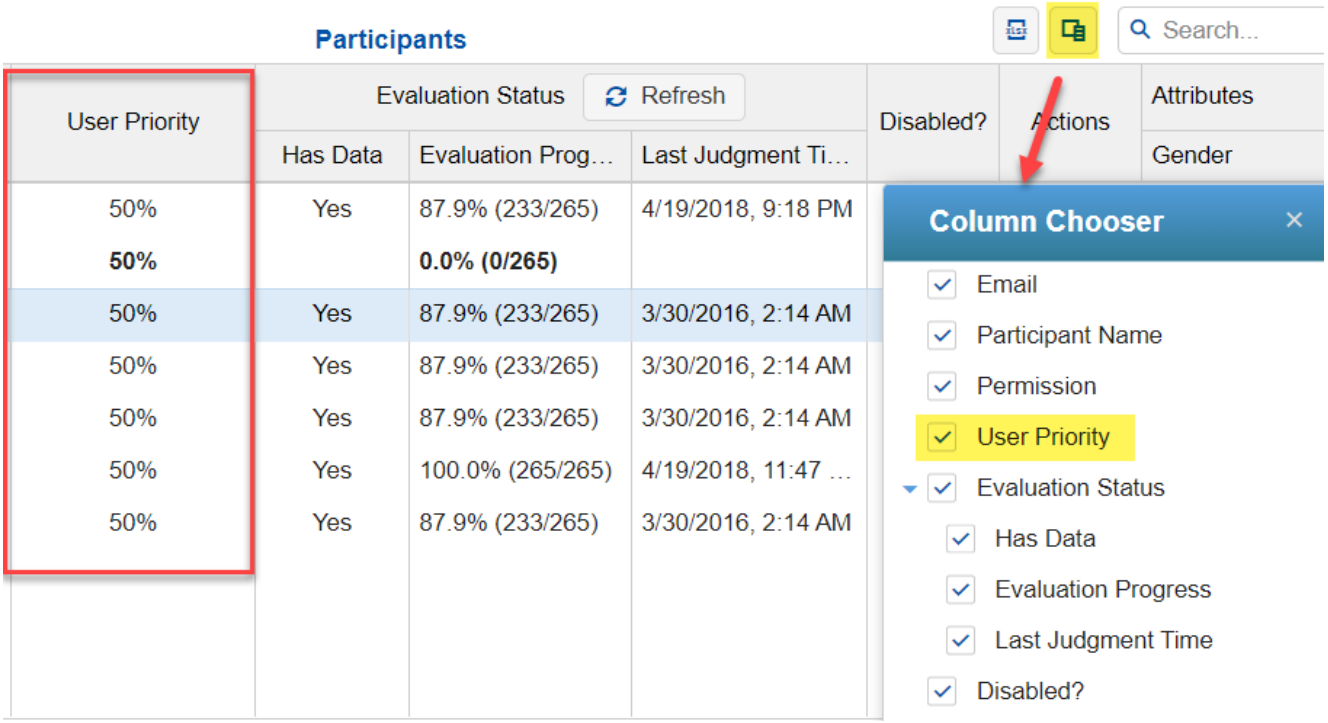
User Priorities (Weights)

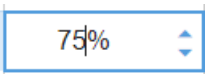
You can set and edit participant priorities (that will be used to weigh the participant's judgments).

By default the User Priorities is hidden; use the column chooser to show it:



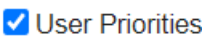
When the User Priority check box is enabled, the User Priority column is displayed as shown above.

You can then set the relative priorities by typing in a value from 0 to 100% in a cell:



By default, all of the participant priorities are the same value of 50% so that you can easily either increase or decrease the priority of one participant.

You can specify to see results with or without participant priorities when viewing results in the Synthesize screens, by clicking the User Priorities check box in Advanced mode.



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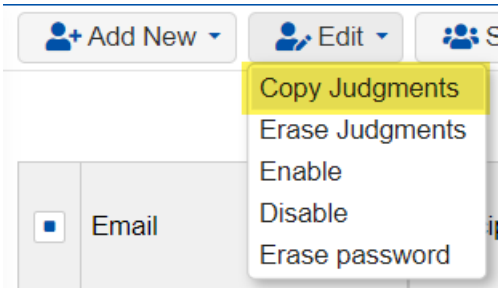
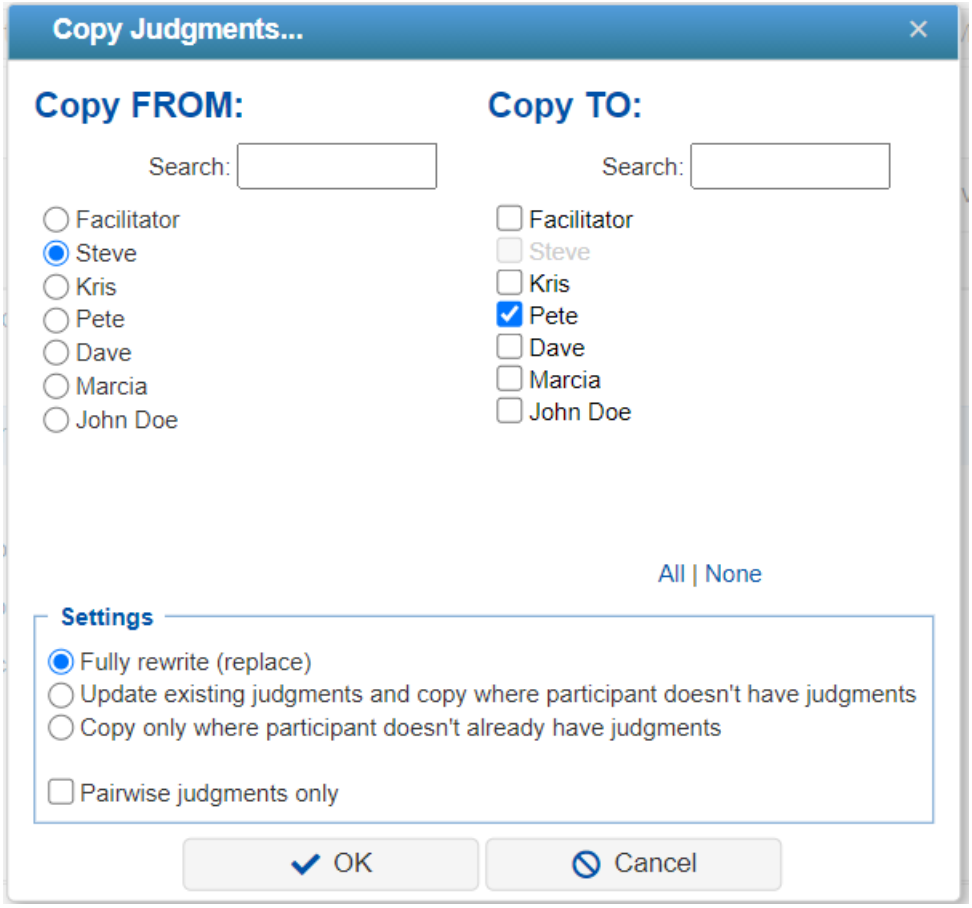
Copy Judgments to Selected Participants

Judgments can be copied from one participant to another participant(s). This can be done in **DEFINE MODEL > Define Participants & Roles > Participants** page.

Select Edit > Copy Judgments:



This will open a dialog box where you can select the participant where the judgments will be copied from (left) and the participant(s) where the judgments will be copied to (right):



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Add, Edit, Delete Participant Groups

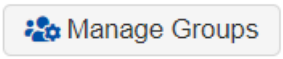
You can add, edit, and delete the participants groups from **DEFINE MODEL > Define Participants & Roles > Participants** page.

Participant Groups can be used when:

- Setting up roles and
- Displaying results

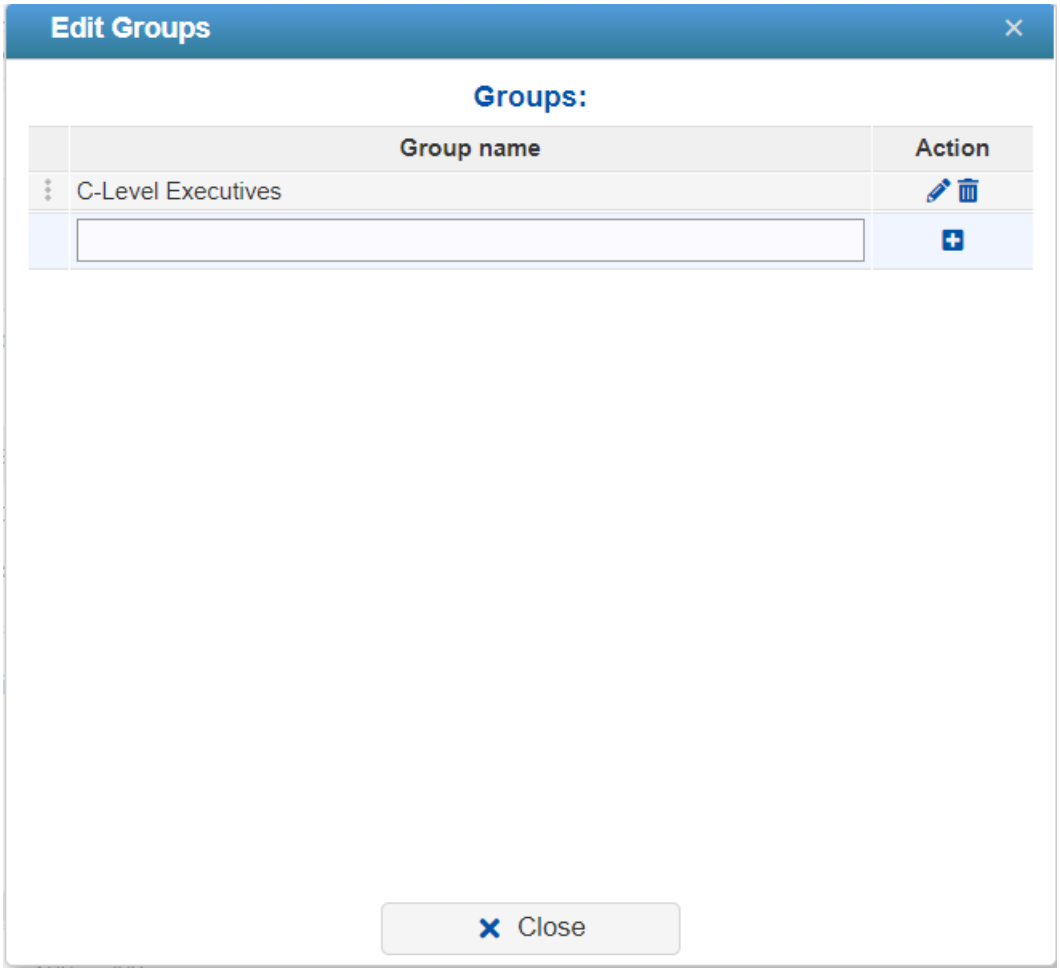
Participant Groups can be:

- Dynamic - in which membership is determined based on the **Participant attributes.**
- **Non-dynamic** - membership is manually assigned by the Project Manager, or as specified when getting the AnyTime General Invitation link.

Click the 

button.

The Manage Groups dialog box will be displayed where you can add, edit, and delete groups.



To add a new one, type the Group name in the text box and then press the plus icon:

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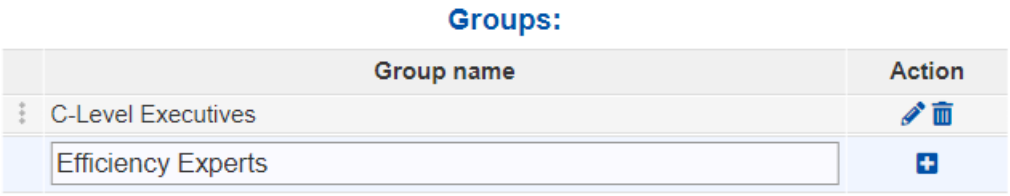
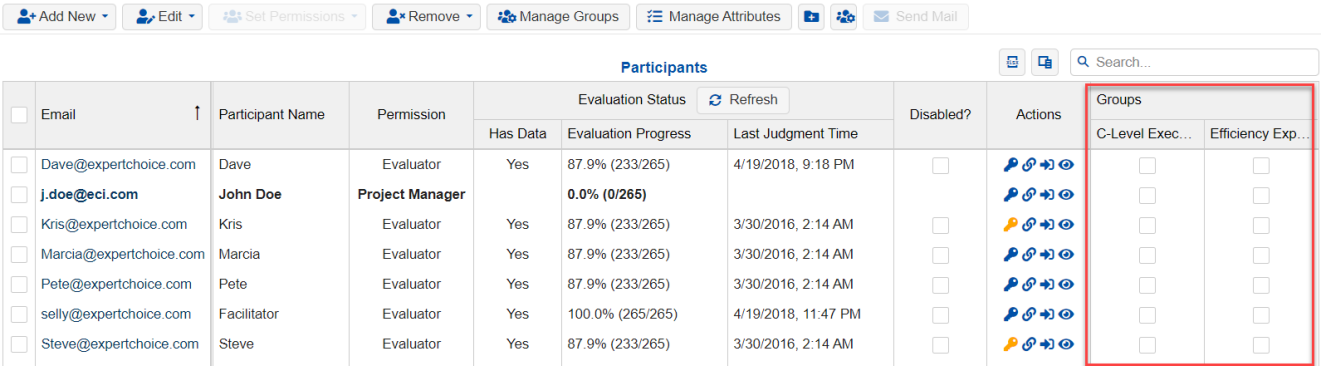


Groups are displayed as columns on the Participants table.



Groups added from the Manage Groups window have a **white** background color. You can manually assign the participants to the groups by checking the corresponding checkboxes on the Groups columns.

Participant Groups can also be **Dynamic** -- in which membership is determined based on the **Participant attributes**. Dynamic Groups columns have a **gray** background and the checkboxes are disabled. Dynamic Groups are discussed **here**.

Managing Participant groups is also available on the Participants Group page.

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Participant Attributes

Participant Attributes can be managed in the **DEFINE MODEL > Define Participants & Roles > Participants** page.

Overview

Participant attributes are the attributes or properties that are assigned to the participants. Participant Attributes are used to:

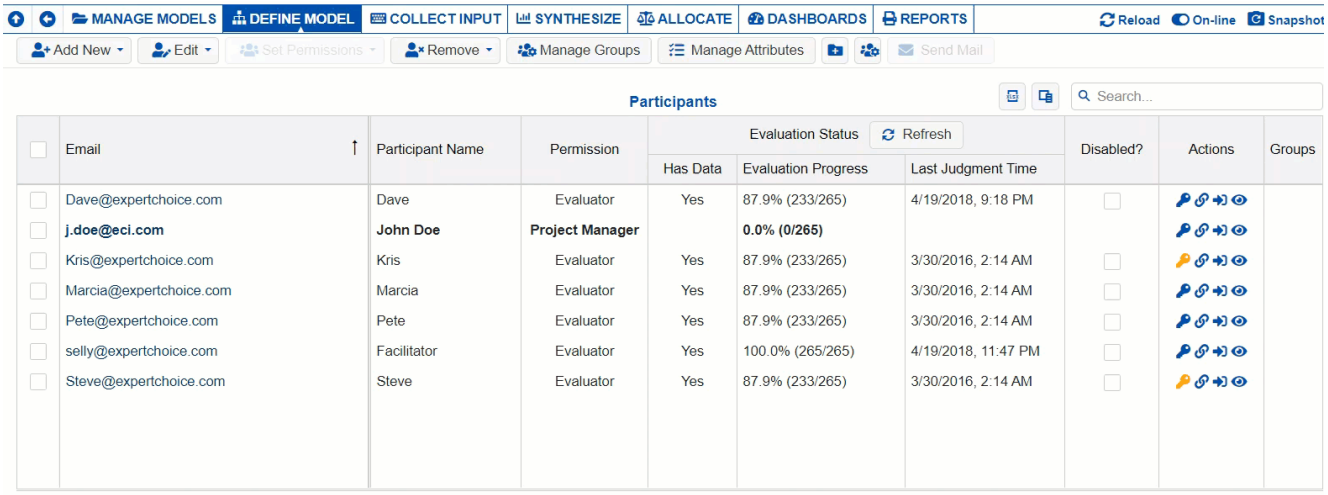
- Create Dynamic Groups,
- Filter Alternatives in the Synthesize Results pages.

You can add participant attributes in two ways:

Manage Participants Attributes

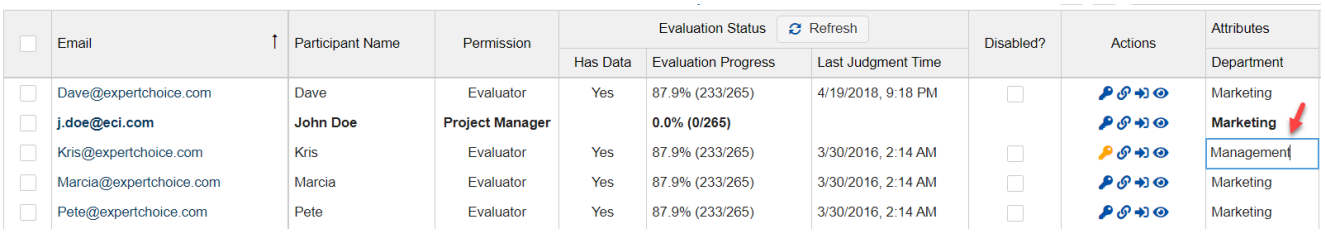
Clicking the Manage Participant Attributes

opens a dialog box where you can add, edit, or delete participant attributes.



The added participant attributes are displayed as new columns on the Participants table.

The attribute values are pre-populated if the "Default Value" is specified; otherwise, the cells will be blank. The Project Manager can update the values by clicking on the cell and then typing in the value as desired. Only Participant attribute cells with white backgrounds are editable.



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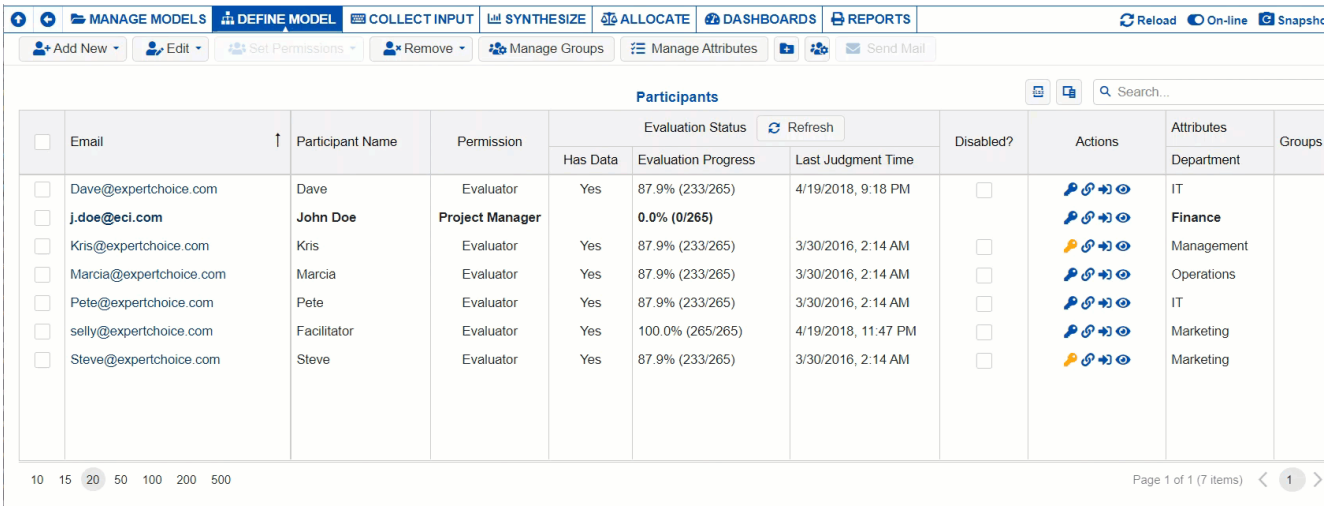
Add Attributes Using Insight Question

Participant Attributes can be added from Insight Questionnaires by clicking .

Participant Attributes added from Insight Questions are also displayed on the Participants table, but the cells are not editable (greyed out). The attribute values are populated based on the participant answers to the linked insight question.



By default, the attribute name is the same as the insight survey question. We recommend shortening the attribute name if it's from a long survey question. In the example above, the Attribute is renamed to "EvaluateWhat."

The attribute values are populated based on the participant answers to the question, "What do you want to Evaluate?"

From above, the user named "John Doe" is assigned the "Objectives Only" categorical code value for the EvaluateWhat participant attribute. This attribute assignment gets updated whenever John Doe modifies his answer to this insight survey question.

The Project Manager can create Dynamic Groups by checking the "Create dynamic groups check box." See more details about Dynamic Groups here.

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Dynamic Participants Groups

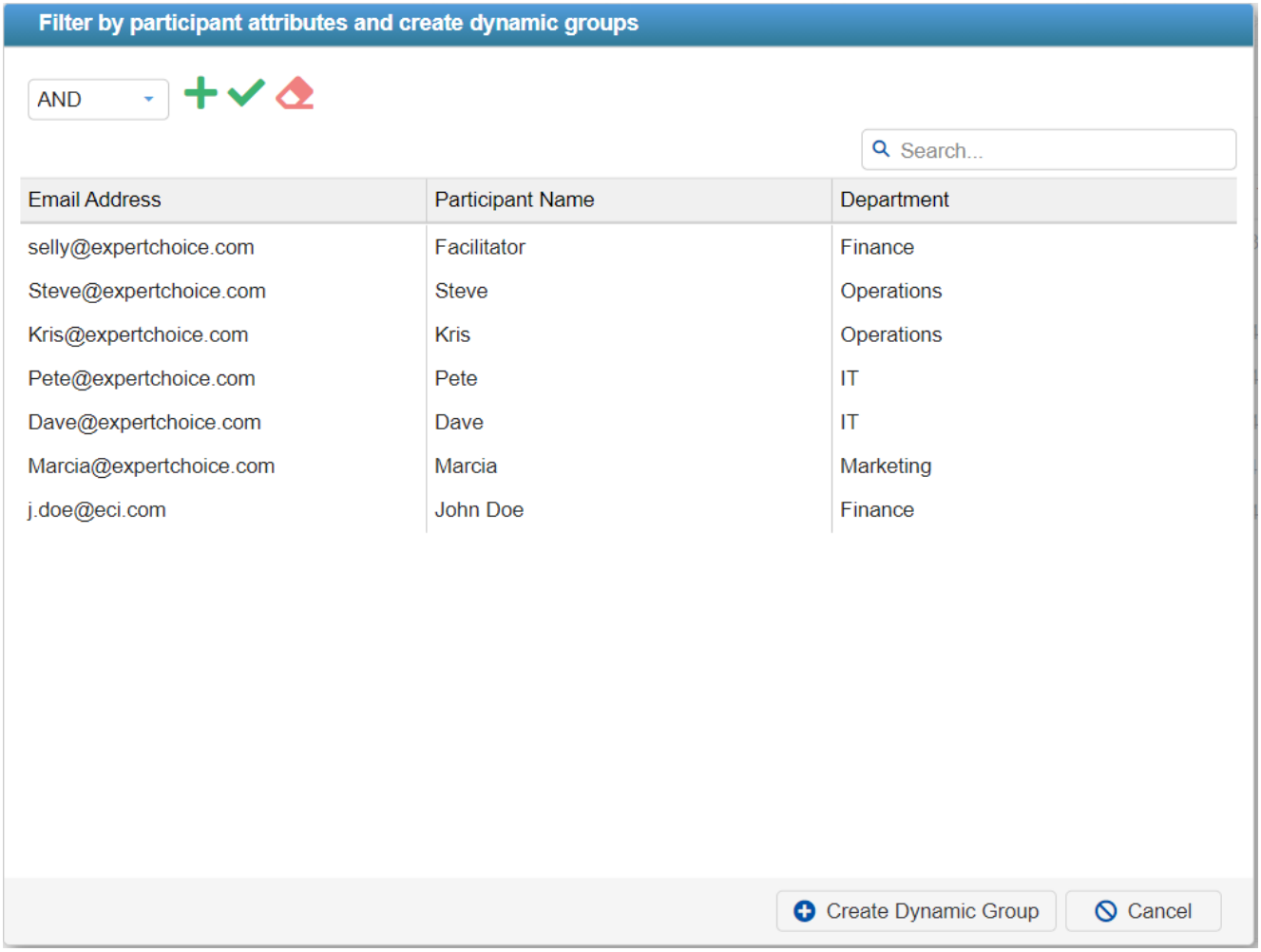
You can create Dynamic Groups in the **DEFINE MODEL > Define Participants & Roles > Participants** page.

A **Dynamic group** is defined as a participant group in which membership is determined by the participant attributes. This allows the Project Manager to define the participant evaluation roles in terms of their attributes.

There are two ways to create Dynamic Groups:

1. Create Dynamic Groups from Participant Attributes Filter

Click to open a dialog box for filtering the participant list by participant attribute:



Here you can specify one or more conditional statements and then create a Dynamic Group based on the created filter.

Click to add a conditional statement:

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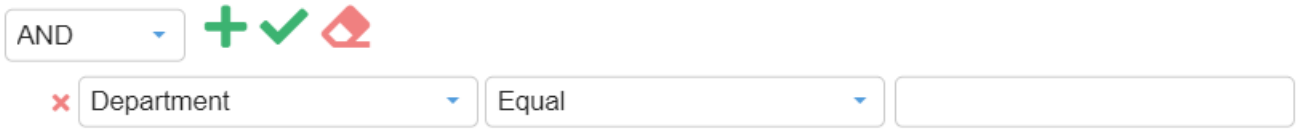
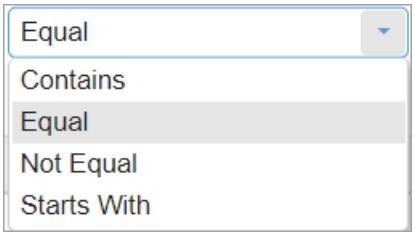


From above, "**Department**" is the participant attribute name when there are more participant attributes in the model; you can click on it to expand the dropdown.

"**Equal"** is the conditional statement. Other conditions are available depending on the attribute type (string, bool, int, long). For string, the following conditions are available:



The last text box is where you will enter the attribute value - for example, " **IT.**"

Click to see the filtered list.

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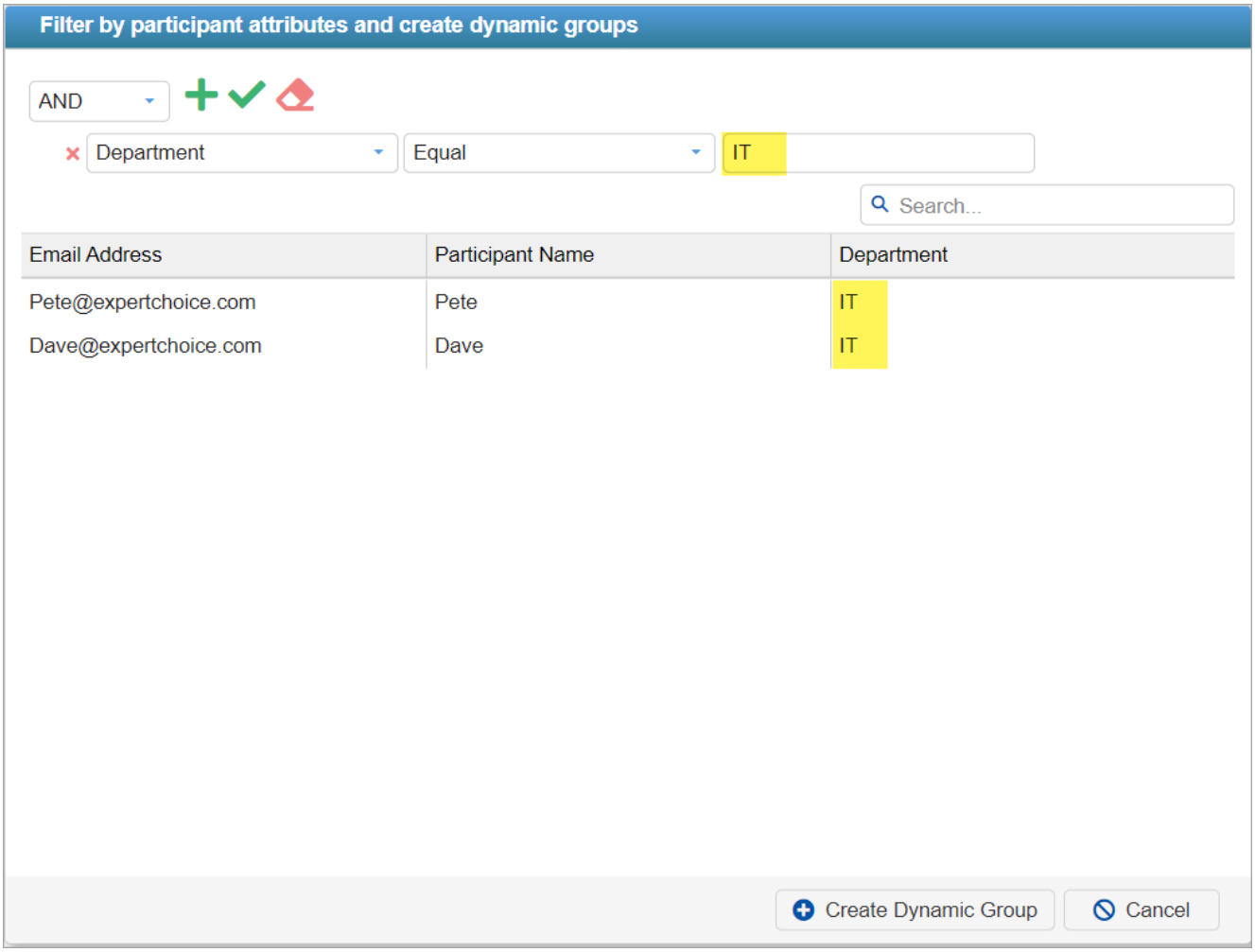
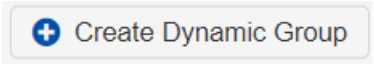
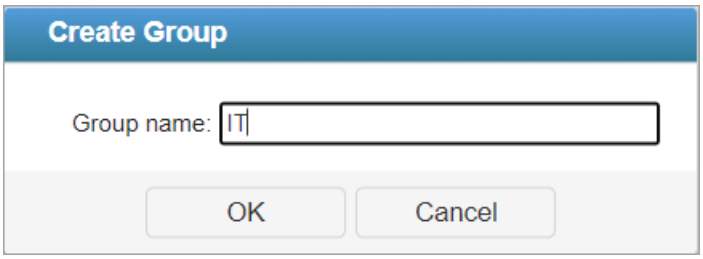


You can add more conditions as needed and specify if:

- **AND** - all conditions must be satisfied
- **OR** - at least one should be satisfied

Click  to create a group based on the current condition.

A dialog box will open where you will specify the group name; in our example, we will enter "IT."



The new dynamic group is added as a new column on the participant grid, under the "Groups" section.

Notice below that the participants with "Department" as IT belongs to the group IT as shown on the checkmark on the IT group.

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Email	Participant Name	Permission	Evaluation Status Load			Disabled?	Actions	Attributes	Groups	
			Has Data	Evaluation Progress	Last Judgment Time			Department	C-Level Exec...	IT
Dave@expertchoice.c...	Dave	Evaluator	Yes	87.9% (233/265)	4/19/2018, 9:18 PM			IT		
j.doe@eci.com	**John Doe**	**Project Manager**		**0.0% (0/265)**				**Finance**		
Kris@expertchoice.com	Kris	Evaluator	Yes	87.9% (233/265)	3/30/2016, 2:14 AM			Operations		
Marcia@expertchoice...	Marcia	Evaluator	Yes	87.9% (233/265)	3/30/2016, 2:14 AM			Marketing		
Pete@expertchoice.c...	Pete	Evaluator	Yes	87.9% (233/265)	3/30/2016, 2:14 AM			IT		
selly@expertchoice.c...	Facilitator	Evaluator	Yes	100.0% (265/265)	4/19/2018, 11:47 PM			Finance		
Steve@expertchoice....	Steve	Evaluator	Yes	87.9% (233/265)	3/30/2016, 2:14 AM			Operations		
z.bayta@eversun.ph	**Project Manager**	**Project Manager**		**0.0% (0/265)**						

The Dynamic Groups cells/checkboxes in the Participant table are disabled (grayed out) since its assignment is based on the participant attributes conditional statement(s); thus it can't be edited.

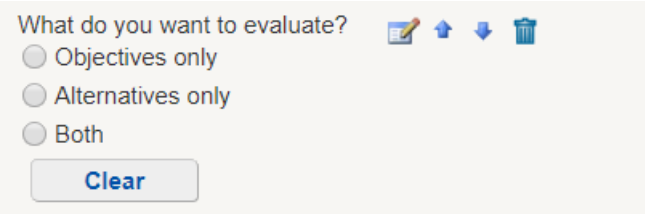
Non-dynamic groups (C-Level Executives in the example above) have a white background and can be edited by checking or unchecking their checkboxes.

The Dynamic group assignment is being updated automatically each time the attribute assignment is changed or modified.

2. Create Dynamic Groups based on Insight Questionnaires

Dynamic Groups can also be added when creating a Participant Attribute from an Insight Question.

For example, we have an insight question:



A Participant Attribute can be created from this insight question, and the possible answers or choices are the dynamic groups the participants can be assigned to, as determined by their answer to the question:

To add dynamic groups from an Insight Question, click the button.

This will open a dialog box listing the insight questions of the model.

Simply select the question you want to link to a participant attribute, and then check the check box to create groups using the answers on the selected survey question.

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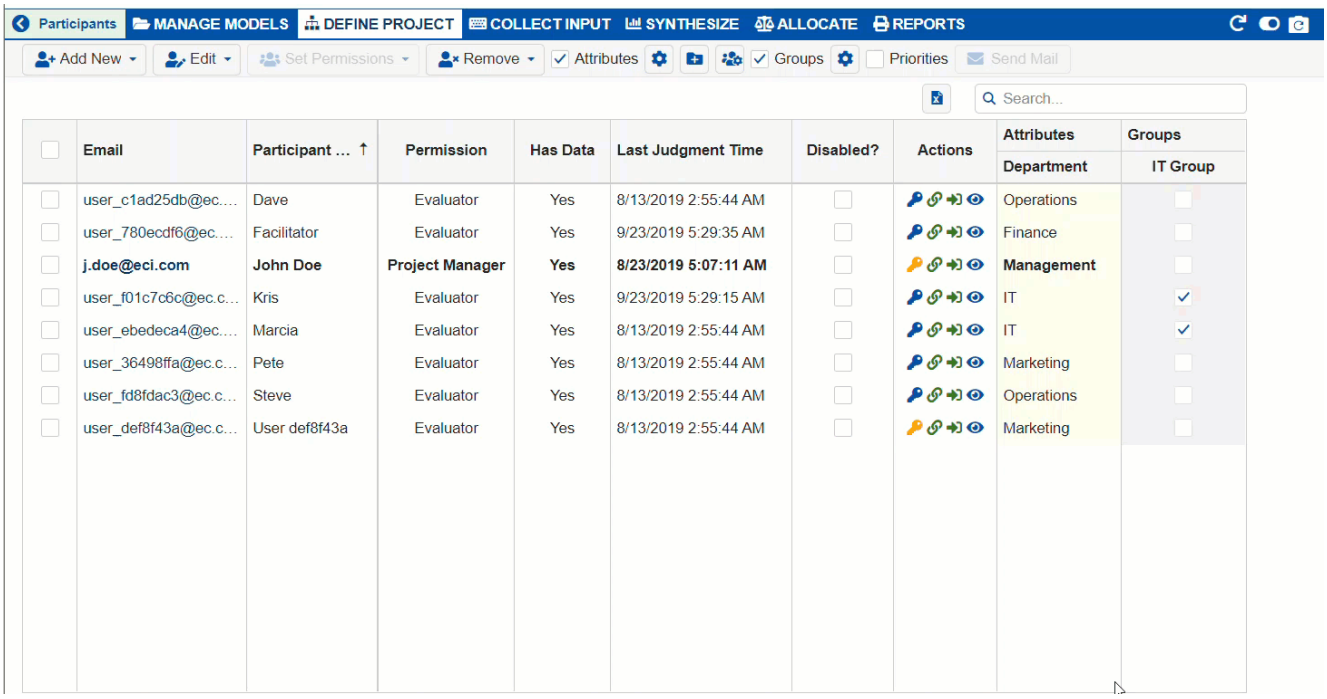

From above, a participant attribute named "EvaluteWhat" was created. The dynamic groups were also created based on the following answers:

- Objectives Only
- Alternatives Only
- Both

Set-up evaluation roles using the Dynamic Participant Groups

When dynamic groups are created, roles can be assigned to the participants dynamically by setting up roles for the dynamic groups.

For example, for the Dynamic Groups added from the Insight Survey above, the Project Manager can assign the roles as follows:

- Objectives Only -- assign roles to evaluate only the Objectives
  - (EvaluateWhat equals "Objectives Only")
- Alternatives Only -- assign roles to evaluate only the Alternatives
  - (EvaluateWhat equals "Alternatives Only")
- Both -- assign roles to evaluate both Objectives and Alternatives
  - (EvaluateWhat equals "Both")
- All Participants -- Undefined or Drop All

When a participant answers the insight question with "Objectives Only" and then clicks the Next button, the participant will be added to the "Objectives Only" group; thus the evaluation will be created according to the "Objectives Only" and "All Participants" roles - that is, to evaluate only the objectives.

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Setting up roles for Dynamic Groups is done on the **DEFINE PROJECT > Participant Roles** page; the process is similar to Setting up roles with groups (non-dynamic).

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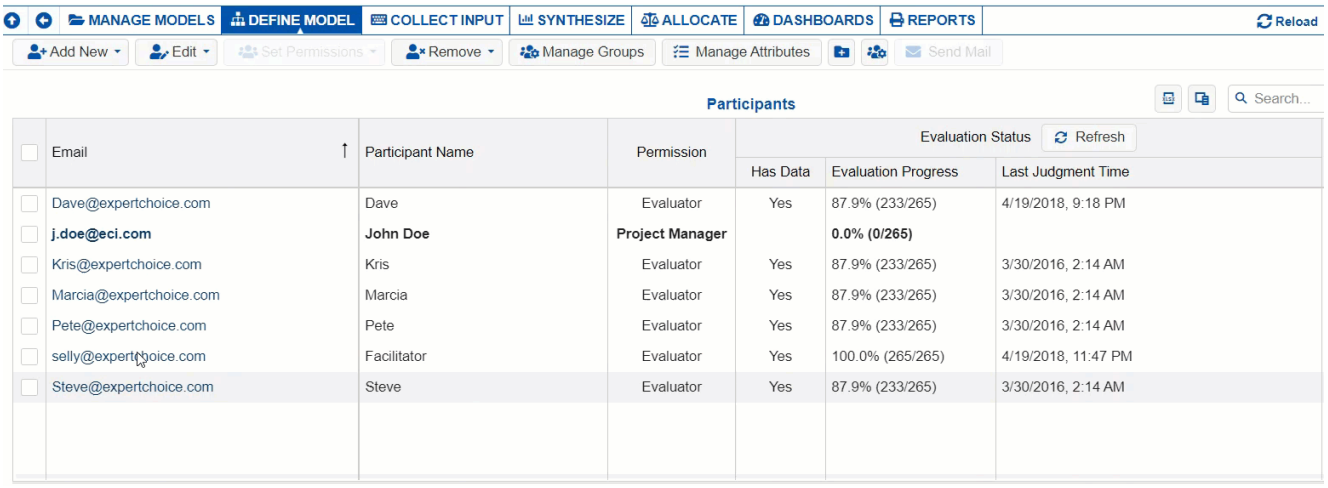
Define Participant Permission in a Model

You can update the model user permission in **DEFINE MODEL > Define Participants & Roles >** **Participants** page.

A model user can be a **Project Manager**, **Evaluator**, **Viewer,** and **Evaluator/Viewer.**



- Project Manager - has overall control over the model
- Evaluator - are participants to evaluate the decision model
- Viewer - can view the structure and results of the decision model
- Evaluator/Viewer - has evaluator and viewer permission

Project Managers are displayed in **bold** font in the project's participant list.

Read the table below to see more of what each role can do.

Model Level Permission

Permission	Project Manager	Evaluator	Evaluator/Viewer	Viewer
Modify model hierarchy	Y			
Modify alternatives list	Y			
Modify alternatives' contributions	Y			
Set specific viewing roles	Y			
Set specific evaluation roles	Y			
Download Model	Y			
Delete Model	Y			
Evaluate Model	Y	Y	Y	
Perform Sensitivity Analysis	Y		Y	Y

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Permission	Project Manager	Evaluator	Evaluator/Viewer	Viewer
View Overall Results	Y		Y	Y
View Model	Y		Y	Y
Use predefined models	Y		Y	Y
Manage Model Participants	Y			
Manage Model options	Y			

Assigning a **Project Manager** permission depends on the Workgroup Permissions (System Manager, Workgroup Manager, Project Organizers, Workgroup Members) of a user.

All Workgroup Users except Workgroup Members can be Project Managers.

Workgroup Permission	Can be a Project Manager?
System Manager	Y*
Workgroup Manager	Y*
Project Organizer	Y**
Workgroup Member	N

* user automatically becomes a Project Manager when they access a project for the first time.
** Optional as assigned by the Project Manager. A Project Organizer who creates a model is a Project Manager of that model.

When you try to set a Project Manager permission to an Evaluator that is only a Workgroup Member, a confirmation prompt asking to make him/her a Project Organizer will be displayed. Click OK to agree.

Note also that a Workgroup Manager in a Workgroup is always a Project Manager in each model.

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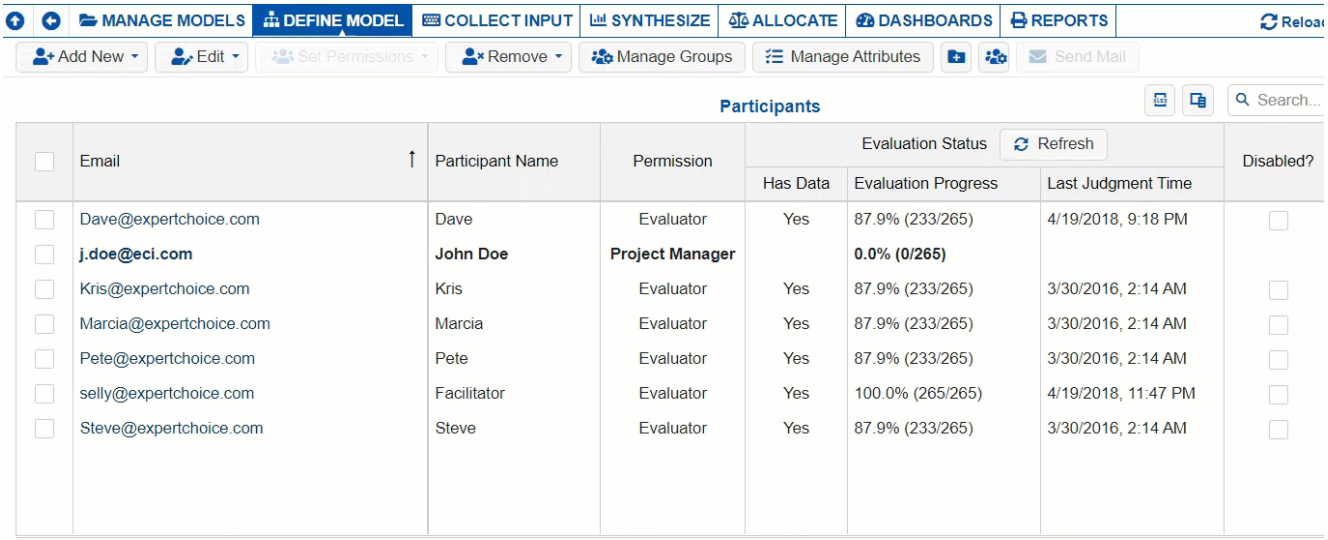
Enable or Disable Participants

You can enable or disable model participants from **DEFINE MODEL > Define Participants & Roles >** **Participants** page:



To enable or disable model participants:

- check (disable) or uncheck (enable) the check box on the "Disabled?" column; or
- select the participant(s) you want to enable or disable, and then click the Edit button and select Enable or Disable.

Disabled participants are displayed in grey font color. Disabled participants will not be able to enter judgments but judgments they previously entered will be included in computing results. If you don't want this to be the case, you can restrict roles for the disabled participant or delete their judgments as described above.

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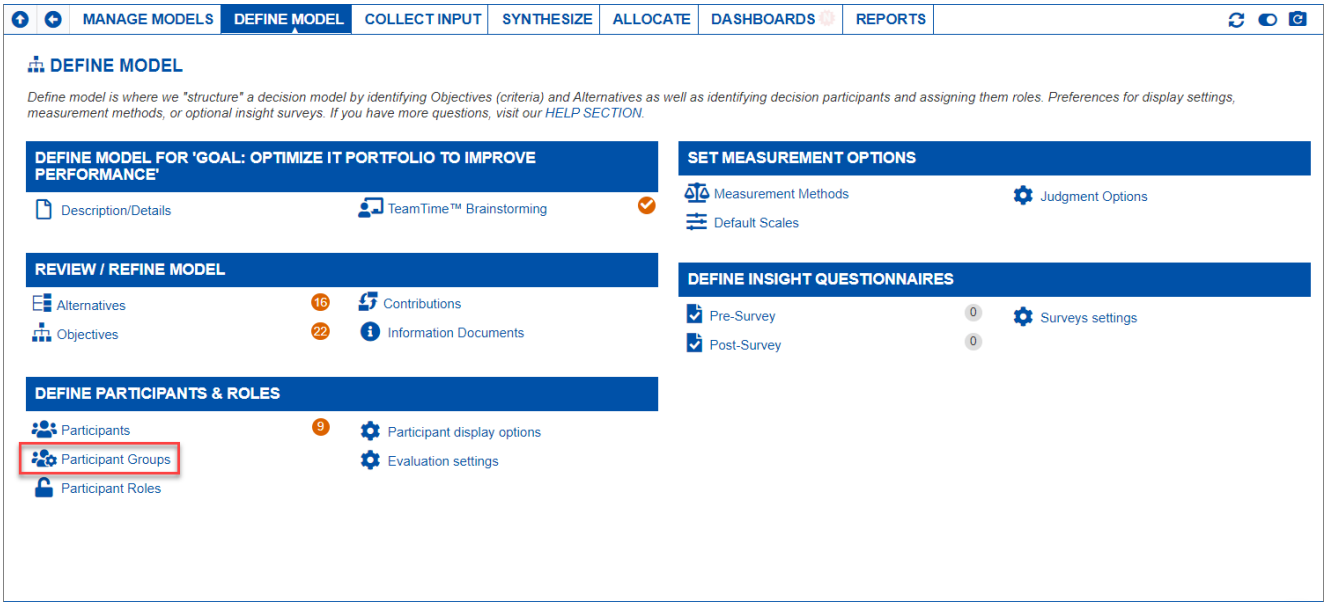
Manage Participant Groups

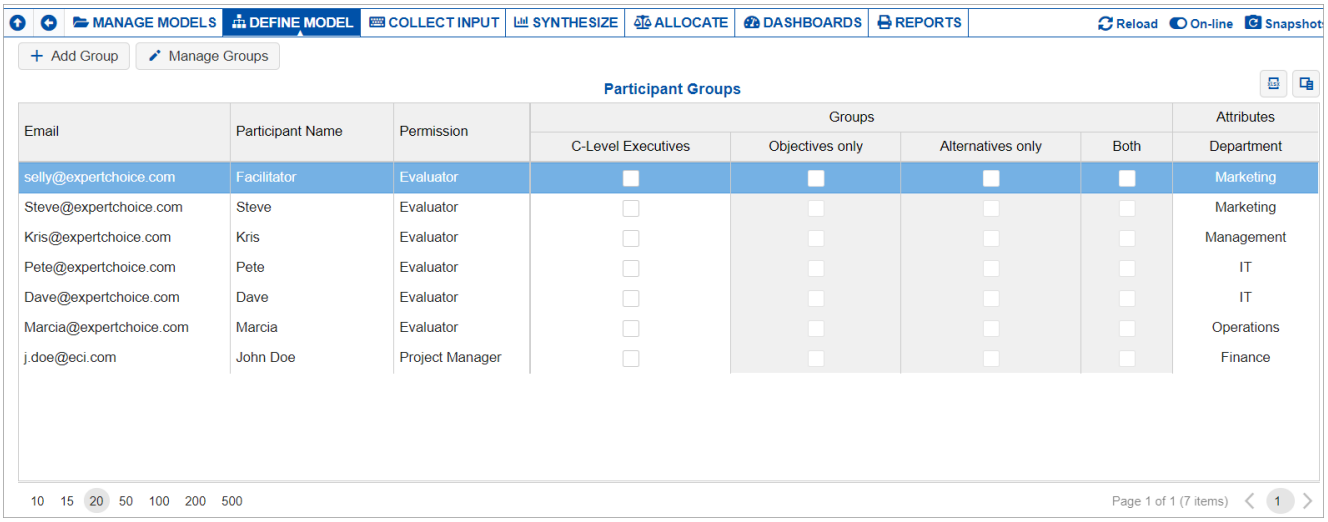
You can add, edit and delete the participants' groups from **DEFINE MODEL > Define Participants & Roles >** Participants Groups page.



Participant Groups can be used when:

- Setting up roles and
- Displaying results

Groups are displayed as columns as shown below.



Groups can either be **Non-dynamic** or **Dynamic**. Both types are displayed on the grid, but only Non-dynamic groups can be added to this page.

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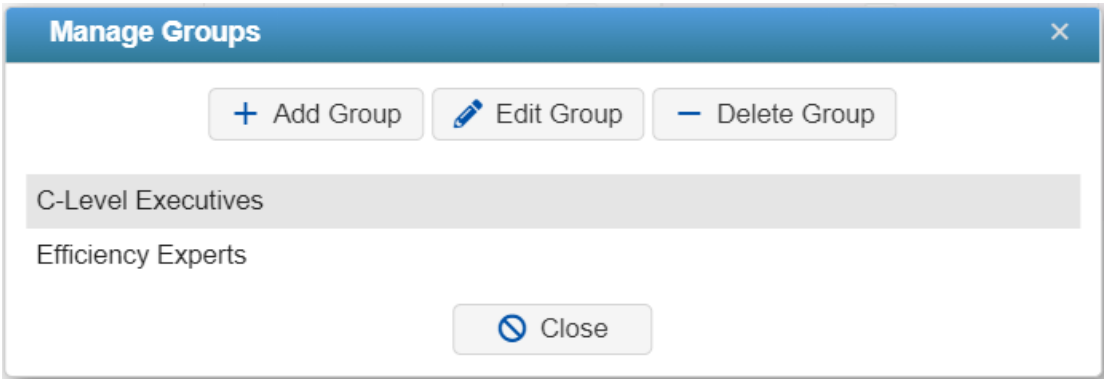
You can add new (non-dynamic) groups by clicking the + Add Group button.

Alternatively, you can click the Manage Groups which will open a dialog box where you can add, rename or delete groups.



You can manually assign the participants to the groups by checking the corresponding checkboxes on the Groups columns.

Dynamic groups - in which membership is determined based on the **Participant's attributes** are displayed with a gray background to indicate that they are non-editable.

Participant attributes columns are also available on the grid.

Managing groups with participants attributes and more options are available on the **Participants** page.

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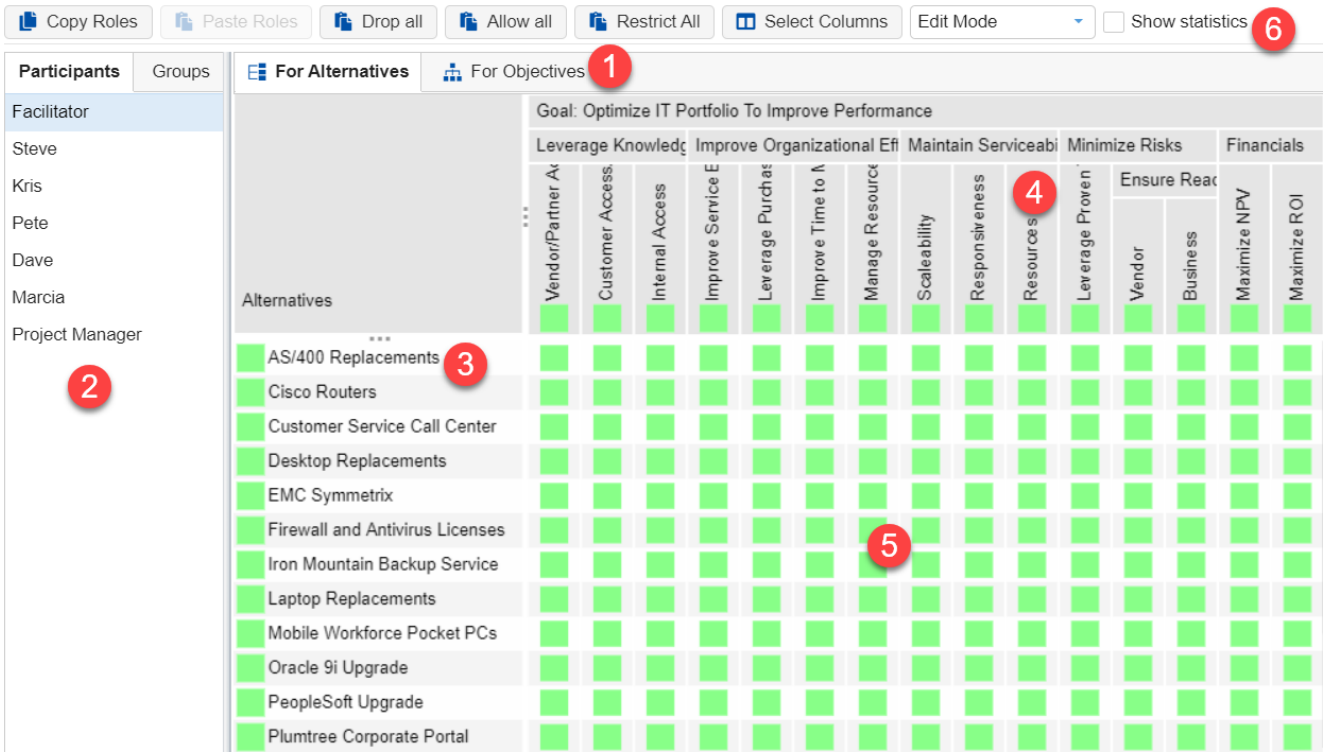
Participant and Group Roles Overview

The Participant Roles page consists of:



1. The **For Alternatives/For Objectives** tabs to assign roles for alternatives and for objectives respectively.
2. The **Participants/Groups tabs** toggle between the participant's list and the group's list of the model.
3. The first column of the grid displays the **Alternatives list.**
4. The grid headings (next to the Alternatives) display the **Hierarchy of Objectives**.
5. The intersecting cells were to assign roles for **evaluating the alternative (row) with respect to covering objectives (column)**.
6. **Toolbar** options.

Roles can be set for:

- The "All Participants Group" (every participant belongs to **"All Participants")**
- Any Defined Participant Groups (non-dynamic and dynamic groups)
- Each individual Participant Roles

How Roles are processed -- Three rules:

1. A role explicitly assigned for a participant **OVERRIDES** any role defined for:
    - The "All Participants Group"
    - Any defined groups to which the participant belongs
2. Roles for the "All Participants Group" and any Defined Groups have the same priority
3. A restrict role overrides an Allow role

Roles can be assigned for:

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- Sub-objectives with respect to their parent Objective and
- Alternatives with respect to covering objectives

Assigning roles without groups is a simpler way of setting up roles. **Setting up roles with groups** is a very flexible and powerful method but somewhat more complex.

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Setting Up Roles without Groups

Roles can be assigned to Participant Groups (custom groups or a pre-defined group called "All Participants") as well as to individual participants. The resultant role for a participant is a combination of the roles assigned to any group to which the participant belongs (including the pre-defined "All Participants" group) and any role explicitly assigned to the individual participant.

In this topic, we will focus on **Setting up roles without groups**. For the purpose of setting roles without using participant groups, all we need to know now is that a participant will have a role for every node (as defined by the "All Participants" group which by default is Allowed) unless they are explicitly restricted for one or more nodes.

Since each participant has an **implicit** allow role for every node, the easiest way to set roles is to restrict nodes for which a participant should not have a role. (There is no need to explicitly allow roles when participant groups are not being used.)

Roles for Evaluating the Objectives

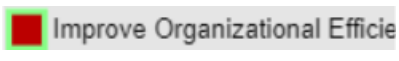
Click the "**For Objectives**" tab to assign roles for evaluating objectives. Roles for evaluating the objectives are represented by the colored boxes on the non-covering objectives as below:

The headers are arranged according to the objectives hierarchy/leveling. For example, the Goal is the top-most node and its top-level objectives are Leverage Knowledge, Improve Organizational Efficiency, and so on.

An "Allow" role for the goal node means that the participant will have the role of evaluating the top-level objectives with respect to the goal. The allow role for an objective node means that the participant will have the role of evaluating the sub-objectives with respect to that objective.

You will notice that all of the cells in the figure above have a background of light green because, by default, the "All Participants" group has an "allow role" for everything, and we have not defined any custom groups that might have had one or more "restrict" roles.

In addition to the implicit assignment of roles based on participant groups, an explicit role can be specified for a participant (either allow or restrict). If this is the case, there will also be an interior color for the node and the background color will appear as a border.



The "Improve Organizational Efficiency" node has an explicitly restricted role in the figure above and thus appears as a red interior with a green background or border. Since restrict overrides allow (details of the rules are below), the participant would

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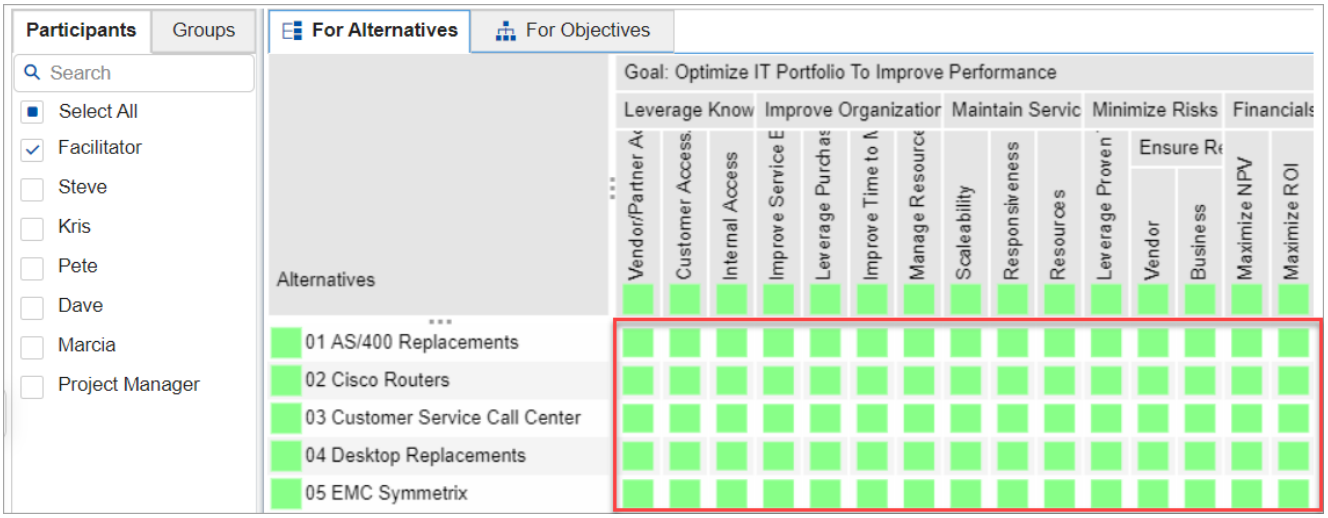
not have a role in evaluating the sub-objectives of "Improve Organization Efficiency" with respect to their parent (Improve Organization Efficiency).

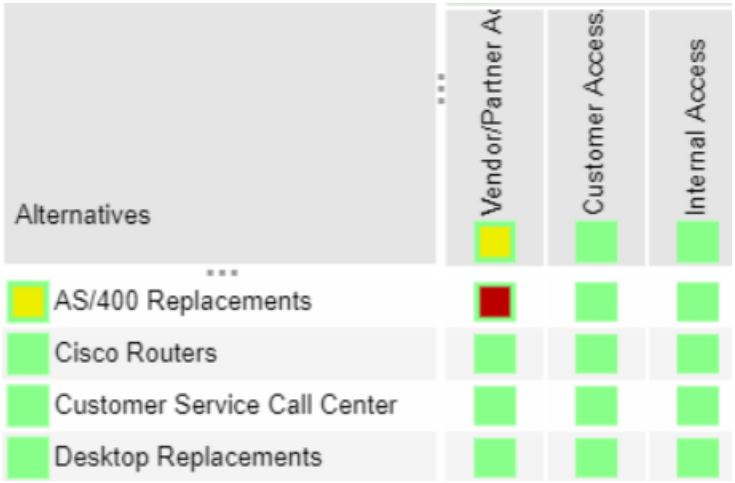
Roles for Evaluating the Alternatives

Click the "**For Alternatives**" tab to assign roles for evaluating alternatives. Roles for evaluating the alternatives are represented by the boxes on the intersecting cells of the alternatives (row) with respect to the covering objectives (column) -- see below.

All of the intersecting cells in the figure below have a background of green because, by default, the "All Participants" group has an "allow role" for everything.



In addition to the implicit assignment of roles based on groups, an explicit role can be specified for a participant (either allow or restrict). If this is the case, there will also be an interior color for the cell and the background color will appear as a border.



"AS/400 Replacements" in the figure above that has an explicit restrict role -- and is shown as a red interior with a green background or border -- when evaluating with respect to covering objective "Vendor/Partner Access."

The yellow interior color on the "AS/400 Replacements" represents that the participant has different explicit roles for evaluating "AS/400 Replacements" with respect to the covering objectives -- from above, one is restricted while others are "undefined" (no interior color). Same reason for the yellow interior color for the "Vendor/Partner Access" cell.

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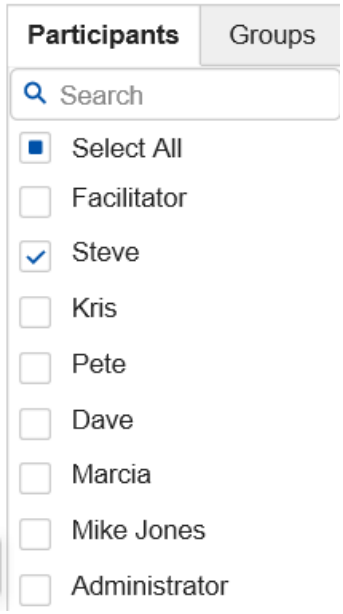
Note: If there is a blank cell, this means that the alternative doesn't contribute to the covering objective.

How Participant Roles are Assigned?

We can assign roles explicitly while in Edit mode. Edit mode is the mode selected by default.

To assign roles to a participant, simply check the check box to the right of the participant's name on the left pane:



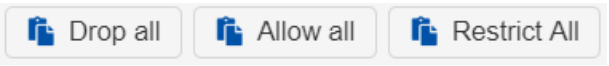
You can also select **multiple participants** at a time for assigning roles using the Shift and Control keys.

By successively clicking on a cell, the **interior** color of the cell will change to:

- dark green (indicating a role that is allowed explicitly);
- dark red (indicating a role that is restricted explicitly); or
- light green (indicating a role that is allowed implicitly, based on participant group roles).

You can click the Legend to open the color legend.

You can set the roles for **all alternatives or objectives at once** by using the:



- **Allow All** (explicit allow),
- **Drop All** (no explicit specification), or
- **Restrict All** (explicit restrict)

buttons, and then selectively click other nodes as desired.

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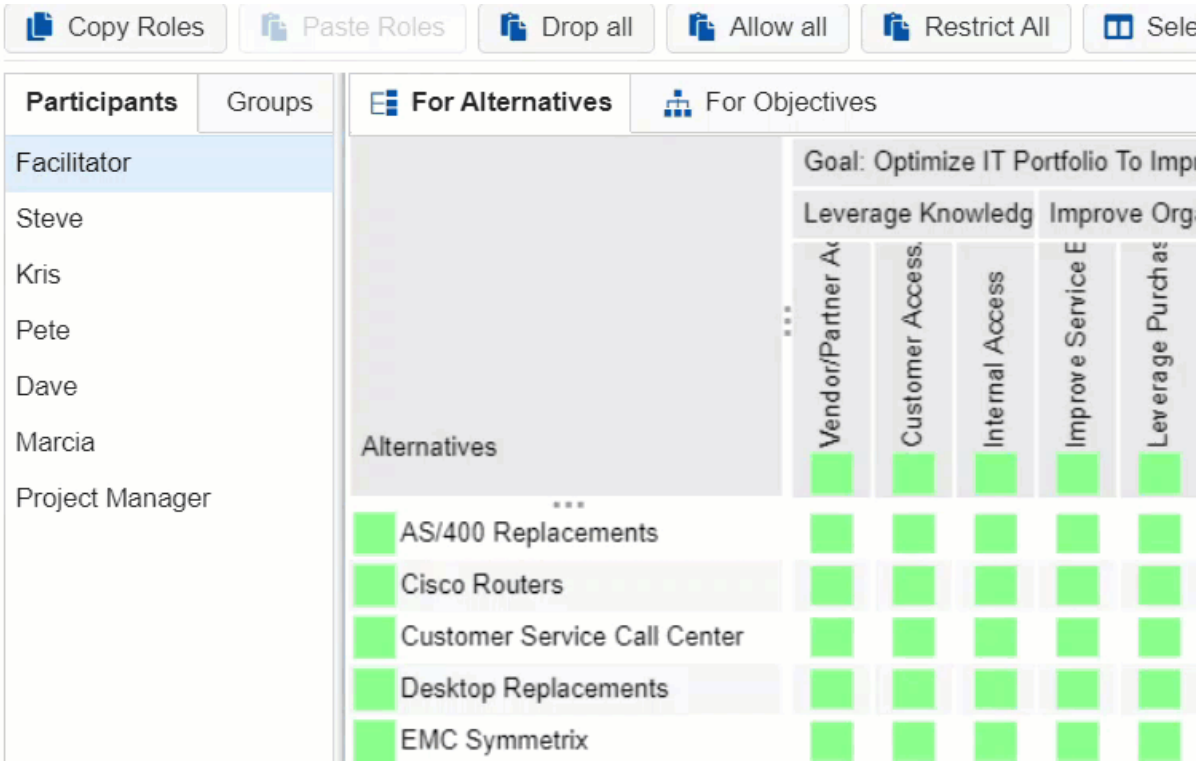

For alternatives, you can also define the role for:

(1) one alternative with respect to all covering objectives; or

(2) all the alternatives with respect to one covering objective at once,

by clicking the box on the alternative or covering objectives names.

The yellow interior on the alternatives names (rows) and covering objectives (columns) represents that the participant has different explicit roles for evaluating the alternative with respect to each of the covering objectives; or that the participant has different explicit roles for evaluating the covering objective given each of the alternatives.

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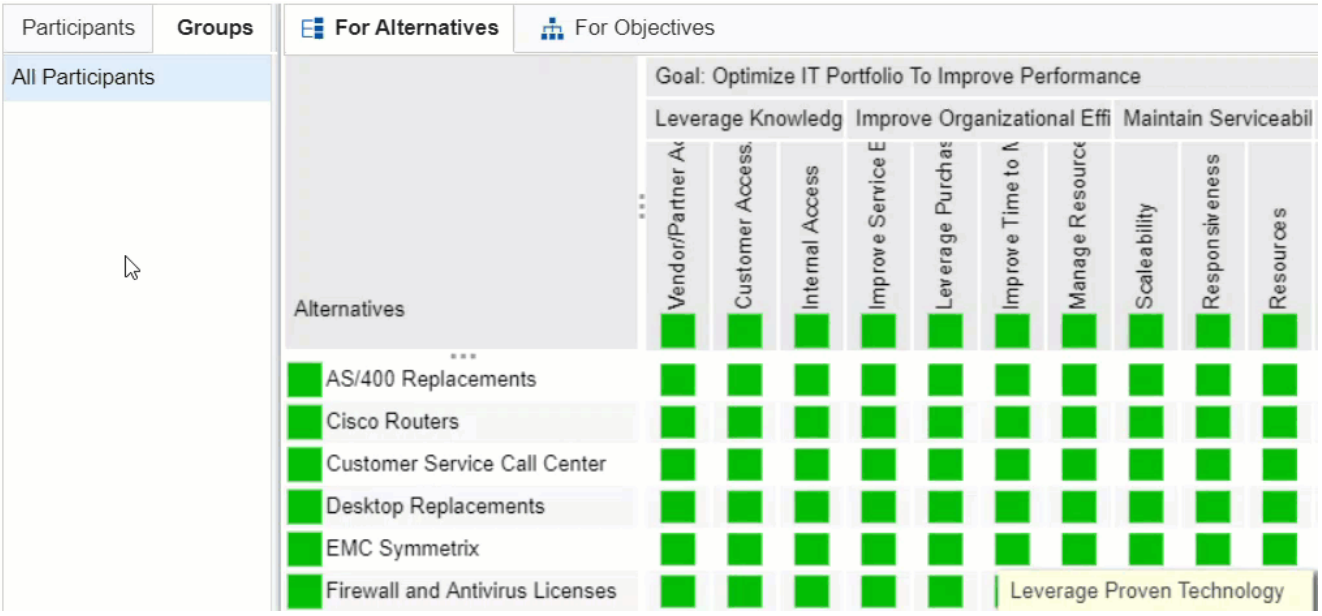
Setting Up Roles with Groups

Setting up roles with groups is a very flexible and powerful method, but somewhat more complex.

Every participant belongs to a Participant Group called "All Participants."

The All Participants group initially has an "allow" role for all cells as seen below:



You can create additional Participant Groups from the Participant page.

Similar to Setting up roles without groups , you can also assign roles to groups by clicking on the cells individually, by entire row or column, or by using the Allow/Restrict/Drop All buttons.

There are three types of roles that can be specified for groups:

- Allow
- Restricted
- Undefined (Neither Allowed nor Restricted)

You can click the Legend to open the color legend.

The role of a participant for any node depends on:

- Roles for the "All Participants" Group
- Roles for any defined Participant Group to which the participant belongs
- Roles explicitly assigned for the participant

Each Column in the following figures represents a Case Illustrating the Above Rules

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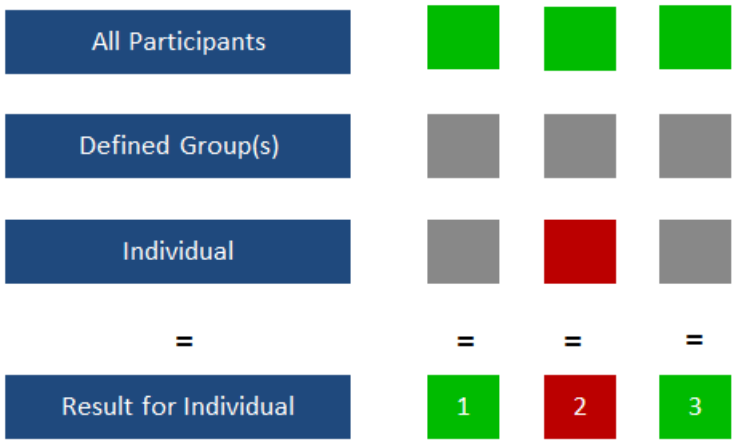
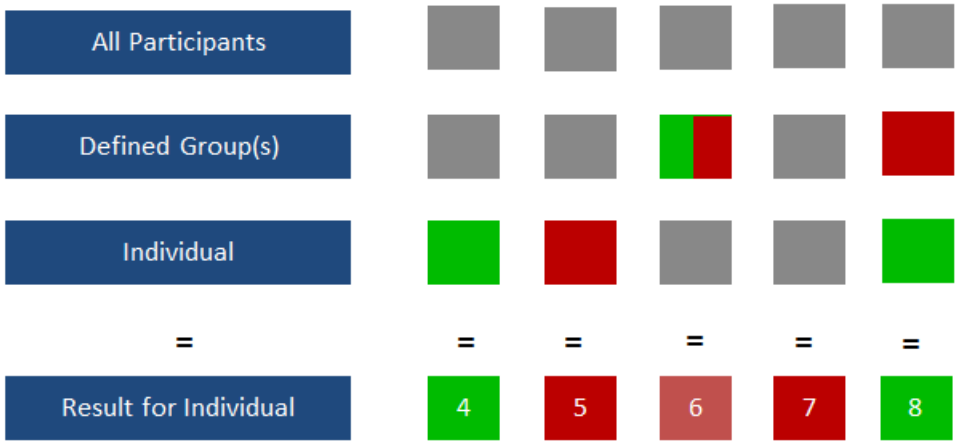


Case 1 is the default. The result is Allow.

Case 2 is a simple way to restrict individual roles.

Case 3 is equivalent to case 1.



To use roles with groups, we recommend that you start with No Specifications for the "All Participants" group.

Cases 4 and **5** are obvious.

Case 6 shows that a restricted group specification overrides an allowed group specification (Rule 3).

Case 7 illustrates that if no roles are allowed for All Participants and Any Groups, then the Individual's role is Restricted.

Case 8 shows an Individual Participant's role overrides any group roles (Rule 1).

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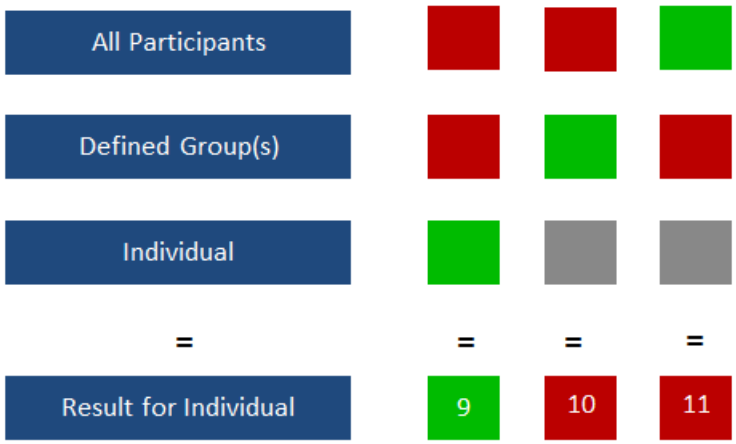

Case 9 An Individual's specification overrides any group specifications (Rule 1).

Cases 10 and **11** show a restricted group specification overrides an allow specification (Rule 3).

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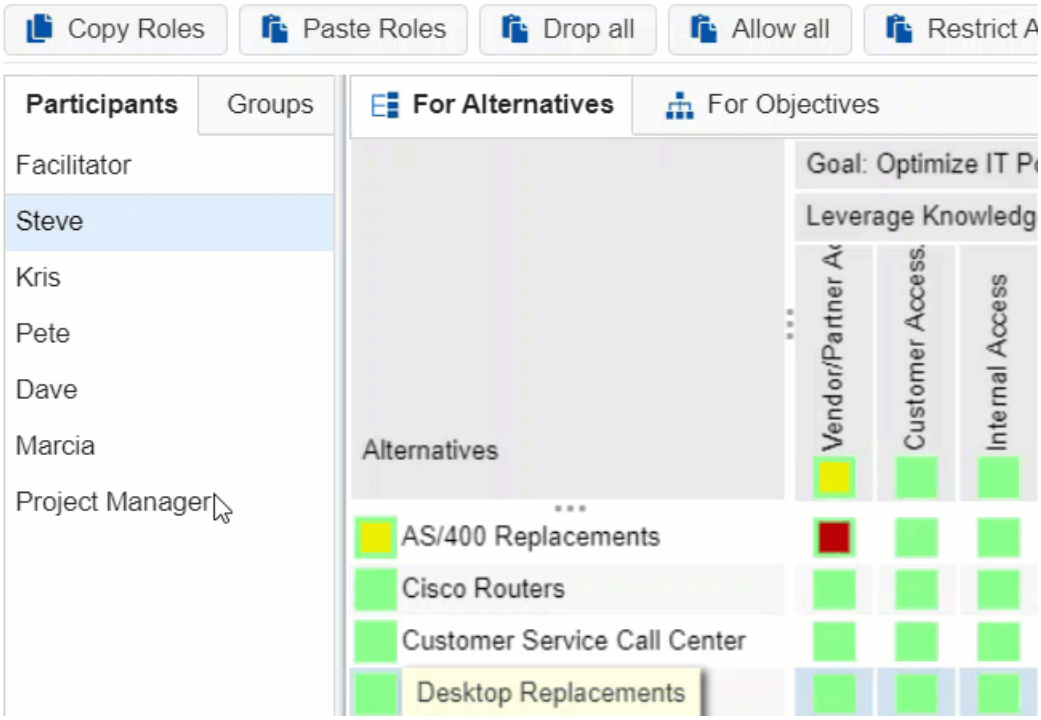
Copy and Paste Roles

You can copy roles from one participant to another:

1. Select the participant(s) whose roles you want roles to copy
2. Click Copy Roles
3. Select the participant(s) you want to copy the roles to
4. Click Paste Roles



You can also select multiple participants to whom you want the roles to be copied.

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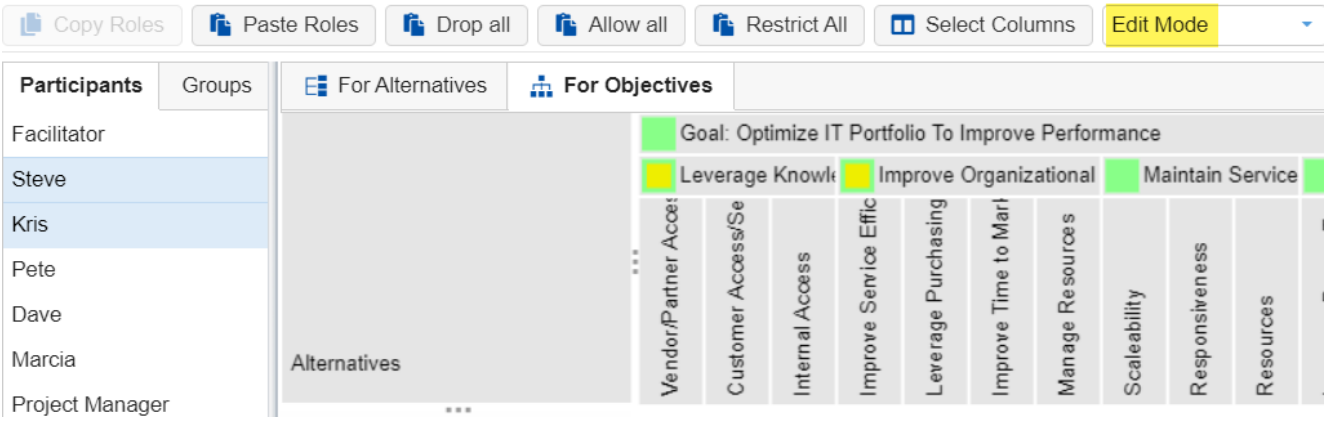
Participant Roles Edit vs View Mode

Edit Mode

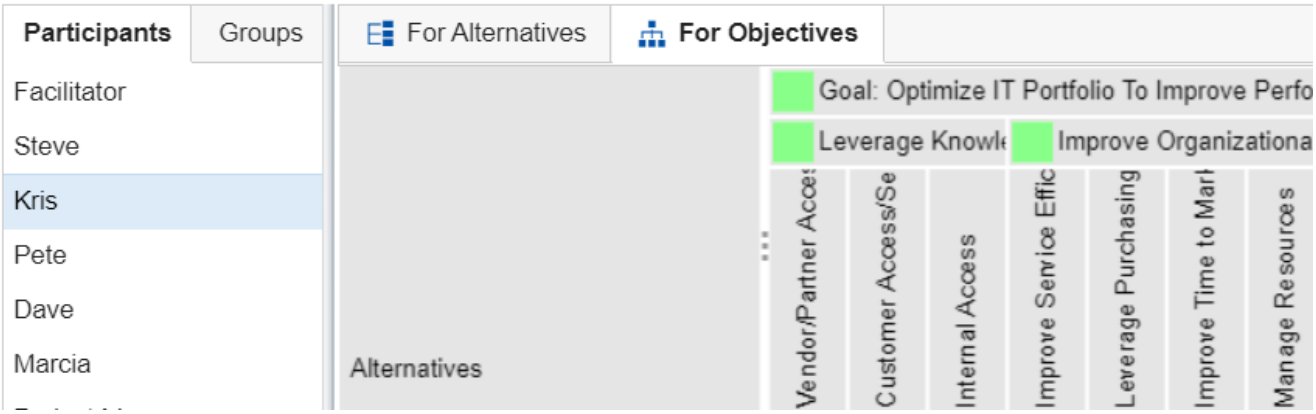
The **Edit Mode** is a mode where the Project Manager can assign roles by clicking on the cells or using the Drop/Allow/Restrict All options.

Two participants are selected in the example below. The border of the node (in this case light green for all nodes) reflects the roles implicitly assigned to the participants based on the roles assigned to the groups they are in. The interior represents the role, if any, explicitly assigned to the selected participants.



To better understand what the yellow means, let's look at the roles assigned for objectives for Chief Risk Officer and Chief Engineering Officer, one at a time.

First for Kris: As we see below, the interior of the nodes for Kris is a light green, the same as the border, meaning that neither allow nor restrict was specified for any node for Kris (if a role had been previously specified, it has been "dropped"). Thus, Kris has a role for every objective and sub-objective based on the roles assigned to groups to which Kris belongs.



Now let's look at Steve's roles:

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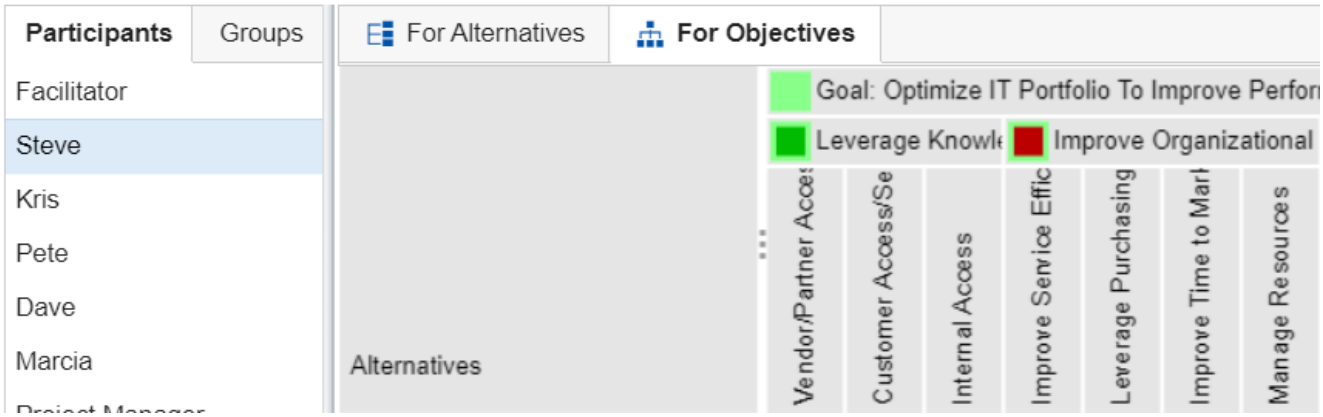
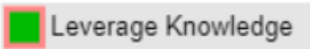


As can be seen above, Steve has been explicitly assigned a role for Leverage Knowledge and explicitly restricted a role for Improve Organizational Efficiency. The explicit assignment for Leverage Knowledge doesn't have any impact since, as can be seen from the border of that node, Steve would have had that role based on the roles of the groups to which Steve belongs. However, if the role for Leverage Knowledge for one of the groups that Steve belongs is later changed to "restrict," this explicit assignment would override it since an explicit assignment for an individual overrides any group role assignments. If that were the case, then Steve's node for Leverage Knowledge would have looked like:



Let's now turn our attention to the display when we look at the roles with both Steve and Kris selected on the first image above.

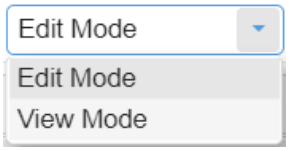
A node is displayed as yellow in the Edit Mode if the individual role explicitly assigned to all of the selected participants is not the same. Leverage Knowledge is yellow because Steve has an explicit role assigned for this node, but Kris does not -- so they are not the same. Improve Organizational Efficiency is yellow because Steve has an explicitly restricted role while Kris has no explicit role -- so again, they are not the same.

From the example above we can see that, in the Edit mode, we can determine whether the individual roles for the selected participants are the same or different.

View Mode

As discussed above, the "Edit mode" is the mode used to assign roles. We cannot determine whether the resulting role for all the selected participants is the same or not from this display. The resulting roles can be determined using another mode called "**View mode.**"

You can switch to the View mode using the menu as shown below:



If we look at the display for the same example above for the "view mode," we would see the following:

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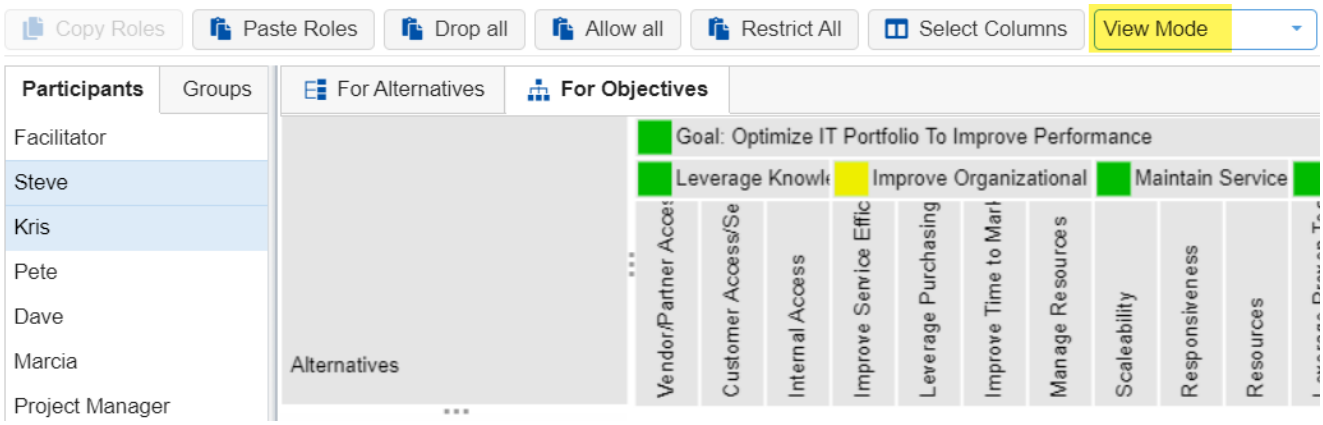

Since both Steve and Kris have the same resulting role (allowed) for Leverage Knowledge, even though they have different explicit assignments, the node is shown as green. The Improve Organizational Efficiency node is still yellow because one of the participants has the role and the other does not. We would have to look at each participant individually to see which one has that role and which one does not.

Examining roles for all participants in the View mode

It is advisable to select all participants in the "View" mode to see if there are any nodes that are red, meaning that no participant has been assigned the role for that node.

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Selecting Multiple Participants for Roles

You can select multiple participants or groups at a time for assigning roles. You can check one or more participants or groups in the left pane and then click a node on the right to allow or restrict roles for the highlighted participant.

You have the following options to select multiple participants (or groups) from the list. These options work on Windows and Macintosh.

1. **Using CTRL key**
   Hold the CTRL key and click the participants or groups in the list to choose them. Click all the items you want to select. They don't have to be next to each other.
   Click any item again to deselect it, e.g., if you have made a mistake. Remember to keep the CTRL key pressed.
2. **Using SHIFT key**
   If you want to **select items that are adjacent**, you can use the **SHIFT key**. Click the first item, then press the SHIFT key and hold it. Click the last item and release the SHIFT key.
3. **Both SHIFT and CTRL Keys**
   You can also use both SHIFT and CTRL keys together. For example, you can deselect an item from a row selection that you have created with the SHIFT key when you hold the CTRL key and click the item you want to deselect.

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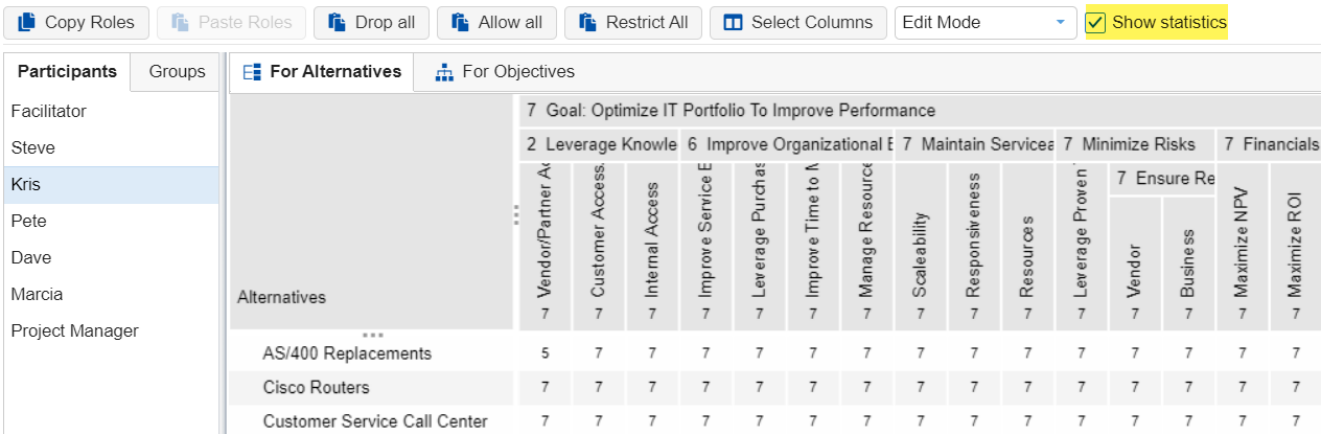
Participant Roles Statistics

You can view the number of participants that have an allowed role by checking the **Show Statistics** check box.



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Recommended Approaches for Setting Roles for the 'All Participants' Group

Participants can be assigned roles with or without groups. In the former case, we advise leaving all roles allowed for the All Participants Group as they are set by default. In the case of assigning roles using groups, we advise starting by dropping all roles for the All Participants Group. There is one additional contingency to take into consideration: If new participants are added to the model after roles have been assigned to existing participants, what do we want the roles for the new participants to be? We describe three cases:

Case 1) If you want the roles for "new" participants to be "allowed" for everything, then leave the "All Participants" group roles set to "Allow" as they are by default.

Case 2) If you want the roles for "new" participants to be "allowed" for *almost* everything, then leave the "All Participants" group roles set to "Allow" as they are by default; then "restrict" roles for the new individuals as desired or add them to groups that have roles restricted for the desired nodes. (The latter can be done via a survey containing a question that is used to assign new participants to a group.)

Case 3) If you want the roles for "new" participants to be "restricted" unless the new participant is in a group or groups that have specific roles enabled, or only if you explicitly allow roles for the participant, then "Drop All" roles from the "All Participants" group.

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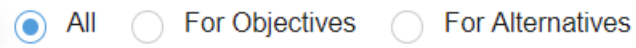
Define Measurement Methods Overview

You can manage the Measurement Methods in **DEFINE MODEL > Set Measurement Options >** **Measurement Methods** page:

The Measurement Methods page is used to designate how priorities are to be derived or assigned:

1. **For objectives** with respect to their **parent objective**
2. **For alternatives** with respect to the **covering objectives**

Depending on the selected option, you can define both the objectives and alternatives measurement methods on the same page or separately:



For example, in the model whose objectives hierarchy is shown below:

Vendor/Partner Access, Customer Access/Service, and Internal Access are covering objectives.

When the **For Objectives** option is selected, we define how the objectives will be measured with respect to their parent.

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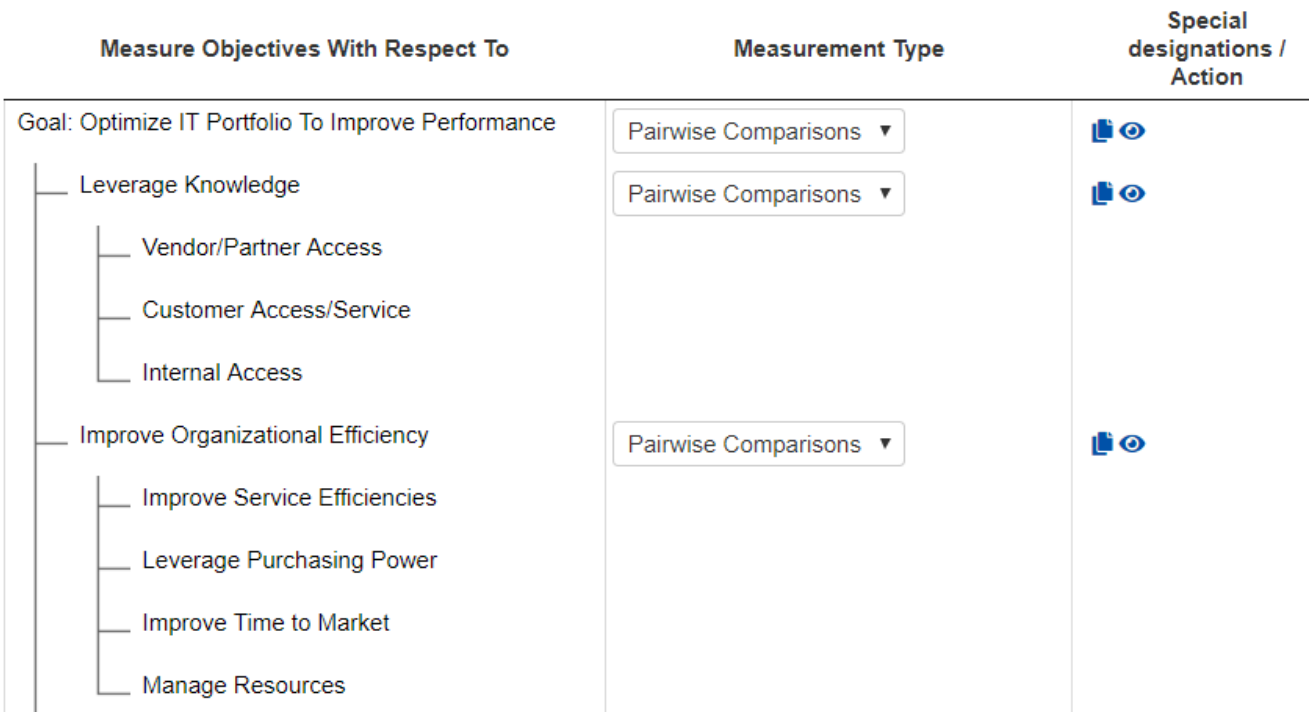
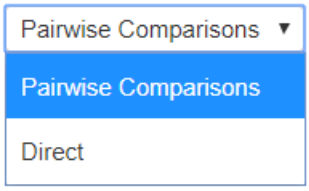


For objectives, we can select either **Pairwise Comparisons** or **Direct entry**



When the **For Alternatives** option is selected, we define how the alternatives are measured with respect to the covering objectives.

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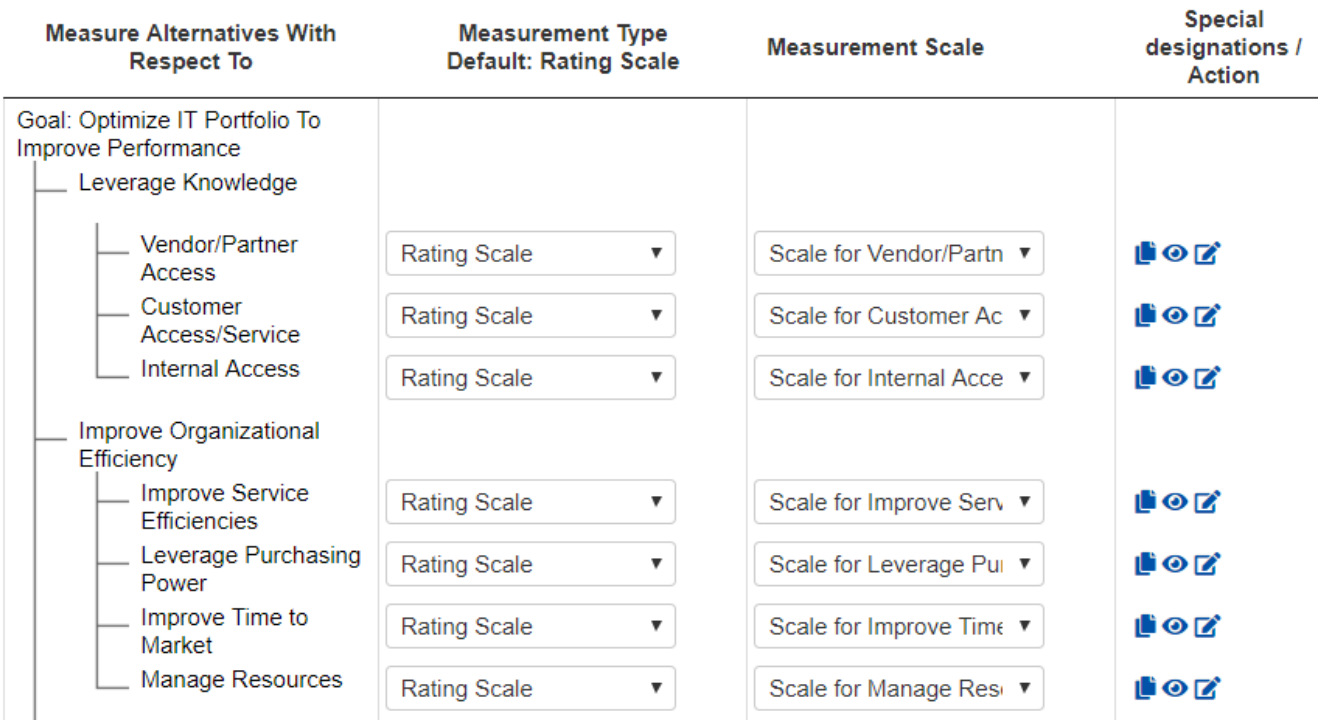
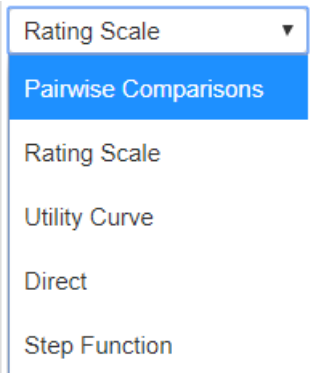


For alternatives, we can select the following methods:



When **All** is selected, we can define both the Objectives and Alternatives methods at the same time:

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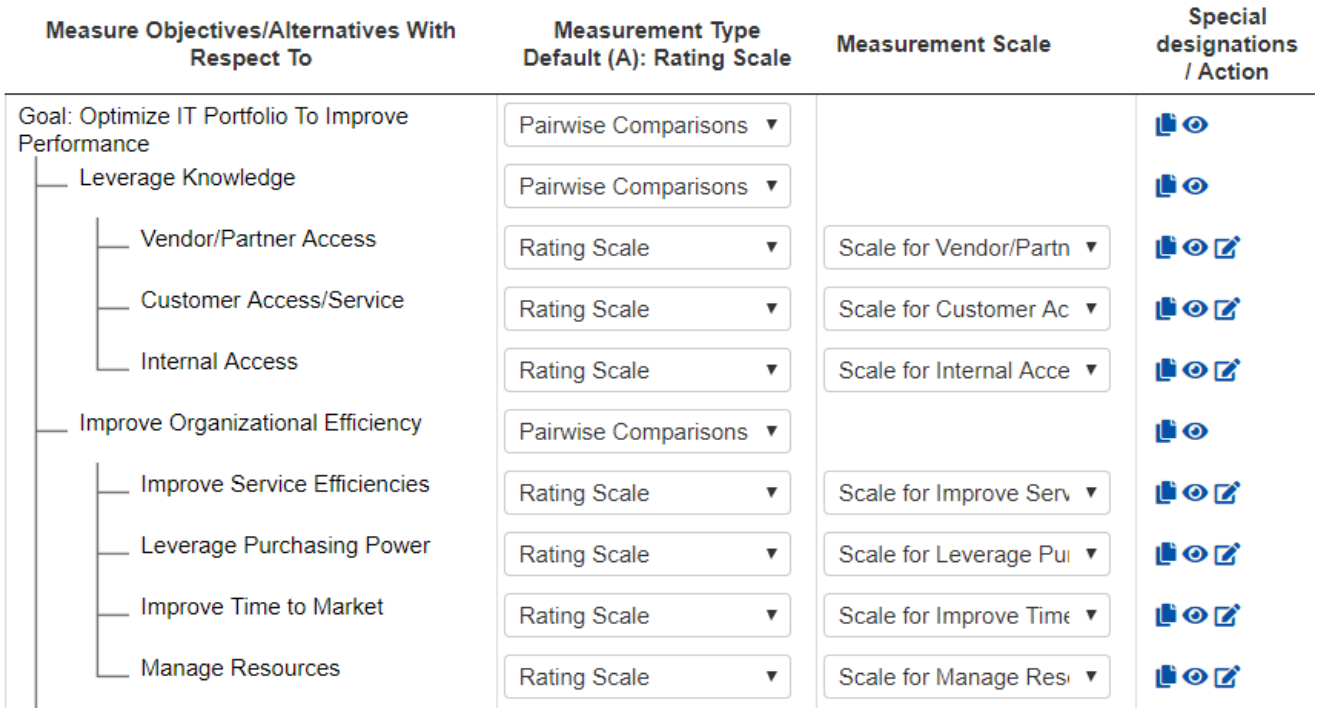

Measure Objectives/Alternatives With Respect To	Measurement Type Default (A): Rating Scale	Measurement Scale	Special designations / Action
Goal: Optimize IT Portfolio To Improve Performance	Pairwise Comparisons		
Leverage Knowledge	Pairwise Comparisons		
Vendor/Partner Access	Rating Scale	Scale for Vendor/Partn	
Customer Access/Service	Rating Scale	Scale for Customer Ac	
Internal Access	Rating Scale	Scale for Internal Acce	
Improve Organizational Efficiency	Pairwise Comparisons		
Improve Service Efficiencies	Rating Scale	Scale for Improve Serv	
Leverage Purchasing Power	Rating Scale	Scale for Leverage Pur	
Improve Time to Market	Rating Scale	Scale for Improve Time	
Manage Resources	Rating Scale	Scale for Manage Res	

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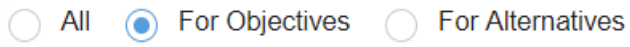
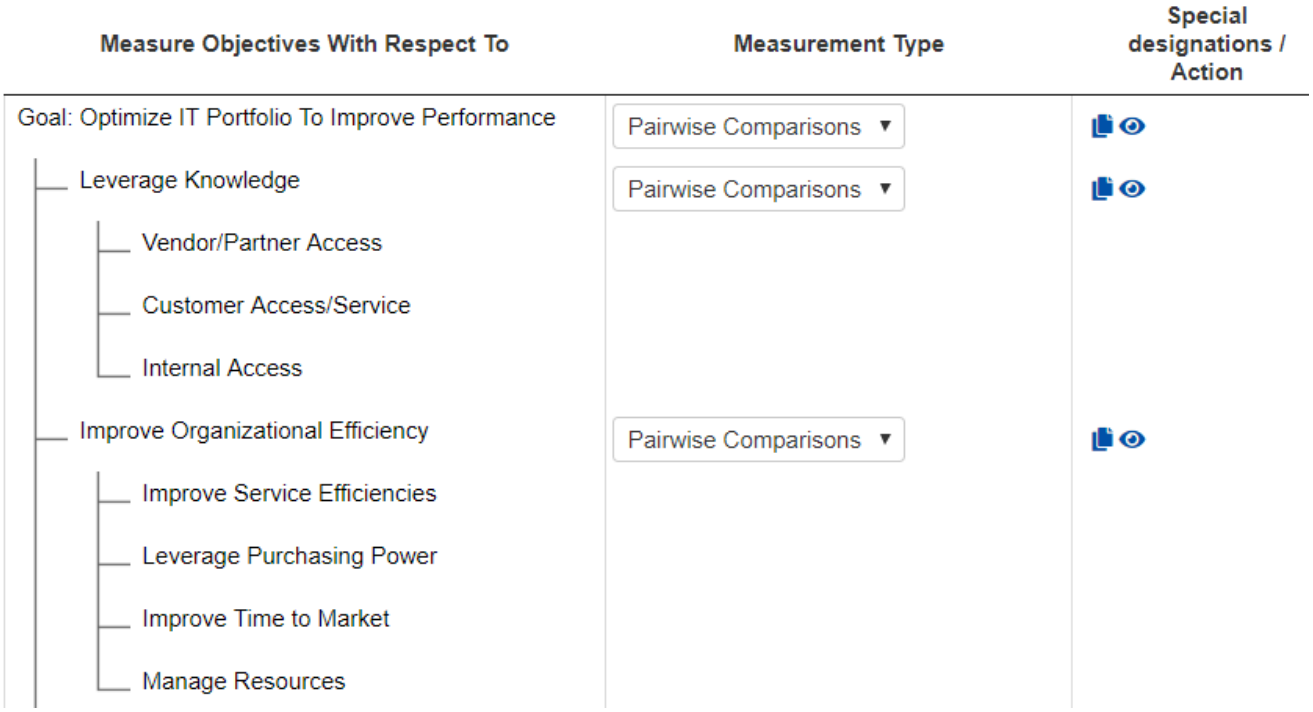
Measurement Methods for Evaluating Objectives

Measurement Methods for evaluating objectives can be found on **DEFINE MODEL > Set Measurement Options > Measurement Methods** > **For Objectives** radio button is where we designate how priorities are to be derived or assigned with respect to those objectives (elements) in the objectives hierarchy that have elements below them.



NOTE: You can also define Measurement Methods for Objectives in **All** mode (measurement methods options For Objectives and For Alternatives options are available).

The default measurement method for each cluster in the objectives hierarchy is pairwise as can be seen below.



Pairwise comparisons are used to derive ratio scale priorities for the relative importance of objectives, possibly sub-objectives, sub-sub objectives... in the objectives hierarchy. (In some decisions, other types of elements such as scenarios or constituencies may be in the hierarchy. Priorities representing the relative likelihood of different scenarios, or the relative importance of different constituencies, are derived in the same manner.)

The pairwise comparisons can be made **verbally**, **numerically**, or **graphically**.

It is also possible to assign priorities **directly** to objectives instead of making pairwise comparisons. This is not generally recommended but can be useful if priorities have been derived in another model or specified by a process such as an RFP.

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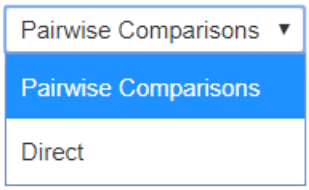

Enabling the Advanced Mode switch at the bottom of the page will show additional information and options per cluster.

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Measurement Methods for Evaluating Alternatives

The same pairwise comparison technique used for measuring the priorities of the objectives can be used to measure the priorities representing the relative preference of alternatives with respect to each lowest level objective (also called covering objective or terminal objective).

However, if a large number of alternatives are being prioritized (possibly hundreds or thousands), there would be an inordinate number of pairwise comparisons if all possible pairs were evaluated. There are two practical approaches that can be taken:

- Make pairwise comparisons on a subset or subsets of all possible pairs.
- Define and apply absolute measurement scales.

The most common approach and the one described here is to use absolute measurement.

There are **three types of absolute measurement scales** in Expert Choice.

1. Rating scales
2. Step functions
3. Utility curves

When there are many alternatives to score, rating scales are an effective way to elicit judgments from participants. Priorities for rating scale intensities are derived using pairwise comparison by the project manager and team prior to scoring alternatives. Rating scales are appropriate for qualitative judgments or qualitative facts about alternatives.

Step functions and utility curves are appropriate for ingesting quantitative data and converting into ratio scale measures. Priorities for step function or utility curve data are derived using pairwise comparison by the project manager and team prior to scoring alternatives.

Specifying Measurement Type and Measurement Scale for Evaluating Alternatives with Respect to Covering Objectives

Use the measurement methods page to maintain measurement methods and to assign measurement methods to covering objectives. Use the drop-down menu in the “Measurement type” column of each covering objective to specify the measurement type for each covering objective. Use the drop-down menu in the “Measurement scale” column of each covering objective to specify the desired scale from the drop-down menu. To create a new measurement method, choose “create new” from the drop-down in the “Measurement scale” column. Click the pencil in the Actions column to edit the measurement scale.

Alternatively, use the Manage Scales button, to maintain all measurement scales in one place. After that, select the measurement method and measurement scale for each covering objective in the “Measurement scale” column, as explained above. A single measurement scale can be assigned to multiple covering objectives.

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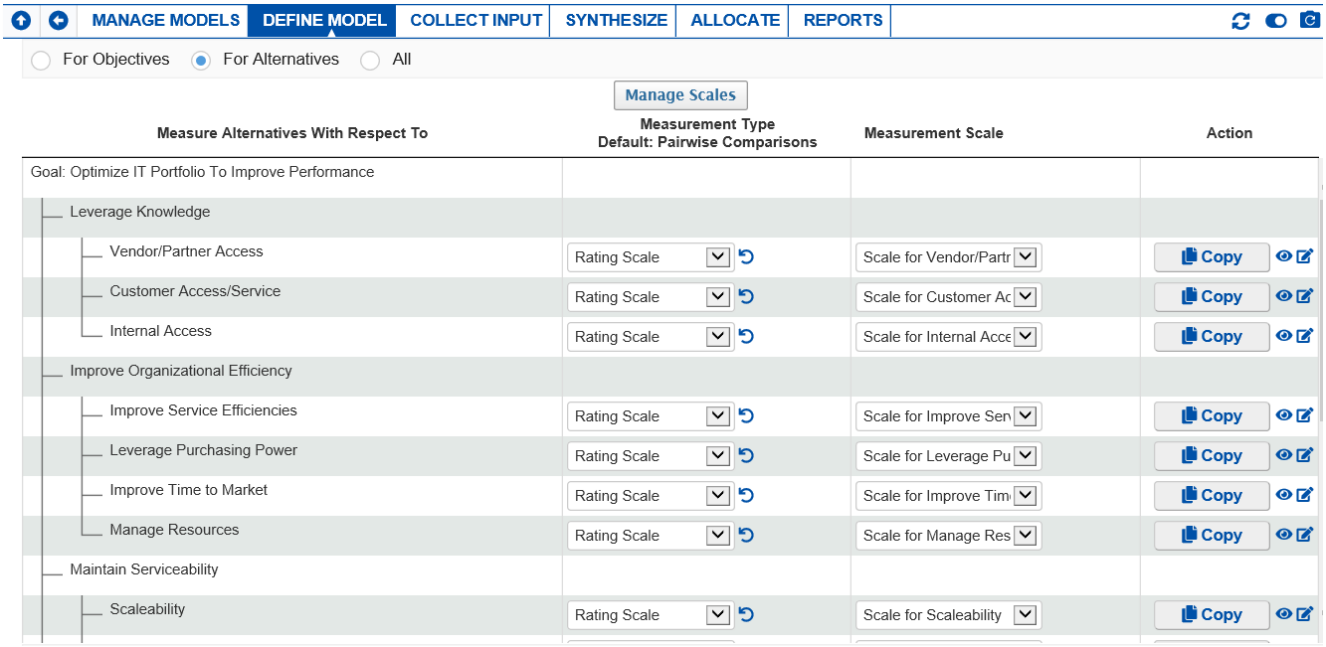
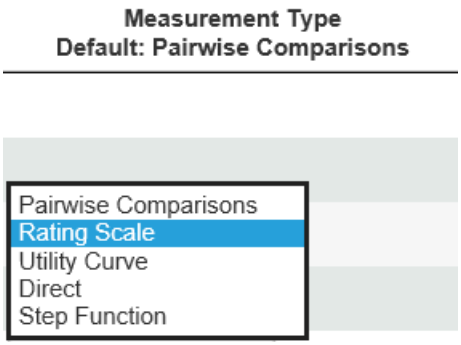


The Measurement Type is set by selecting from the drop-down menu under Measurement type:



With the exception of pairwise comparisons, you also specify a measurement scale (either an existing one or create a new one) for the selected measurement type. The Measurement Scale is set by selecting from the Measurement Scale drop-down:

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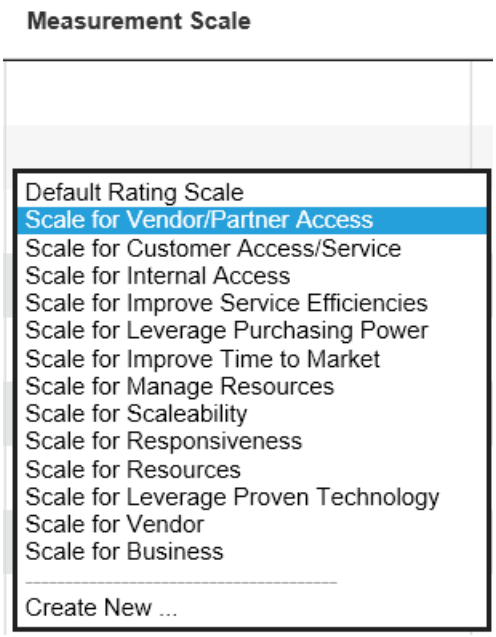

From our example above, alternatives with respect to Vendor/Partner Access are to be evaluated with the "Rating Scale" measurement type using "Scale for Vendor/Partner Access."

Clicking the | icon will open the evaluation page specific to the cluster:

In the example above, clicking the eye icon for the Vendor/Partner Access will redirect you to the first evaluation step for evaluating the alternative(s) with respect to the Vendor/Partner Access.

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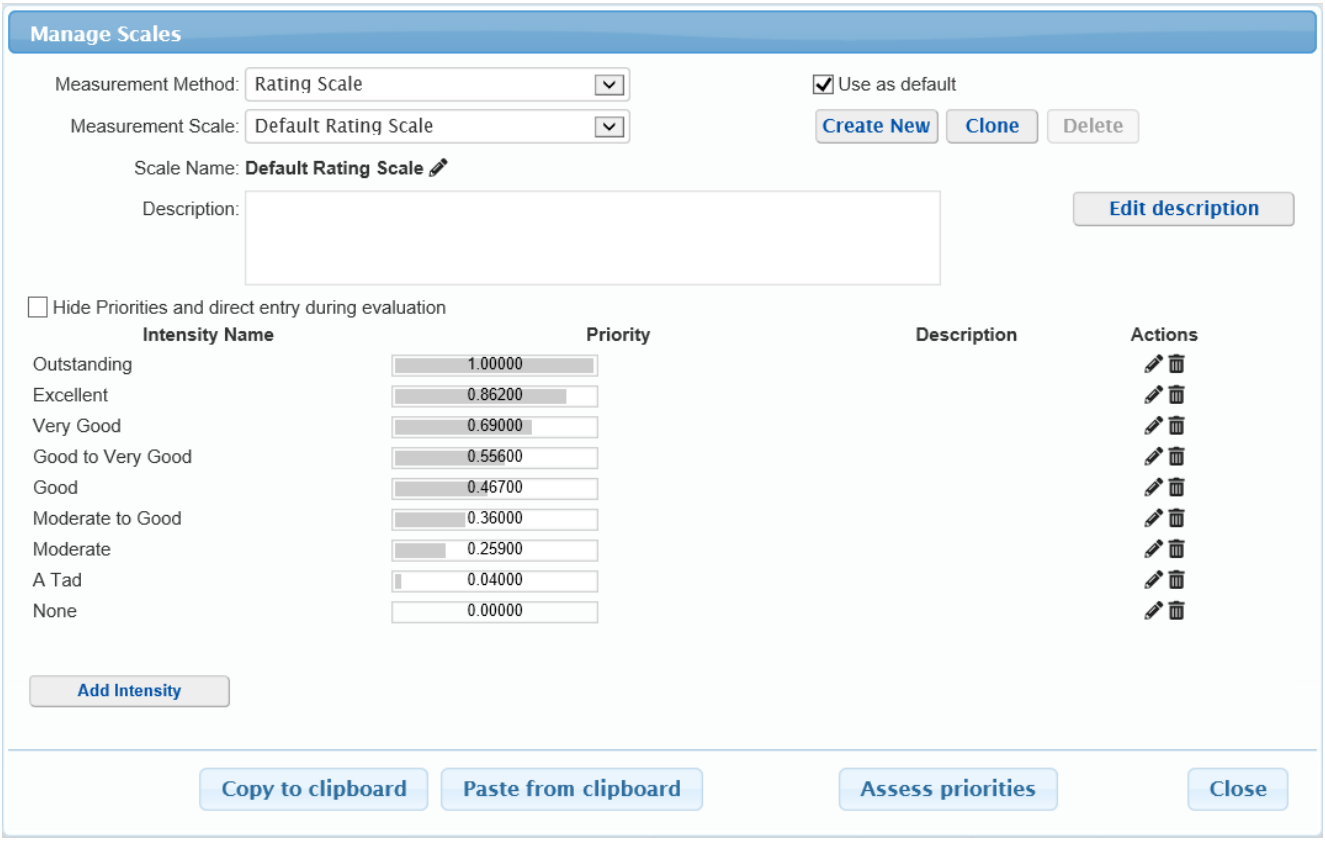
Manage Measurement Scales for Alternatives

You can manage (create, edit, delete, clone, etc.) the measurement scales of the model using the

button.

Clicking the **Manage Scales** button will open a dialog box as below:



The existing scale(s) of the selected Measurement Method are populated in the Measurement Scale drop-down.

Comparion provides at least one "default" scale for each rating type, and unless you have already defined additional scales specific to your application, you may have the choice of only one default scale for each measurement type. Although it is more time-consuming, it is also more accurate and we recommend creating scales specific to the evaluation being performed.

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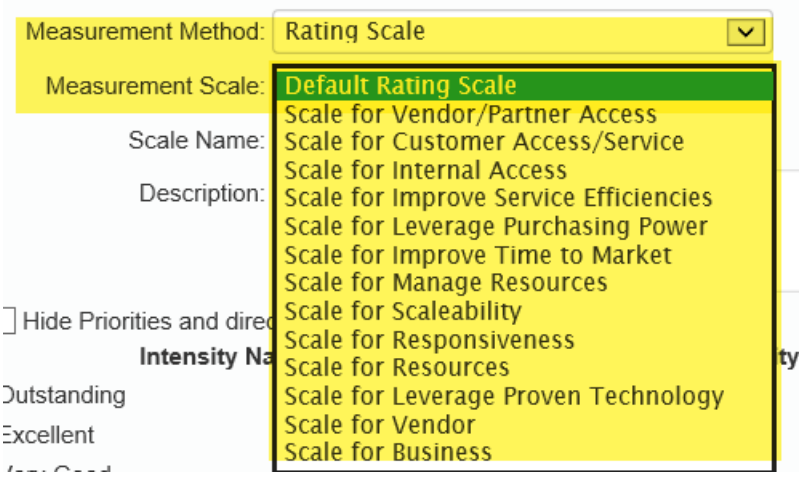
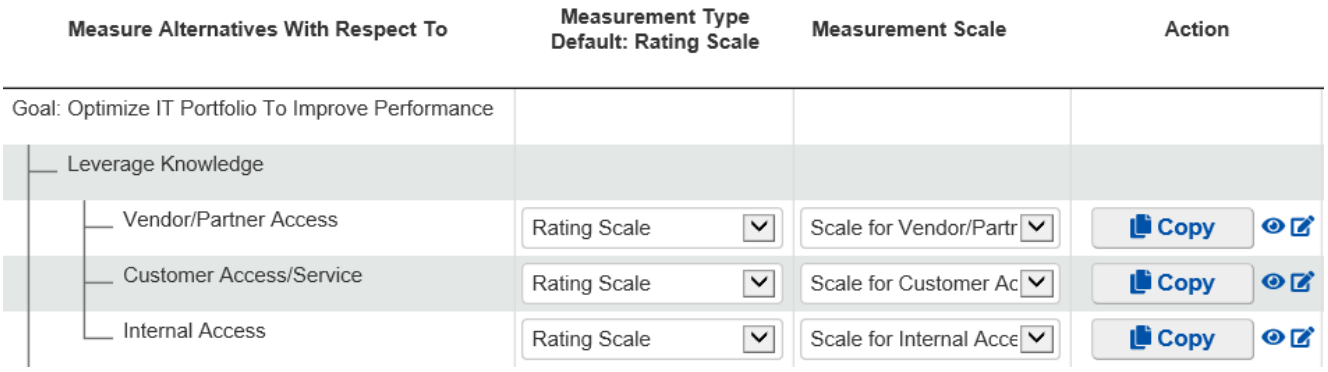


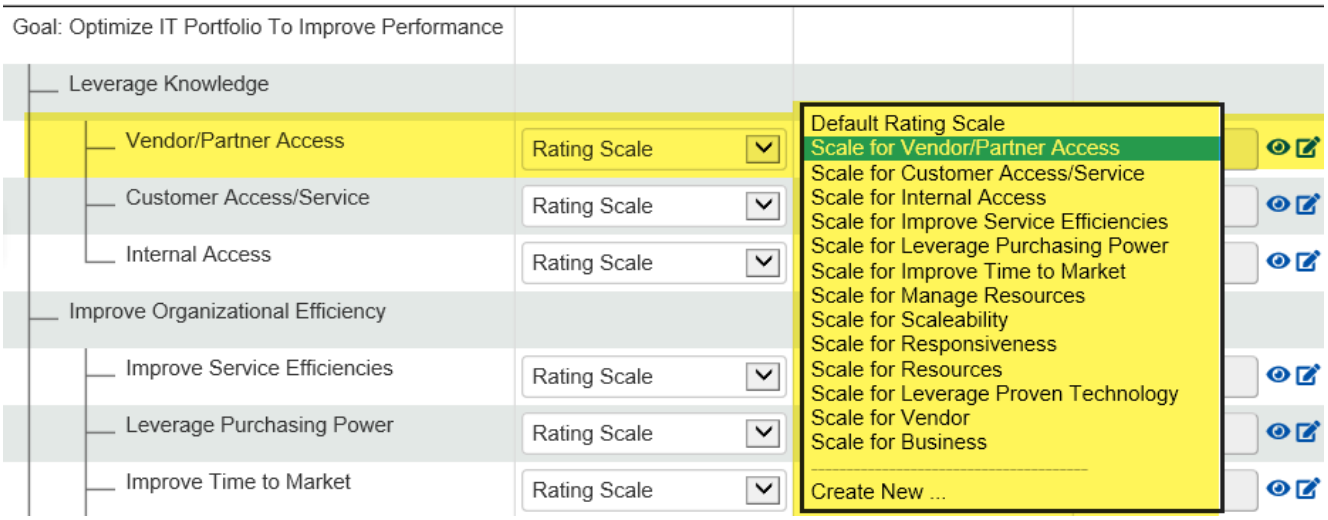
Measurement scale settings/options vary depending on the Measurement Type (Rating scale, Step Function, Utility curve).

You can specify, create, and edit measurement scales for covering objectives. Use the drop-downs to set measurement type and measurement scale for each covering objective (either an existing scale or "New" to create a new scale).



From above, the covering objectives are assigned with Rating Measurement Type with a specific scale for each.

Clicking the Measurement Scale drop-down on one covering objective will list all the Rating Scales available in the model. You can click "**Create New ...**" if you want to create a new one and assign it to that covering objective.



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You can also edit the measurement scale currently selected on the drop-down by clicking the button.

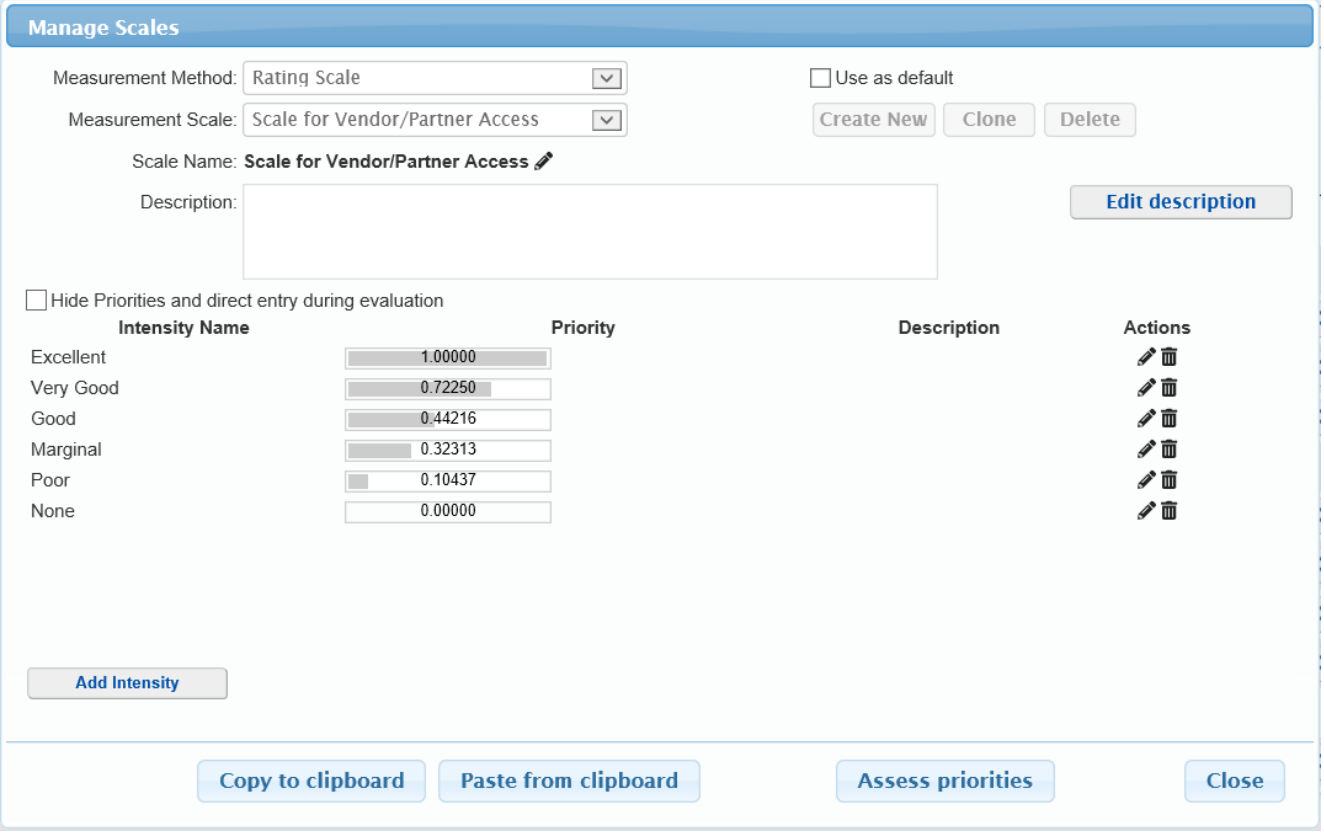
The parameters needed to define a measurement scale vary according to Measurement Method (rating scale, step function, or utility curve).

NOTE: If you edit the priorities or shapes of utility curves for any scales after some or all evaluations are performed, the new priorities will be applied to the existing evaluations.

However, if you choose a new scale or modify an existing scale by adding or removing intensities, any prior evaluations will need to be redone. You can also click the button in the grid to edit a specific scale selected in the row.

Rating Scales

Rating scales can be created and modified by specifying Intensities (words) and corresponding priorities. It is recommended that the rating scales contain more than just three or four intensities and that the priorities be derived, rather than arbitrarily assigned.



Copy / Paste Scale

Click Copy to clipboard to copy the intensity names, priorities, and descriptions to the clipboard which you can

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paste to another scale of the same or another model.

You can paste intensities from the clipboard using the Paste from clipboard . Scale to be pasted should be in this format:

Scale Name

Intensity NamePriorityDescription

e.g:

My Default Scale
Excellent 1 (the alternative has excellent performance)
Very Good 0.5
Very Poor 0.1

Note: The Scale Name and Intensity Description are optional.

Clone Scale

Click Clone to create an exact copy of a rating, step function, or utility curve scale. This includes all the scale details as well as the judgments made to derive the priorities (if any).

Deriving Rating Scale Priorities

For example, we will create a new rating scale with the following intensities:

- Very High
- High
- Average
- Low
- Very Low
- None

Clicking the Assess priorities button will open a window where you can select the option settings for assessing the intensities:

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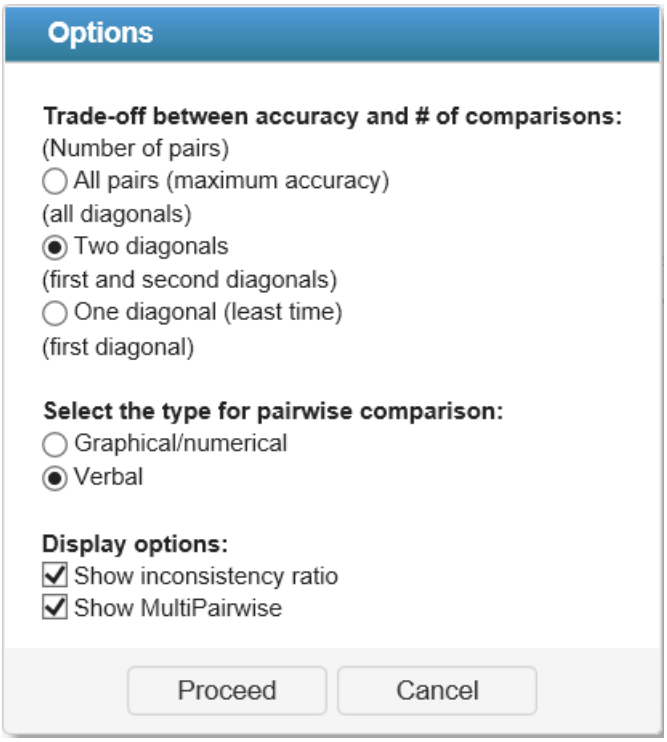
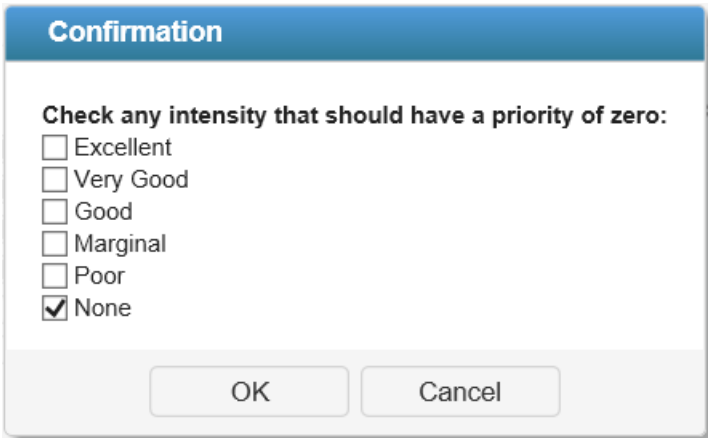


Click Proceed.

Another dialog box will be displayed where you can select which of the intensities will be excluded in the assessment. Excluded intensities will get a zero priority.



From above, we excluded the intensity "None."

Clicking the OK button will open the evaluation page where you can do the assessments as shown below:

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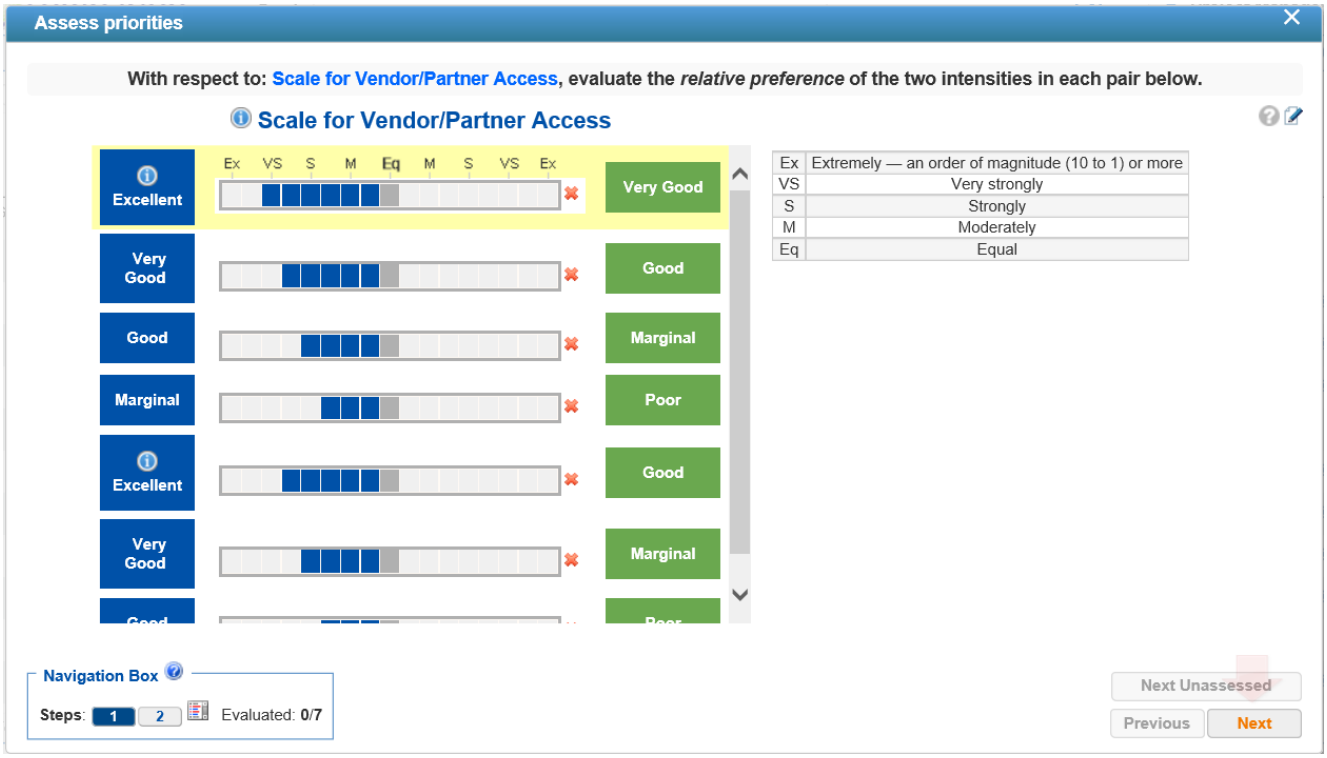
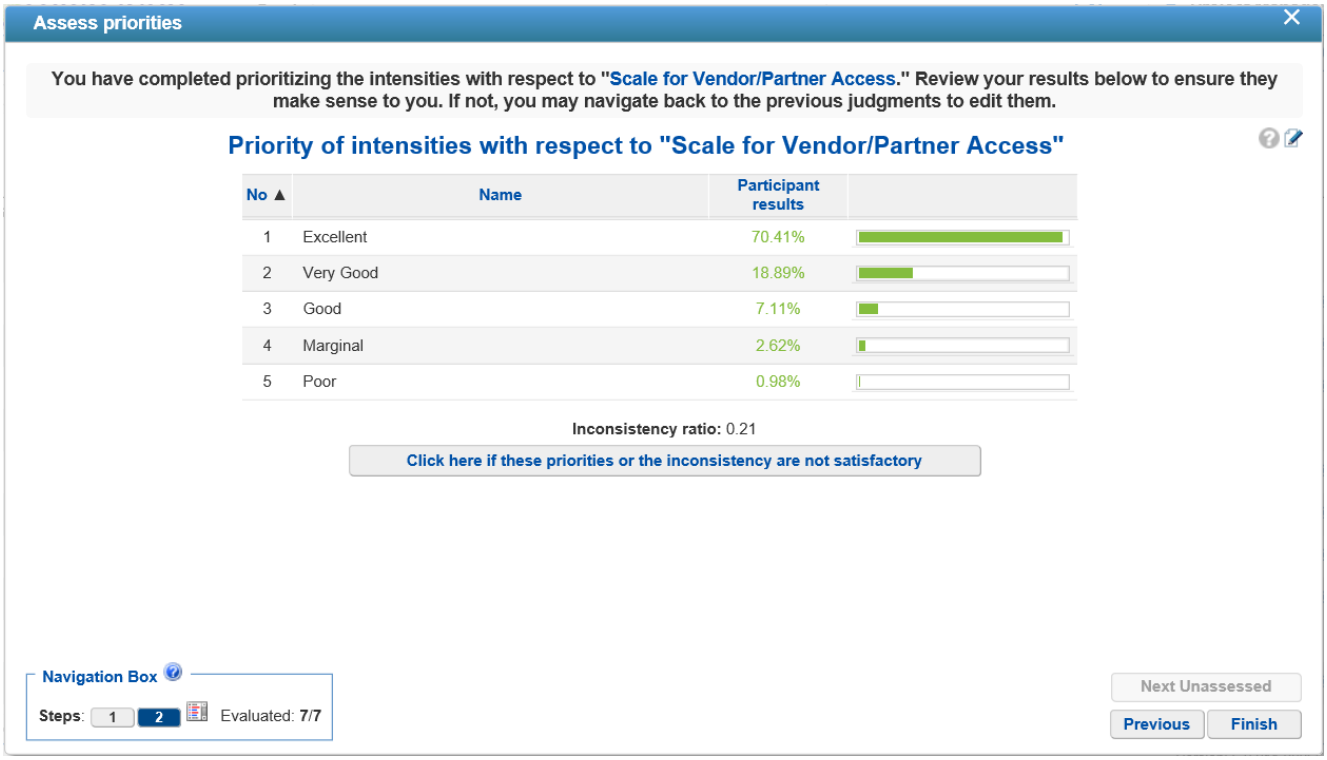


Click the Next button.



Be sure to click the Finish button to generate the intensity priorities from the assessment made.

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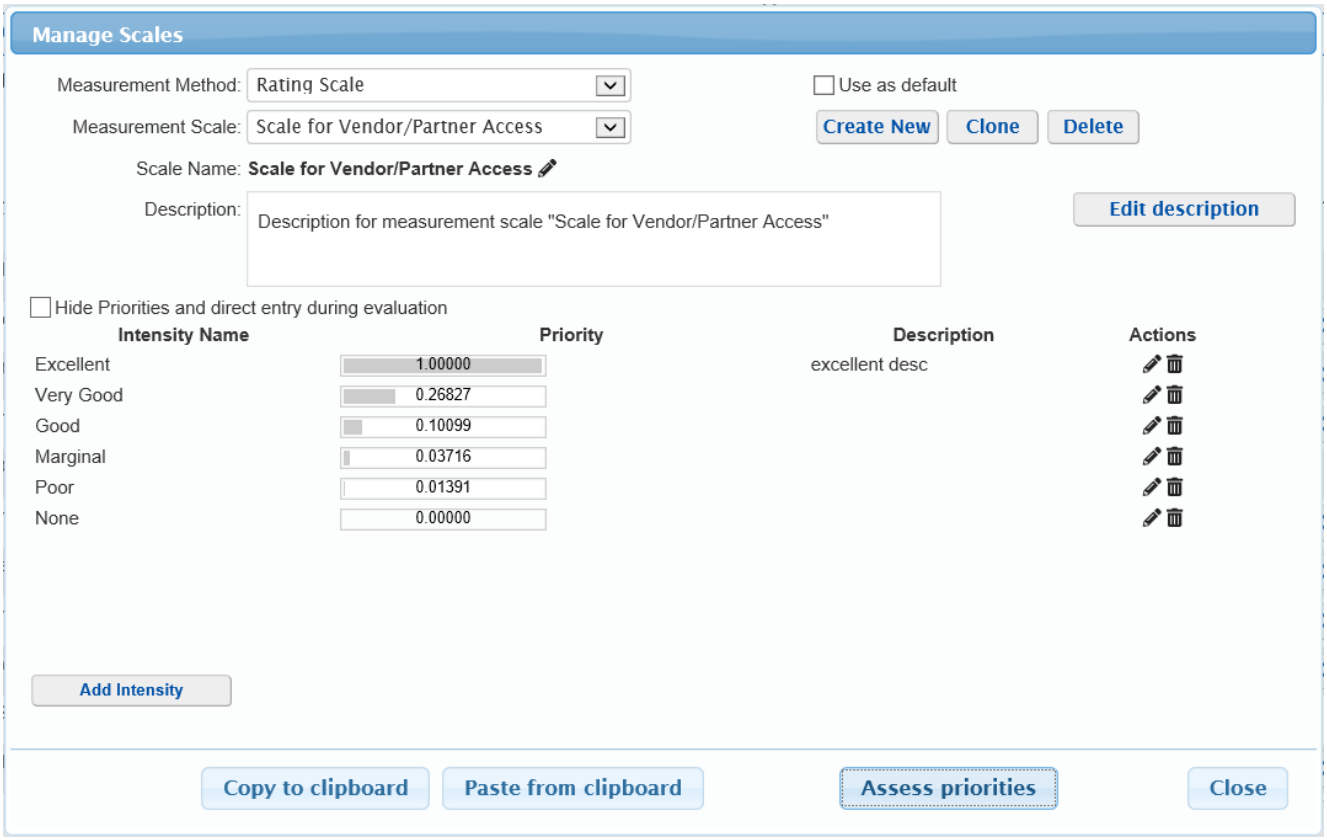

The derived priorities are normalized so that the maximum is 1 as shown above.

Step Functions

Step functions are similar to rating scales in that they contain verbal intensities and priorities, but they are more similar to Utility curves which translate data into priorities.

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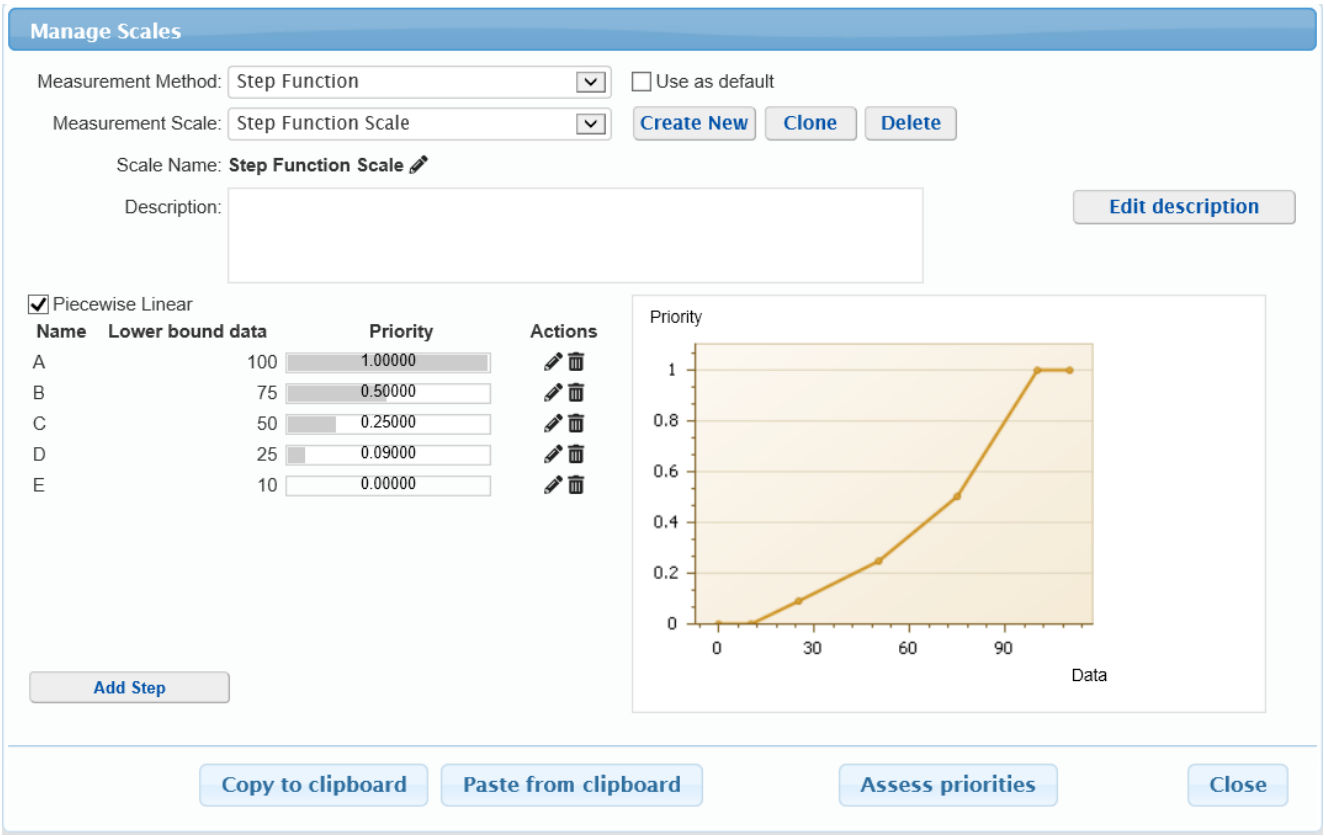
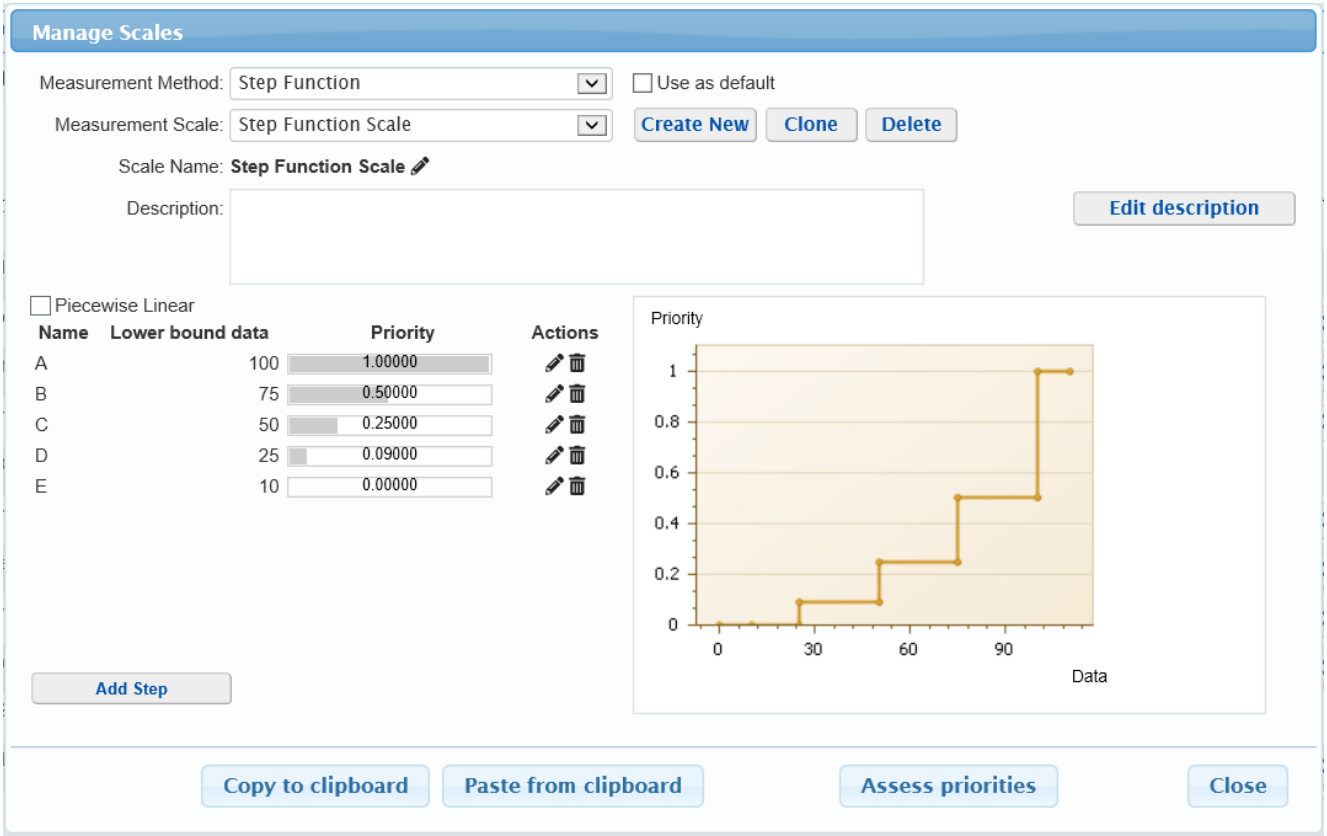


By default, the Piecewise Linear option is enabled. Disabling this will produce the data-priority graph as shown below:



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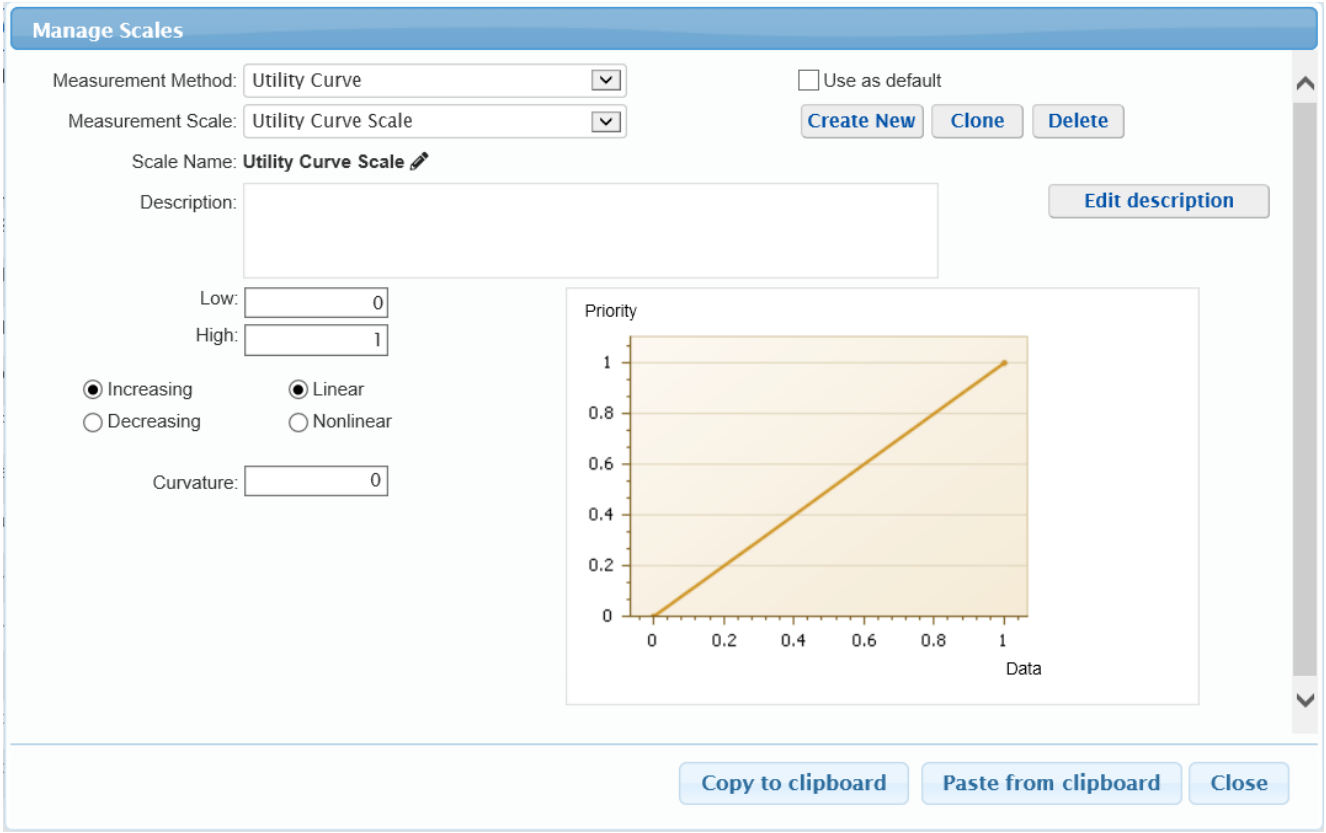
You can also derive the Step function priorities the same way when Deriving the Rating Scale Priorities.

Utility Curves

Utility curves translate data into priorities.

Utility curves can be increasing or decreasing, linear, or non-linear.

You can set the lower and upper limits of utility curves, which by default are 0 and 1.



The lower limit on the x-axis of the utility curve can be negative to accommodate negative data. Ratio scale priorities (y values), however, are always positive. Some care should be exercised in selecting the x value representing 0 priority because an arbitrary shifting of a utility curve will destroy the ratio scale property of the resulting priorities.

Curvature:

Increasing the value in the curvature specification will introduce more curvature and a concave utility curve:

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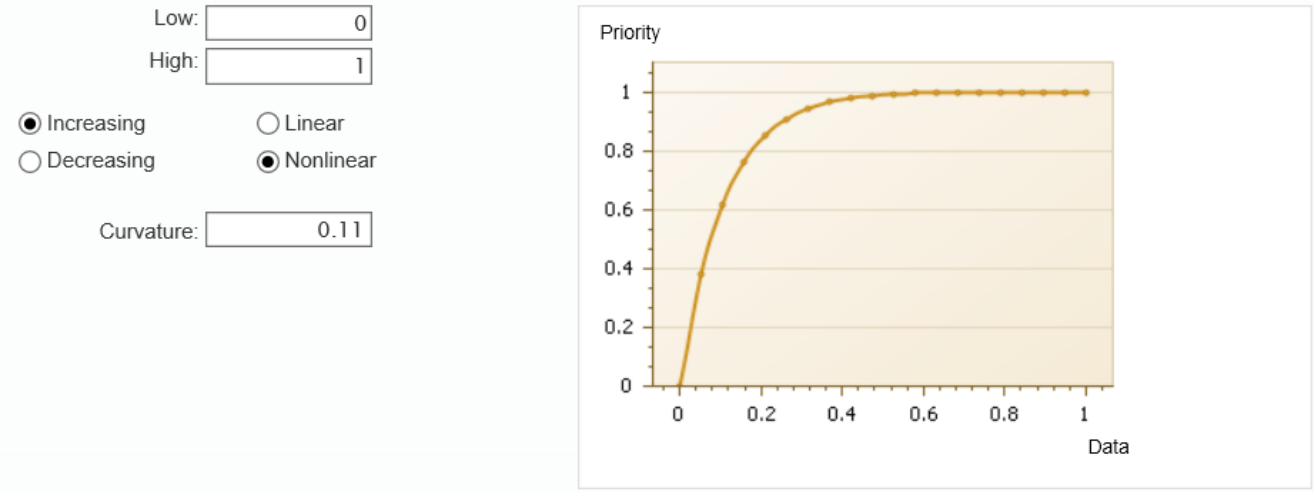
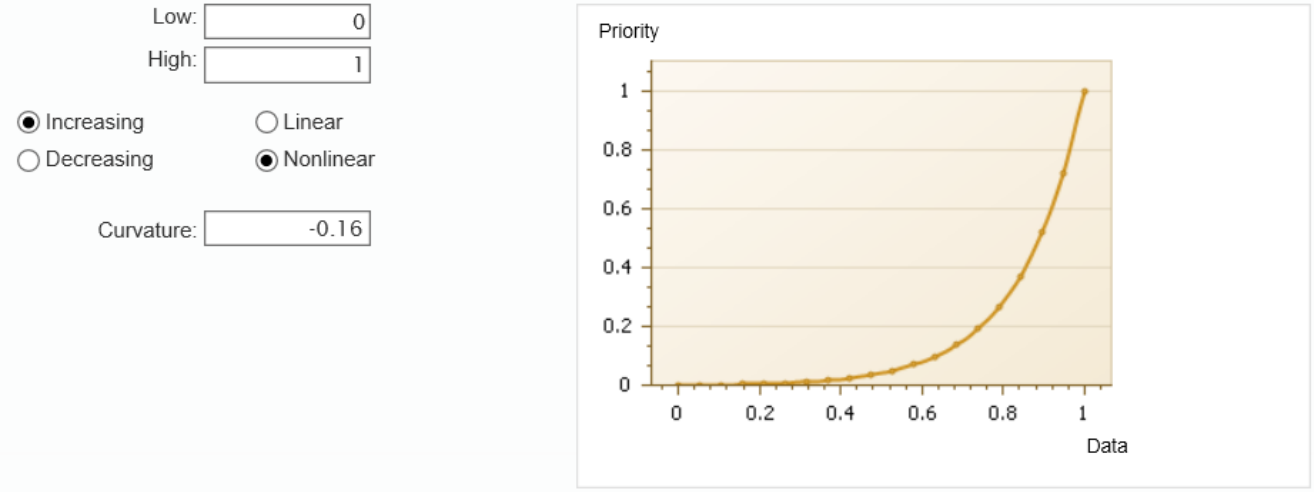


Decreasing the value in the curvature specification to negative values will produce a convex utility curve:



For decreasing utility curves, data that is below the lower limit will translate to priorities of 1, and data to the right of the upper limit will translate to priorities of 0. Data between the lower and upper limit will translate to priorities as specified by the utility curve:

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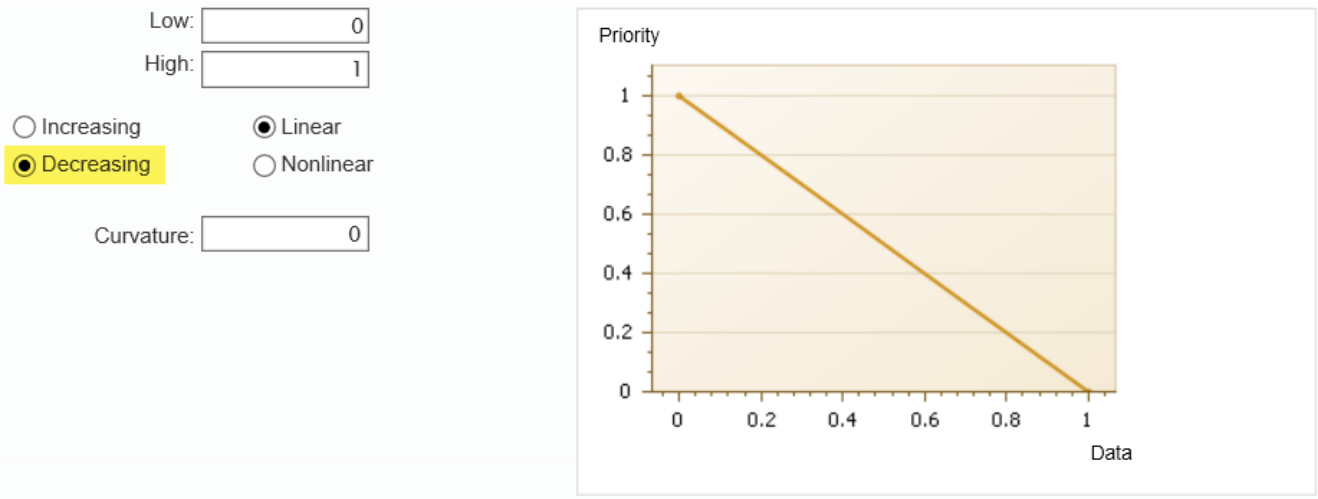
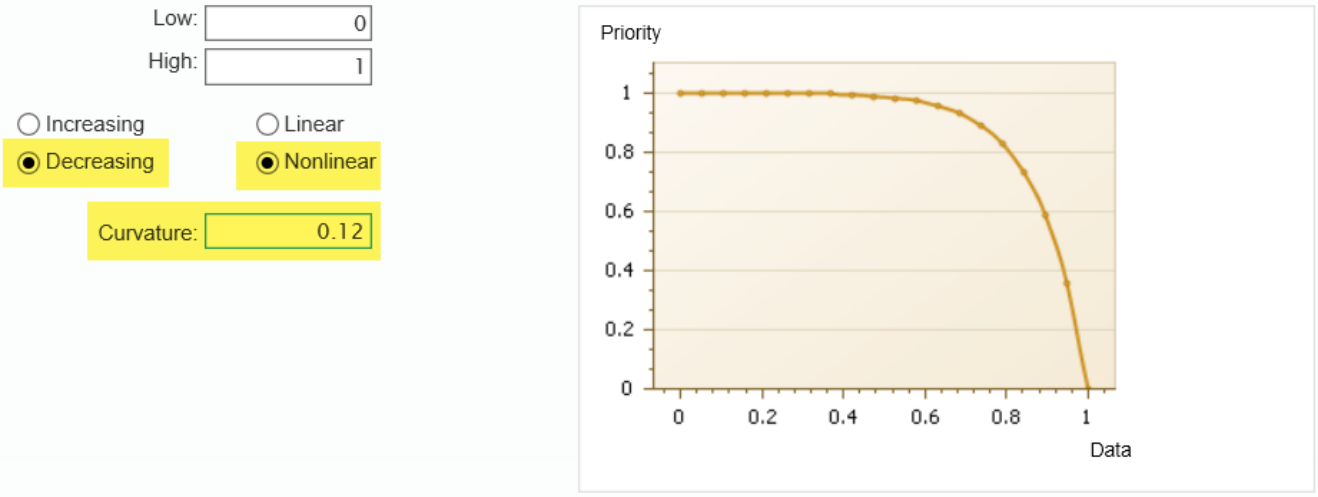
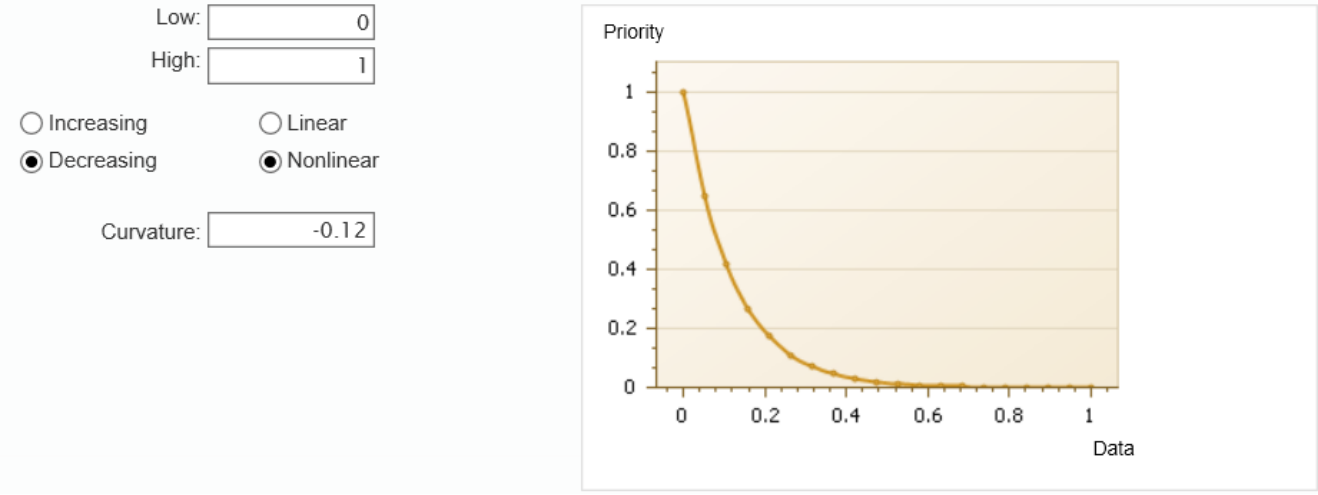


Concave and Convex decreasing utility curves can be established by increasing or decreasing the curvature specification above or below zero in a similar fashion as for the increasing utility curves:





Enabling the Advanced Mode switch at the bottom of the page will show additional information and options per cluster:

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The **# of Elements** column displays the number of alternatives that are contributing to a given cluster.

The **# of Judgments** for non-pairwise measurement methods is simply equal to the # of elements.

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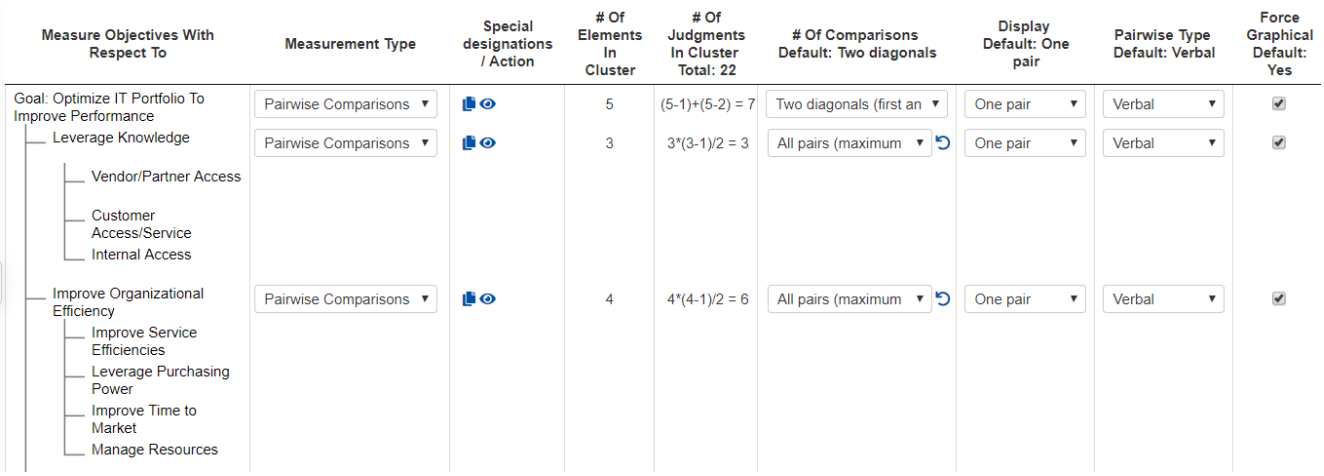
Advanced Mode: Define Pairwise Comparisons Options per Cluster

When defining the Measurement Methods, additional information and options can be displayed when Advanced Mode is ON.

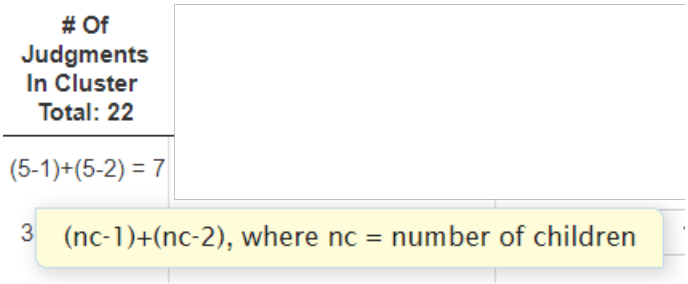


Options per cluster for ALL measurement types:

The **# of Elements in cluster** column displays the number of sub-objectives of the given objective (parent).

The **# of Judgments in Cluster** shows the total number of judgments required on a given cluster *(ignoring roles)*. For pairwise comparisons, the number of judgments depends on the number of elements and the number of comparisons (diagonals) specified. For non-pairwise comparisons, the number of judgments is equal to the number of elements.

Hovering on the cell will display the formula used:



Options per cluster for Pairwise Comparisons

You can define the options for Pairwise Comparisons *(No. of diagonals, Display, Pairwise Type, Force Graphical)* when evaluating the objectives with respect to its parent, or alternatives with respect to the covering objectives in Judgments Options page which determine the default options for each cluster.

When the Auto-advance option is ON, you have additional control over these options by assigning them per **cluster**. These help you to better balance rigor and accuracy with the time and energy required to evaluate the various steps.

In the example below, for "Goal: Optimize IT Portfolio Optimization" we keep the number of comparisons Two Diagonals (as

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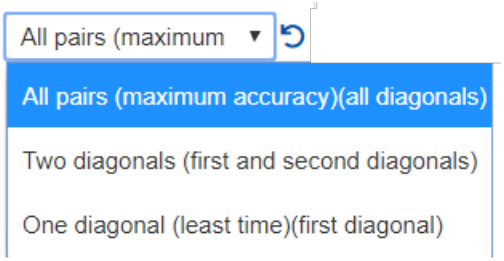
defined in Judgments Options page), but for the "Leverage Knowledge" and "Improve Organizational Efficiency" clusters, we specify to evaluate all the possible pairs (All pairs).

Measure Objectives With Respect To	Measurement Type	Special designations / Action	# Of Elements In Cluster	# Of Judgments In Cluster Total: 22	# Of Comparisons Default: Two diagonals	Display Default: One pair	Pairwise Type Default: Verbal	Force Graphical Default: Yes
Goal: Optimize IT Portfolio To Improve Performance	Pairwise Comparisons		5	(5-1)+(5-2) = 7	Two diagonals (first an	One pair	Verbal	☑
Leverage Knowledge	Pairwise Comparisons		3	3*(3-1)/2 = 3	All pairs (maximum	One pair	Verbal	☑
Vendor/Partner Access								
Customer Access/Service								
Internal Access								
Improve Organizational Efficiency	Pairwise Comparisons		4	4*(4-1)/2 = 6	All pairs (maximum	One pair	Verbal	☑
Improve Service Efficiencies								
Leverage Purchasing Power								
Improve Time to Market								
Manage Resources								

The **# of Comparisons** can be All pairs, two diagonals, or one diagonal.

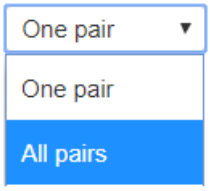


The most accurate results are achieved with the first option above but at the expense of taking more time. If the number of elements in a cluster is small, then this option provides the most redundancy and hence the most accurate results.

The choice of first and second diagonals in the above example would entail 4+3 judgments. This would consist of 3 "redundant" judgments (since at least 4 judgments are required for a spanning set) and would be reasonable even if verbal judgments were made.

Choosing the minimum number of comparisons is not recommended unless pairwise graphical judgments are made and you have confidence in the accuracy of each of the judgments.

The **Display** column defines the number of pairs to display during the evaluation -- whether to compare one pair at a time or display all pairs at once:



The **Pairwise type** can be Graphical/Numerical or Verbal:

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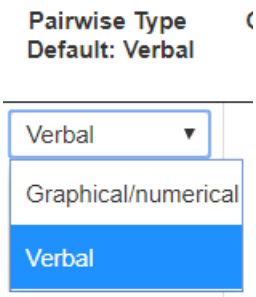

Graphical judgments, being ratio scale measures to begin with, generally produce more accurate results and require less redundancy to produce accurate results than do verbal judgments.

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Identify Default Measurement Scales

The Project Manager can define the default scales. This can be done in **DEFINE PROJECT > Set Measurement Options > Default Scales**.

The default scales lists all the measurement scales for Ratings, Utility Curve, and Step Function.

Default Scales

Delete | ∧ | ∨ | Copy | Print | CSV

Measurement Scale	Is Default	Applied to #
Ratings		
Default Rating Scale	◉	0
Scale for Vendor/Partner Access	○	1
Scale for Customer Access/Service	○	1
Scale for Internal Access	○	1
Scale for Improve Service Efficiencies	○	1
Scale for Leverage Purchasing Power	○	1
Scale for Improve Time to Market	○	1
Scale for Manage Resources	○	1
Scale for Scaleability	○	1
Scale for Responsiveness	○	1
Scale for Resources	○	1
Scale for Leverage Proven Technology	○	1
Scale for Vendor	○	1
Scale for Business	○	1
Utility Curve		
Default Regular Utility Curve	◉	0
New Utility Curve 1	○	1
New Utility Curve 2	○	1
Step Function		
Default Step Function	◉	0

By clicking on a scale, you can delete or move the scale up ∧ or down ∨.

The Project Manager can specify the default scale by clicking on the radio button in the "Is Default" column.

The number of applications is shown in the "Applied to" column.

The Project Manager can copy, export to CSV file format, and print the information.

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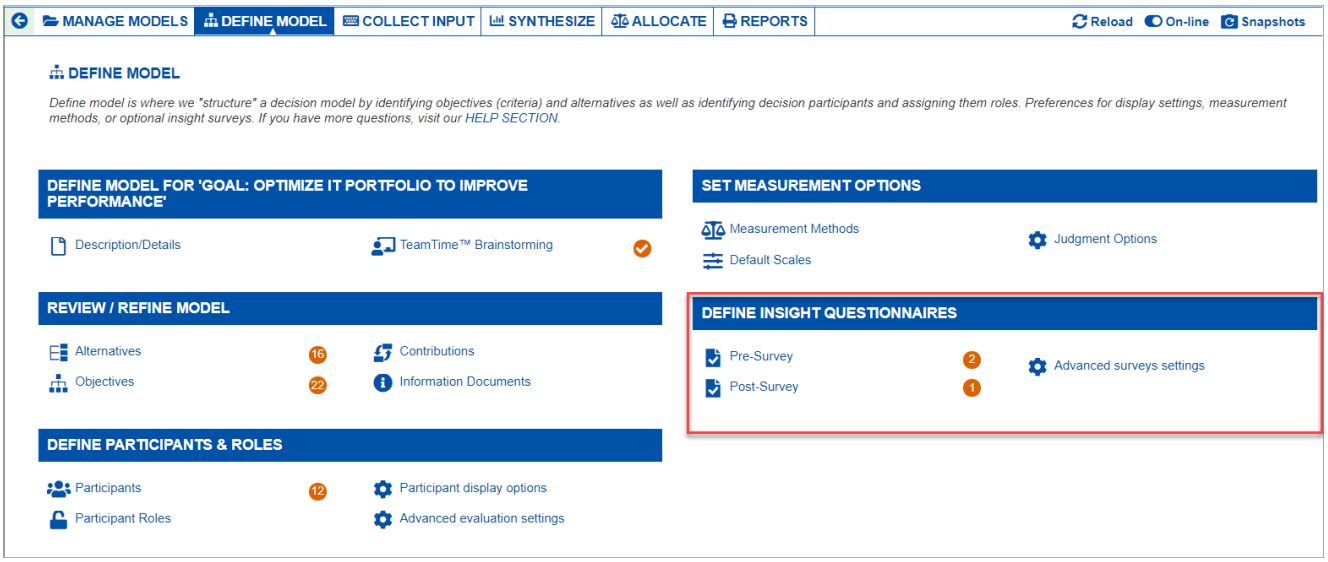
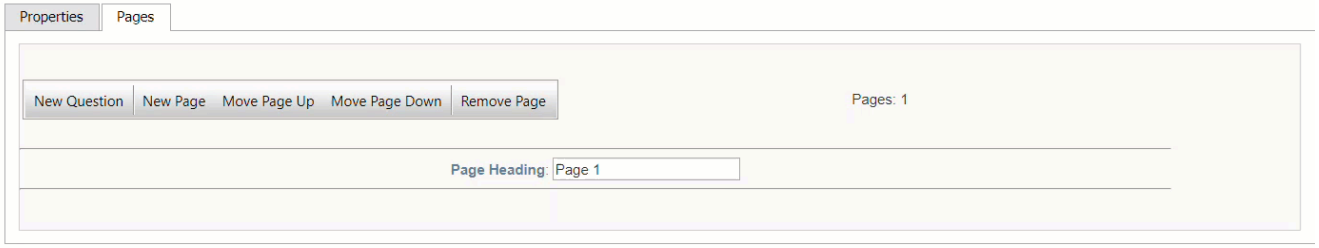
Creating and Editing Insight Questionnaires

An **"Insight Questionnaire"** can be presented to evaluators at the beginning (**Pre-Survey**) of the input collection process, at the end (**Post-Survey**) of the input collection process, or both.



Clicking Pre-Survey or Post-Survey will display a page where you can create a new, or edit an existing, survey.

An empty survey is shown below:



A survey consists of a set of questions arranged on one or more survey pages.

The Pages tab shows the following options:

- New Question
- New page
- Move questions Up and Down
- Remove Page

The Properties tab allows you to:

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- Add a title and description to the questionnaire
- Hide the index or numbering of the questions

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What is Collect Input?

After structuring the hierarchy and defining the participant roles and defining the measurement methods, the next step is collecting input.

(*Note: iteration, or going back to change objectives or alternatives based on new knowledge is supported and recommended. After adding an objective or alternative, you only need new judgments or data related to the added objective or alternative.*)

The input is either data or participant judgments.

- Measurement methods for participant judgments include **Pairwise comparison** and **Rating scale**.
- Measurement methods for data include **Direct**, **Utility curve**, or **Step function**.

is the process of collecting participants' judgments -- either individually (AnyTime Evaluation) or collaboratively as a team (TeamTime Evaluation).

The process of collecting input consists of a series of steps/pages containing:

- An introduction page
- A series of pages for comparisons, ratings, and data
- Intermediate results
- Overall results
- Possibly some sensitivity graphs *(anytime)*
- A "thank you" page

The Project Manager can set options for what pages to appear, the order of appearance, and what appears on each page -- these settings are done in the "DEFINE MODEL" stage.

The Project Manager sends the invitation for the AnyTime Evaluation.

The Project Manager can collect his or her own judgments by clicking either "Collect Input" for non-responsive pages or "Collect Input" for responsive pages.

Responsive evaluation allows you to automatically adjust the content and layout of the page to accommodate a variety of devices and windows or screen sizes.

The Project Manager can also send the invitation for TeamTime evaluation and Start or Stop the meeting.

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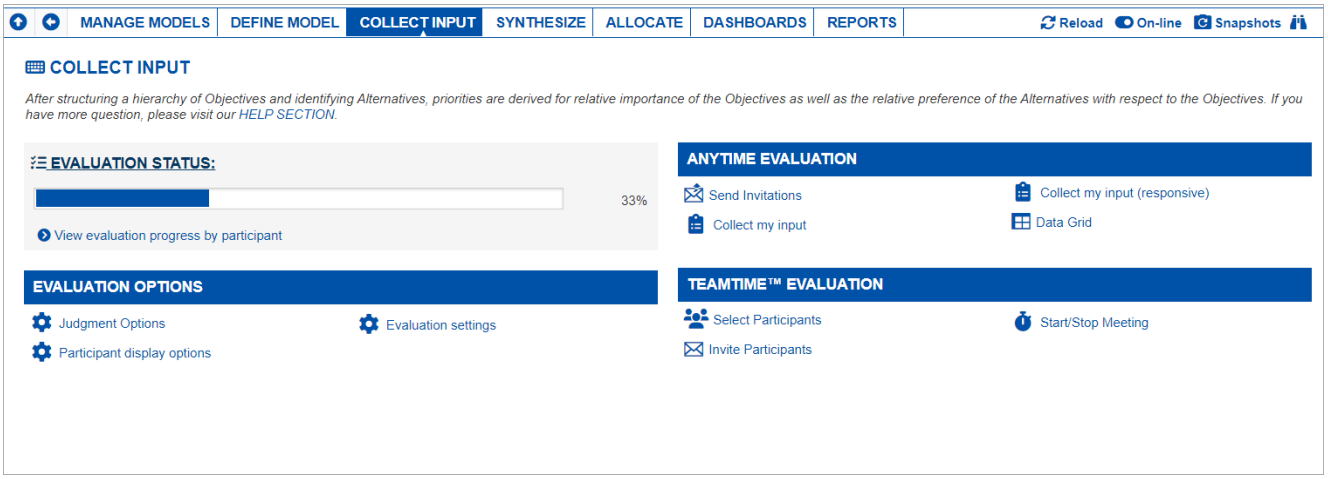

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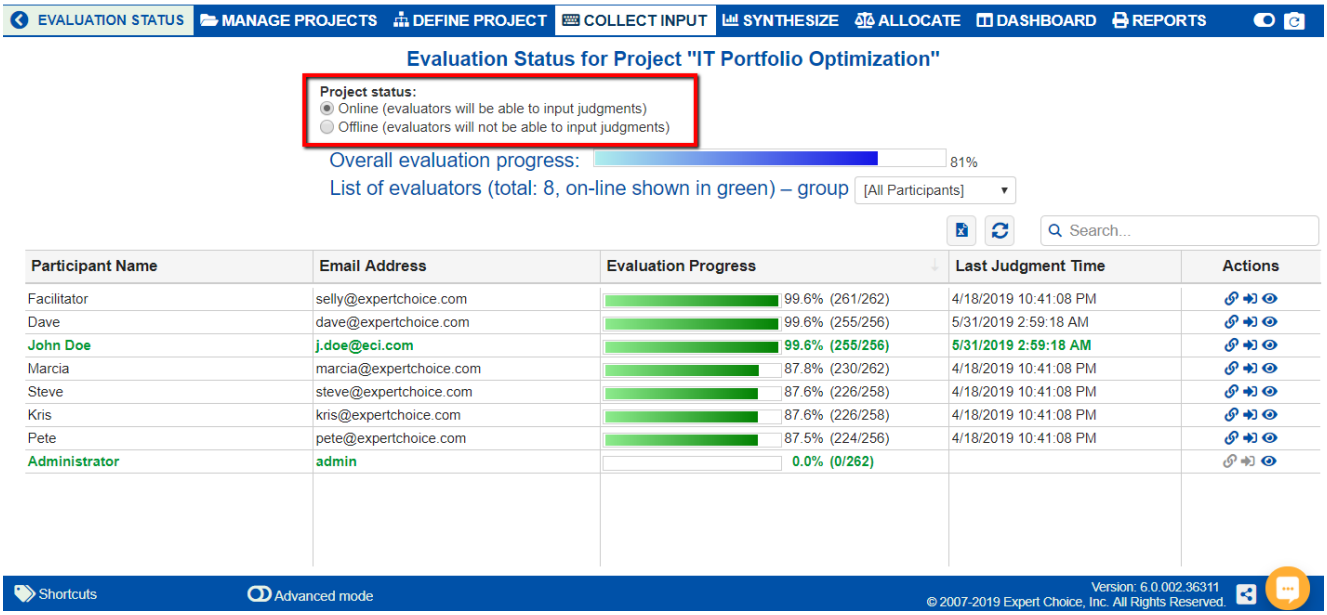
Model Status: Online or Offline

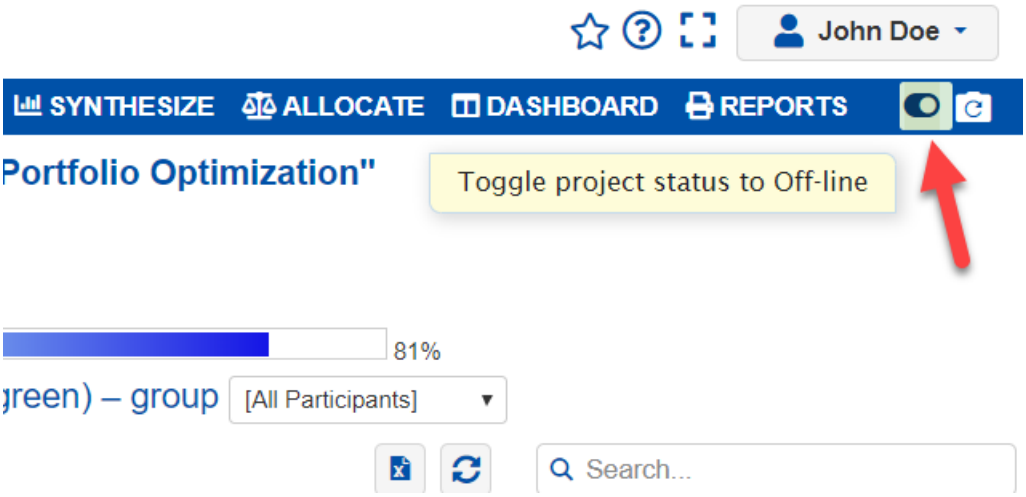
Only **online** models are accessible to evaluators for collection of input.

The Project Manager can set the model status



Evaluators won't be able to evaluate a model that is offline. Accessing the evaluator's link will redirect them to the login page with a message stating that the model is offline and to contact the Project Manager for additional information.

The Project Manager can also place the currently open model online or offline from the top bar using the toggle switch:



The Model's Online or Offline status can also be updated from the Models list page.

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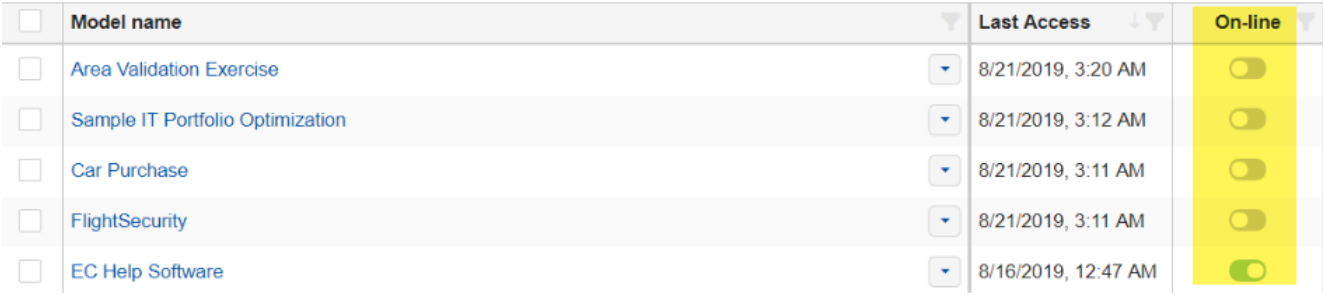

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Evaluation Progress

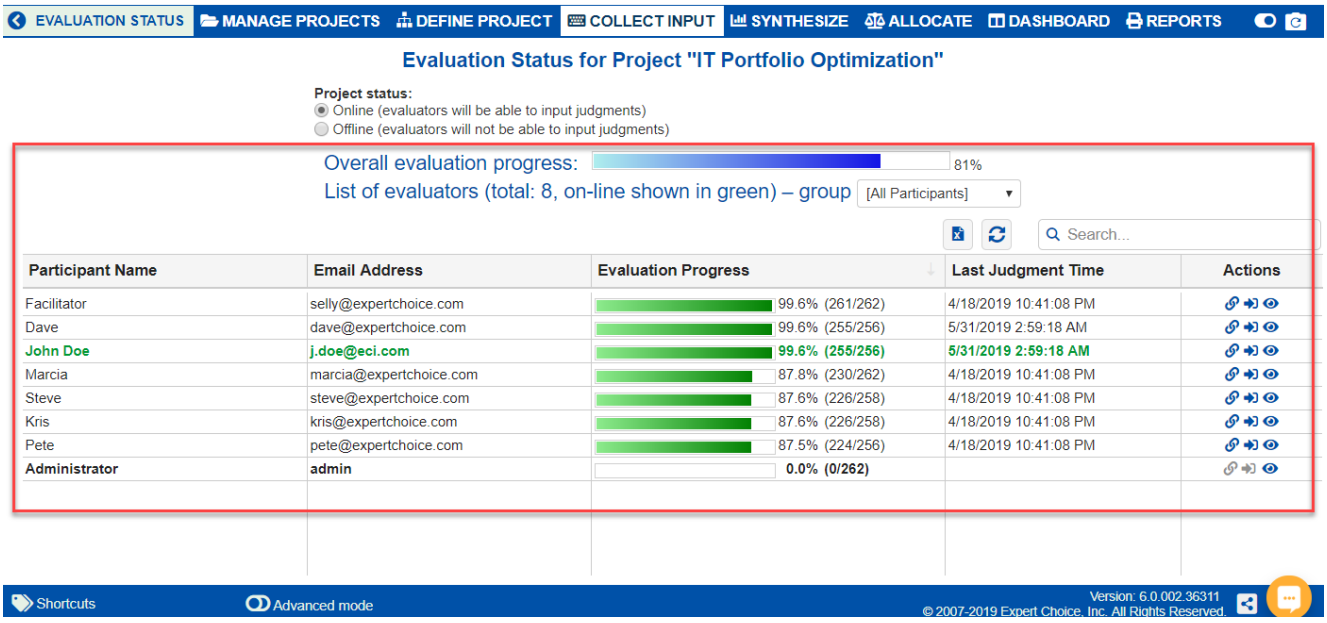
The landing page for Collect Input includes a progress bar summarizing overall evaluator progress.

To monitor individual participant evaluation progress use the Evaluation Status page.

The Evaluation Status page is found in **COLLECT INPUT > Evaluation Status.**

The progress bar and its equivalent percentage are displayed.

Clicking the EVALUATION STATUS link opens the list of participants, with individual evaluation progress.



This page lists all of the evaluators for the model as well as the percentage of their input that has already been provided.

The display can be sorted by Name, E-mail, Evaluation progress, or Last judgment time by clicking on the table headers.

There are three icons under the Actions column:

1. **Copy an evaluator's anytime link** on the clipboard
2. **Log out and log back** in with another user's anytime link
3. **View the evaluation steps** and judgments for any evaluator. This is a "view only" mode so while you can enter or change judgments, they will not be saved.

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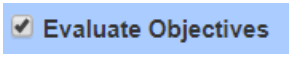
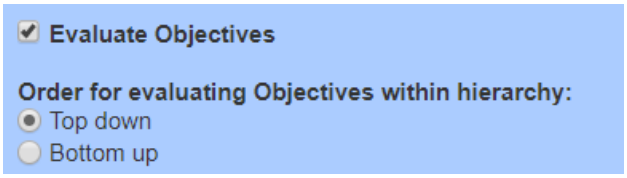
Defaults for Evaluating Objectives (Turn ON/OFF Objectives evaluation, Order of Evaluation within the Hierarchy and Default Pairwise Options)

Evaluate Objectives



The default option is to evaluate objectives, although a Project Manager might want to do the evaluation in stages over a period of time, and turn off the evaluation of objectives and evaluate only alternatives during one of these phases (for both Anytime and TeamTime evaluations).

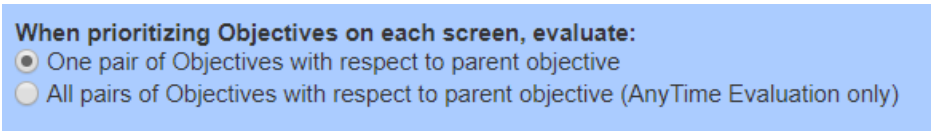
Order for evaluating within the objectives hierarchy



When there is more than one level of objectives, as is typical for important decisions, it is customary to proceed from the **top-down** -- that is, evaluating the relative importance of the main objectives, then the relative importance of the sub-objectives with respect to the objectives, and so on. However, for reasons similar to the above where it was recommended to proceed **bottom-up** -- evaluating alternatives before the objectives -- it is also recommended to evaluate the various levels in the objectives hierarchy bottom-up as well. Doing so will enable the evaluators to have a better idea of the significance of the elements contained within the higher-level objectives when they are evaluated.

One or All pairs on the display

When prioritizing Objectives on each screen, the Project Manager can select to display one pair or all pairs of Objectives.



Multi-pairwise evaluation is only applicable for AnyTime Evaluation.

Number of diagonals (Trade-off between accuracy and # of comparisons)

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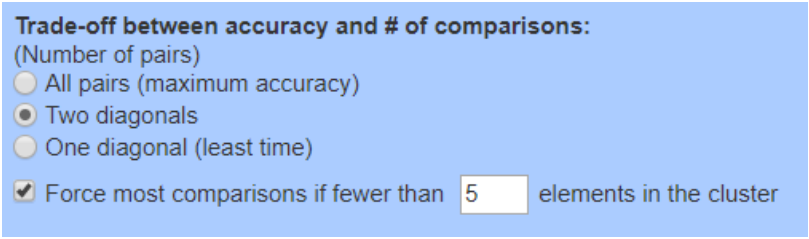
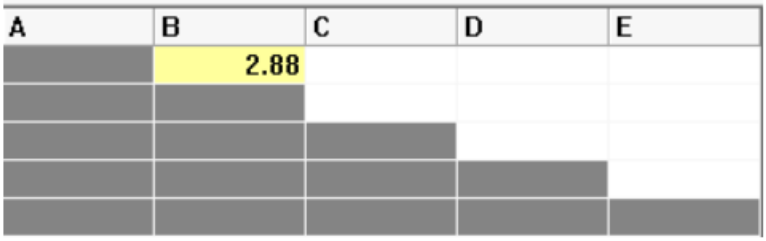


These options apply to the number of pairwise comparisons to be made within each cluster of elements. Let's consider an example of a cluster with five elements, A, B, C, D, and E:

The non-dark cells in the following figure illustrate all possible ((5 * 4)/2 = 10) pairwise comparisons for a cluster of five elements.

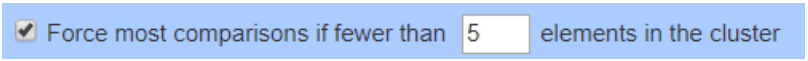


The most accurate results are achieved with the first option above but at the expense of taking more time. If the number of elements in a cluster is small, then this option provides the most redundancy and hence the most accurate results.

The choice of first and second diagonals in the above example would entail 4+3 judgments. This would consist of 3 "redundant" judgments (since at least 4 judgments are required for a spanning set) and would be reasonable even if verbal judgments were made.

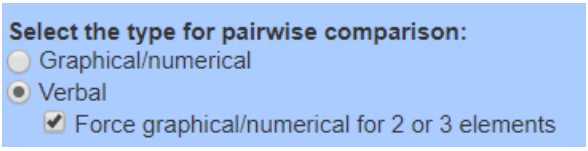
Choosing the minimum number of comparisons is not recommended unless pairwise graphical judgments are made and you have confidence in the accuracy of each of the judgments.

Force most comparisons



A combination of choosing the first and second diagonals, along with forcing most comparisons if fewer than 5 or 6 elements (you can specify how many), is recommended if there are some clusters with many elements that would require a large number of judgments for all diagonals and some clusters with just a few elements for which more accurate priorities would result from making judgments for all diagonals.

Pairwise Type (Verbal or Graphical)



You can choose between making the pairwise comparisons either graphically or verbally. Graphical judgments, being ratio

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scale measures to begin with, generally produce more accurate results and require less redundancy to produce accurate results than do verbal judgments. There are circumstances where verbal judgments might be more appropriate, however. If you do choose verbal judgments as a default, we recommend that you also specify that graphical judgments be used when there are only 2 or 3 elements in a cluster since there aren't enough redundant judgments to expect that accurate ratio scale priorities would be produced from the ordinal verbal judgments.

The pairwise options specified here are the defaults when evaluating objectives with respect to the parent objectives for each cluster set to be evaluated using pairwise comparisons. You can specify the pairwise options per cluster on the **Advanced Mode of Measurement Methods** , which will override the defaults.

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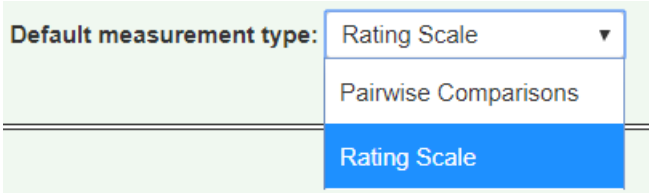
Defaults for Evaluating Alternatives (Turn ON/OFF Alternatives Evaluation, Default Measurement Type and Pairwise Options)

Evaluate Alternatives

The default option is to evaluate alternatives, although a Project Manager might want to do the evaluation in stages over a period of time, and turn off the evaluation of alternatives and evaluate only objectives.

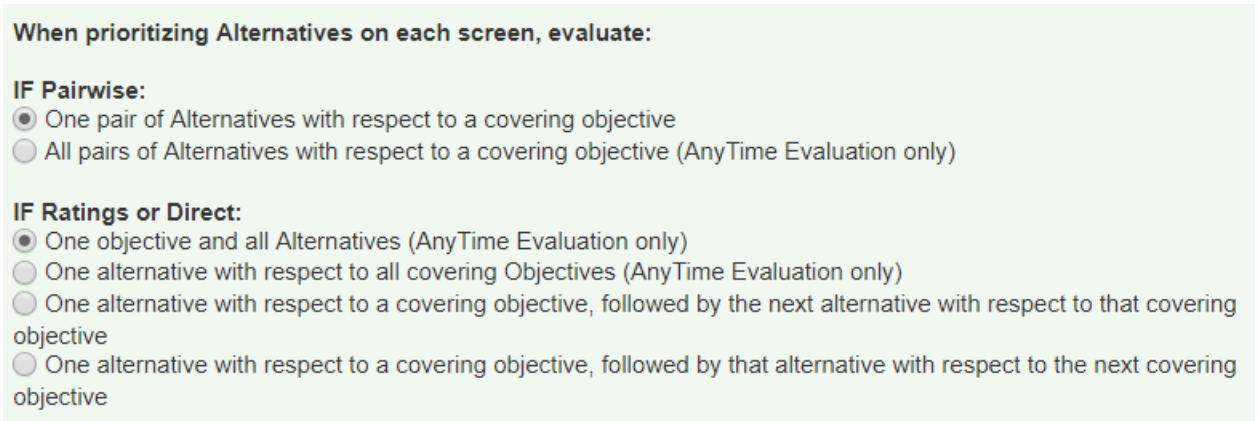
Default Measurement Type



The covering objectives are the lowest level nodes in the objectives hierarchy. The alternatives are compared or rated with respect to these "covering objectives." This option sets the default type for comparing/rating (the alternatives) with respect to the covering objectives to either pairwise comparisons or the default rating scale.
Note: The measurement type can be changed from this default setting for any or all covering objectives from **Measurement Methods for Alternatives**. In addition to specifying pairwise or ratings, other options include utility curves and step functions.

- When creating a new model, the template chosen will set the above option automatically.
- This option applies to covering objectives added to the model. If the option is changed, and new covering objectives are added, then the new option will take effect for the new covering objectives.

Number of Evaluation on each screen



When prioritizing Alternatives on each screen using pairwise comparisons, the Project Manager can select to display one pair

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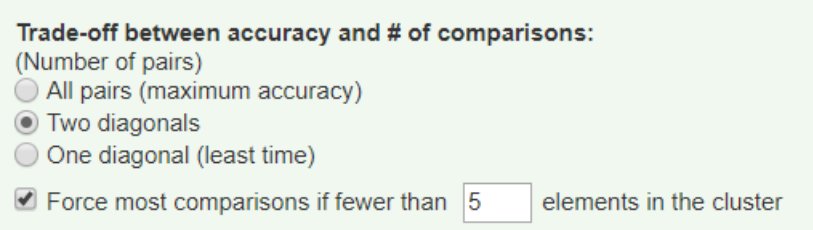
or all pairs of Alternatives.

When prioritizing Alternatives on each screen using rating, the Project Manager can select from various options are shown above.

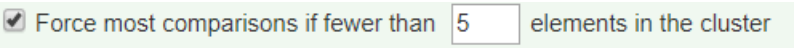
Multi evaluation is only applicable for AnyTime Evaluation.

Number of diagonals (Trade-off between accuracy and number of comparisons)

The below option applies to evaluating the alternatives with pairwise comparisons. This option is analogous to the corresponding option for pairwise comparisons of objectives.



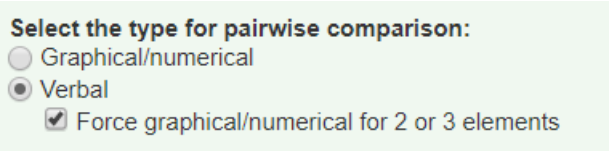
Force most comparisons



A combination of choosing the first and second diagonals, along with forcing most comparisons if fewer than 5 or 6 elements (you can specify how many), is recommended if: 1) there are some clusters with many elements that would require a large number of judgments for all diagonals; and 2) there are some clusters with just a few elements for which more accurate priorities would result from making judgments for all diagonals.

Pairwise Type (Verbal or Graphical)

This option is also analogous to the corresponding option for pairwise comparisons of objectives.



The pairwise options specified here are the defaults when evaluating alternatives with respect to the covering objectives for each cluster set to be evaluated using pairwise comparisons. You can specify the pairwise options per cluster on the **Advanced Mode of Measurement Methods**, which will override the defaults.

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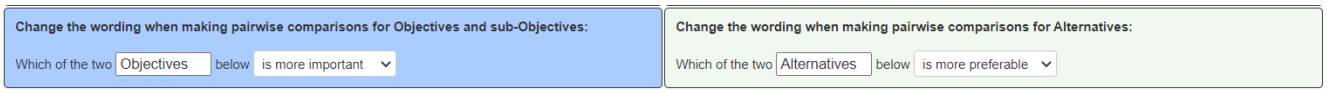
Model Wording

The default wording of your Comparion model is determined during model creation.

For existing models, the Objectives and Alternatives terminologies can be modified in the model from the **COLLECT INPUT > Evaluation Options > Judgment Options** page:

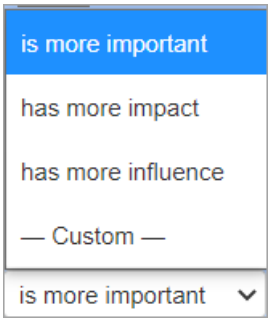


From above, we can specify the **Objectives** and **Alternatives** terminologies.

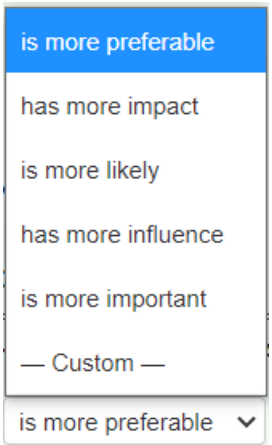
NOTE: The Model Terminologies for the Objectives and Alternatives will be used throughout the model interface. However, since we can only specify the plural form here, few places which use the singular wording will still apply the Workgroup Wording Template's singular terminologies.

You can also specify the wording to use during the evaluation, specifically for pairwise comparison (and rating, see explanation below)

For Objectives:



For Alternatives:



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Simply select from the predefined wording on the drop-down.

Selecting a predefined phrase will apply a similar phrase for Rating evaluation. For example, if you selected " **is more preferable,**" the Rating wording will be "**Rate the preference.**"

You can also select **--Custom--** and type in a custom phrase (e.g., is more influential, etc.).

Custom wording will not be applicable for Rating evaluation -- the default will be used.

If you want to fully customize the evaluation questions, you can edit the question from the evaluation page itself.

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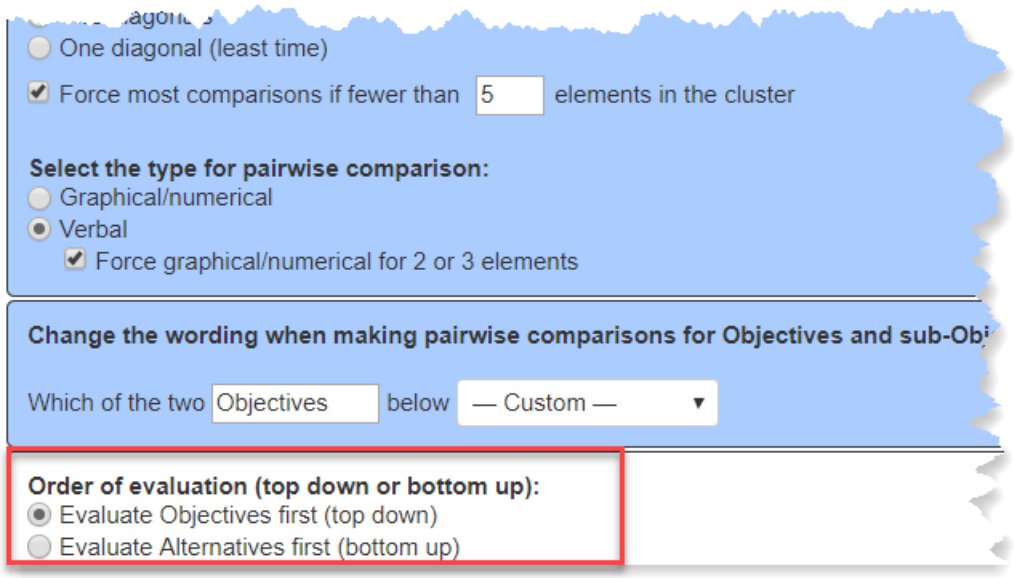
Order of evaluation (top down or bottom up)

You can define the order of evaluation from **COLLECT INPUT > Evaluation Options > Judgment Options**:

When an individual or small group derives priorities in an AHP model, they can evaluate either from the **top-down** (from goal to objectives to alternatives) or **bottom-up** (from alternatives to covering objectives, to top-level objectives).



Assuming there are evaluators that have roles to evaluate both the importance of the objectives as well as the preferences for the alternatives with respect to the objectives, it is customary to evaluate the objectives first. However, if the evaluators are not familiar with the alternatives, we recommend that they evaluate the alternatives first. Doing so will give them a better context for their judgments about the relative importance of the objectives (provides some feedback) and will lessen the amount of iteration that may be required.

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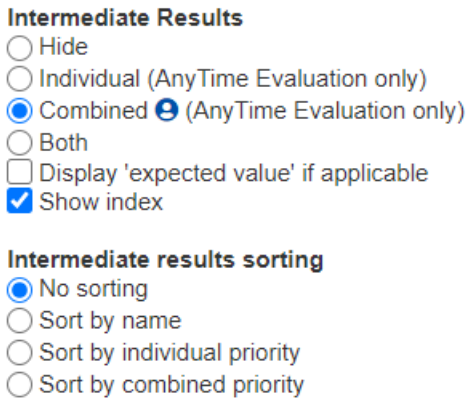
Show or Hide Intermediate and Overall Results

The Project Manager can select options that determine what the evaluators will see during their evaluation session, such as the Intermediate and Overall Results. This can be done on **COLLECT INPUT > Evaluation Options > Participant display options**.

Intermediate Results

Intermediate results, such as the priorities for elements in a cluster derived from pairwise comparisons, can be shown or hidden from evaluators. If shown, their individual results can be shown, or the combined results, or both.



Intermediate results can be sorted by name, individual priority, or combined priority.

The Hide option applies to both Anytime and TeamTime. The Individual and Combined are applicable only to Anytime Evaluation.

TeamTime will display both individual and combined results unless the “Hide” option is ticked, in which case you get no results steps at all.

To hide the combined results in TeamTime, the Project Manager can click the gear icon and then check the "Hide Combined Results" checkbox during the meeting.

You can show the "expected value" if the node names are numeric.

You can also hide or show the index in the results grid.

Overall Results

Overall results for the alternatives can be shown to or hidden from evaluators. If shown, their individual results can be shown,

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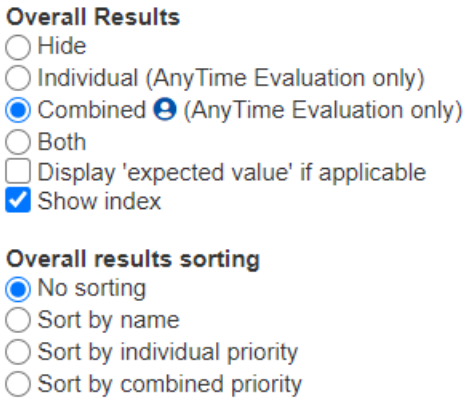
or the combined results, or both.



The Hide option applies to both Anytime and TeamTime. The Individual and Combined are applicable only to Anytime Evaluation.

TeamTime will display both individual and combined results unless the “Hide” option is ticked, in which case you get no results steps at all.

To hide the combined results in TeamTime, the Project Manager can click the gear icon and then check the "Hide Combined Results" checkbox during the meeting.

Overall results can be sorted by name, individual priority, or combined priority.

You can show the "expected value" if the node names are numeric.

You can also hide or show the index in the results grid.

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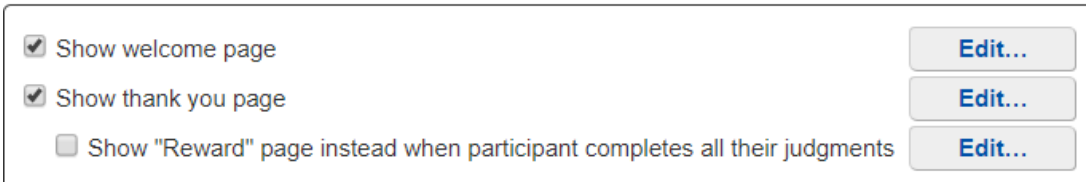
Edit Welcome, Thank You or Rewards pages

The Welcome, Thank you, or Reward pages of the evaluation can be shown or hidden. This can be done on **COLLECT INPUT > Evaluation Options > Participant display options**.

A welcome page is shown at the beginning of the evaluation and/or a thank you page at the end of the evaluation.

You can also display a reward page instead of the thank you page when participants have completed all the judgments they have a role for.



Each of these pages can be edited. Simply click the **Edit...** button to open the rich text editor where you can add texts, images, URLs, etc.

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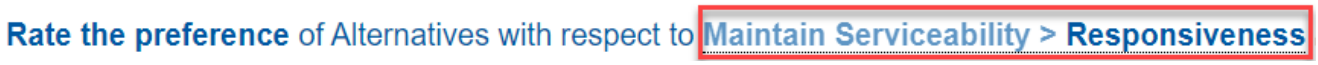
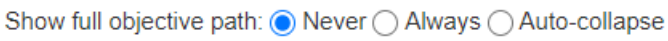
Show Objectives Full Path

You can show or hide the objective's full path in the evaluation heading.



This can be found on **COLLECT INPUT > Evaluation Options > Participant Display Options.**



- **Never** - do not show the objectives full path at all.
- **Always** - always show the objectives full path.
- **Auto-collapse** - show the objectives full path for 5 seconds and then collapsed it. Clicking the objective name will show again the full path.

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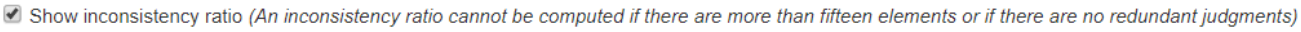
Show or Hide Inconsistency Ratio

Inconsistency Ratio can be shown or hidden in the Intermediate Results pages. This can be done on **COLLECT INPUT > Evaluation Options > Participant display options**.

The inconsistency ratio can be shown when judgments are entered using pairwise comparisons. The evaluators will also see various options to improve the inconsistency.



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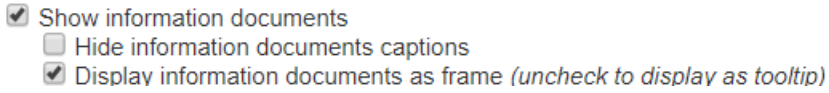
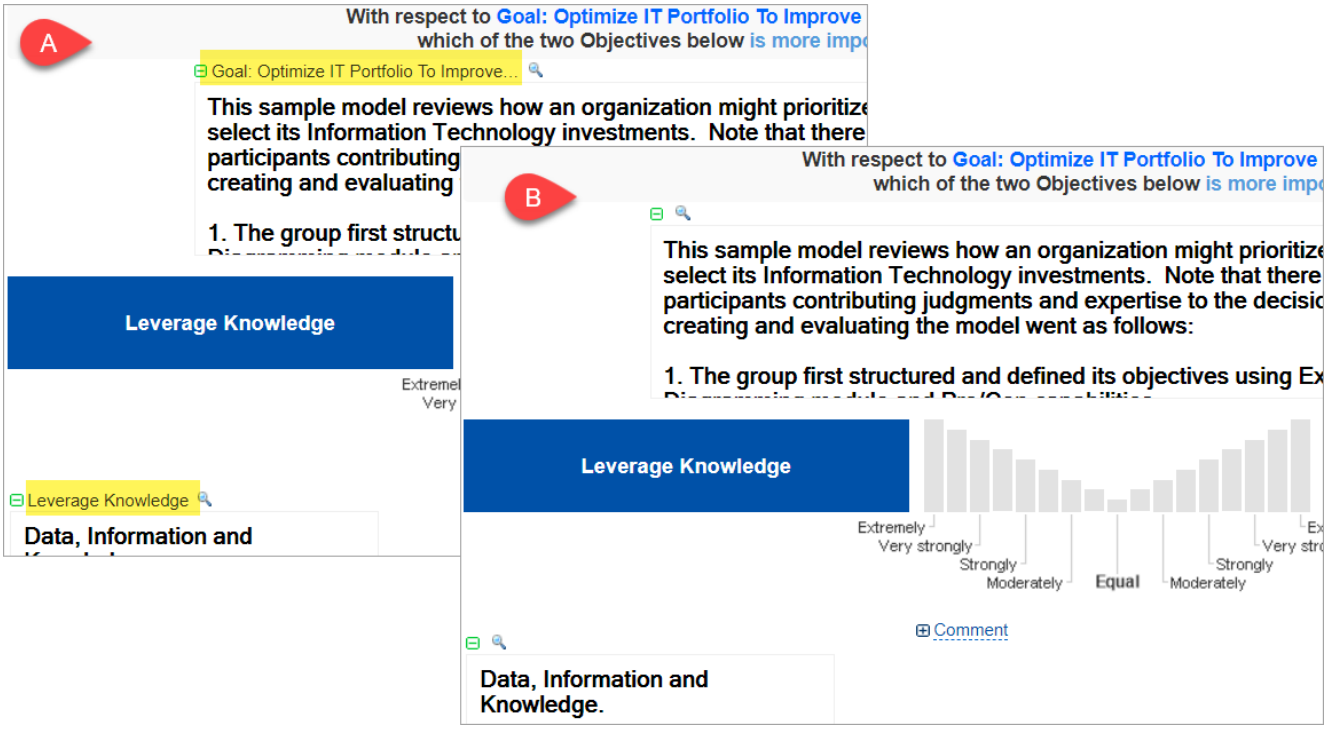
Information Documents Settings (Hide or Show, Tooltip or Frame View)

Information Documents can be shown or hidden and displayed as a tooltip or as a frame in the Collect Input process. This can be done on **COLLECT INPUT > Evaluation Options > Participant display options**.

Simply check the "Show information documents" checkbox to show the information documents.



The information documents captions can be hidden:



The information documents can be displayed in the **frame** as shown above or as a **tooltip**:

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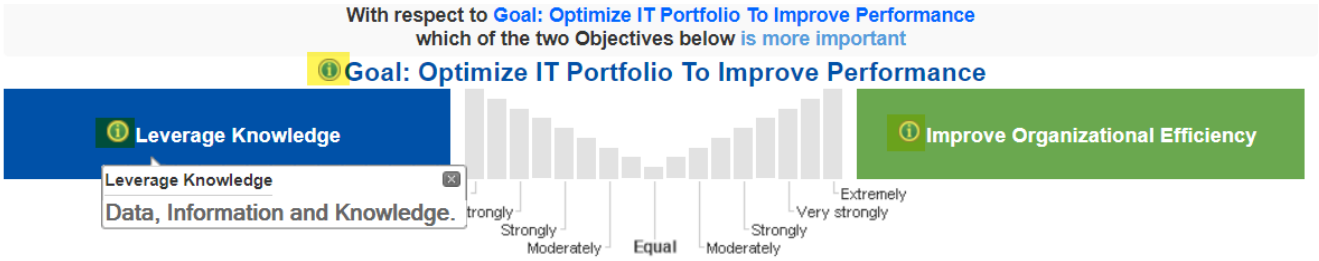

Simply hover on the "i" icon to display its content.

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Allow Comments Entry

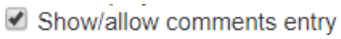
Evaluators can add comments during the evaluation.

A comment allows the evaluator to add a note for his/her specific judgment, which the Project Manager can later review in the Judgments Overview Reports.

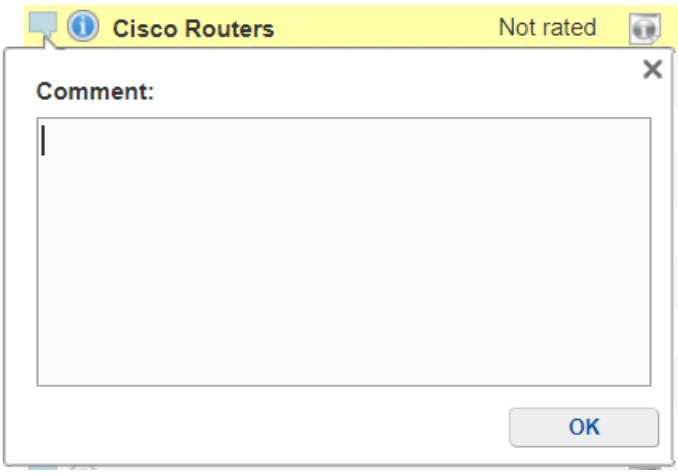
The comments Entry can be enabled or disabled.

This can be done on **COLLECT INPUT > Evaluation Options > Participant display options**.

Simply check or uncheck the Show/allow comments entry.



Depending on the evaluation (multi or single), comments are displayed as a tooltip by clicking the blue icon.



or in the expandable frame:

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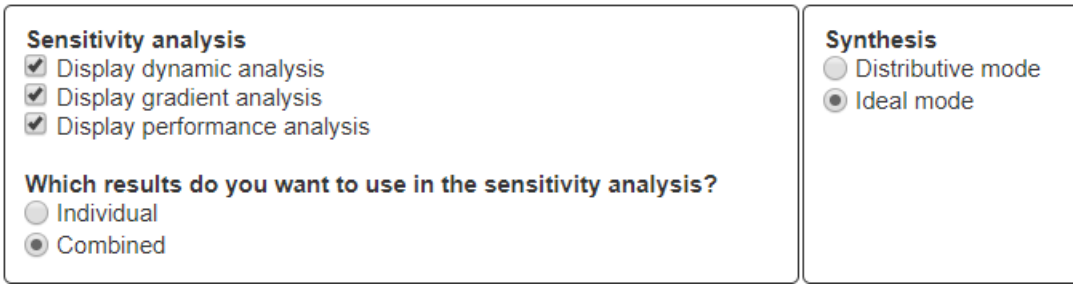
Show Sensitivity Analysis on the Evaluation

Sensitivity analysis (Dynamic, Performance, and Gradient) can be shown or hidden to the evaluators. If shown, either the individual or combined priorities can be shown.

This can be done on **COLLECT INPUT > Evaluation Options > Participant display options**.

Results can be computed as an ideal mode (default) or distributive mode synthesis.

An ideal alternative can be included (default) so that priorities of alternatives, with respect to covering objectives where no alternative has a priority of 1, will be commensurate with priorities of alternatives that are computed with pairwise comparisons.



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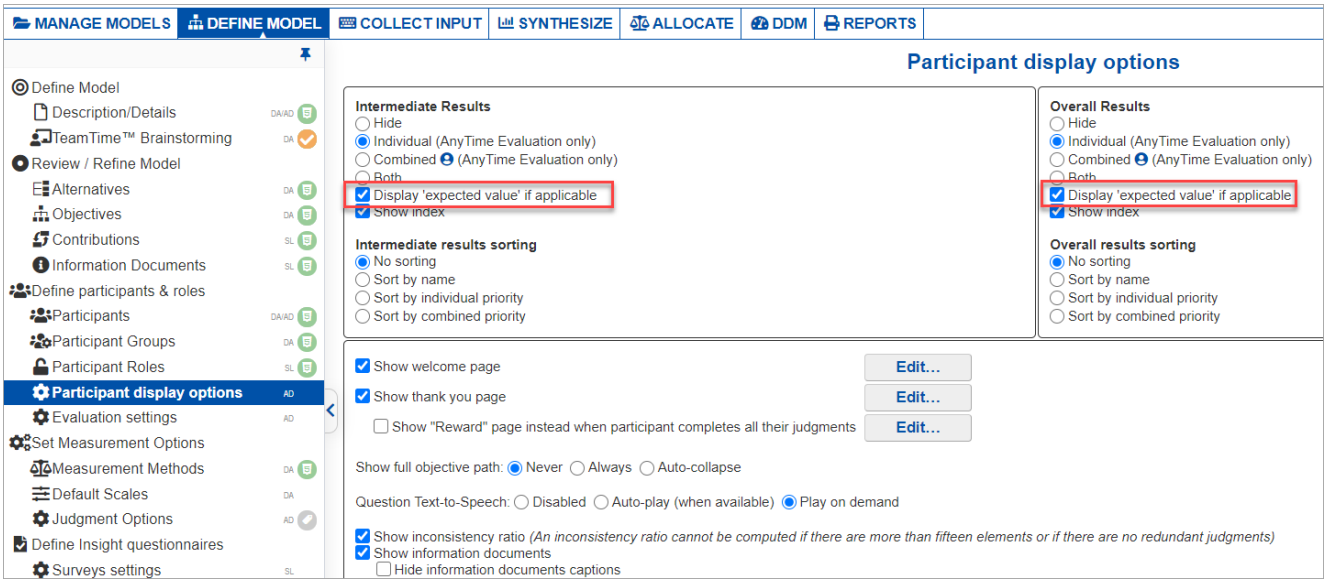
Show Expected Values

If applicable, you can show the Expected Values on Intermediate and Overall Results.

Expected value (also known as EV, expectation, average, or mean value) is a long-run average value of random variables. It also indicates the probability-weighted average of all possible values.

This can be turned on or off from **COLLECT INPUT > Evaluation Options > PARTICIPANT DISPLAY OPTIONS:**



In the example below, the expected value is an anticipated value for investment at some point in the future (Price of Apple). The variables used to calculate the Expected Value are the element names.

The Expected Value is displayed at the bottom of the Intermediate and Overall Results of the evaluation pages, as highlighted below:

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Priority of Alternatives with respect to "Price of Apple (AAPL) in June 2017 as of June 2016"

Normalization options: Normalized

No ▲	Name	Participant results
1	none	13.81%
2	75	20.21%
3	90	33.00%
4	100	27.49%
5	110	3.95%
6	125	1.41%
7	150 or more	0.13%

Expected value (Participant) = 238.35
Inconsistency ratio: 0.95

Judgments matrix

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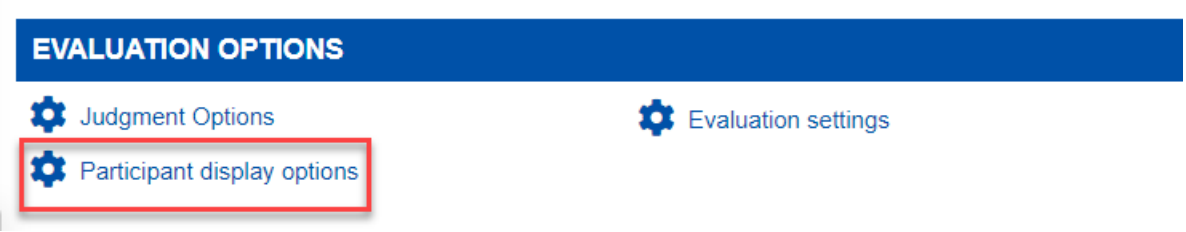
Show or Hide Index, Normalization and Priority bars

The Project Manager can select options that determine what the evaluators will see during their evaluation session, such as the Intermediate and Overall Results. This can be done on **COLLECT INPUT > Evaluation Options > Participant display options**.



For the Intermediate and Overall Results screens, the Project Manager can select to show or hide the element index, normalization dropdown, and priority bars. These are checked by default.

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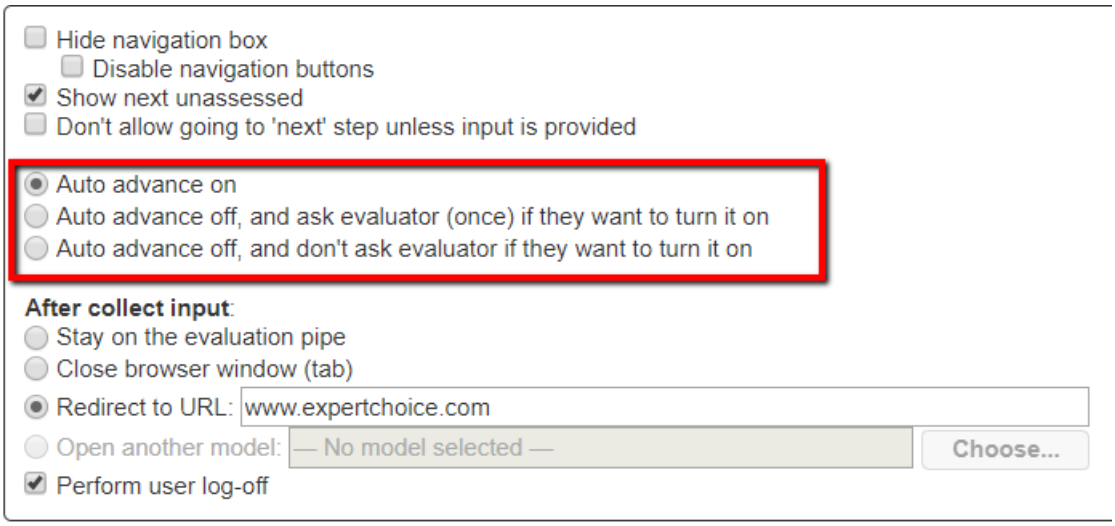
Auto-advance Evaluation

Auto-advance can be used to make the evaluation for single pairwise verbal and single rating faster by auto-advancing to the next step after the judgment is made.

The Auto-Advanced option can be set on **COLLECT INPUT > Evaluation Options > Advanced Evaluation settings.**

There are three options for the auto-advance feature:

- Auto-advance on.
- Auto-advance off, and ask the evaluator (once) if they want to turn it on. (After going through 5 pairwise steps a prompt will display asking the evaluator if they want to turn on the auto-advance feature.)
- Auto-advance off, and don't ask evaluator if they want to turn it on.



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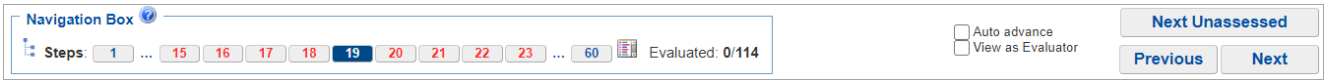
Show or Hide the Navigation box and buttons

The Project Manager can show or hide navigation buttons during the evaluation. This can be done in **COLLECT INPUT > Evaluation Options > Advanced Evaluation settings**.

By default, the navigation elements available on the evaluation are:



The Project Manager has options to show/hide some buttons and more:

- **Hide navigation box/Evaluation progress** - hide the navigation box at the left which shows the buttons to move to a specific step, current cluster, and steps list.
    - **Hide navigation step buttons** - hide the navigation box but show the evaluation progress. Note: When the "Hide navigation box/Evaluation progress" is checked, this option is disabled since it will be overridden.

      Step: **4/60** Evaluated: **0/114**
- **Show next unassessed** - show or hide the "Next unassessed" button. The next unassessed button allows the evaluator to skip the results/information/evaluated steps and jump to a specific step that is not yet evaluated, and skip results or information steps.
- **Don't allow going to "next" step unless input is provided** - disable the Next button and the number steps when the evaluator hasn't provided judgment for the current step.

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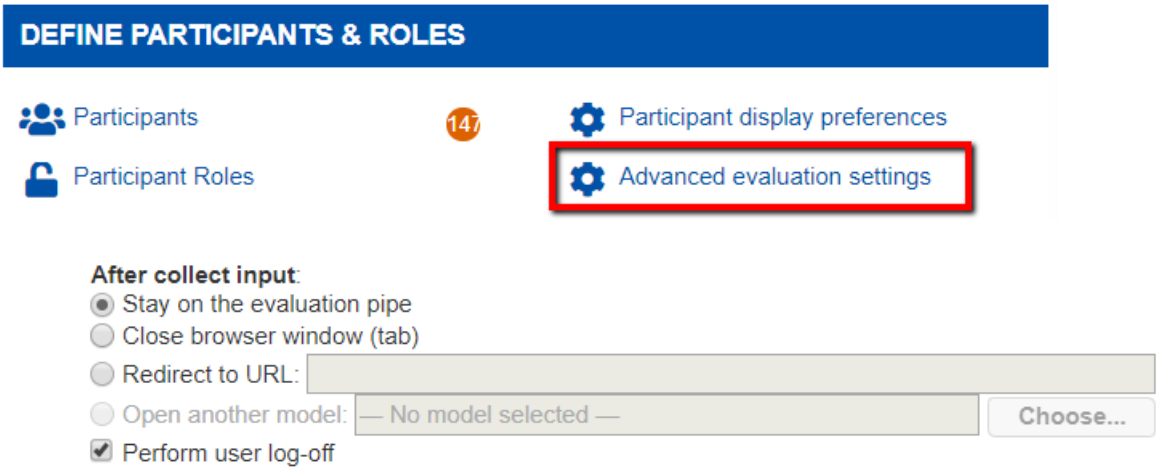
After collect input options

The Project Manager can let the evaluators stay on the evaluation, close the browser tab, or redirect to another Comparion project or website once they have finished the evaluation process. This can be done in **COLLECT INPUT > Evaluation Options > Advanced Evaluation settings.**



- **Stay on the evaluation pipe** - stay on the last step of the evaluation, commonly the "Thank you" page. The evaluator can close the tab or go back to the previous steps.
- **Close browser window (tab) -** add a Finish button on the last step of evaluation which will close the browser tab.
- **Redirect to URL** - will take the evaluator to the URL specified by the Project Manager following their completion of the evaluation.
- **Open another model** - select and open another Comparion model where the evaluator will be redirected to collect input.
- **Perform user log-off** - automatically log the evaluator off after completing their input.

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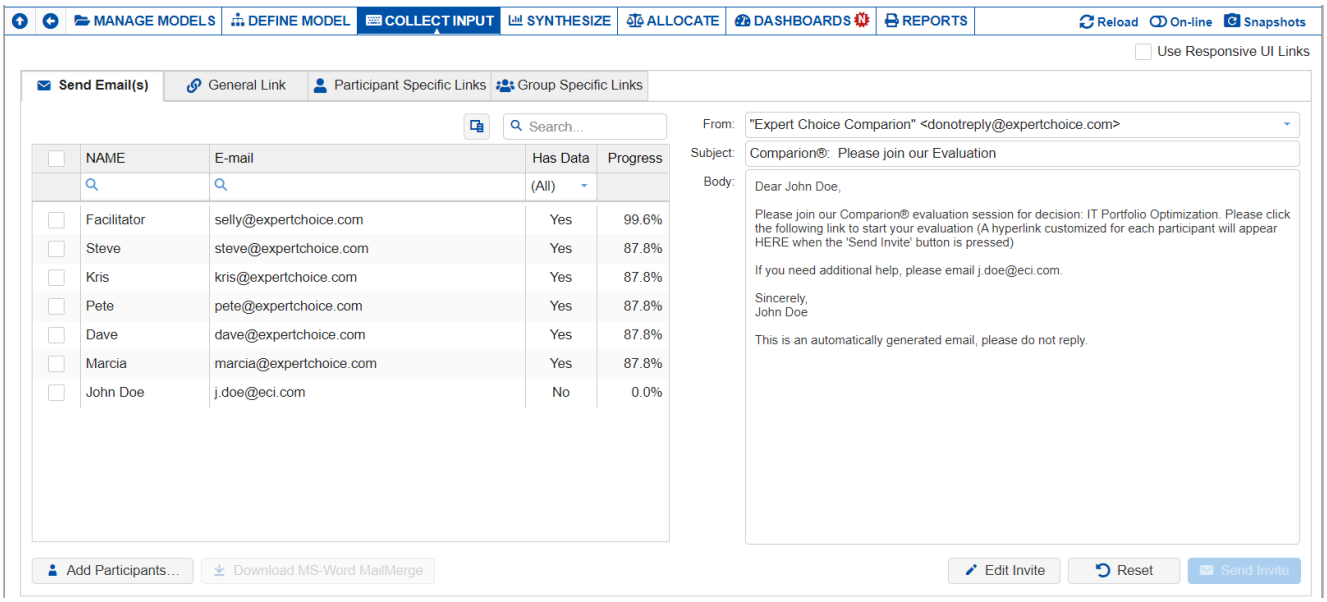
Send AnyTime Invitations Overview

Comparion has several ways to invite participants to an anytime evaluation -- both for unregistered participants as well as those already registered in the model.



Responsive or Non-responsive Evaluation pages

AnyTime evaluation pages can be Responsive or Non-responsive.

In general, responsive Evaluation allows you to automatically adjust the content and layout of the page to accommodate a variety of devices and window or screen size.

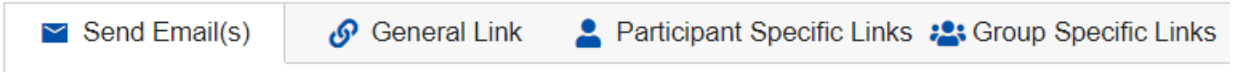
To generate responsive invitation links, simply check the ☑ Use Responsive UI Links checkbox.

By design, responsive links simply add **"r-"** on the non-responsive links.

For example, if the invite link for non-responsive is: **https://comparion.expertchoice.com?hash=abcde,** then the responsive invitation link would be **https://r-comparion.expertchoice.com?hash=abcde**

📖 Learn more on Responsive vs Non-responsive pages

There are four tabs for inviting participants, each with a different purpose.



Send Email(s)

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This option is used to select one or more **participants already registered** in the model, and then to have Comparion or your Local email client send an email to each of the selected participants.

General Link

The General Link tab provides a hyperlink and/or invite instructions that can be used **both by registered and unregistered participants**.

📖 Learn more on Invite Participants using General Links.

Participant Specific Links

The Participant Specific Links tab provides a (unique) link and email address generated for every **registered participant** in the model. The Project Manager can use these links in any way that they desire.

Group-Specific Links

The Group-Specific Links tab provides a link that will assign both **registered** and **unregistered** participants to a specific group.

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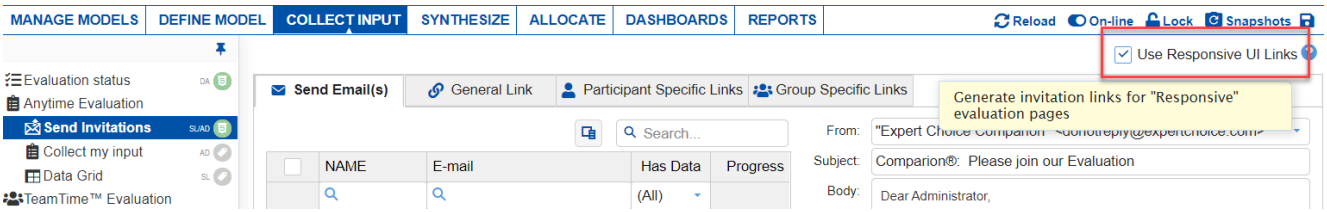
Responsive vs. Non-responsive Evaluation pages

AnyTime evaluation pages can be **Responsive** or **Non-responsive**.

In general, Responsive Evaluation allows you to automatically adjust the content and layout of the page to accommodate a variety of devices and window or screen size.



To generate responsive invitation links, simply check the ☑ Use Responsive UI Links on the AnyTime Send Invitation screen.

See below for more comparisons between Responsive and Non-responsive evaluation:

Non-Responsive Page	Responsive Page
Works flawlessly for desktop or big screen devices. For smaller devices, some browsers have a built-in way to show non-responsive pages as "mobile view," but it still requires scrolling and zooming.	Designed to render the page content based on the user's screen size. **Responsive** layouts automatically adjust and adapt to any device screen size, whether it is a desktop, a laptop, a tablet, or a mobile phone.
Features only available on non-responsive evaluation: • Edit welcome and thank you page • Evaluation Question Text to speech • Save Quick Help per cluster • Upload or Download Quick Help • Apply Question's wording to other clusters • Show information documents on overall results step • Insert Template (Variable) option on Evalaution Question	Features only available on responsive evaluation: • Auto-resize information documents image • Signing up form (detect existing email and ask for password instead of fields previously selected on Invite participants screen)
Support anonymous and signing up user evaluation for models with insight questions that can change the evaluation steps (e.g., Alternatives/Objectives checklist, Questions linked to participants' attributes)	Does not support

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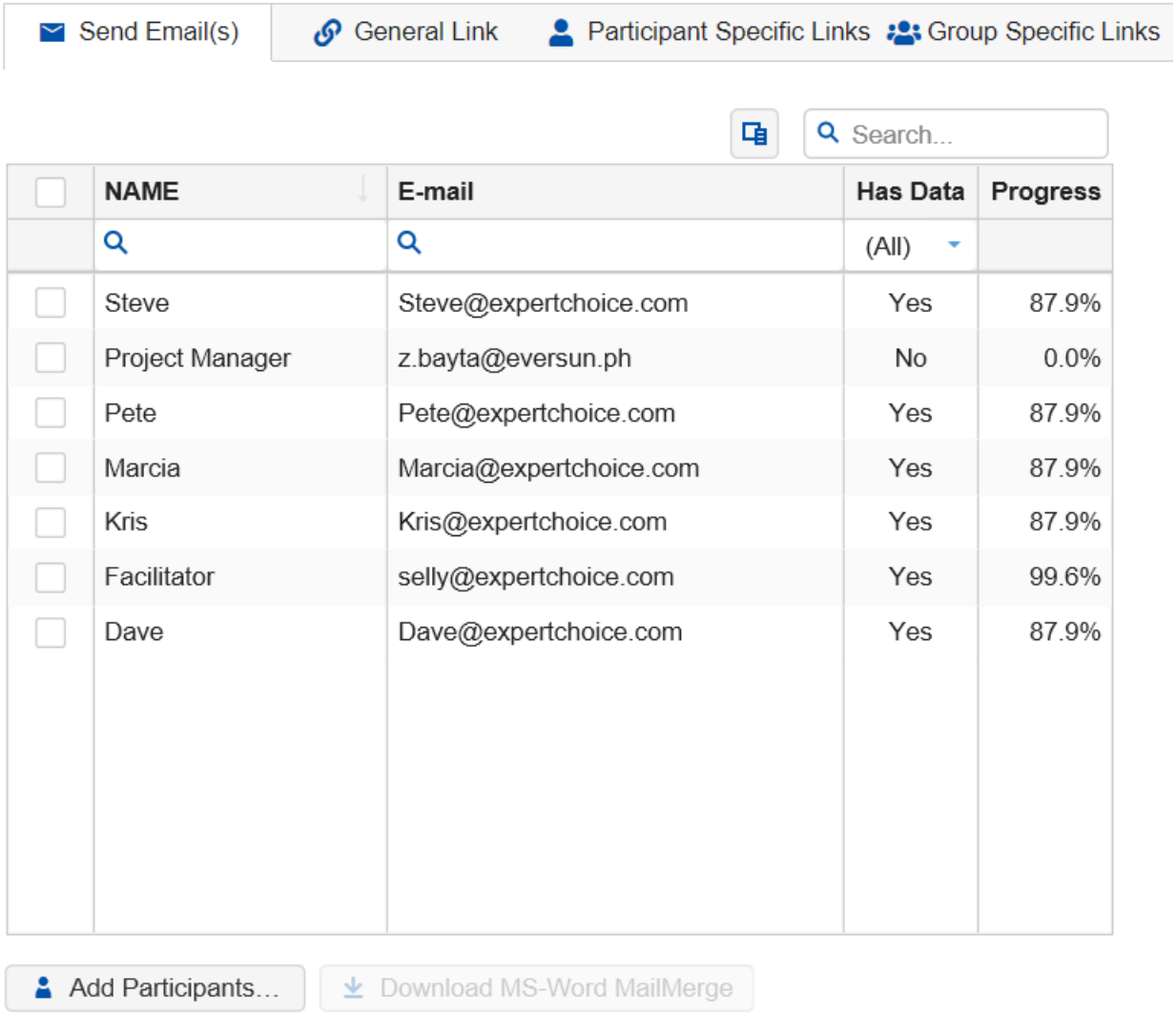
Send AnyTime Invitation (from Comparion or Local Mail Client)

The **Send Email(s)** tab is one of the send invitation options for AnyTime Evaluation. It displays a participants list table as shown below where the Project Manager will select the participant/s that will receive the AnyTime invitation. You can add participants in the Define Model > Participants page by navigating through the menus or by simply clicking the **Add Participants** button below the table.



A template for the email is also provided which can be edited to explain the purpose of the evaluation and provide any other information or hyperlinks that you want to convey to the evaluators.

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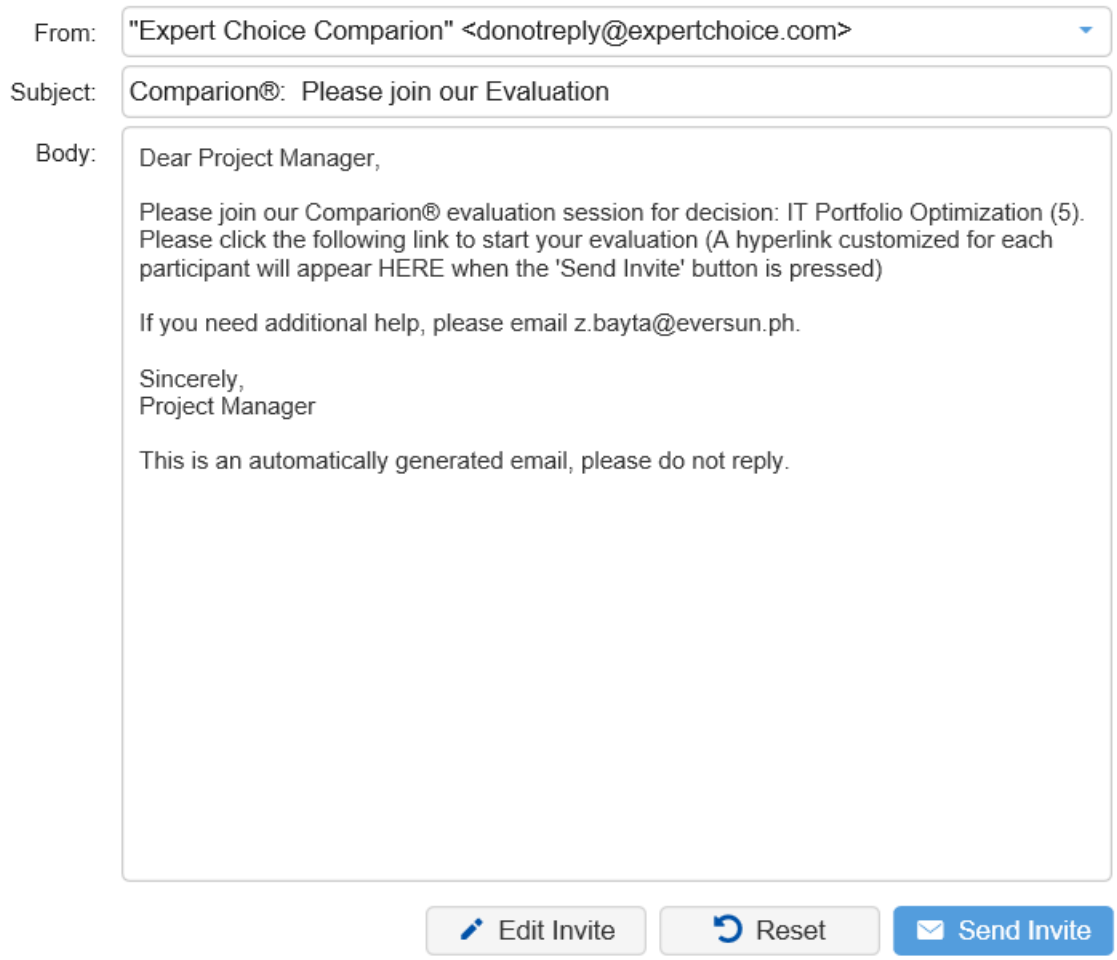


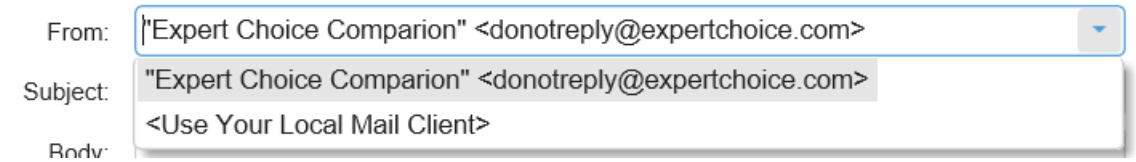
You can edit the email Subject by typing on the Subject Field.

Clicking the **Edit Invite** button will open a rich text editor where you can edit the body of the invitation. You can add variables that Comparion will replace with the appropriate information as desired. After returning from editing you can then view what the email will look like.

Click the **Reset** button to reset the invitation to the default.

The **Send Invite** button is disabled until you select at least one participant from the left. You can select some or all of the participants to receive the email. You can also re-invite or remind participants if they are not making progress. You can select all participants without judgments or sort by the Evaluation Progress column and select those with a small percentage of judgments to re-invite or remind.

By default, the invitation email is being sent by Comparion; you can choose to send the invitation using your local mail client (e.g Outlook, Thunderbird, etc.) by selecting "Use Your Local Mail Client" under the "From:" field.



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Note that using this option, you can only send invitations to one selected participant at a time. If you want to send to multiple participants at once using your local mail client, you can use the Mail Merge option.

Simply select the participants you want to send the invitation to and then click the Download MS-MailMerge button at the bottom.

A .zip file will be downloaded; extracting the zip file will uncompress the ff:

- Your_Model_Name.docx - the MS mail merge file
- Your_Model_Name.mdb - MS database
- README.docx

Read the README.docx for the instructions.

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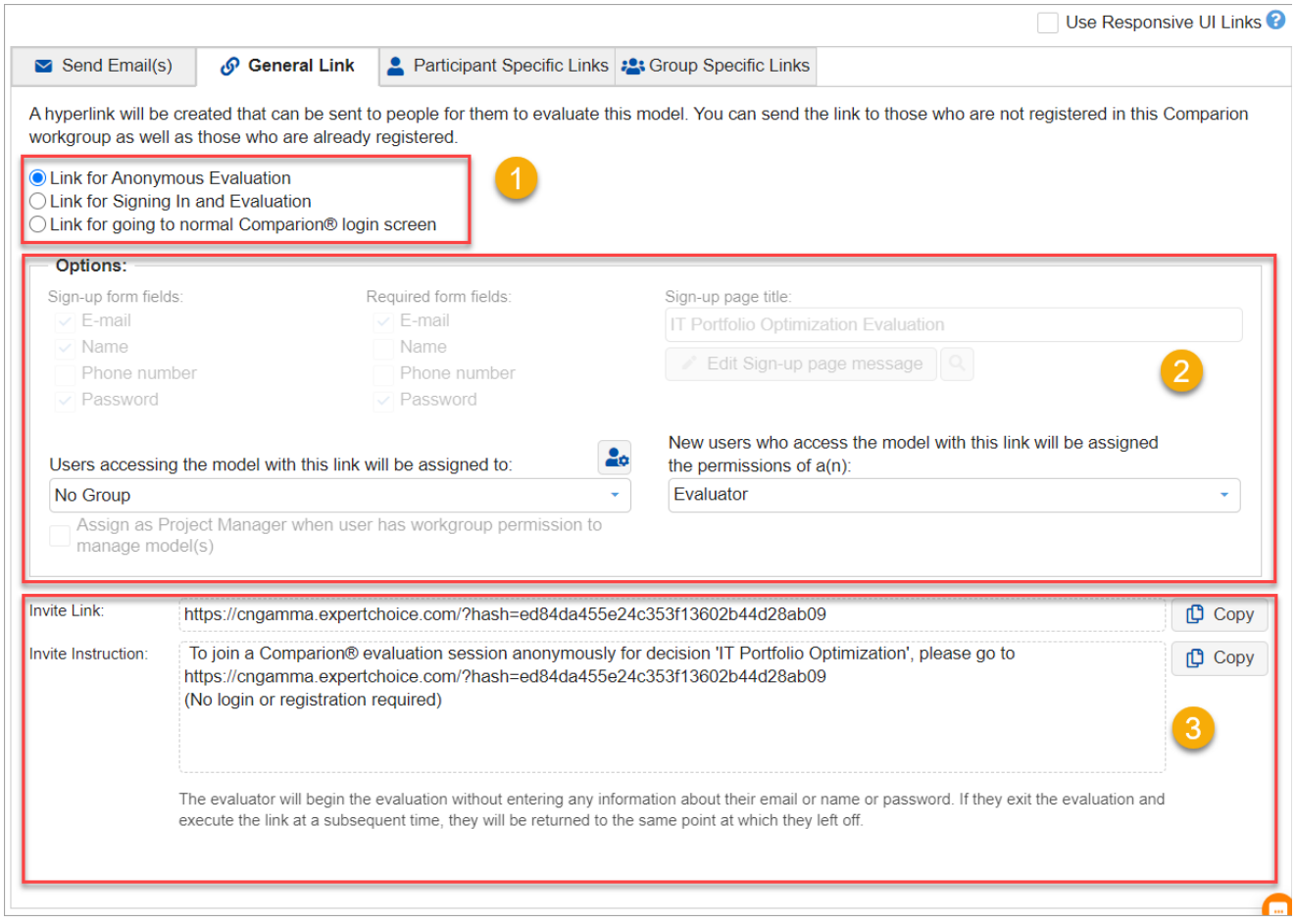
Invite Participants using General Links

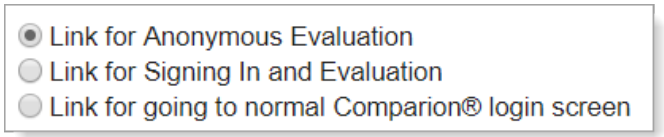
The General Link tab provides a hyperlink and/or invitation instructions that can be used **both by registered and unregistered participants**.

The General Link page is divided into three sections:

- **General Link type** - Anonymous, Sign in and Evaluate, and Log in. These are explained in detail below.
- **Options** - Options can be enabled or disabled as applicable to the selected General Link type.
- **Invitation Link and Invitation Instruction** - where the invitation link and instructions based on the general link type and options specified are displayed. The Project Manager can copy and send the link/instruction via email, post it to a website, or transmit it via a chat window or any other communications mode. You can also see hint text below the invitation instruction explaining briefly how the link works.



There are three options for General Links:



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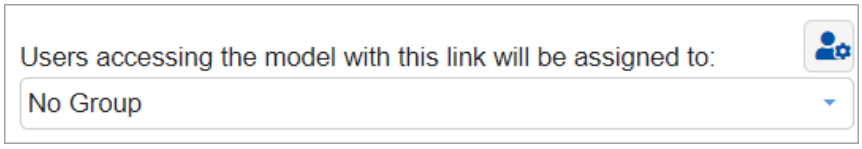
1. Link for Anonymous Evaluation

Generates a link that, when used, will allow the respondent to enter judgments anonymously. If they exit the evaluation and execute the link at a subsequent time, they will be returned to the same point at which they left off.

The options available for Anonymous Evaluation invitation are as follows:
(These options are also available for the Signing Up and Evaluation tab)

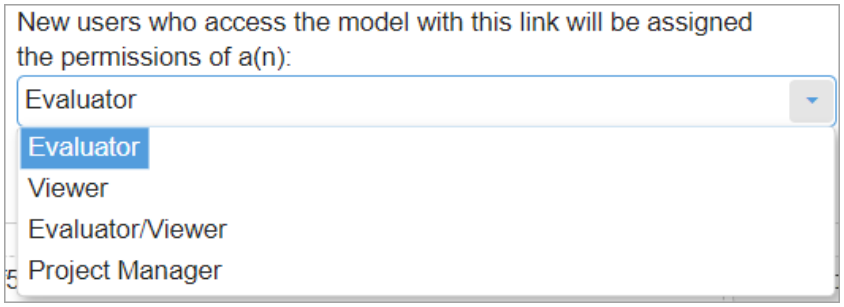
- **Group Assignment** - assigns the invited users to a specific participant group when executing the link.



By default, "No group" is selected, meaning they will not be assigned to any group. You can select a group, if available, by clicking on the drop-down. You can click the Manage Groups icon to redirect you to the Add Participants screen and open the Manage Groups dialog box where you can add groups.

TIP: The invitation/instruction link section at the bottom has a generated link that is based on the currently selected group on the drop-down. If you want to get the links for all the existing groups at once, go to the fourth tab, **Group-Specific Links** tab lists, where you can copy/download the links.

- **Permission Assignment** - assign permission (Evaluator, Viewer, Evaluator/Viewer, and Project Manager) to non-registered participants when executing the link.



2. Link for Signing In and Evaluation

The Link for Signing In and Evaluation is applicable for **registered** and **non-registered** users. Executing the link will redirect the users to a page with two forms, where they can either sign up or log in:

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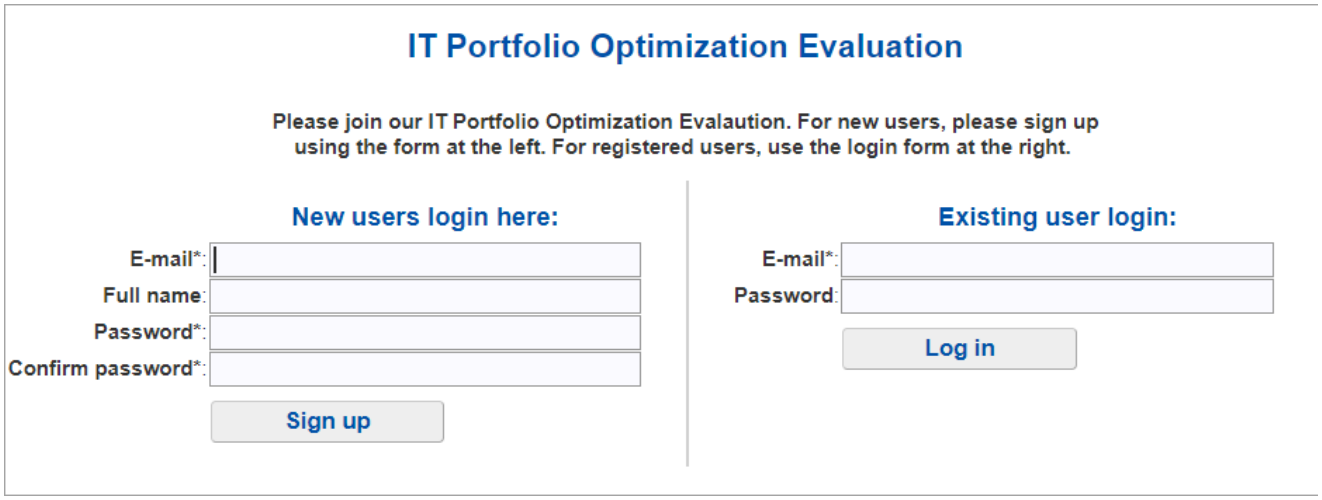
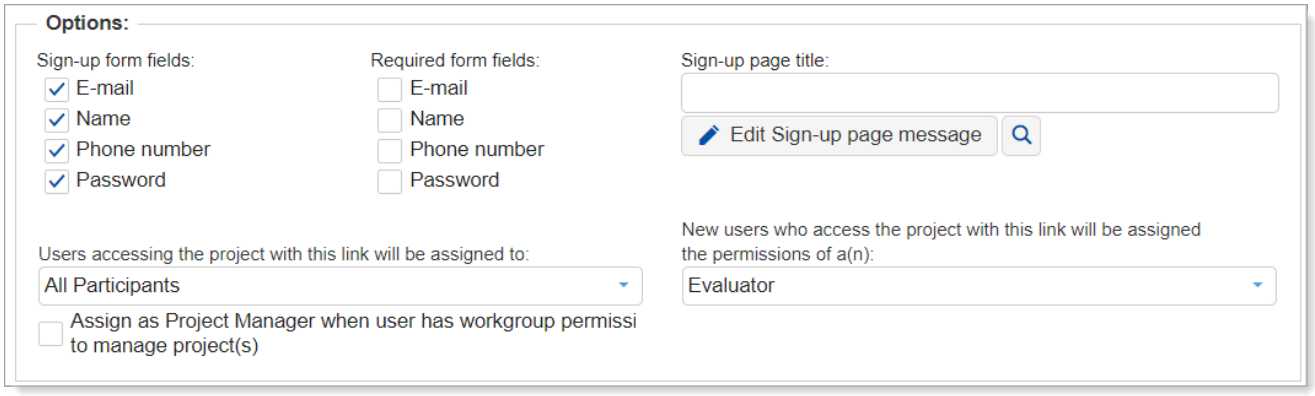


In addition to the two options (Group and Permission Assignment) available for the Anonymous Evaluation described above, more options are available for Link for Signing In and Evaluation:



- **Sign-up form fields and required fields** - select the fields (E-mail, Name, Phone number, Password) to display for the non-registered users form when the link is executed and indicate if responses are required or not. At least one of the fields must be selected (checked) to appear.

Note: You cannot specify a required password unless the email is required. If all selected fields are designated as optional (not required) and the user chooses to not enter any information, then the link functions the same as the anonymous evaluation.

- **Assign a Project Manager permission to the registered user** - if this option is checked, a registered user that has a Project Organizer Workgroup Permission will be a Project Manager of the model. (Note: A Workgroup Manager will always be a Project Manager of a model.)
- **Specify the signup page title and message** - this is the (1) heading and (2) custom message that will appear at the top of the signing up/login page.

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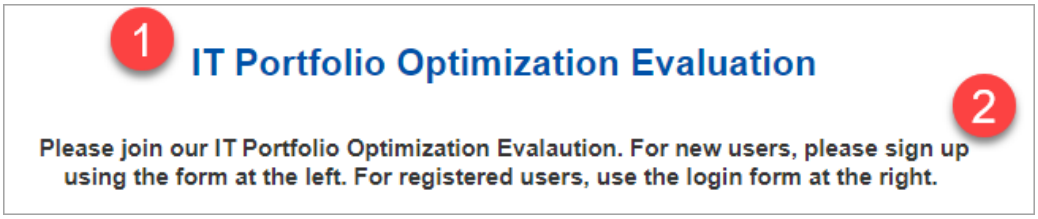
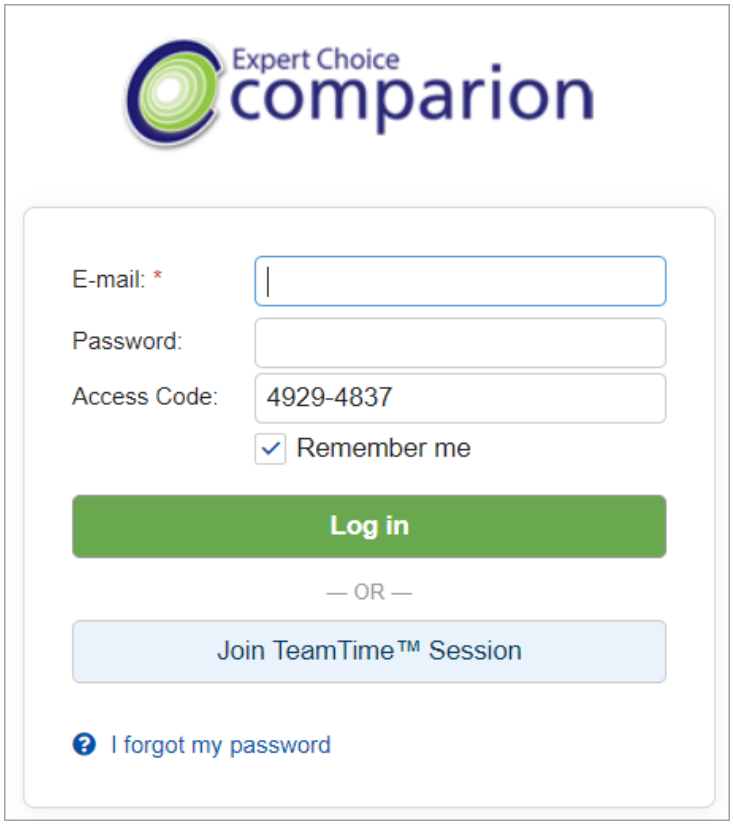


3. Link for going to normal Comparion login screen

When executing the link generated from this option, the user will be taken to the normal Comparion login screen with an **access code** for this model. The registered user needs to provide his/her email and password, and click Log in.



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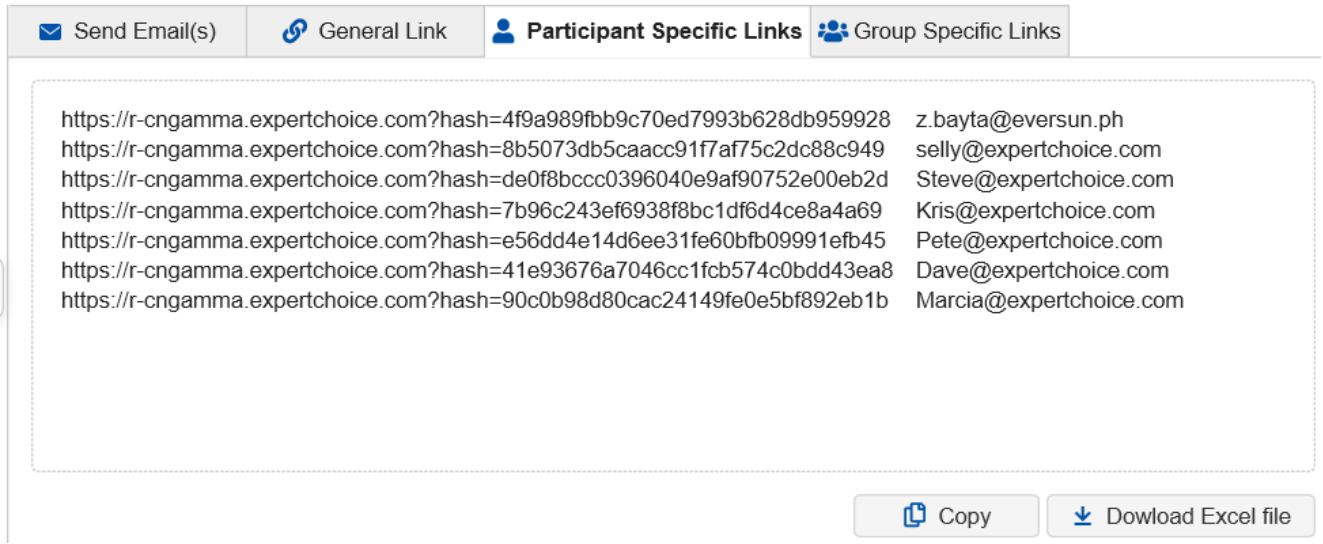
Invite Participants using Participant Specific Links

The Participant Specific Links tab provides a (unique) link and email address generated for every **registered participant** in the model. The Project Manager can distribute these links to participants.



The Project Manager can copy the links and emails using the Copy button or download them to an Excel file.

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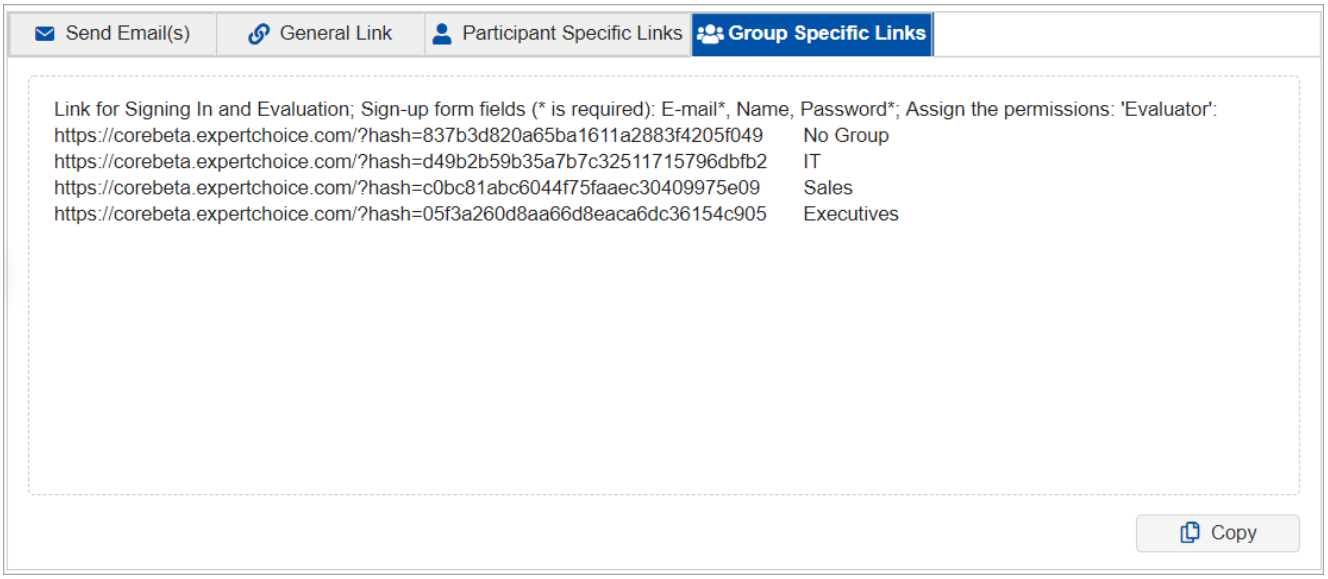
Invite Participants using Group Specific links

The Group-Specific Links tab provides a link that will assign both **registered** and **unregistered** participants to a specific group.

In the General Link tab, you can only select a group and copy the invitation link one at a time. Here in the Groups-specific tab, we take into account the currently selected options from the General links tab (e.g., general link type, permission, etc.) and generate a link with those definitions for each existing participants group.

For example:



The invitation link details are indicated in the first line as shown above. "Signing In and Evaluation" invite links with sign-up form fields: Email*, Name, and Password*, users will be assigned to an "Evaluator" permission.

Three invite links were generated. When a user executed the first link, s/he will be redirected to the "Signing in and Evaluation" page and will be not be assigned to any group after he/she signed up or logged in.

The second link will assign the users to the "Risk Experts" group, and the third to the "C-Level Executives" group.

Participants Groups can be added on **DEFINE MODEL > DEFINE PARTICIPANTS & ROLES >** **Participants groups** page. Each group has a unique link as shown below.

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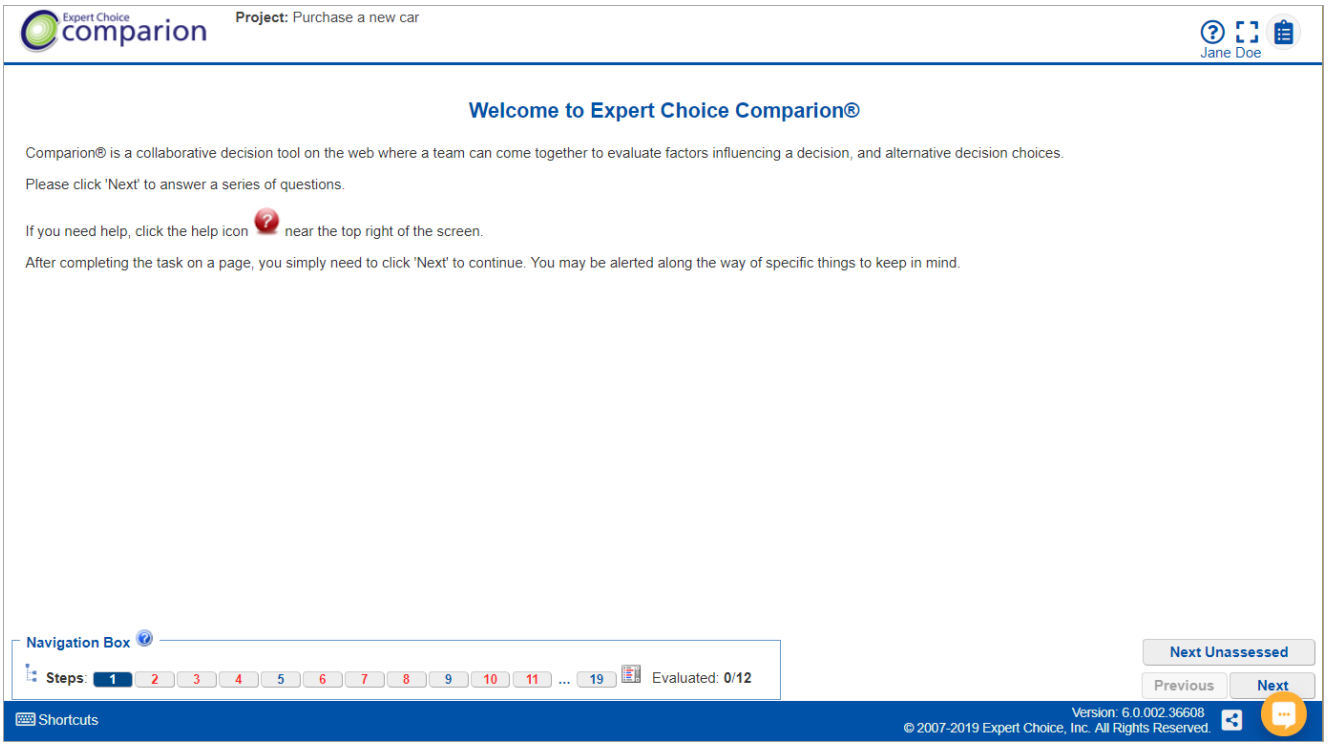
Welcome Page

The Comparion Evaluation process usually starts with the Welcome Page where the Project Manager can give an introduction and instructions to the Evaluators.



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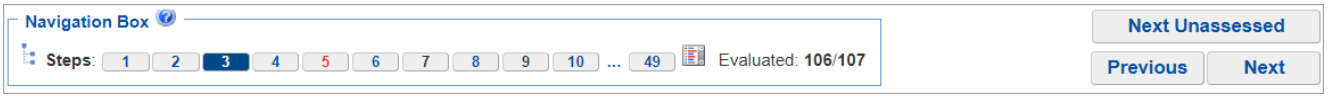
How to Navigate in the Evaluation?

How to Navigate in the Evaluation?

The Project Manager decides the navigation options available during the evaluation.

By default, the following navigation box and buttons are available at the bottom of the evaluation page.



Sequential Navigation:

The easiest and most common way to proceed through the evaluation is sequential -- by clicking the Next button after entering any information requested on each page. You can go back to a previous step using the Previous button.

If you have previously entered judgments and request to go back to an earlier step (see below), click Next Unassessed to jump to the next screen that is unassessed.

Non-Sequential Navigation:

Depending on options set by the Project Manager, you may have considerable flexibility in navigating through the evaluation without sequentially going step by step. We recommend that you do this only if you have used Comparion before.

The "Current Step" icon at the bottom left of the screen can be used to display a pop-up view of the hierarchy. By clicking on any element in the hierarchy, you will jump to the first screen that elicits judgments with respect to that element. The "with respect to" for the current step is shown in blue.

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If the Project Manager enables displaying the navigation box, you can click on any step to move either forward or backward.

The current step is displayed with a dark background. The step numbers are colored as follows:

- Red: judgment has not yet been made
- Black: judgment has been made
- Blue: Results or information steps

The number of steps (pages shown during the evaluation) is NOT the same as the number of evaluations because:

a) some pages show information or results; and

b) some pages may have multiple evaluations.

If you want to navigate directly to a step (assuming you remember what is at that step), you can click on the numbered step button, or you can click on the ellipses and be prompted for the step:

Click the "Current Step"

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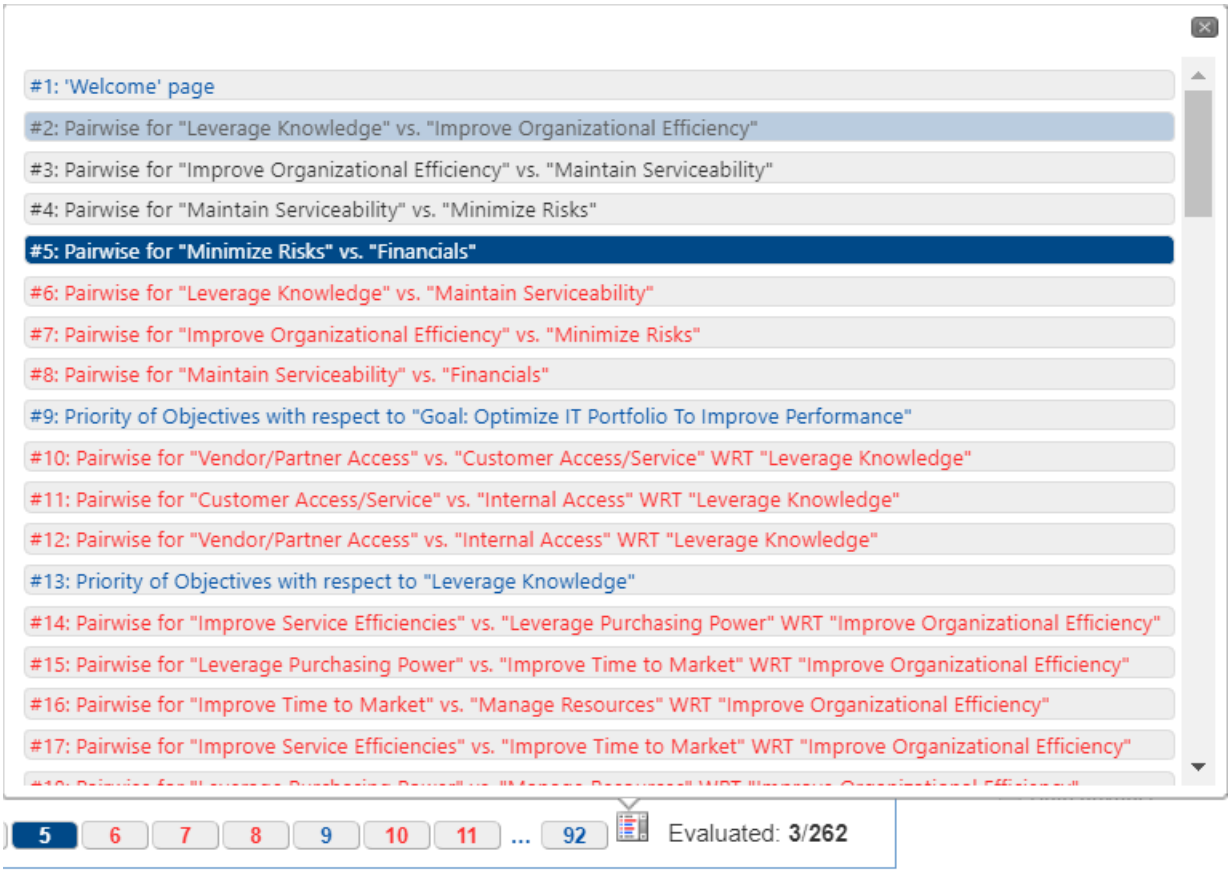

This option is very useful if you want to have a quick look at all the steps of the evaluation with their short descriptions, which enables you to quickly jump to any step. We recommend that you use this option for better navigation, especially on large structured models. Note that the color-coding is the same as for navigation box steps.

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How to Save Judgments

Judgments are automatically recorded when you go to another step, by clicking the Next button, the Previous button, or the Next Unassessed button.

You can leave the evaluation at any time and be assured that all your judgments are saved.

When you later return to the evaluation, you'll pick up right where you left off.

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Single Pairwise Verbal Comparisons

Pairwise Verbal can be used to express your judgment about the relative importance or preference or likelihoods of the two elements.

In the example below, we are asked to compare the **relative importance of the two objectives** (Cost of Ownership and Performance) with respect to the decision of which car to purchase.

Hovering your mouse over any bar will display the verbal intensity that it represents.

You can enter a judgment by clicking on the bar or a word below the bar that expresses your judgment about the relative importance of one objective over the other objective. You can also select an intensity between any of the words, such as between moderately and strongly.

The judgment above shows that "Performance" is strongly more important than the "Cost of Ownership" with respect to the decision "Purchase a new car."

You can also click once on each of the elements being compared to move the judgment one space in that direction.

Your judgment will be automatically recorded when you go to another step, such as by clicking Next

You can also enter judgments about the **relative preference of two alternatives** with respect to an objective using the pairwise verbal comparison method.

You can enter judgments using the same options as discussed above when doing pairwise verbal comparisons for alternatives.

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Multi-pairwise Verbal Comparison Evaluation

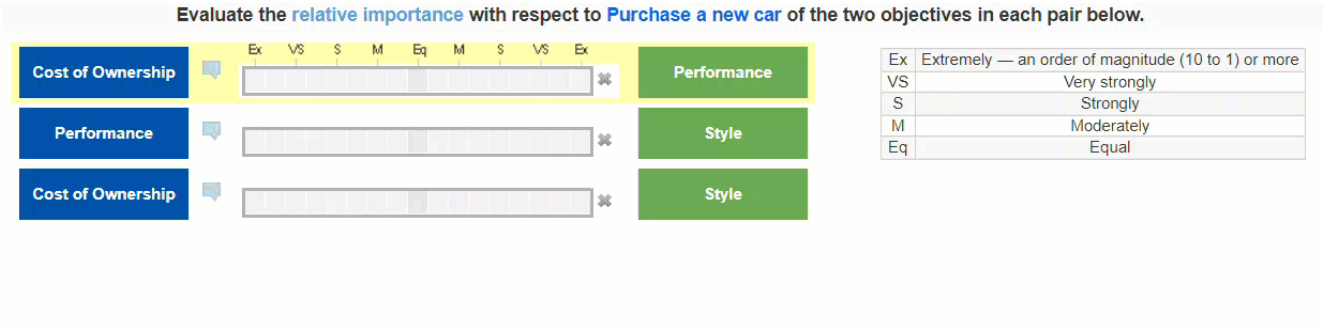
Pairwise comparisons are entered on a screen, as shown in the figure below, by clicking on or between words that express your judgment about the relative importance or preference or likelihoods (see Pairwise Comparisons Contexts) of the two elements shown on each line.

The AHP pairwise relative verbal scale consists of the following words:

Ex	Extremely — an order of magnitude (10 to 1) or more
VS	Very strongly
S	Strongly
M	Moderately
Eq	Equal

The words are not precise, but because of the way Comparion computes priorities from redundant pairwise comparisons, it is possible to derive accurate ratio scale priorities from ordinal judgments.

In the example below, we are asked to compare the **relative importance of each pair of objectives** with respect to the decision of which car to purchase.



For each pair, you can enter a judgment by clicking on the bar that expresses your judgment about the relative importance of one objective over the other objective. You select equal or specify an intensity on either side of equal. The intensities can be moderate, strongly, very strongly, or extreme, or between any of the words, such as between moderately and strongly.

In the top line of the example above, a judgment is made that "Performance" is strongly more important than "Cost of Ownership" with respect to the decision "Purchase a new car."

You can hover your mouse over the letters or boxes below the letters to see the verbal judgments they represent by the letters.

Your judgment will be automatically recorded when you go to another step, by clicking **Next**

You can also enter judgments about the **relative preference of two alternatives** with respect to an objective, using the multi-pairwise verbal comparison method.

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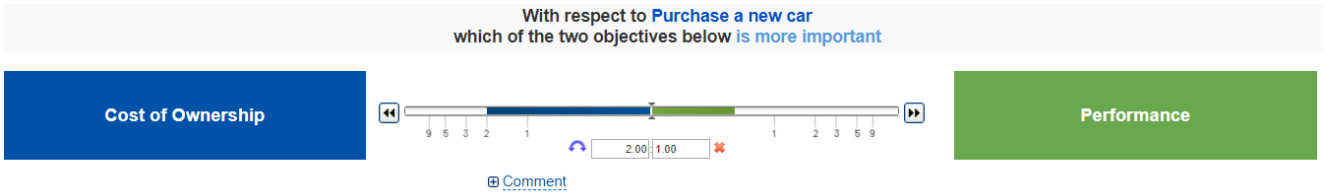
Single Pairwise Graphical/Numerical Comparisons

Pairwise graphical/numerical comparisons can be used to express your judgment about the relative importance or preference or likelihoods of the two elements.

In the example below, we are asked to compare the relative importance of the two objectives (Cost of Ownership and Performance) for a decision of which car to purchase.



You can enter a judgment by clicking or dragging the slider bar or by entering a number in the left or right boxes below the slider bar.

The judgment above shows that "Performance" is about twice as important as the "Cost of Ownership" with respect to the decision "Purchase a new car."

You can drag the bar only up to the ratio 9:1 as the extreme.

Judgments with ratios > 9 to 1 can be entered numerically which will move the slider on the extra white spaces from 9.

Graphical judgments can also be entered by clicking on the chevron icons ⏪ or ⏩ . If the mouse is held down on either of these two icons, the slider will continue to move in the appropriate direction with increasing increments the longer the mouse is depressed.

Additionally, you can click on either of the elements being compared to move the slider in the direction of that element.

If you realize that your judgment is inverted, you can click on the ↷ icon.

Your judgment will be automatically recorded when you go to another step, such as by clicking Next .

You can also enter judgments about the **relative preference of two alternatives** with respect to an objective by using the pairwise graphical/numerical comparison method.

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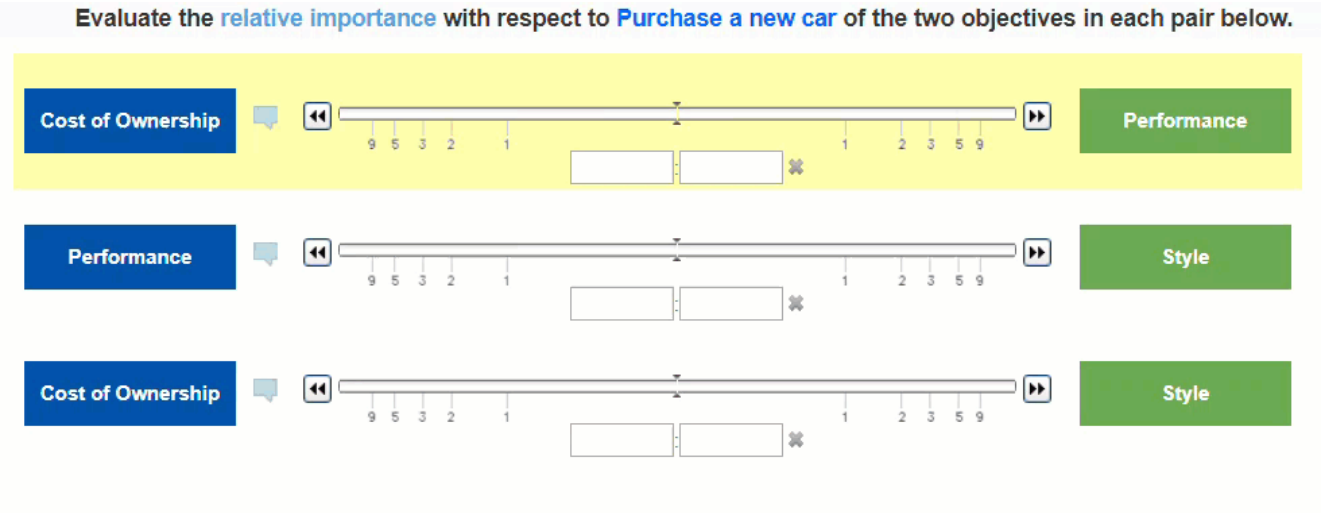
Multi-pairwise Graphical/Numerical Comparisons

Pairwise graphical/numerical comparisons can be used to express your judgment about the relative importance or preference or likelihoods of the two elements shown on each line.

In the example below, we are asked to compare the relative importance of each pair of objectives with respect to the decision of which car to purchase.



For each pair, you can enter a judgment by dragging the slider bar or by entering a number (greater than zero) in the left or right boxes below the slider bar.

In the top line of the example above, a judgment is made that "Performance" is about twice as important as "Cost of Ownership" with respect to the decision "Purchase a new car."

You can drag the bar only up to ratio 9:1 as the extreme (see Performance vs. Style). Judgments with ratios > 9 to 1 can be entered numerically (see Cost of Ownership vs. Style), which will move the slider on the extra white spaces from 9.

Graphical judgments can also be entered by clicking on the chevron icons or . If the mouse is held down on either of these two icons, the slider will continue to move in the appropriate direction with increasing increments the longer the mouse is depressed.

If you realize that your judgment is inverted, you can click on the icon.

Your judgment will be automatically recorded when you go to another step, such as by clicking Next .

You can also enter judgments about the **relative preference of two alternatives** with respect to an objective by using the multi pairwise graphical/numerical comparison method.

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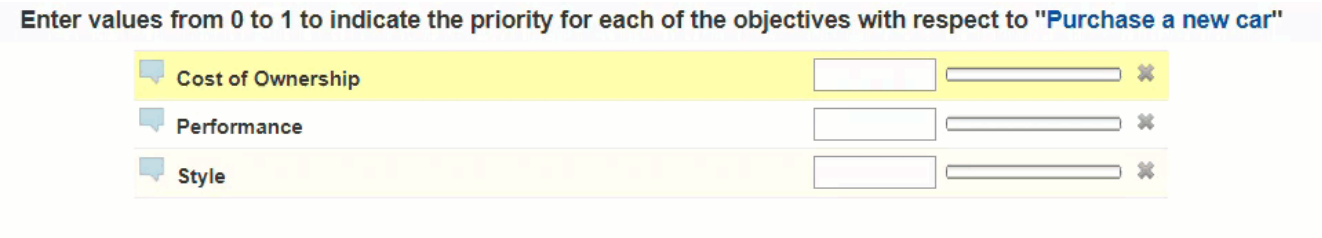
Direct Priority Entry

The Direct Input method can be used when evaluating objectives with respect to another objective or when evaluating alternatives with respect to an objective.

In the example below, we are asked to evaluate all the objectives with respect to the decision to purchase a new car using the direct input method.



The question for the evaluation is indicated at the top of the page.

You can enter a judgment by dragging the slider on the bar or by entering a number from 0 to 1 in the text box.

Your judgment will be automatically recorded when you go to another step, by clicking Next .

You can also enter judgments about the **relative preference of alternatives** with respect to an objective by using the direct priority entry.

Depending on how the Project Manager set up the evaluation, you will be asked to evaluate one alternative with respect to one objective on each screen, or all alternatives with respect to one objective on each screen, or one alternative with respect to all objectives on each screen.

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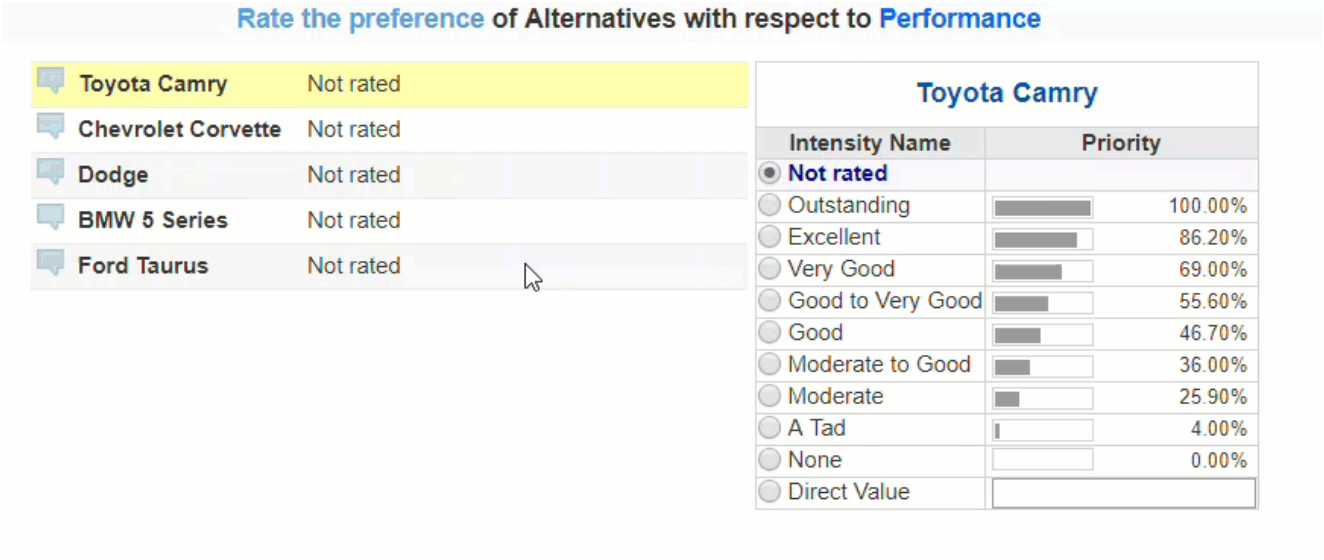
Rating Alternatives

Depending on how the Project Manager set up the evaluation, you will be asked to rate one alternative with respect to one objective on each screen, or all alternatives with respect to one objective on each screen, or one alternative with respect to all objectives on each screen.



Each row shown above is the alternatives to be evaluated with respect to one objective: Performance.

The yellow highlight indicates which of the alternatives is being evaluated with respect to Performance.

The fastest way to enter a rating is to click on an intensity name, such as "Moderate to Good" on the right side of the page.

After clicking the intensity name, the highlight advances to the next alternative.

The priority corresponding to the verbal intensities is also shown at the right of the page (Moderate to Good - 36.0%).

If you would like to enter a rating other than those corresponding to the intensities, you can enter a direct value between and including zero and 1.

The judgments will then be displayed beside the alternative name with the corresponding bar presentation.

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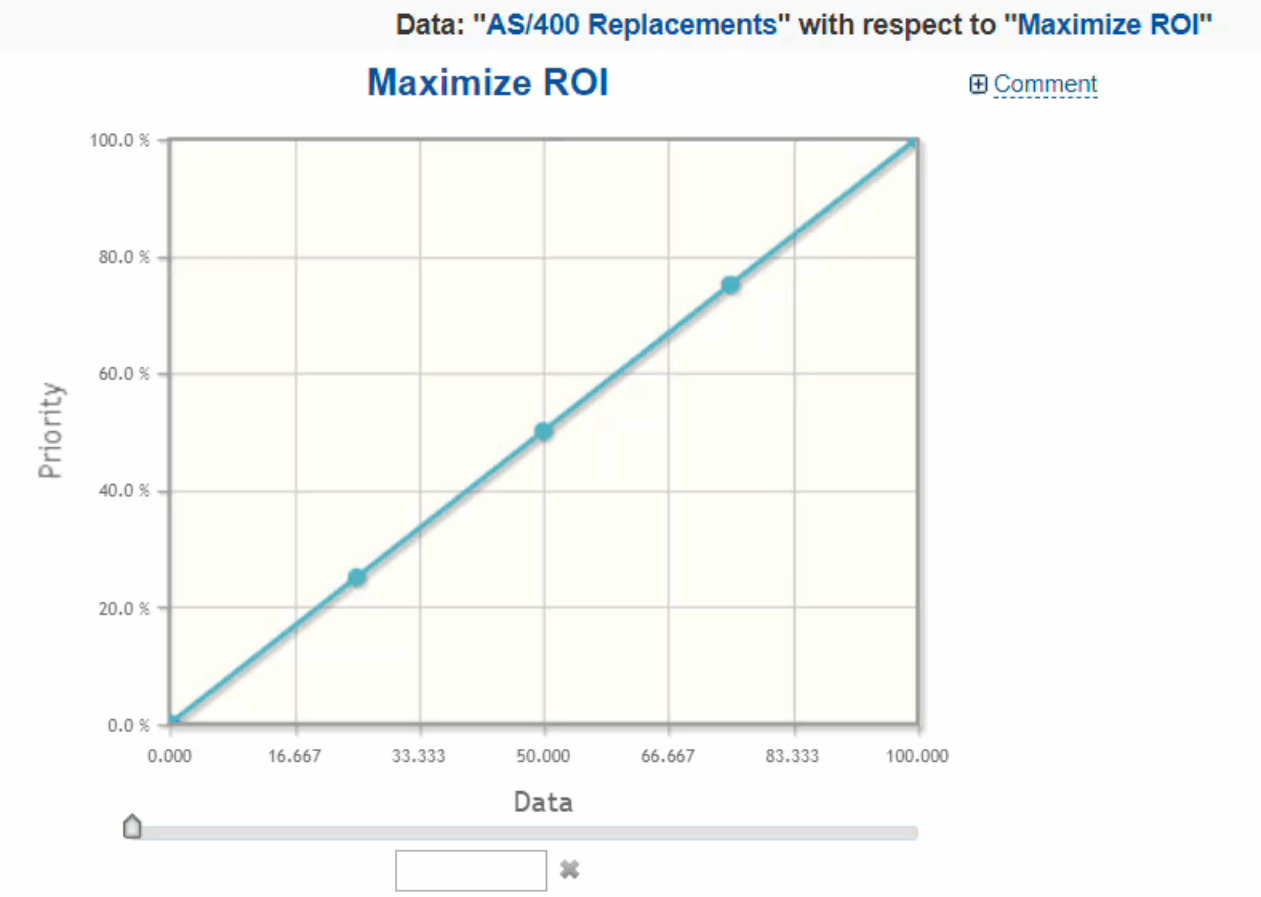
Step Function

Depending on the settings made by the Project Manager, the Step Function graph and the resulting priority may vary depending on whether the Piecewise Linear option is enabled or not.

The graph below shows the Step Function when the Piecewise Linear option is enabled.



- The x-axis is the data for the alternative being evaluated
- The y-axis is the corresponding priority

The graph above shows that the slope from one point (delta priority/delta x value) is increasing.

The data can be entered by dragging the handle of the vertical slider or typing on the textbox provided. From our example, the data entered is **40** and the resulting priority is **40%**.

When the Piecewise Linear option is disabled on the same Step function scale used above, the graph will be:

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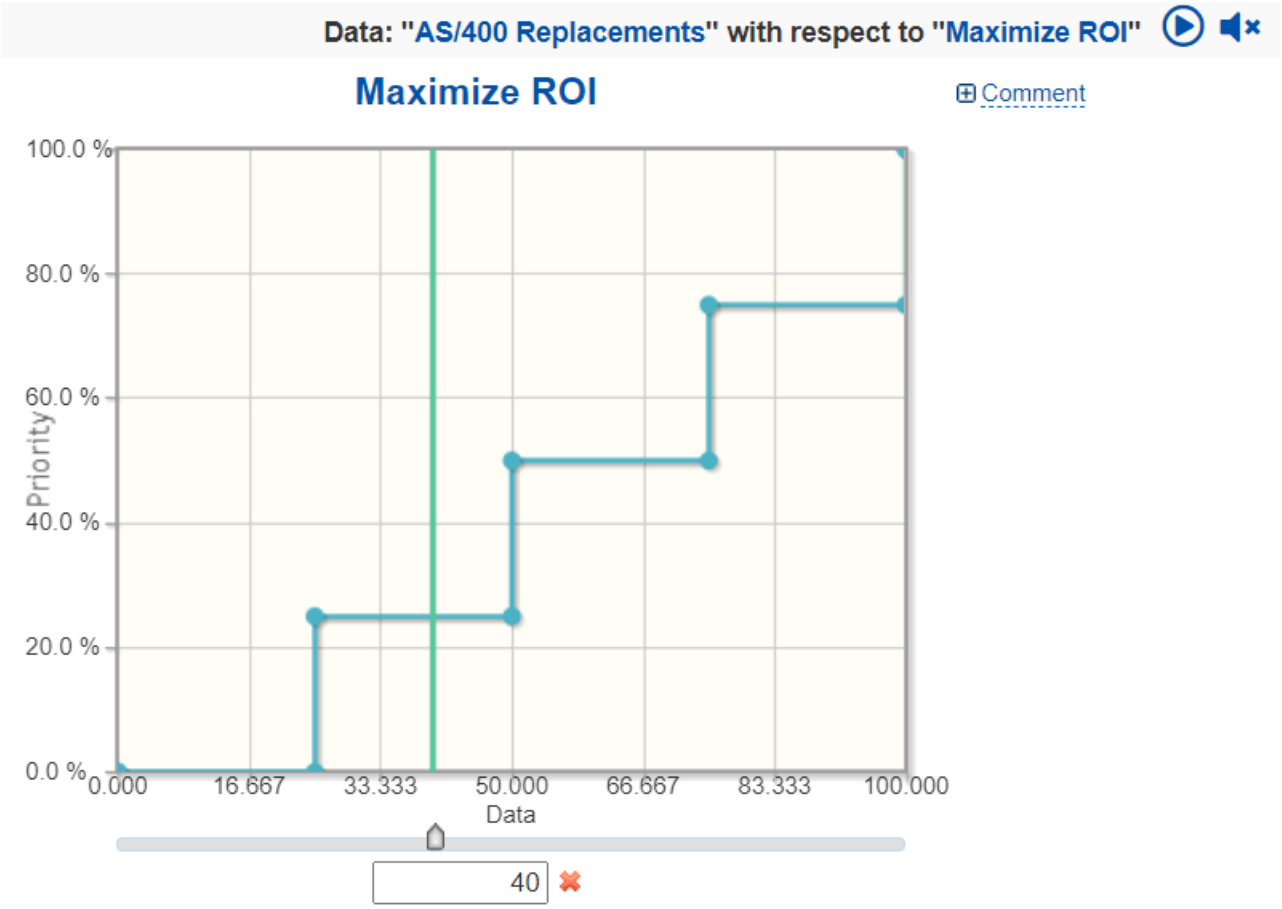

The Step Function graph is now different from the first one; the slope from one point to the next is now equal to zero.

Having the same data as **40**, the resulting priority is now **25%** (this was 40**%** when Piecewise Linear was enabled).

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Utility Curve

Utility curves can be increasing or decreasing, linear or non-linear.

In the example below, we are asked to enter data (Initial Cost: 20,195) for the alternative "Toyota Camry."

The data can be entered by dragging the handle of the vertical slider or typing on the textbox provided.

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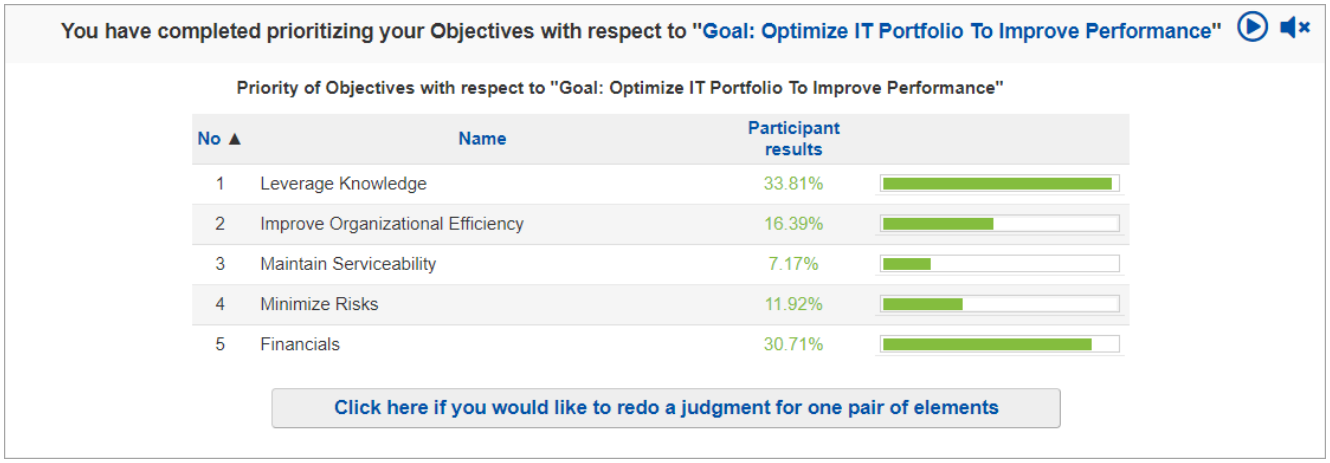
Local Results (Cluster Priorities)

The priorities for elements in each cluster of the objectives hierarchy, as well as the priorities derived for the alternatives with respect to each covering objective, are referred to as "local" priorities.

The options available on the "Cluster Priorities" page depend on if the inconsistency ratio is hidden or shown .

Local Results when Inconsistency Ratio is hidden

If the Project Manager has specified that the inconsistency ratio for your judgments not be shown , you will see the priorities for the judgments elements you have just made on a screen that looks like:



You can click on any heading to sort by that column.

If you think the priorities are not reasonable (i.e., are not intuitive), then click the

button.

You can then (1) select a pair of elements: one element that you think may have too high a priority and the other element too low a priority.

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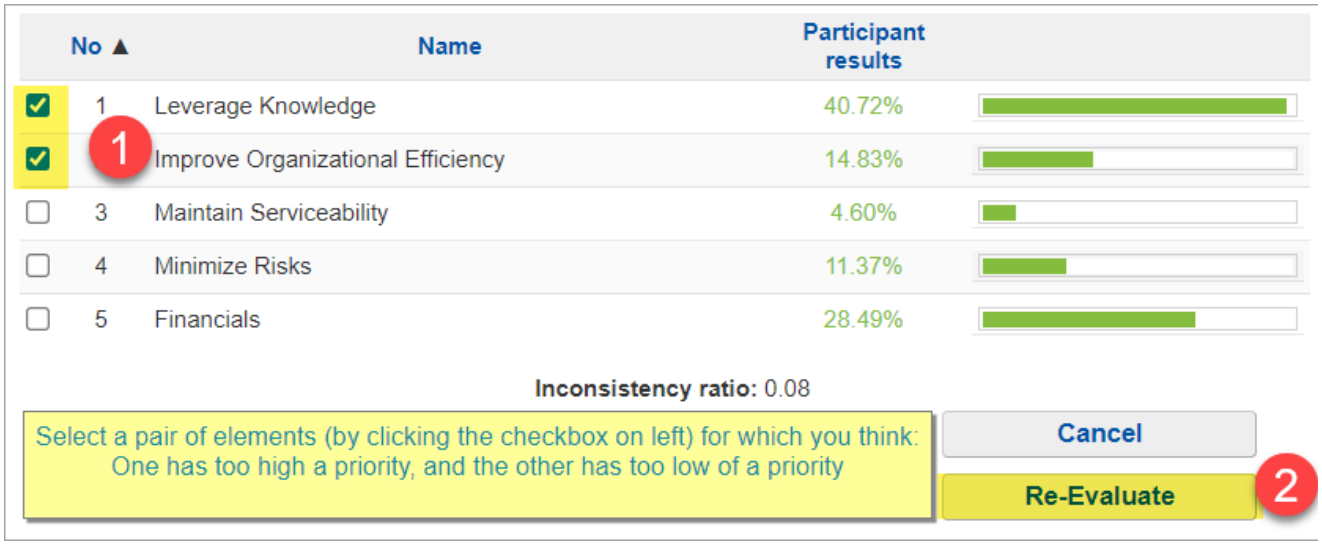
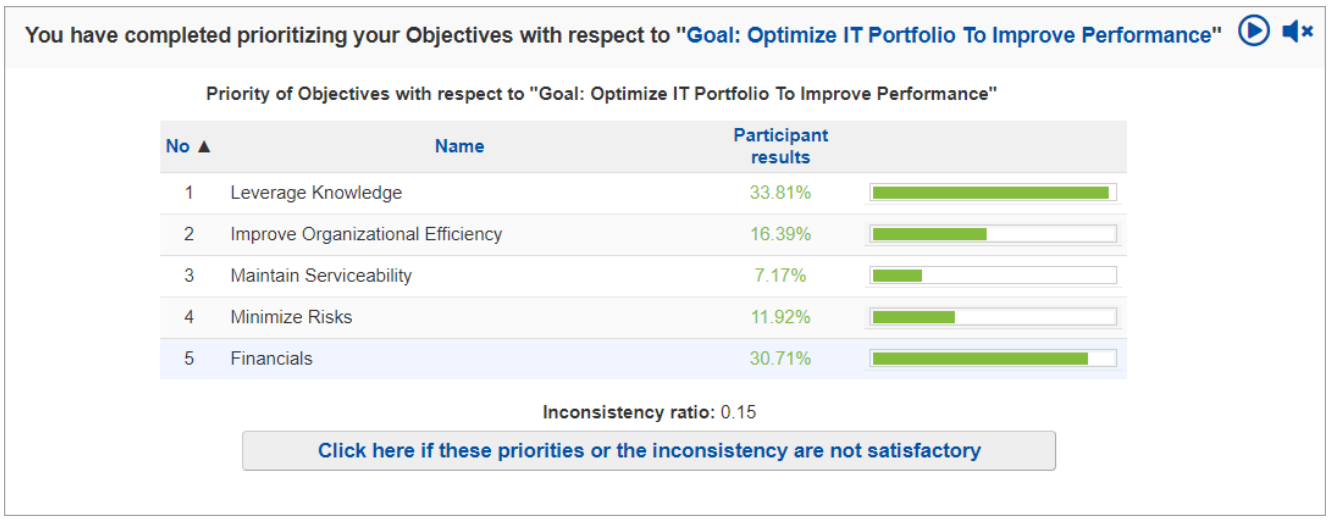


(2) After selecting the pair and clicking "Re-evaluate," you will be taken to the screen where you can enter or revise the judgment comparing these two elements.

After doing so and clicking Next, you will be taken back to the screen showing the revised cluster priorities.

Local Results when Inconsistency Ratio is shown

If the Project Manager has specified that the inconsistency ratio of your judgments is shown (See Math of AHP and Inconsistency Ratio), then the priorities of the elements - as well as the inconsistency ratio - will be displayed on a screen like the following:



As a very rough rule of thumb, the inconsistency ratio should be .10 or less. However, there are reasons for accepting results even if the inconsistency ratio is as high as .2 or .3. (See Inconsistencies, or *Decision by Objectives* on Professor Forman's Website or at Amazon.) It is more important that the priorities be reasonable to you than to have a low inconsistency ratio. You should NOT change judgments just because of inconsistencies. You *should* re-examine judgments because of high inconsistency and change only those judgments that you feel were incorrectly recorded or for which you have a change of opinion -- regardless of inconsistency.

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If you feel that either the priorities are not satisfactory or would like to review the judgments to address a high inconsistency ratio, click the above button. Doing so will produce the following screen:

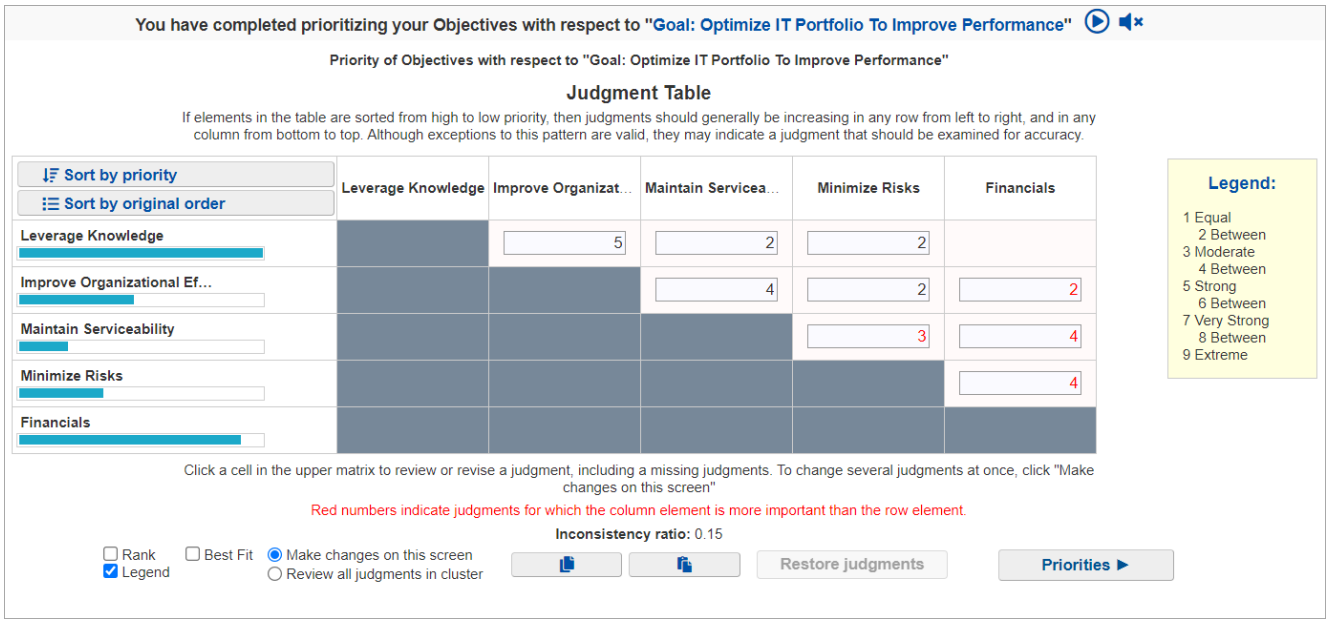
Clicking the "**Click here to review your judgments**" will take you through the first page of the evaluation for the given cluster.

Clicking the "**Click here if you think the inconsistency is too high**" button will result in a screen showing the judgment matrix (discussed below).

Clicking the "**Click if you would like to redo a judgment for one pair of elements** " will take you through the sequence explained at the top of this page.

Judgment Matrix

The judgment matrix will be displayed when you click the second button



The judgments shown in the cells of the matrix indicate how much more important or preferable the row element corresponding to a judgment cell is, rather than the column element corresponding to the judgment cell.

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Red judgments mean that judgments for an element in the column are more important or preferable than an element in a row.

Blank cells in the upper diagonal of the matrix represent judgments that were not elicited or entered.

The radio button ◉ Review all judgments in cluster makes the intersecting cells clickable. Clicking on any one of the cells will redirect you to the step displaying the pairwise comparison for the row and column elements corresponding to that cell.

Make changes on the judgment matrix

If you wish to make or investigate possible changes to judgments in the matrix itself, click on the ◉ Make changes on this screen button and enter or change the judgment.

The judgments are shown numerically in this matrix, regardless of whether they were made in the verbal or numerical/graphical modes.

You can type in judgments and then press enter to save.

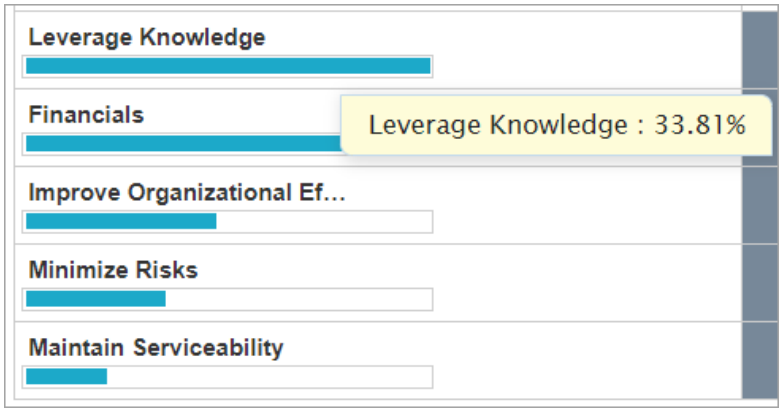
To invert judgments (change from black to red or red to black), press either the - or i keys. Inverting is saved automatically.

Red judgments mean that judgments for an element in the column are more important or preferable than an element in a row.

By default, the elements (objectives or alternatives) are sorted by original order in the model as shown above.

You can sort the elements by priority (descending) by clicking Sort by priority.

You can easily notice that elements are sorted by priority by looking at the priority bars below the elements:



You can hover on the element cell to see its priority as shown above.

You can sort back the elements based on their original order by clicking Sort by original order

You can then click Sort by priority to see how the sorting changed after altering the judgments.

Conditions for consistent judgments when the matrix is sorted by priority.

If the judgments were perfectly consistent, they would be increasing (or more precisely non-decreasing) as you look at them:

a) from left to right in each row, and

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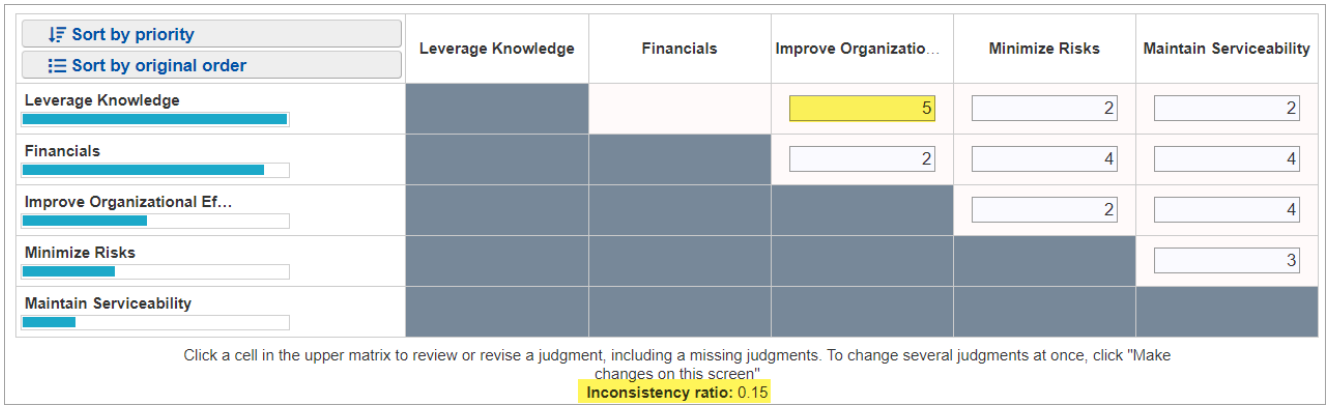
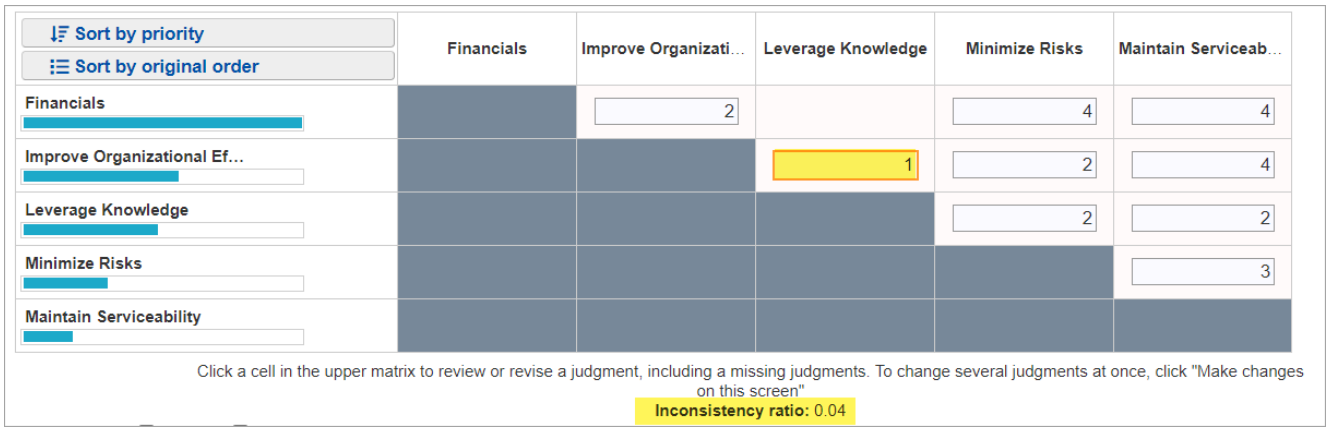
b) from bottom-up in each column



In the above figure, which corresponds to a "reasonably" low inconsistency ratio of 0.15, the most inconsistent judgment is the 5 in the top row, which violates condition a) above. Changing this judgment to a 1 (less than the 2 to its right) will decrease the inconsistency to 0.04. However, changing judgments just to reduce the inconsistency is NOT A GOOD IDEA. Judgments should be changed only when the evaluator feels that the judgment itself was an error or is no longer warranted. If this judgment (Financials vs. Improve Organizational efficiency) was to be changed from a 5 to a 1, the ranks of the elements also change as shown below:



If the evaluator doesn't believe that a judgment of 1 (equal) is appropriate, or that the change in ranks of the objectives/alternatives is correct, then pressing the **Restore judgments** button will abandon all changes and return to the original judgments.

Looking at the original matrix and without knowing what the participant's thinking is for these judgments, it is more likely that changing the 2 (Leverage Knowledge vs. Maintain Serviceability) to something higher, such as 8 ("very strong to extreme" if these were verbal judgments), would be more appropriate -- it violates both conditions a) and b) above.

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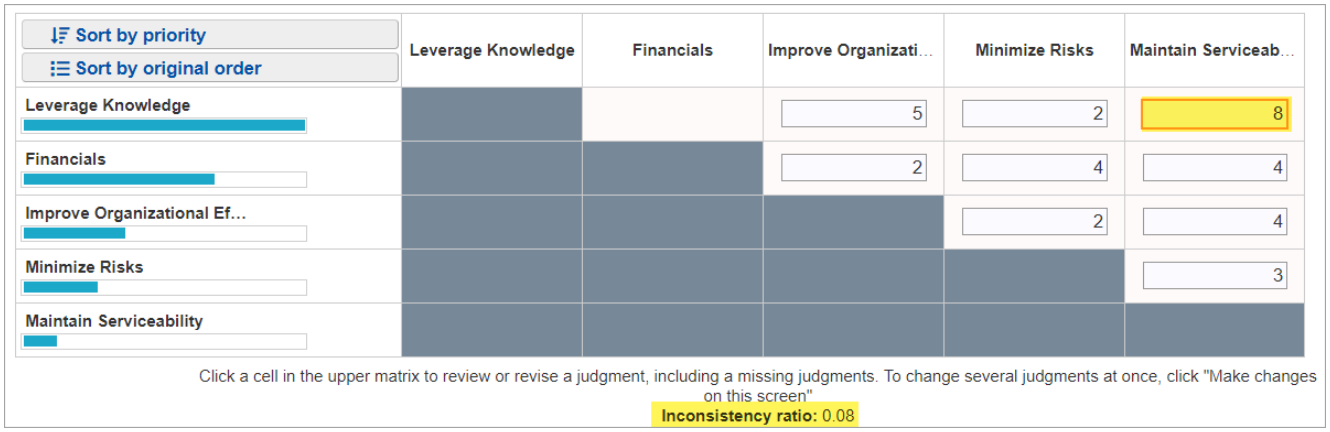

Even though this inconsistency (.08) is more than that resulting from the first change considered (.04), it is more logical. But once more, we must say it is NOT A GOOD IDEA to change judgments just to lower the inconsistency ratio.

Click on the Priorities ▶ to return to the results screen.

Note: Comparion doesn't calculate inconsistency for a group of evaluators because the group geometric average reduces the consistency considerably, so the simulations that were done for individual sets of judgments do not apply for priorities computed from geometric averages.

Rank and Best Fit

You can display the inconsistency rank and the best fit by checking ☑ Rank and ☑ Best Fit respectively.

This will show small numbers on each cell with judgments.

The **Rank by Inconsistency** is the number at the upper right (blue), while the **best fit** is at the lower right (black or red (inverted)) of the actual judgment.

The **Rank by Inconsistency** is the order of inconsistency of that judgment with the other judgments. So, for example, the cell with a judgment of 5 (strong in the verbal mode) and a 1 in the upper right corner of the cell is the most inconsistent judgment; and the judgment of 2 with a 2 in the upper right of the cell is the second most inconsistent judgment.

The **best-fit** judgment is not necessarily the best judgment, but rather it is the judgment that fits best with all of the other judgments that were made.

Best Fit suggests what changes should be made to the judgments to reduce inconsistency from a mathematical perspective. It is not advisable to change judgments to the "best fit" values, but rather to use the "best fit" values to give you an idea of which

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judgments you might want to reconsider in order to reduce the inconsistency. As a decision-maker, you must determine if this is logical and what changes in judgment should be made versus what is recommended.

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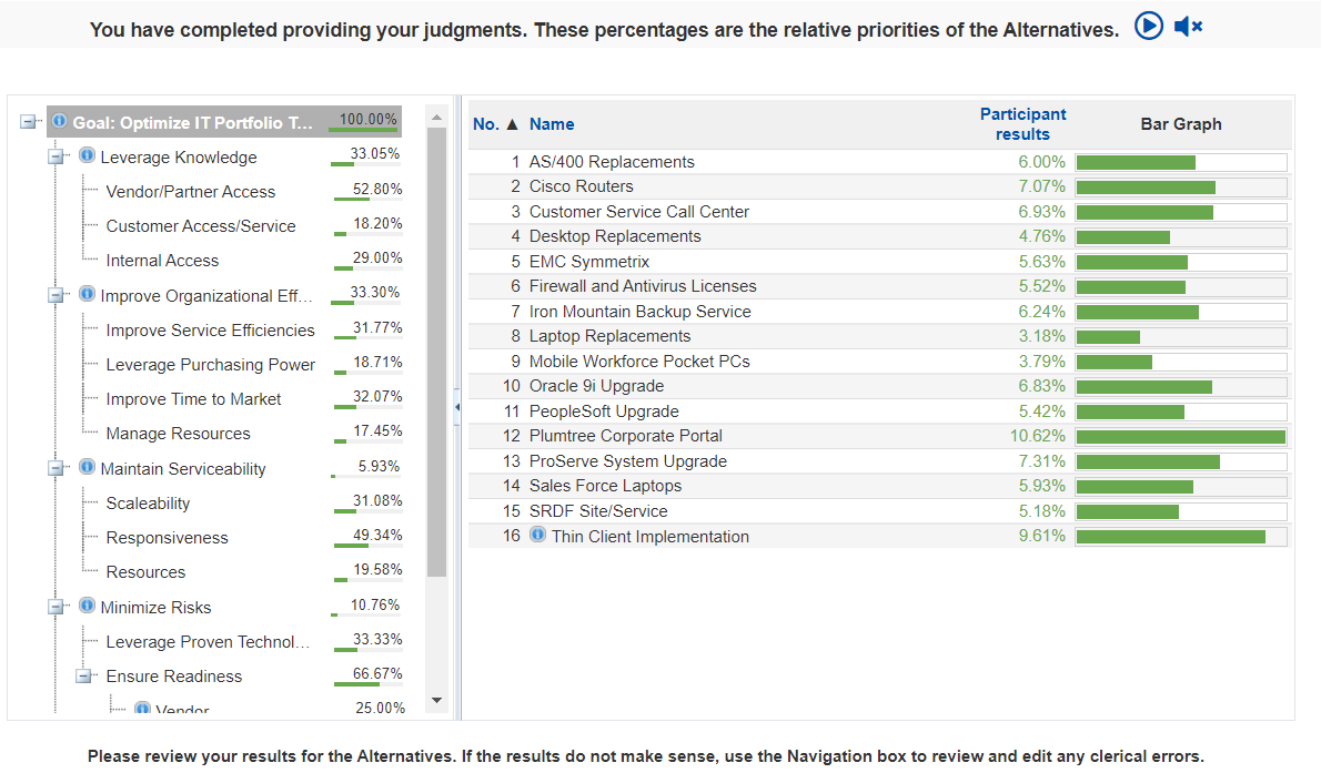
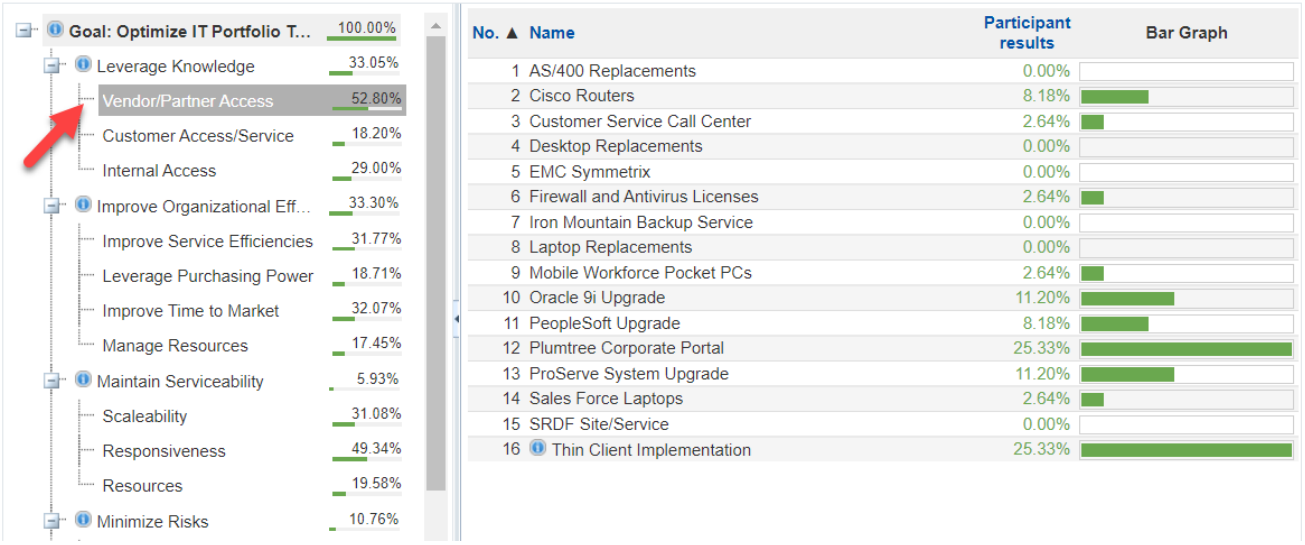
Overall Results (Global Priorities)

The priorities of the alternatives with respect to the Goal are shown on this screen:



Depending on the Project Manager, the participants and/or combined results can be displayed.

Clicking on a lower level node in the objectives hierarchy will display the alternative priorities with respect to that node.



You can view the information document by clicking on the icon. The blue information document icon means that it has content; otherwise, the icon is hidden for the evaluators. For the Project Manager, a gray information document icon is displayed when the information document is empty. The Project Manager can edit any information document.

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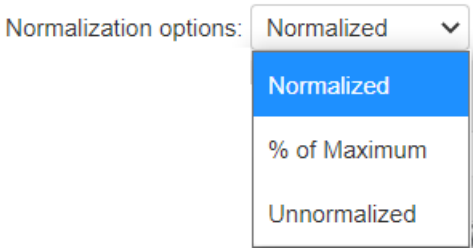
You can select from normalization options:



Normalized - Priority (sum to 1).

Percentage of Maximum - the alternative with the highest priority is 1 and all others are a percentage of this.

Unnormalized - The priority is the sum of the products of each covering objective's global priority, times the priority of the alternative with respect to each covering objective. If an alternative has a priority of 1 for every covering objective, it will have an unnormalized priority of 1 and is referred to as an ideal alternative.

You can sort the alternative results table by column, by clicking on the column name.

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Welcome Page

Enabled by default, the Welcome page is the first page you'll see when you start an evaluation session. This page can be customized by a project manager, which can help to inform participants about aspects of the decision.

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How to Navigate in the Evaluation?

Sequential Navigation:

The easiest and most common way to proceed through the evaluation is sequential -- by clicking the " **Next**" button after entering any information requested on each page. You can go back to a previous step using the "**Previous**" button.

If you have previously entered judgments and request to go back to an earlier step (see below), click " **Next Unassessed**" to jump to the next screen that is unassessed.

Non-Sequential Navigation:

Depending on options set by the Project Manager, you may have considerable flexibility in navigating through the evaluation without sequentially going step by step. We recommend that you do this only if you have used Comparion before.

The '**Current Cluster**'' button:

at the bottom left of the screen can be used to display a pop-up view of the hierarchy. By clicking on any element in the hierarchy, you will jump to the first screen that elicits judgments with respect to that element. The "with respect to" for the current step is displayed with the darker font as with the Goal: Optimize IT Portfolio To Improve Performance below.

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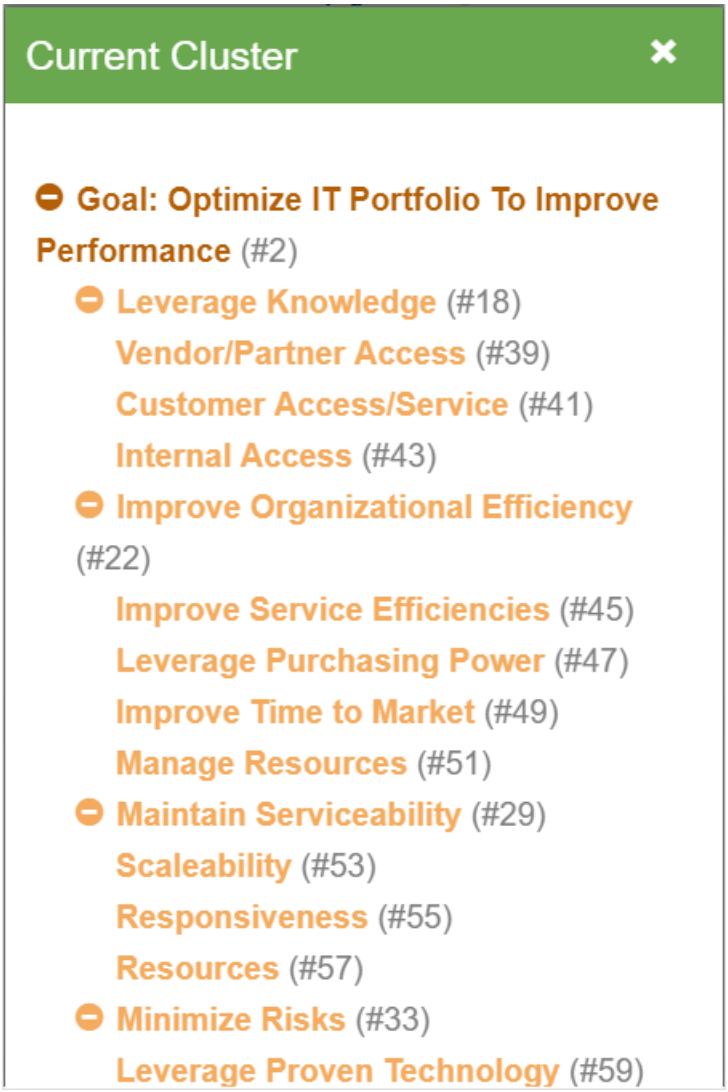

If the Project Manager enables displaying the navigation box, you can click on any step to move either forward or backward.

(Desktop)

(Mobile)

The current step is displayed with a dark background. The step numbers are colored as follows:

- Red: judgment has not yet been made
- Black: judgment has been made
- Blue: Results or information steps

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The number of steps (pages shown during the evaluation) is NOT the same as the number of evaluations because:

a) some pages show information or results; and

b) some pages may have multiple evaluations.

If you want to navigate directly to a step (assuming you remember what is at that step), you can click on the numbered step button, or you can click on the ellipses and be prompted for the step:

Clicking the "**Steps**" button

(desktop) or

(mobile) displays the list of steps with a description. This option is very useful if you want to have a quick look at all the steps of the evaluation with their short descriptions, which enables you to jump to any step. We recommend that you use this option for better navigation, especially on large structured models. Note that the color-coding is the same as for navigation box steps.

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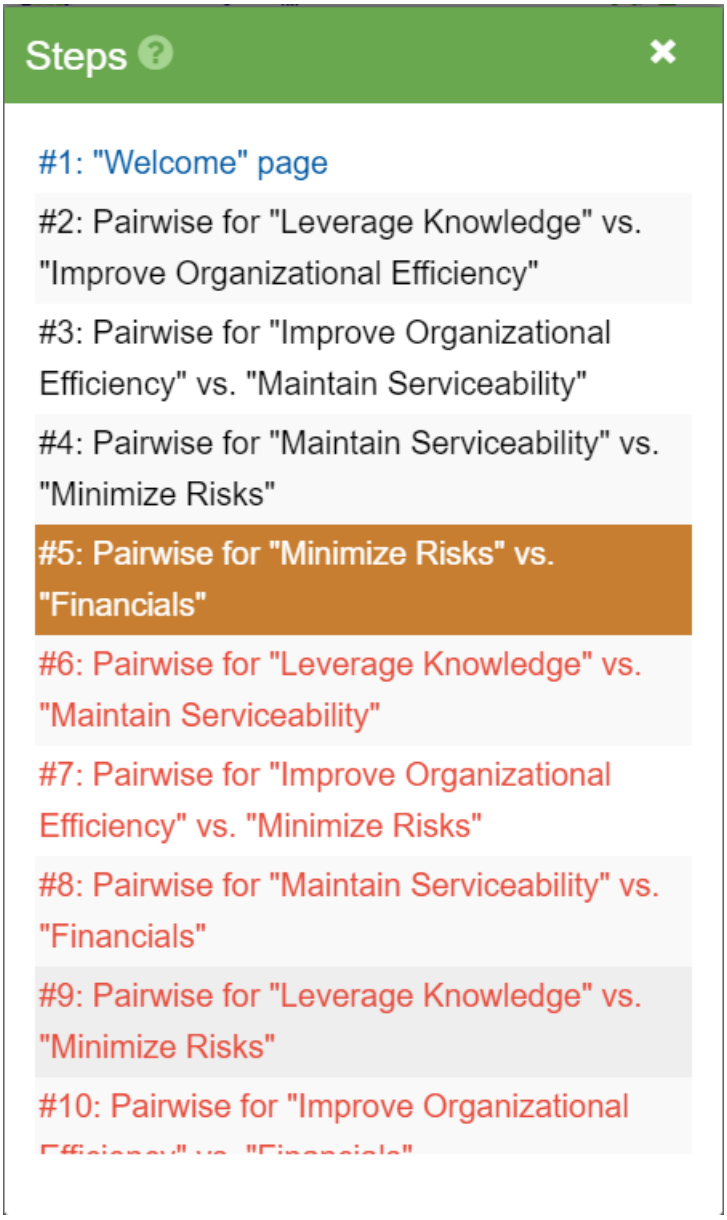

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How to Save Judgments?

Your judgments are automatically recorded when you move to another step by using the " **Next,**" "**Previous**," or "**Next Unassessed**" button.

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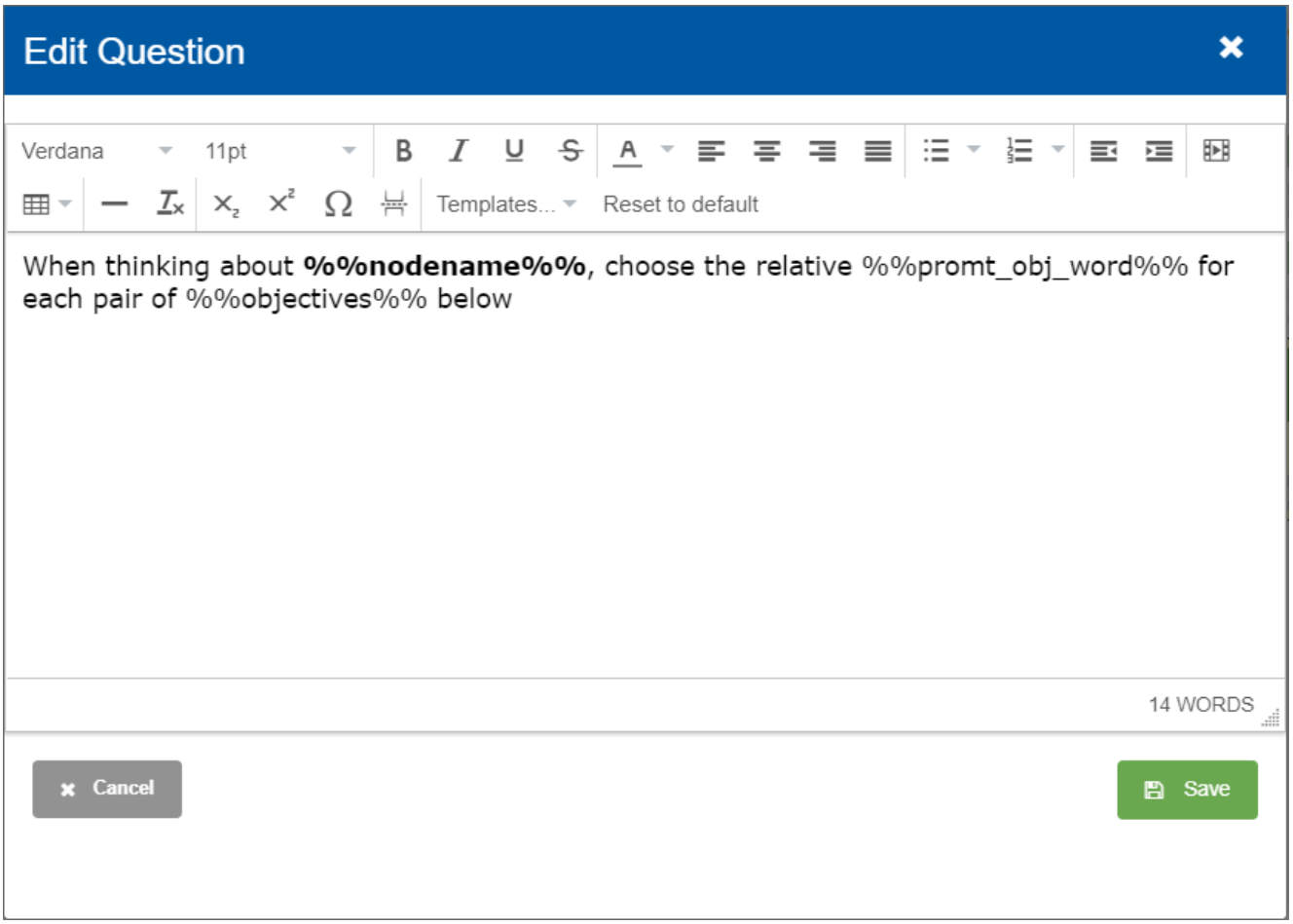
Edit Evaluation Question

The Project Manager can edit the evaluation phrase to make it more suitable to the model or clearer to the evaluators.

This is done by clicking the pencil icon.

The wording phrase editor will be displayed where you can edit the question:



Click the Templates drop-down to display possible templates that can be inserted:

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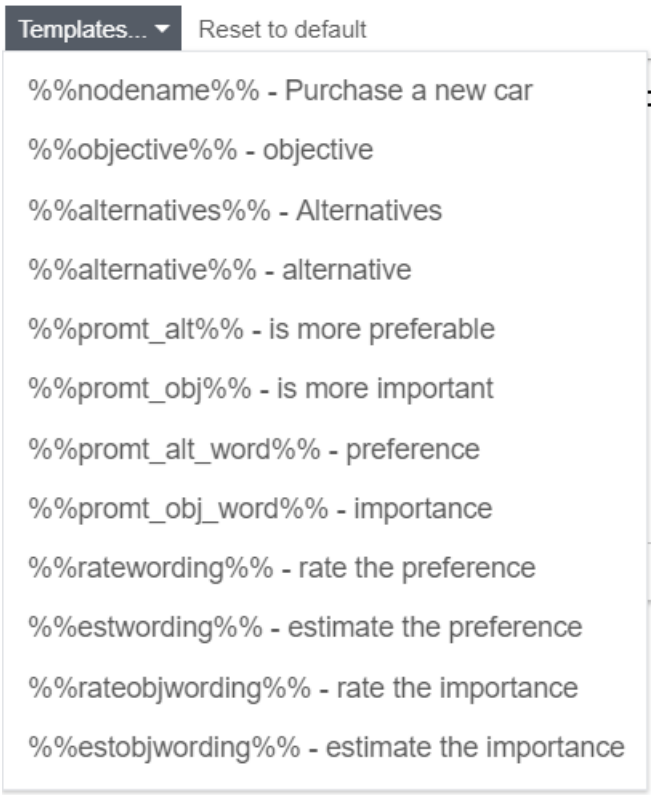

Click **Reset to Default** to reset the wording.

Click **Save** to save changes.

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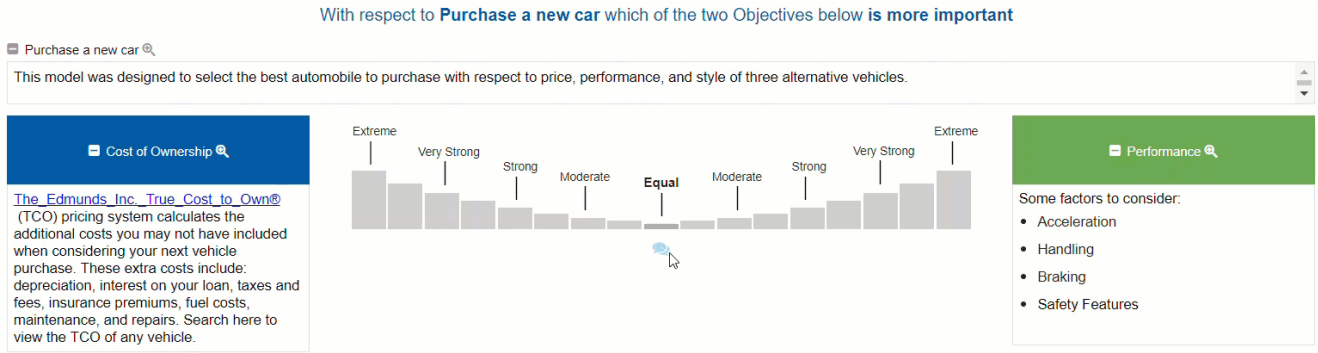
Single Pairwise Verbal Comparisons

Pairwise Verbal can be used to express your judgment about the relative importance or preference or likelihood of the two elements.

In the example below, we are asked to compare the **relative importance of the two objectives** (Cost of Ownership and Performance) with respect to the decision of which car to purchase.



Hovering your mouse over any bar will display the verbal intensity that it represents.

You can enter a judgment by clicking on the bar that expresses your judgment about the relative importance of one objective over the other objective. You can also select an intensity between any of the words, such as between Moderately and Strong.

The judgment above shows that "Performance" is **strongly** more important than the "Cost of Ownership" with respect to the decision "Purchase a new car."

Your judgments are automatically saved by clicking the **Next, Previous, or Next Unasessed button.**

You can also enter judgments about the **relative preference of two alternatives** with respect to an objective using the pairwise verbal comparison method.

You can enter judgments using the same options as discussed above when doing pairwise verbal comparison of alternatives.

How to Navigate in the Evaluation?

Sequential Navigation:

The easiest and most common way to proceed through the evaluation is sequential -- by clicking the " **Next**" button after entering any information requested on each page. You can go back to a previous step using the "**Previous**" button.

If you have previously entered judgments and request to go back to an earlier step (see below), click " **Next Unassessed**" to jump to the next screen that is unassessed.

Non-Sequential Navigation:

Depending on options set by the Project Manager, you may have considerable flexibility in navigating through the evaluation without sequentially going step by step. We recommend that you do this only if you have used Comparion before.

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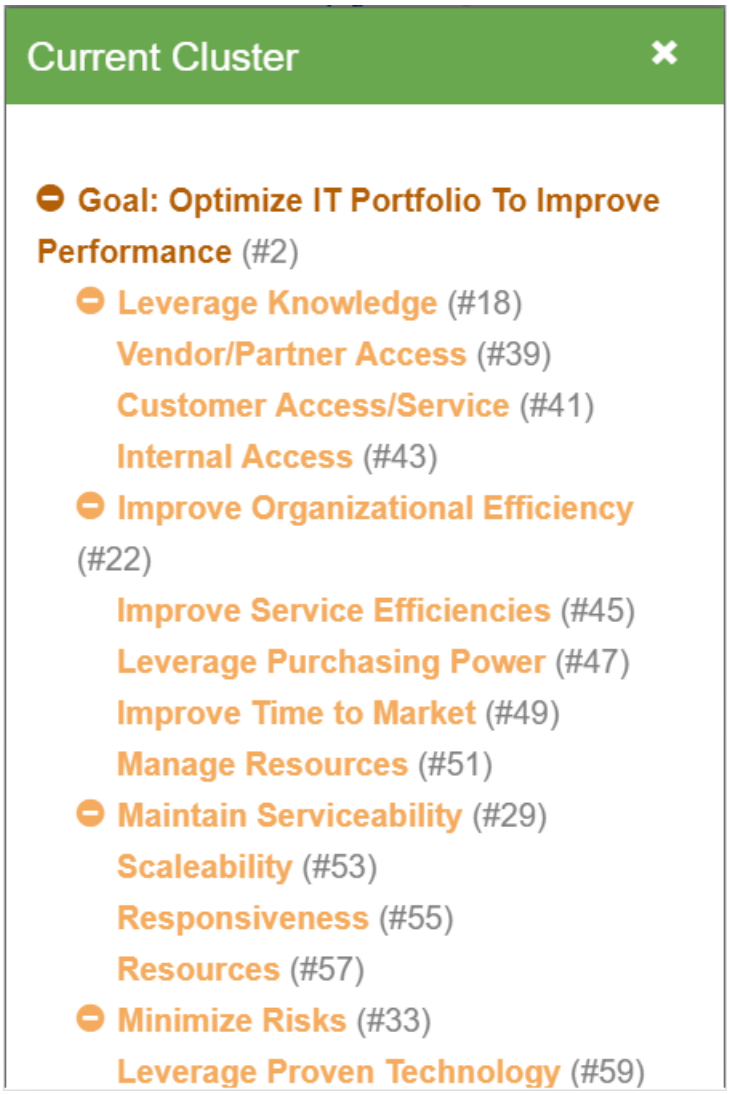
The '**Current Cluster**'' button:

(desktop)

(mobile)

at the bottom left of the screen can be used to display a pop-up view of the hierarchy. By clicking on any element in the hierarchy, you will jump to the first screen that elicits judgments with respect to that element. The "with respect to" for the current step is displayed with the darker font as with the Goal: Optimize IT Portfolio To Improve Performance below.



If the Project Manager enables displaying the navigation box, you can click on any step to move either forward or backward.

(Desktop)

(Mobile)

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The current step is displayed with a dark background. The step numbers are colored as follows:

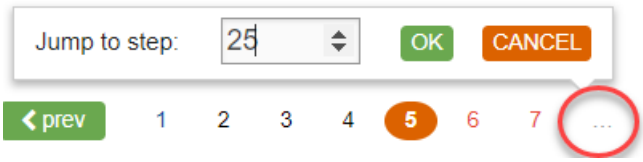
- Red: judgment has not yet been made
- Black: judgment has been made
- Blue: Results or information steps

The number of steps (pages shown during the evaluation) is NOT the same as the number of evaluations because:

a) some pages show information or results; and

b) some pages may have multiple evaluations.

If you want to navigate directly to a step (assuming you remember what is at that step), you can click on the numbered step button, or you can click on the ellipses and be prompted for the step:



Clicking the "**Steps**" button

(desktop) or

(mobile) displays the list of steps with a description. This option is very useful if you want to have a quick look at all the steps of the evaluation with their short descriptions, which enables you to jump to any step. We recommend that you use this option for better navigation, especially on large structured models. Note that the color-coding is the same as for navigation box steps.

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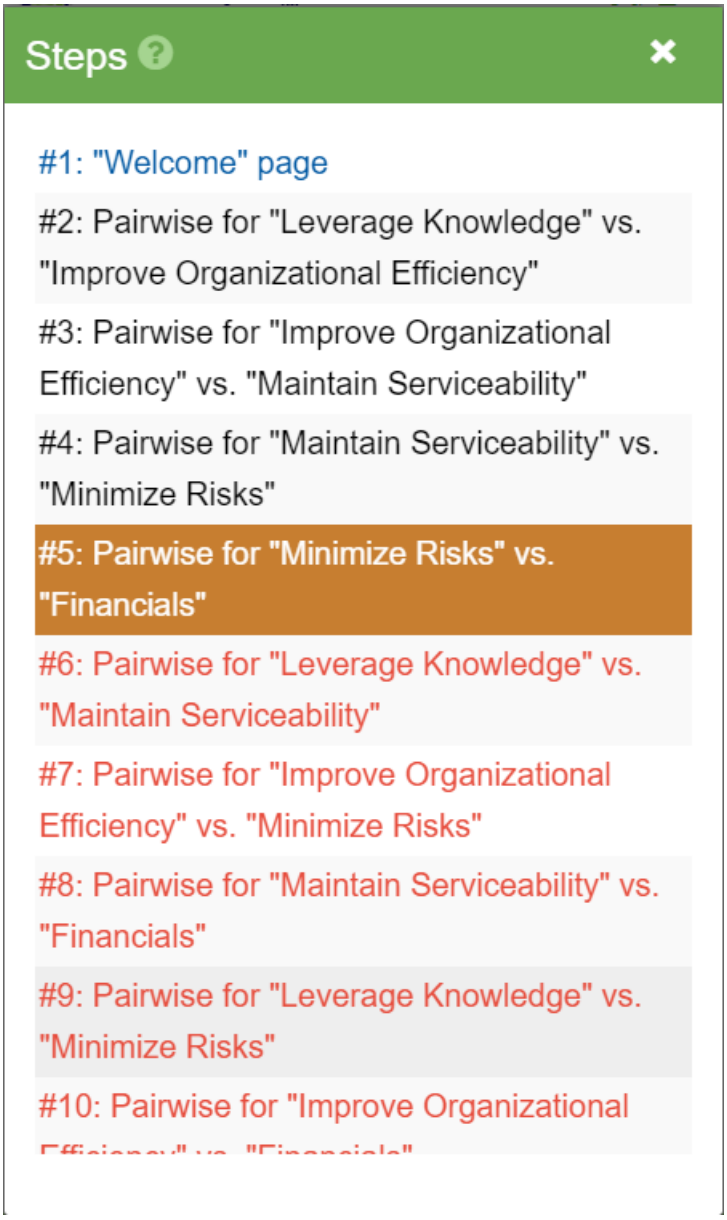

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Multi-pairwise Verbal Comparison Evaluation

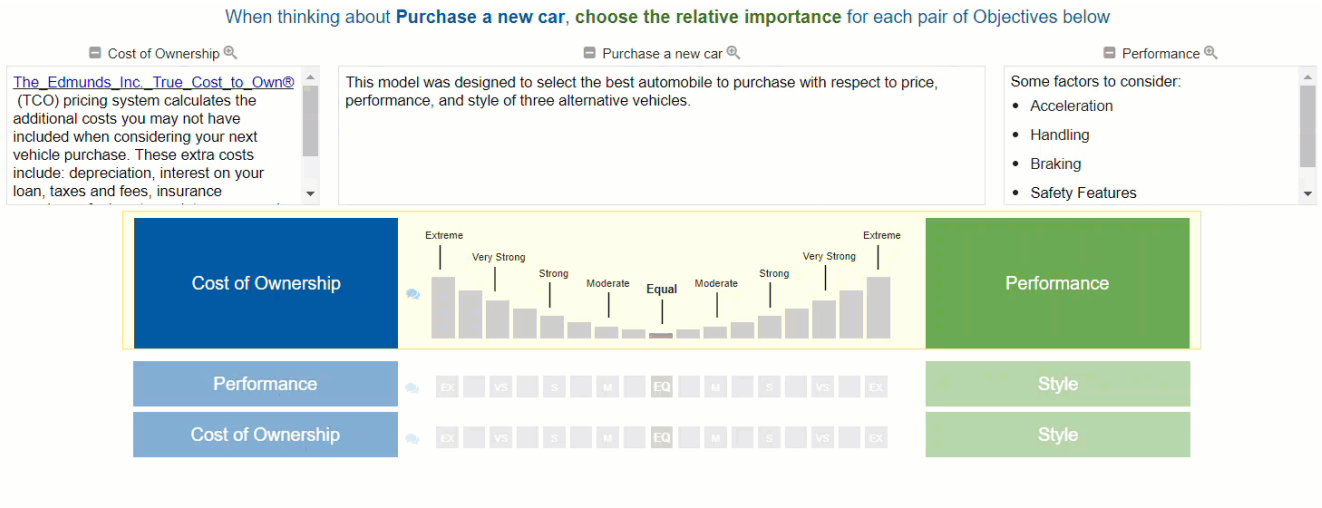
Pairwise comparisons are entered on a page as shown in the figure below, by clicking on or between words that express your judgment about the relative importance or preference or likelihoods (see Pairwise Comparisons Contexts) of the two elements shown on each line.

The AHP pairwise relative verbal scale consists of the following words:

EX	Extremely -- an oder of magnitude (10 to 1) or more
VS	Very Srongly
S	Strongly
M	Moderate
EQ	Equal

The words are not precise, but because of the way Comparion computes priorities from redundant pairwise comparisons, it is possible to derive accurate ratio scale priorities from ordinal judgments.

In the example below, we are asked to compare the **relative importance of each pair of objectives** with respect to the decision of which car to purchase.



For each pair, you can enter a judgment by clicking on the bar or a word below the bar that expresses your judgment about the relative importance of one objective over the other objective. You select equal, or specify an intensity on either side of equal. The intensities can be **moderate**, **strong**, **very strong** or **extreme**, or **between any of the words** such as between moderately and strongly.

In the top line of the example above, a judgment is made that "Performance" is strongly more important than "Cost of Ownership" with respect to the decision "Purchase a new car."

You can hover your mouse over the letters or boxes below the letters to see the verbal judgments they represented by the letters.

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Your judgment will be automatically recorded when you go to another step by clicking the Next button.

You can also enter judgments about the **relative preference of two alternatives** with respect to an objective using the multi-paiwise verbal comparison method.

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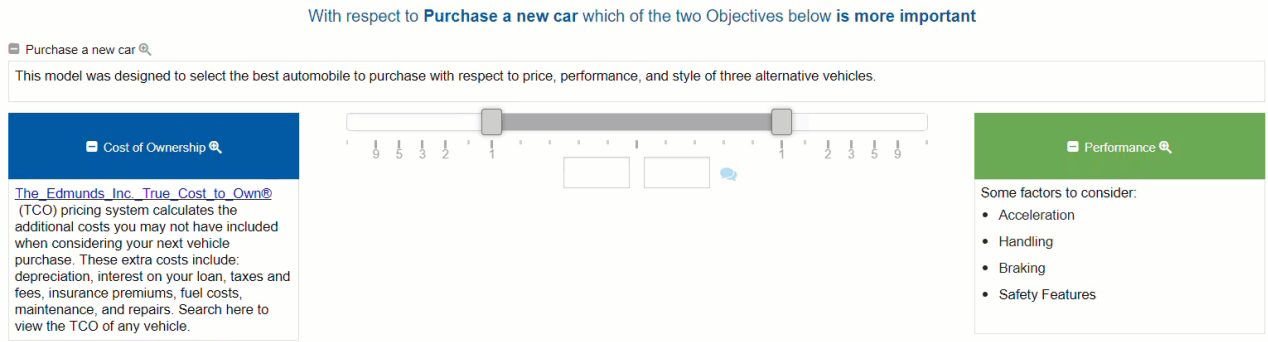
Single Pairwise Graphical/Numerical Comparisons

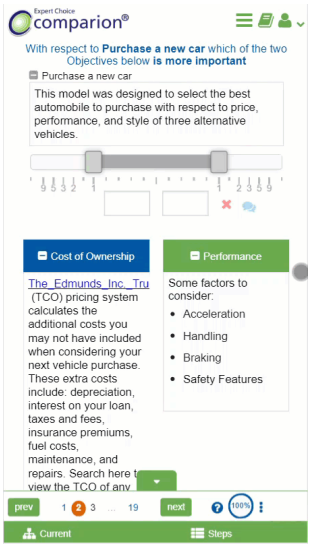
Pairwise graphical and numerical comparisons are used to express your judgment about the relative importance, preference, or likelihood of the two elements being compared.

In the example below, we are asked to compare the relative importance of the two objectives (Cost of Ownership and Performance) with respect to a car purchase decision.

Desktop



Mobile



You can enter a judgment by clicking or dragging the slider bar or by entering a number in the left or right boxes below the slider bar.

The judgment above shows that "Performance" is about twice as important as the "Cost of Ownership" with respect to the decision "Purchase a new car."

You can drag the bar only up to ratio 9:1 as the extreme.

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Judgments with ratios > 9 to 1 can be entered numerically, which will move the slider on the extra white spaces from 9.

If you realize that your judgment is inverted, you can click on the icon.

Your judgment will be automatically recorded when you go to another step by clicking **Next**.

You can also enter judgments about the **relative preference of two alternatives** with respect to an objective using the pairwise graphical or numerical comparison method.

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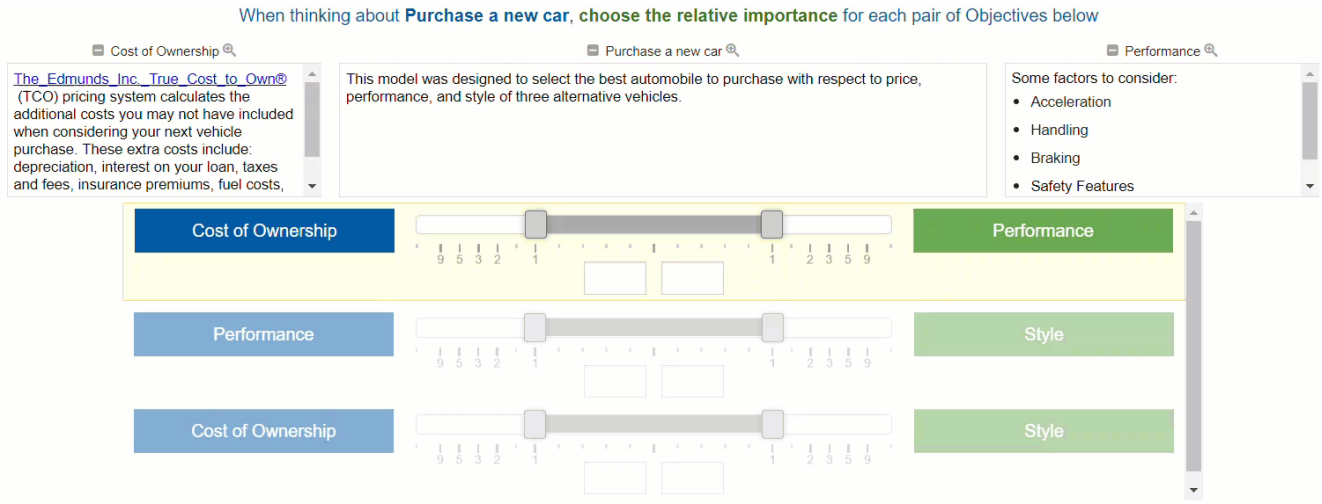
Multi-pairwise Graphical/Numerical Comparisons

Pairwise graphical and numerical comparisons are to be used to express judgments about the relative importance, preference, or likelihoods of the two elements shown on each line.

In the example below, we are asked to compare the relative importance of each pair of objectives with respect to the decision of which car to purchase.



For each pair, you can enter a judgment by dragging the slider bar or by entering a number (greater than 0) in the left or right boxes below the slider bar.

In the top line of the example above, a judgment is made that "Performance" is about twice as important as "Cost of Ownership" with respect to the decision "Purchase a new car."

You can drag the bar only up to ratio 9:1 as the extreme (see Performance vs. Style). Judgments with ratios > 9 to 1 can be entered numerically (see Cost of Ownership vs. Style), which will move the slider on the extra white spaces from 9.

If you realize that your judgment is inverted, you can click on the icon.

Your judgment will be automatically recorded when you go to another step by clicking **Next**.

You can also enter judgments about the **relative preference of two alternatives** with respect to an objective using the multi pairwise graphical or numerical comparison method.

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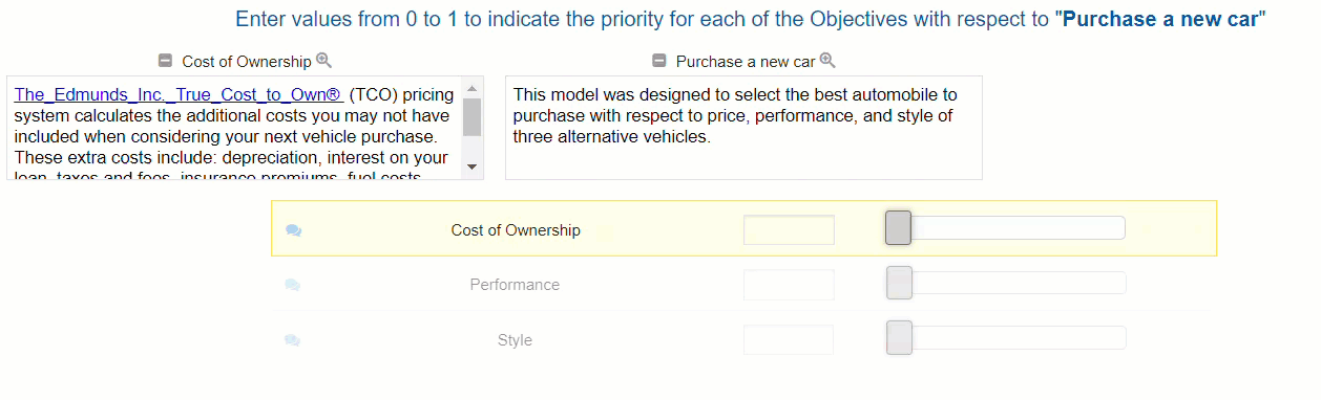
Direct Priority Entry

The Direct Priority Input method can be used when evaluating objectives with respect to another objective or when evaluating alternatives with respect to an objective.

In the example below, we are asked to evaluate all the objectives with respect to the decision to purchase a new car using the direct input method.



You can enter a judgment by dragging the slider on the bar or by entering a number from 0 to 1 in the text box.

Your judgment is automatically recorded when you go to another step by clicking **Next**.

You can also enter judgments about the **relative preference of alternatives** with respect to an objective by using the direct priority entry.

Depending on how the Project Manager set up the evaluation, you will be asked to evaluate one alternative with respect to one objective per page, or all alternatives with respect to one objective per page, or one alternative with respect to all objectives per page.

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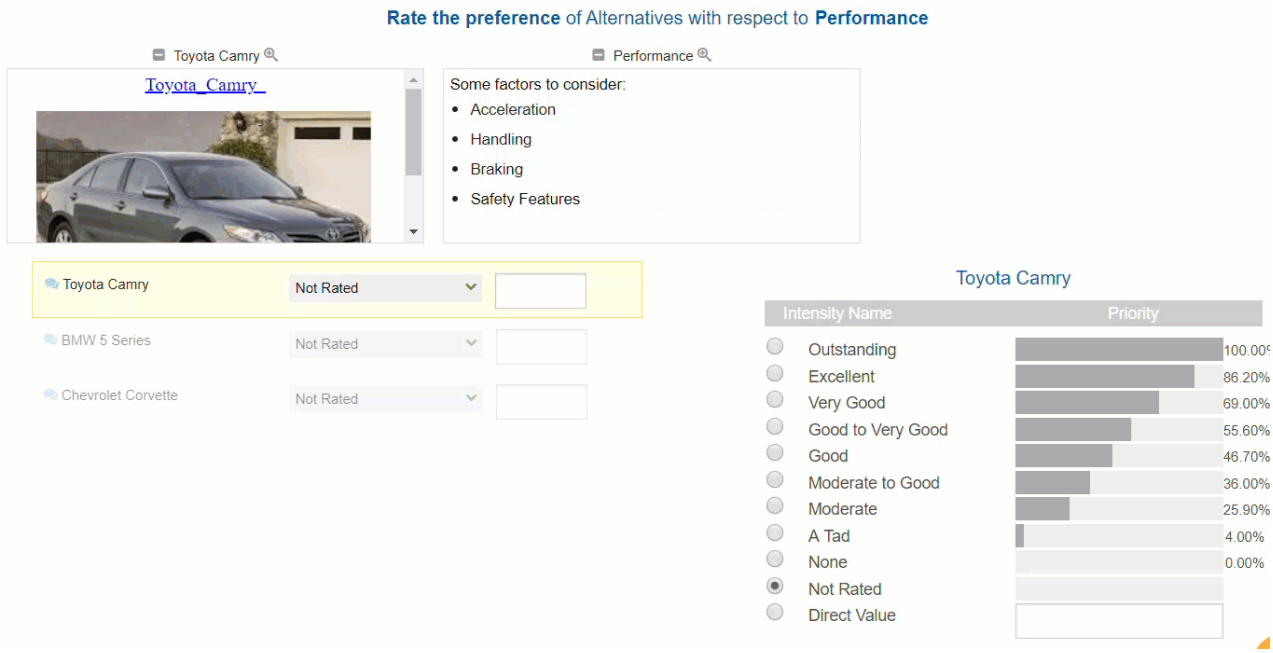
Rating Alternatives

Depending on how the Project Manager sets up the evaluation, you will be asked to rate one alternative with respect to one objective per step, all alternatives with respect to one objective per step, or one alternative with respect to all objectives per step.

Desktop



Mobile

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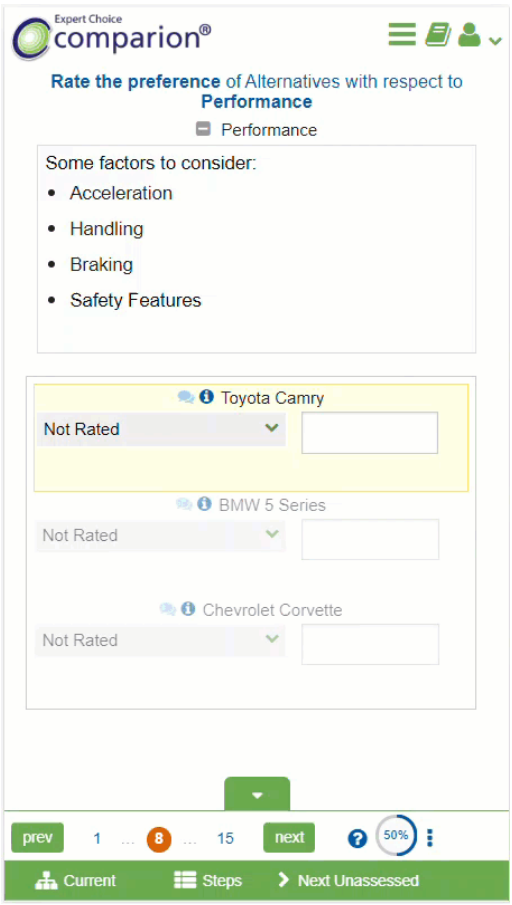

Each row shown above contains the alternatives to be evaluated with respect to one objective: Performance.

The yellow highlight indicates which alternative is being evaluated with respect to Performance.

The fastest way to enter a rating is to click on an intensity name, such as "Moderate to Good" at the right side of the page.

After clicking the intensity name, the highlight advances to the next alternative.

The priority corresponding to the verbal intensities is also shown at the right of the page (Moderate to Good - 36.0%).

If you would like to enter a rating other than those corresponding to the intensities, you can enter a direct value between and including 0 and 1.

The judgments are displayed beside the alternative name with the corresponding bar presentation.

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Step Function

The step function is used to convert raw data into ratio-scale data.

Depending on the settings made by the Project Manager, the Step Function graph and the resulting priority may vary depending on whether the Piecewise Linear option is enabled or not.

The graph below shows the Step Function when the Piecewise Linear option is enabled.

- The x-axis is the data for the alternative being evaluated
- The y-axis is the corresponding priority

The graph above shows that the slope from one point (delta priority/delta x value) is increasing.

The data can be entered by dragging the handle of the vertical slider, by typing in the text box provided, or via data grid upload (recommended when there are many alternatives).

In the image below, the ROI is 40, which (coincidentally) corresponds to a priority of 40% shown in the graph.

When the Piecewise Linear option is disabled on the same Step function scale used above, the graph will look like this (you can see why this is called a Step Function):

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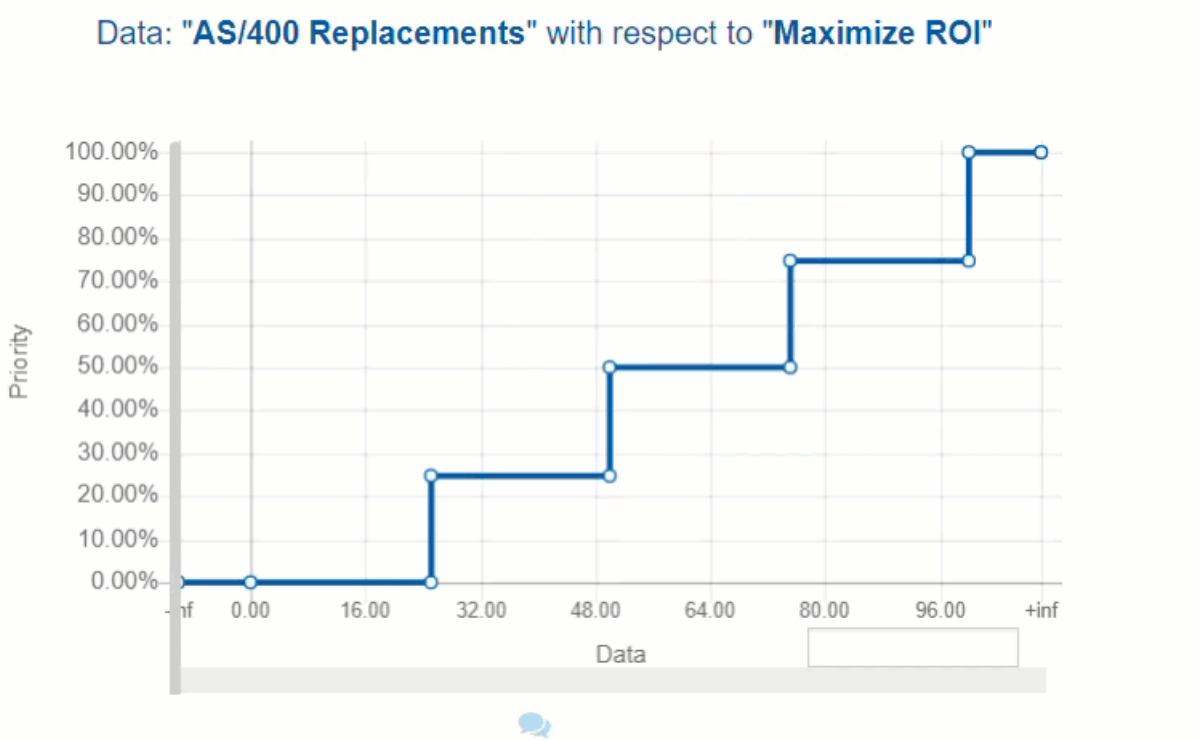

The above Step Function graph is different than the first one. The slope from one point to the next is now zero.

With the same ROI of 40, the resulting priority is now 25% (it was 40% when the Piecewise was enabled).

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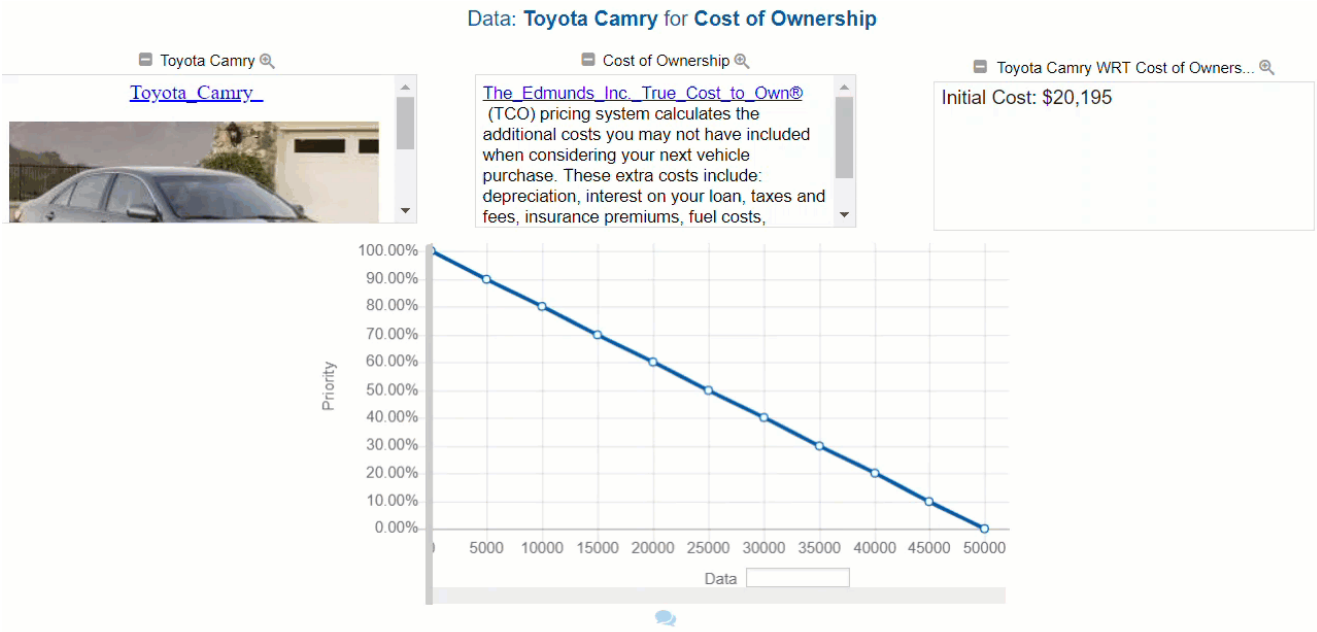
Utility Curve

Utility curves are used to convert data into ratio scale priorities. Utility curves can be increasing or decreasing, linear or non-linear.

In the example below we are asked to enter data (Initial Cost: 20,195) for the alternative "Toyota Camry."



The data can be entered by dragging the horizontal slider, typing in the text box, or with a data grid upload (recommended when there are many alternatives). In our example above, the data is translated to priority (59.61%).

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Collect Input -- Insight Survey

The Insight survey has been prepared by your Project Manager and should be self explanatory.

If you are the Project Manager, you can create and/or modify the insight survey on the Insight Questionnaire page.

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Collect Input -- Local Results

Overview

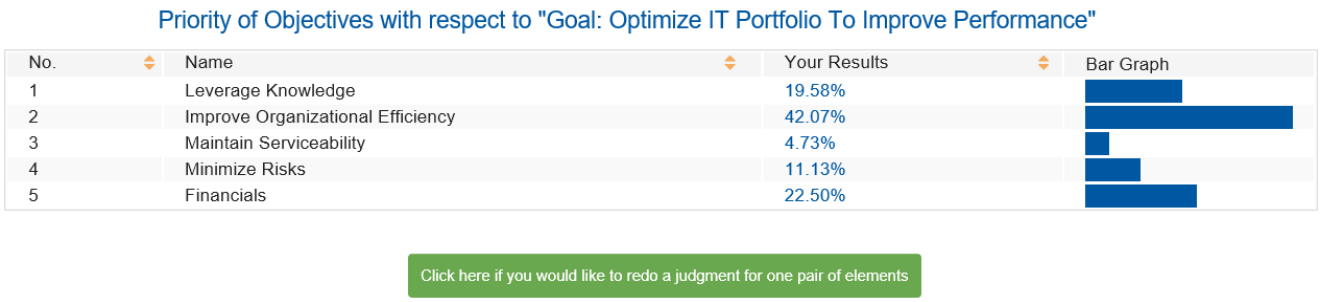
The priorities for elements in each cluster of the objectives hierarchy, as well as the priorities derived for the alternatives with respect to each covering objective, are referred to as "local" priorities and are displayed on the Intermediate Results page.

Intermediate results can be shown to or hidden from evaluators. If shown, their individual results can be shown, or the combined results, or both.

The inconsistency ratio can also be shown or hidden on this page. (Only pairwise comparisons can calculate inconsistency.)

Local Results when Inconsistency Ratio is hidden

If the Project Manager has specified that the inconsistency ratio for your judgments will not be shown , you will see the derived priorities for the elements in the current cluster:



You can click on any heading to sort by that column.

If you do not think the priorities are reasonable (i.e. are not intuitive), then click the " **Click here if you would like to redo a judgment for one pair of elements**" button.

This allows you to select a pair of elements you think may have too high a priority, and the other too low a priority, and re-evaluate them against each other.

On Desktop

Click the checkbox to the left of the two elements you want to re-evaluate. The checkboxes of the unselected elements will be disabled after you have selected two elements.

Click the **Re-evaluate** button.

You will be taken to the screen where you can enter or revise the judgment comparing these two elements. After doing so and clicking **Next**, you will be taken back to the screen showing the revised cluster priorities.

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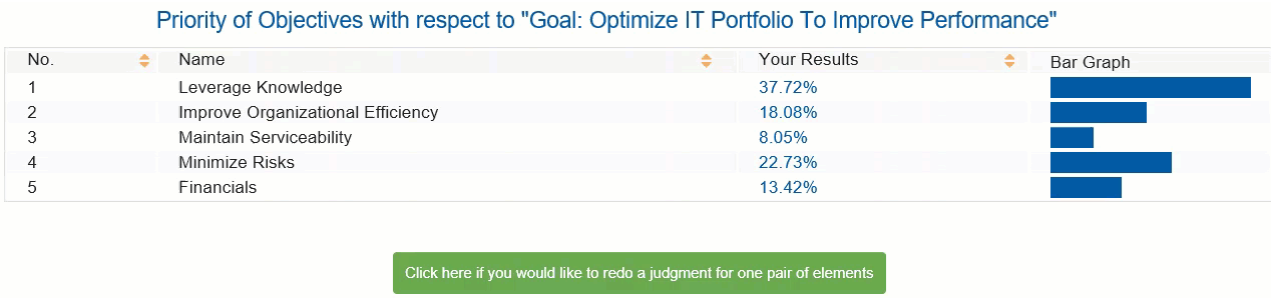
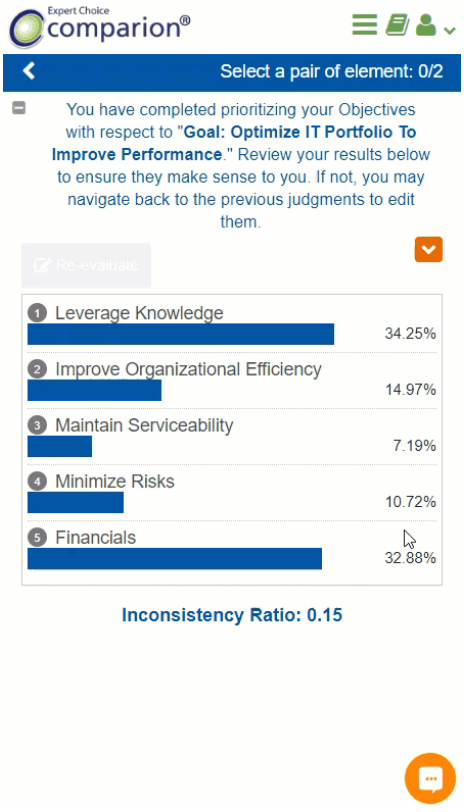


On Mobile

Tap on the two elements that you want to re-evaluate.

Once done, click the **Re-evaluate** button.

You will be taken to a page where you can enter or revise the judgment comparing these two elements. Click ' **next**', to be taken back to the priorities page. where you will see the revised priorities.



Local Results when Inconsistency Ratio is shown

The Project Manager can configure the Intermediate Results page to display inconsistency ratio. (See Math of AHP and Inconsistency Ratio)

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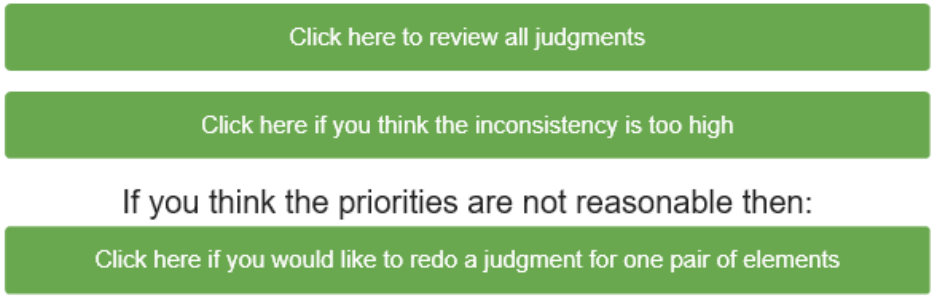
As a very rough rule of thumb, the inconsistency ratio should be .10 or less. However, there are reasons for accepting results even if the inconsistency ratio is as high as .2 or .3. (See Inconsistencies, or *Decision by Objectives* on Professor Forman's Website or at Amazon.) It is more important that the priorities be reasonable to you than to have a low inconsistency ratio. You should NOT change judgments just because of inconsistencies. You *should* re-examine judgments because of high inconsistency and change only those judgments that you feel were incorrectly recorded or for which you have a change of opinion -- regardless of inconsistency.

If you feel that either the priorities are not satisfactory or you would like to review the judgments to address a high inconsistency ratio, click the button above. There are three ways to address high inconsistencies.



"**Click here to review your judgments**" will take you to the first step of the evaluation for the given cluster.

"**Click here if you think the inconsistency is too high"** will open the judgment table (see more details below).

"**Click if you would like to redo a judgment for one pair of elements** " will take you through the sequence explained at the top of this page (redo judgment for selected pair).

Judgment Matrix

"**Click here if you think the inconsistency is too high** " will display the judgment table. You can review and modify the pairwise judgments for the given cluster.

Every matrix cell contains the relative priority between the row element and the column element, on a scale of one to nine (1 - 9).

The judgment table has two modes:

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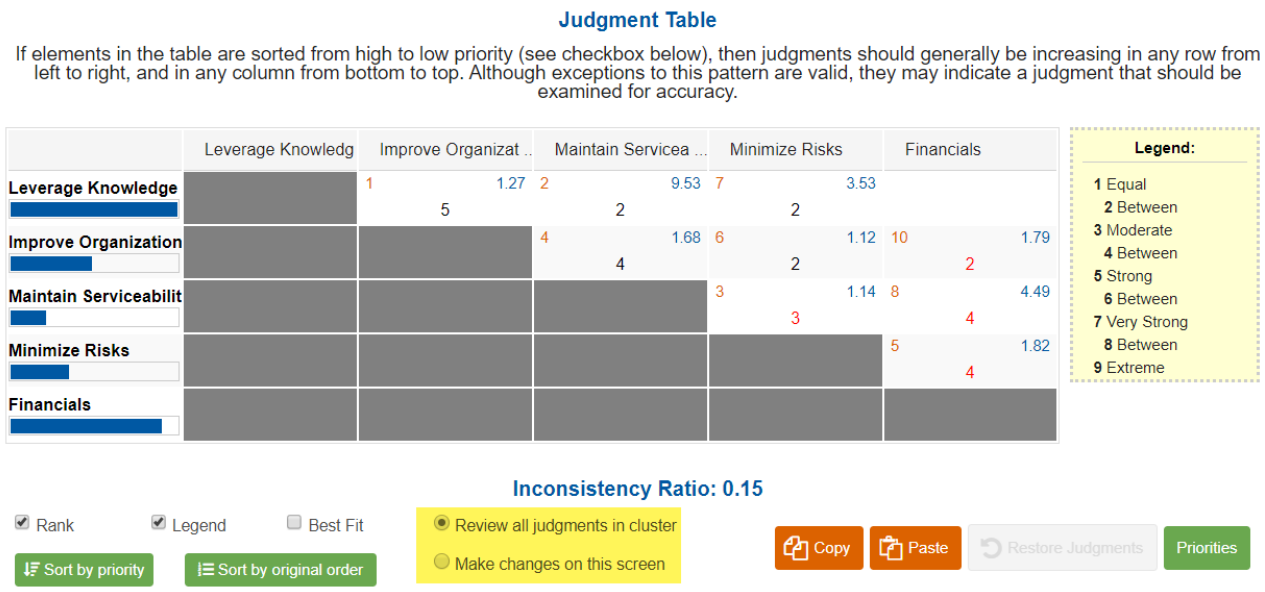
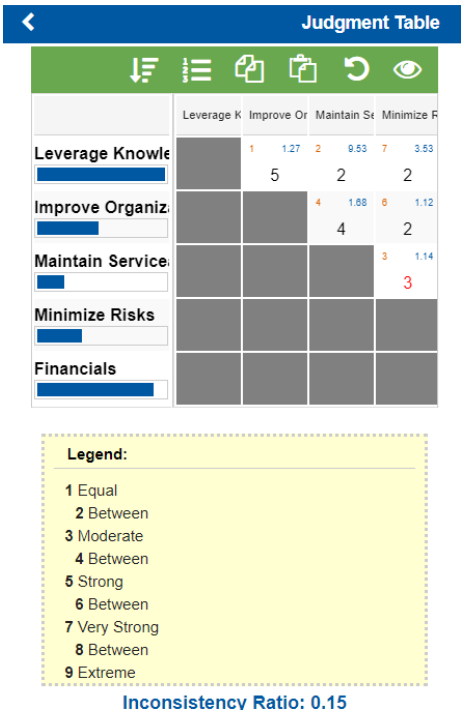
1. **Review all judgments in cluster** - makes the matrix cells clickable. Clicking on a matrix cell will redirect you to the step displaying the pairwise comparison for the row and column elements corresponding to that cell.
2. **Make changes on this screen** - allows you to make or investigate possible changes to judgments in the matrix itself. The judgments are shown numerically in this matrix regardless of whether they were made in the verbal or numerical/graphical modes. You can type in judgments and then press enter to save.

Desktop



Mobile



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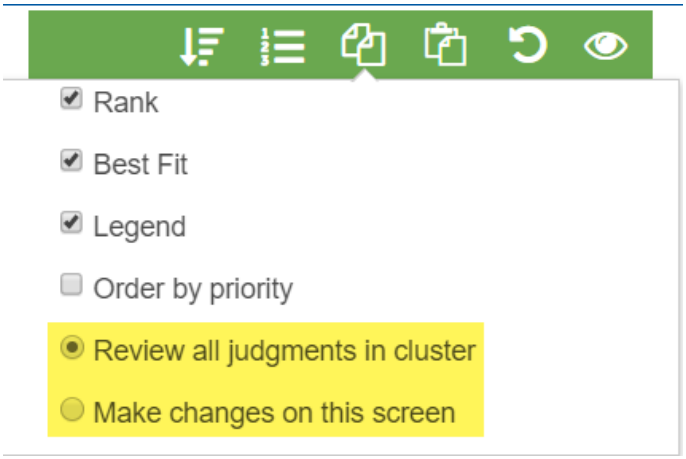
The Judgment table modes are available from the eye icon.



Red matrix cell numbers represent "flipped" priorities. It can be useful to look at flipped priorities to find instances of judgments being entered on the wrong side. If you find any flipped judgments, it is easy to correct them right there.

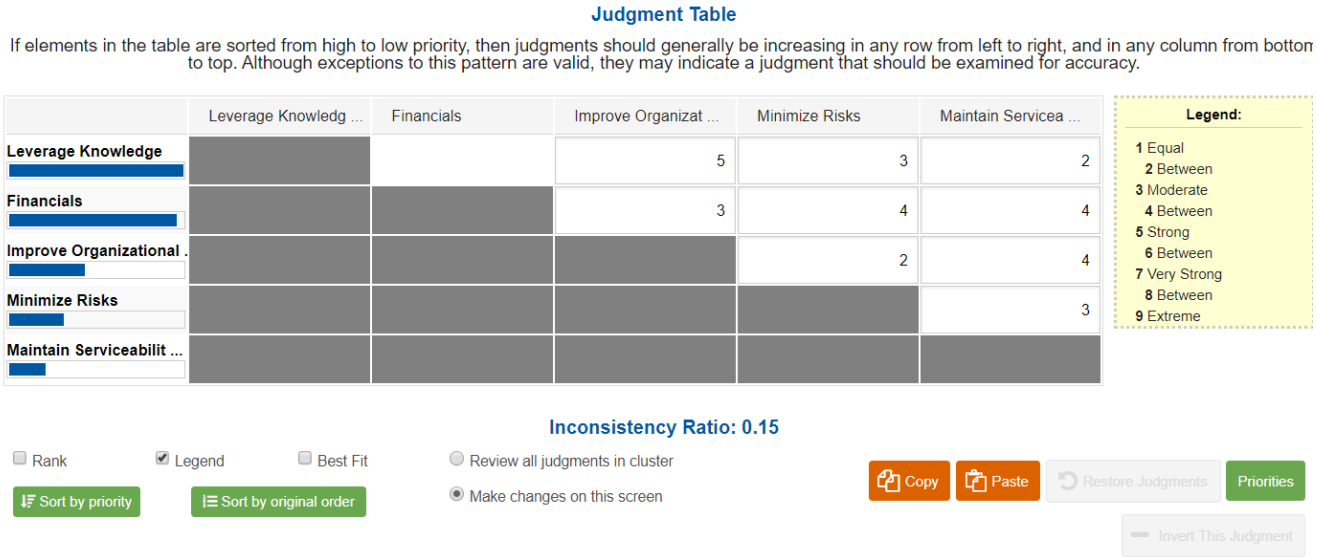
Blank matrix cells indicate a pairwise comparison that was not elicited or entered.

Conditions for Consistent Judgments

When the judgment table is sorted by priority, the judgments are perfectly consistent if they are increasing (or more precisely non-decreasing) as you look at them in the judgment table:

a) from left to right in each row, and

b) from the bottom up in each column.



In the figure above, which corresponds to a "reasonably" low to an inconsistency ratio of 0.15, the most inconsistent judgment is the 5 in the top row, which violates condition a) above. Changing this judgment to a 1 (less than the 3 to its right) will

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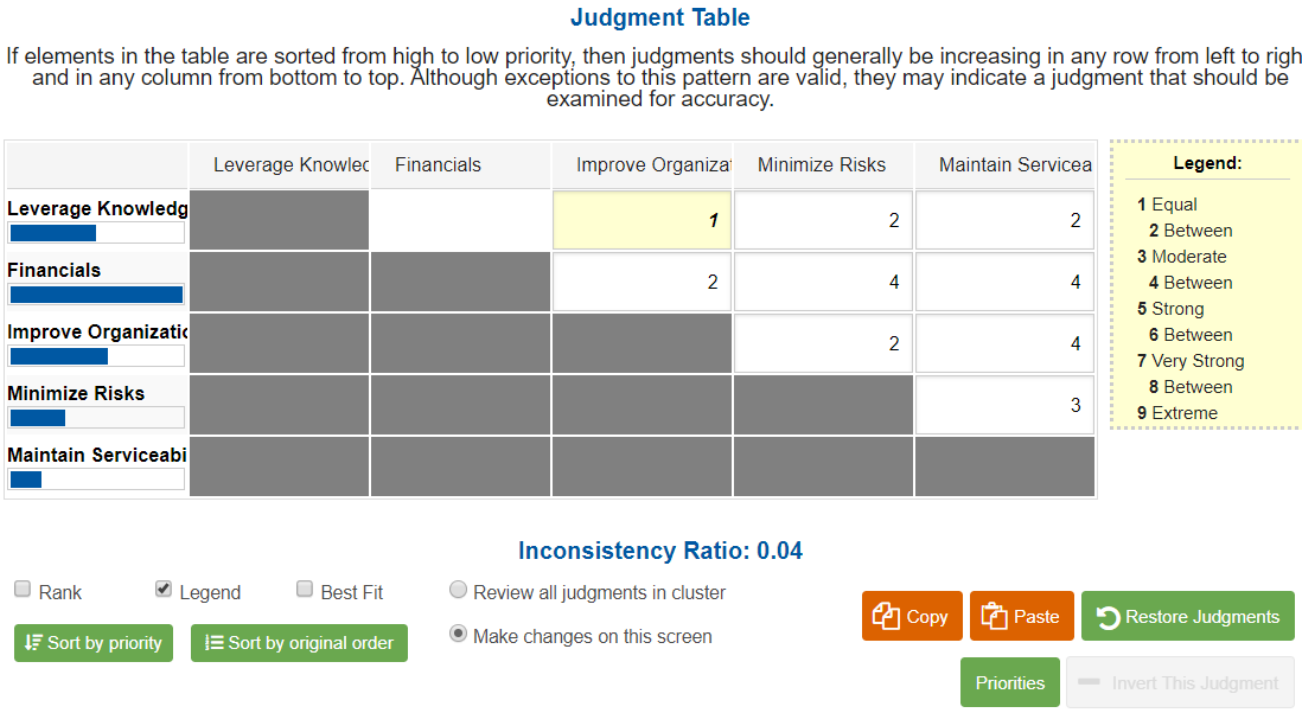
decrease the inconsistency. However, changing judgments just to reduce the inconsistency is NOT A GOOD IDEA. Judgments should be changed only when the evaluator feels that the judgment itself was in error or is no longer warranted. If this judgment (Leverage Knowledge vs. Improve Organizational efficiency) is changed from a 5 to a 1, the matrix is refreshed, as shown below.



The modified cell will have a light yellow background (see 1 above)

> Note: Click "Sort by Priority" to re-sort the elements after modifying judgment(s).

If the evaluator doesn't believe that a judgment of 1 (equal) is appropriate, or that the change in ranks of the objectives/alternatives is correct, then press the

button.

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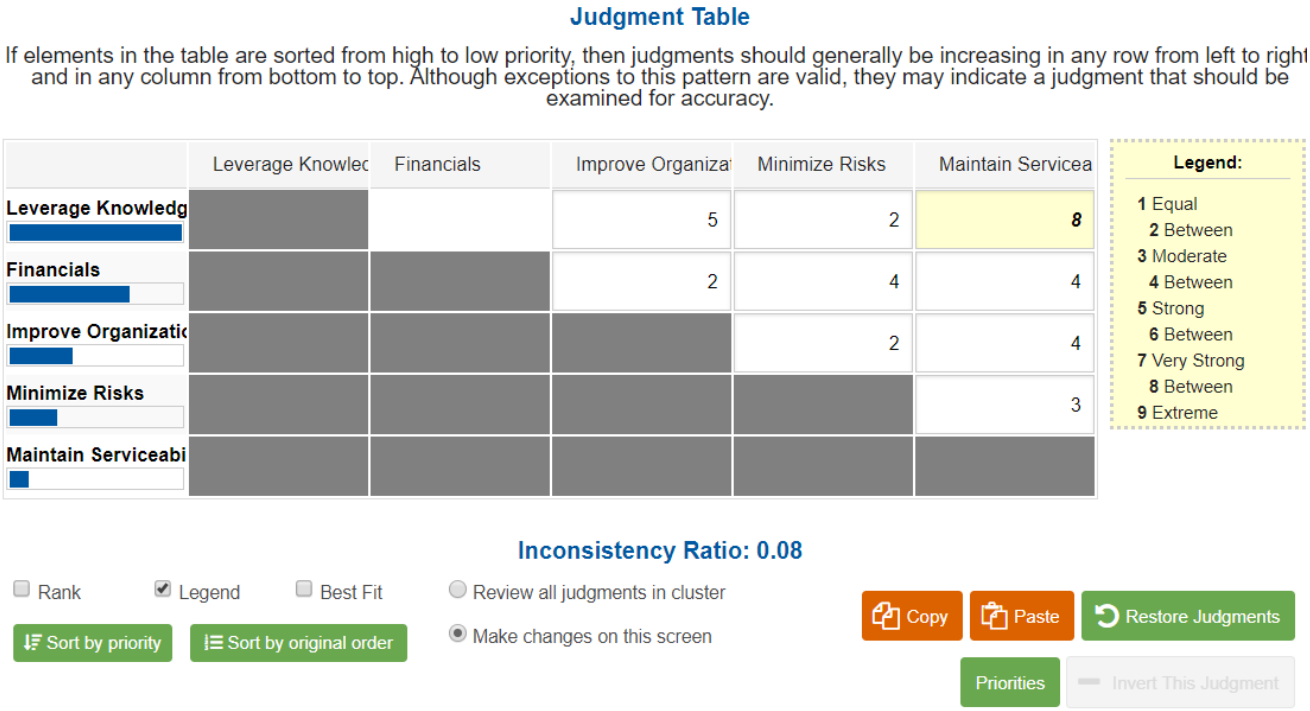

But once more we must say it is NOT A GOOD IDEA to change judgments merely to lower the inconsistency ratio. It is more important to be correct than consistent.

Note: Comparion doesn't calculate inconsistency for evaluator groups.

Inconsistency calculations are for one individual and one cluster, and should never be combined with other individuals or clusters.

Rank and Best Fit

You can display the inconsistency rank and the best fit by checking and respectively.

Inconsistency Rank is the small red number in the upper left corner of each cell.
Best Fit is the blue number in the upper right corner of each cell.

- **Inconsistency Rank** indicates the rank of each judgment's relative inconsistency on an ordinal scale from 1 to *n*. For example, the cell with a judgment of 5 (strong in the verbal mode) and a 1 in the upper left corner of the cell is the most inconsistent judgment and the judgment of 2 with a 2 in the upper right of the cell is the second most inconsistent judgment.
- **Best Fit**. The best-fit judgment is not necessarily the "best" judgment. Rather, it is the judgment that fits best with all of the other judgments that were made. It is not advisable to change judgments to the "best fit" values, but rather use the "best fit" values to give you an idea of which judgments you might want to reconsider in order to reduce the inconsistency.

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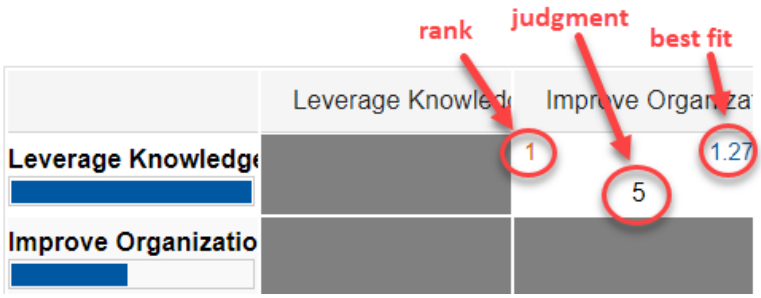

In the example above, "Leverage Knowledge" (row) is 5 times more important than "Improve Organizational Efficiency" (column). 5 = "Strongly" on the Pairwise Verbal scale. This the most inconsistent judgment (rank =1) and the best-fit judgment for the cell is 1.27.

The Rank and Best Fit can be hidden by unchecking their corresponding checkboxes for desktop view or from the eye icon for mobile view.

Invert Judgments

The numbers in the matrix cells indicate how much more important or preferable the row element is when compared to the column element. Judgments for which an element in the column is more important or preferable than an element in a row is shown in red.

You can invert judgments in the "Make changes on this screen" mode. To invert a judgment, change from black to red or red t black, press either the - or 'i' keys.

Desktop

You can invert a judgment using the "- Invert This Judgment" button:

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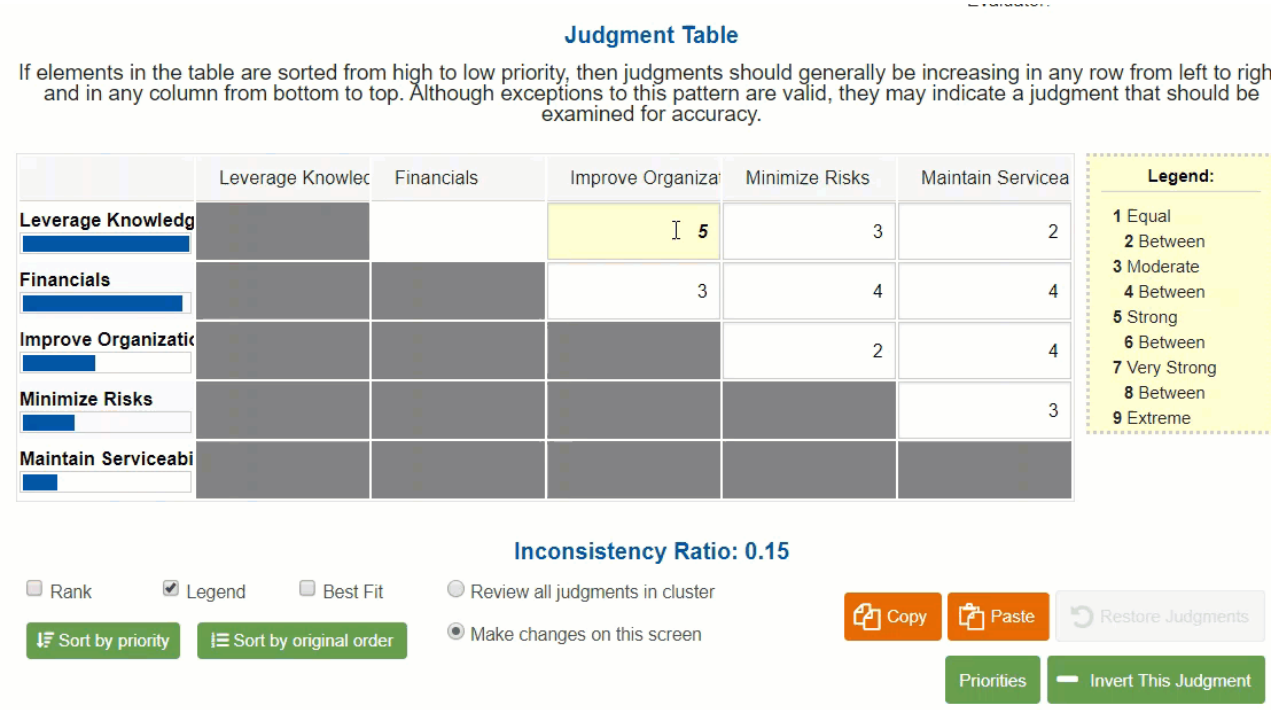
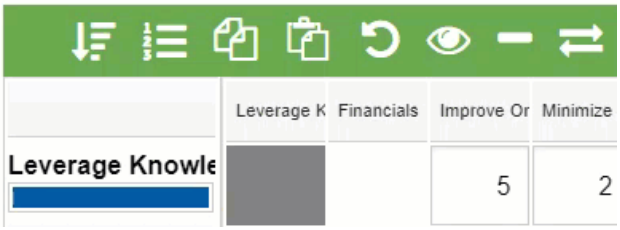


Mobile

You can invert judgments using the - button:



Sort Elements

Desktop

By default, elements in the judgment matrix (they might be objectives or alternatives) are sorted as they are sorted in the model (sort by original order). Click the "Sort by Priority" button to sort by priority, High to Low.

1. Sort by priority
2. Sort by original order

Mobile

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By default, elements in the judgment matrix (they might be objectives or alternatives) are sorted as they are sorted in the model (sort by original order). Click the "Sort by Priority" button to sort them by priority, high to Low.

1. Sort by Priority (high to low)

2. Sort by original order - based on the sorting of the elements in the model

Copy / Paste Judgments

You can copy and paste the judgments for a cluster from the judgments matrix page.

Desktop

To copy the judgments matrix, click the

icon.

> Note: Judgments will be copied based on the original order of the elements.

Click

to paste.

Mobile

To copy the judgment matrix to clipboard, click the copy button or Ctrl-C (Cmd-C on MacOS) on your keyboard. Judgments are copied in the original order of the elements.

To paste judgments from clipboard click the paste button or Ctrl-V (Cmd-V on MacOS) on your keyboard.

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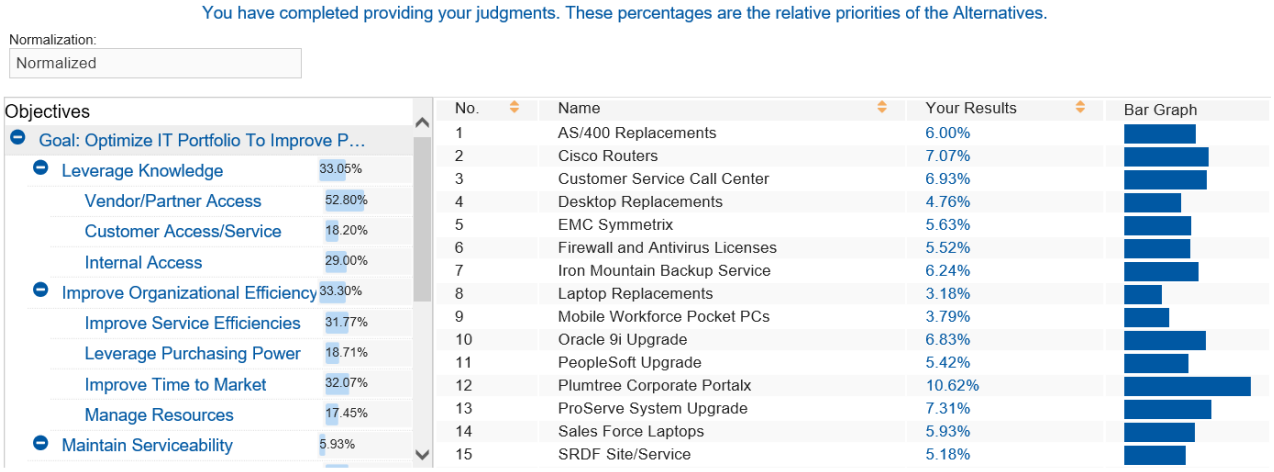
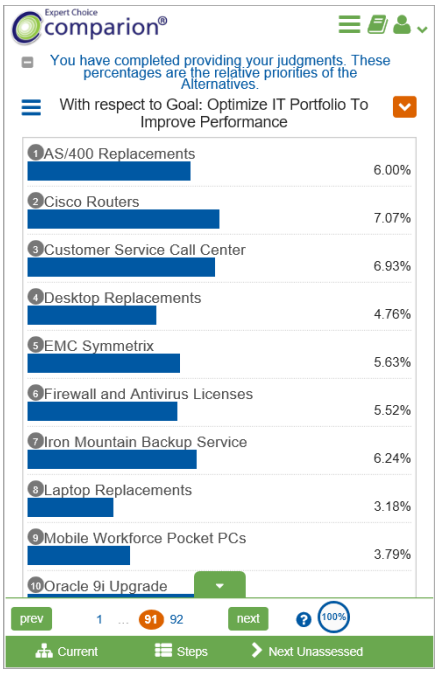
Collect Input -- Overall Priorities

The priorities of the alternatives with respect to the Goal are shown on this screen:

Desktop



Mobile



Clicking on a lower level node in the objectives hierarchy will display the alternative priorities with respect to that node.

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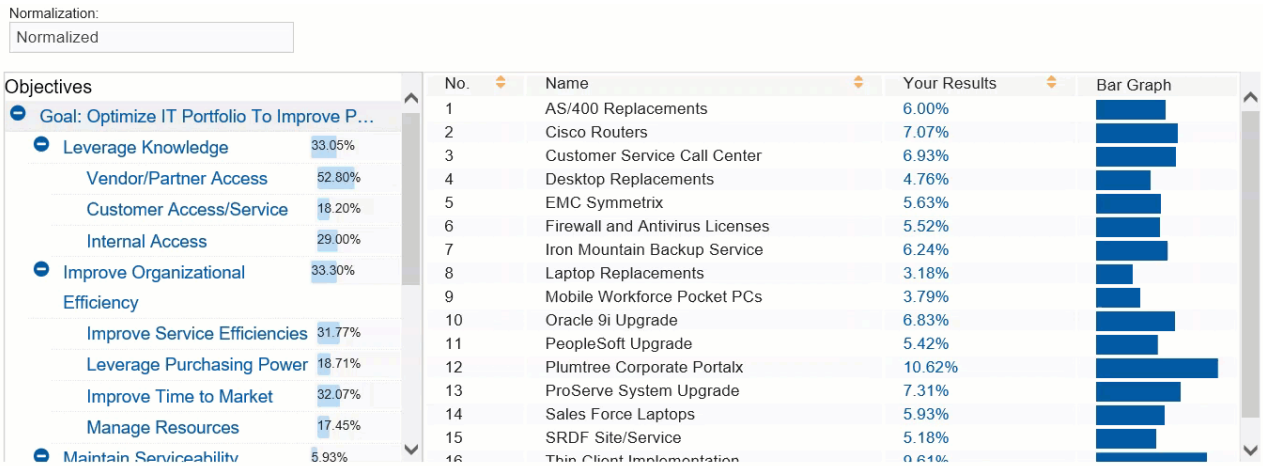
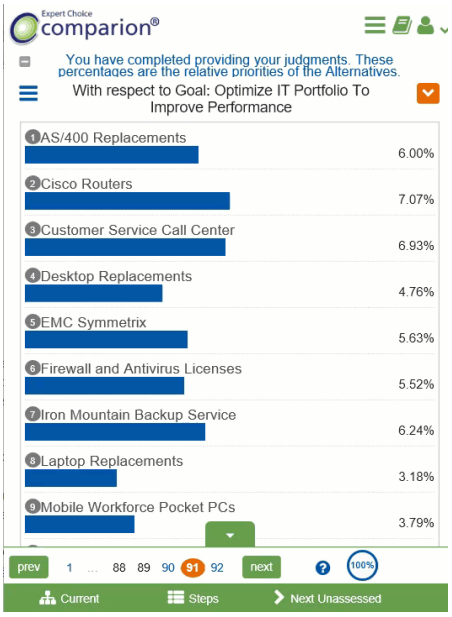
Desktop



Mobile



You can show results as:

- **Normalized** - Priority (sums to 1)
- **Percentage of Maximum** The alternative with highest priority is 1 and all others are a percentage of this
- **Unnormalized** The priority is the sum of the products of each covering objective's global priority multiplied by the priority of the alternative with respect to the covering objective. If an alternative has a priority of 1 for every covering objective, it will have an unnormalized priority of 1 and is referred to as an ideal alternative.

You can do this by selecting from the Normalization drop-down:

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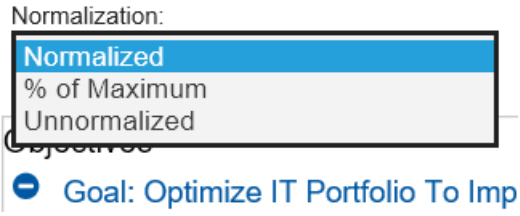
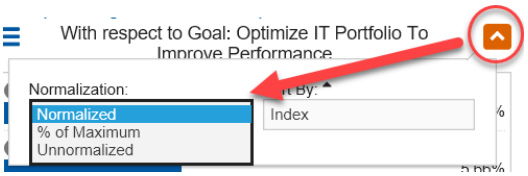
Desktop



Mobile



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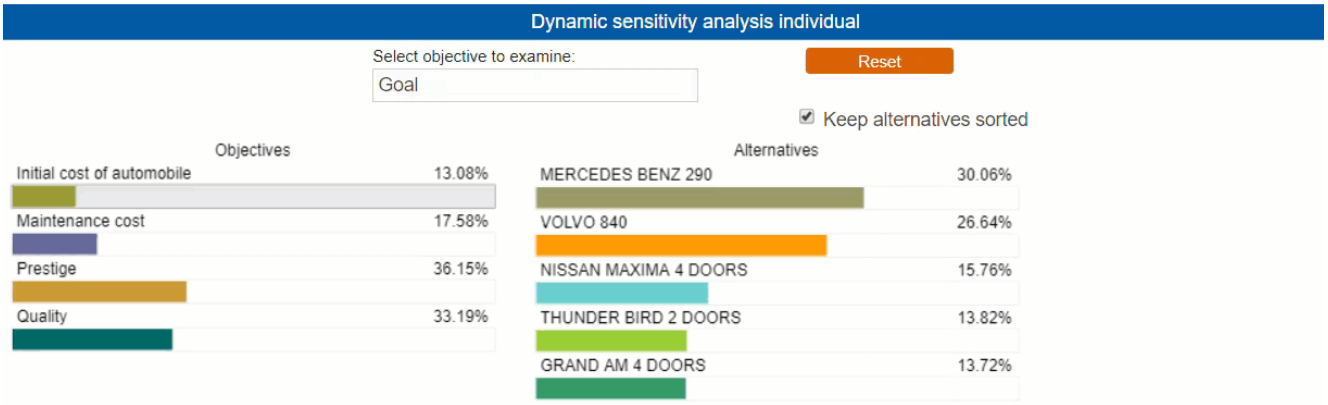
Collect Input -- Dynamic Sensitivity

The Project Manager can show or hide the Sensitivity Analysis at the end of the Collect Input steps. The purpose of the sensitivity analyses is to graphically see how the alternative priorities would change if the priorities of the objectives or sub-objectives are changed.

Dynamic Sensitivity analysis is used to play what-if with objective priorities to see change how these changes affect the priorities of the alternatives. This is for analysis only; the objective priority changes are not saved in the model and do not affect the results.



The left hand column in the dynamic sensitivity graph above shows the priorities of the top objectives while the right hand column shows the priorities of the alternatives.

By dragging the objective's priorities back and forth in the left column, the priorities of the alternatives will change in the right column. If you think an objective might be more or less important than originally indicated, drag that objective's bar to the right or left to increase or decrease the objective's priority and see the impact on alternatives.

(As an objective bar is dragged left or right to make it less or more important, all other objective priorities are increased or decreased in proportion.)

Sensitivity analysis can be performed from the Goal node of the objectives hierarchy, or from a top-level objective, or from a sub-objective.

Clicking the **Reset** button will reset all of the priorities (to those determined from the actual judgments or data in the model).

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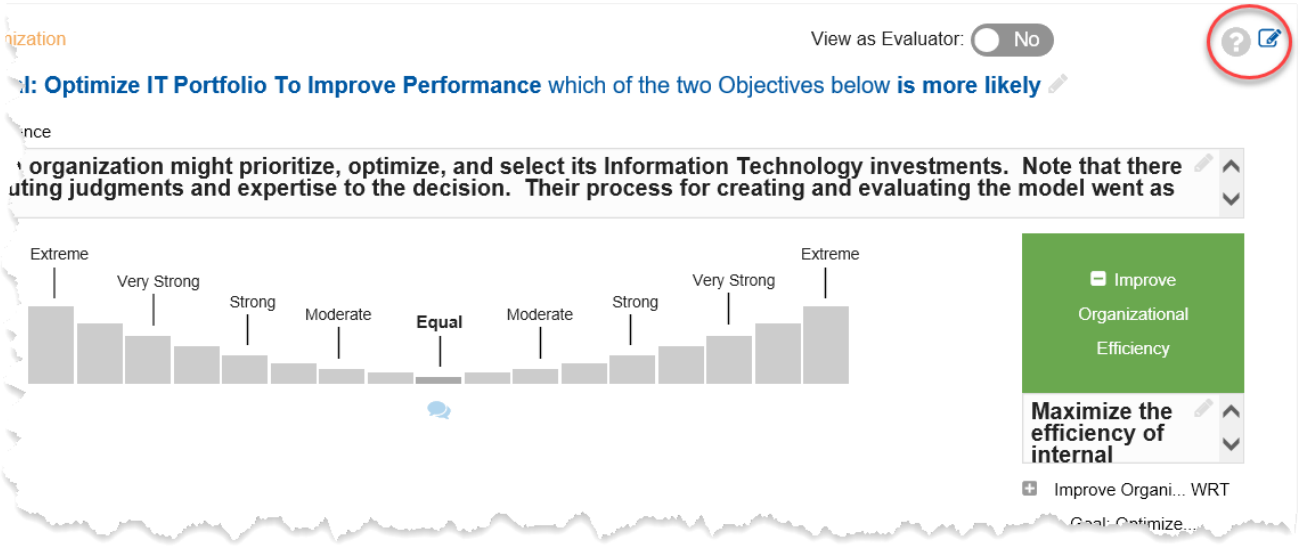
Create Evaluation Quick Help

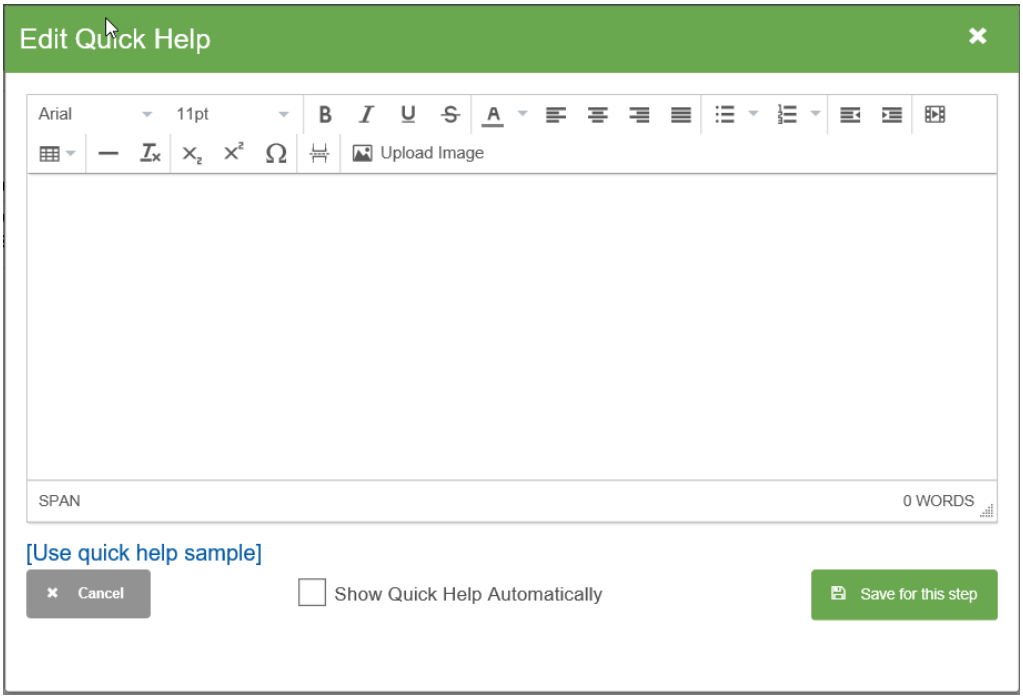
Quick Help is custom help set up by the Project Manager to be shown during the evaluation process.

The Project Manager can view and set up Quick Help (QH) from the QH icons found at the top right of every evaluation step.



An empty Quick Help is indicated by ? with gray background as shown above; it will be orange when there is content. Evaluators won't see the ? icon at all when it is empty.

To add or edit Quick Help, click the icon beside ?. This will open the **Rich Text Editor** where the Project Manager can enter texts, tables, images, videos, etc.



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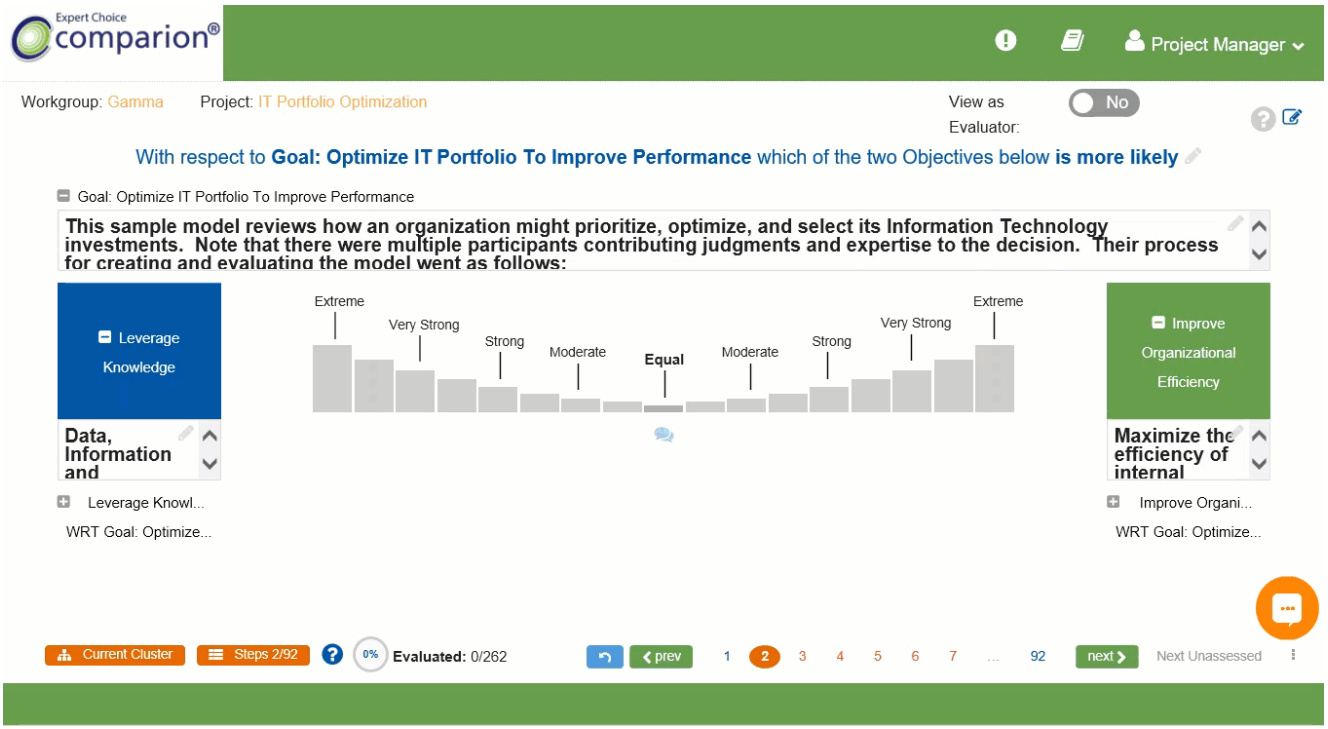
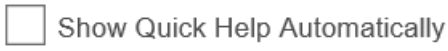
The Project Manager can also use the quick help sample (if available) by clicking the " **[Use quick help sample]**" link:



The Project Manager can set the Quick Help to auto-display by checking the check box.



This will automatically open the Quick Help dialog box when the Evaluator comes to the step where the QH was added. Evaluators can turn this off any time and just click the orange Quick Help button manually to open the QH dialog box.

Using the Rich Text Editor

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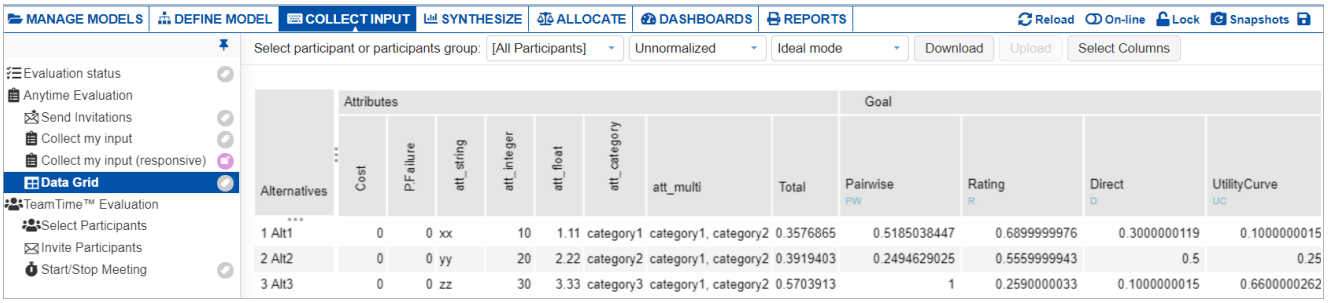
Data Grid Overview

We will introduce an artificial sample project that will be used to illustrate the Datagrid functionality.

- Alternatives (Alt1, Alt2, and Alt3)
- We named the Objectives based on the Measurement Methods used when evaluating the alternatives with respect to (wrt) those objectives (Pairwise, Rating, Direct, UtilityCurve, StepFunction)

The Datagrid for this example looks like the following:



The Cost and Risk are values used in the Allocate process. The Alternative Attributes, if they exist, are also displayed -- we will ignore them here.

The values in the display are the priorities for the alternatives for All Participants.

Similar Datagrid displays can be produced for any participant or group of participants by selecting the participant or group from the pull-down menu.

You can also select the normalization, either Normalized or Unnormalized;

and then select Ideal or Distributive for Normalized Results.

You can Download the Datagrid as a .xlsx file for one user or group at a time.

You can modify the downloaded file -- such as add, edit, delete Alternatives, enter judgments (for participants Datagrid), and alternative attributes assignments.

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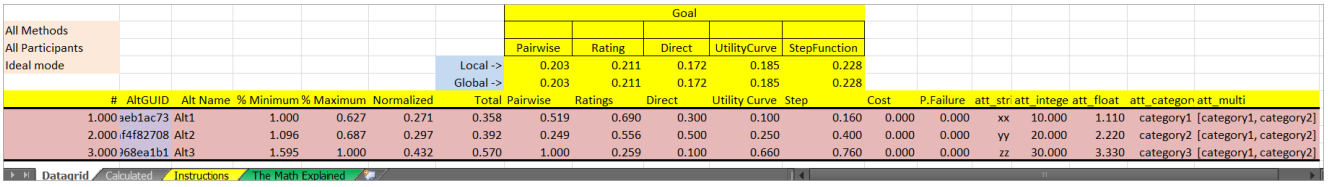
Download Data Grid

The Download button is used to create a .xlsx file (readable in Excel) with four sections:

- Datagrid
- Calculated
- Instructions
- The Math Explained

Datagrid for All Participants:

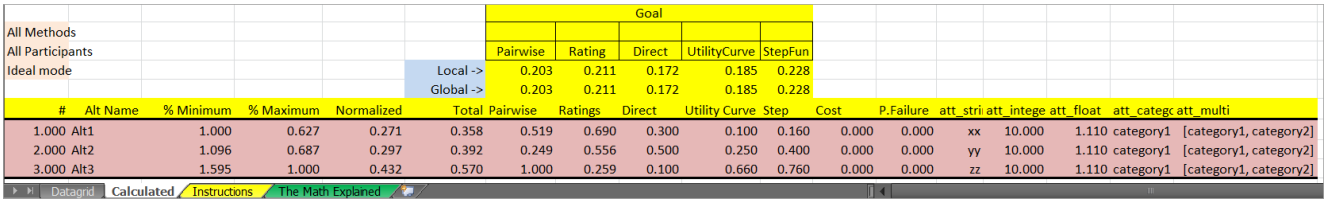
The Datagrid for All Participants (see below) contains the:



						Goal												
All Methods																		
All Participants						Pairwise	Rating	Direct	UtilityCurve	StepFunction								
Ideal mode					Local ->	0.203	0.211	0.172	0.185	0.228								
					Global ->	0.203	0.211	0.172	0.185	0.228								
#	AltGUID	Alt Name	% Minimum	% Maximum	Normalized	Total	Pairwise	Ratings	Direct	Utility Curve	Step	Cost	P.Failure	att_stri	att_intege	att_float	att_categor	att_multi
1.000	aeb1ac73	Alt1	1.000	0.627	0.271	0.358	0.519	0.690	0.300	0.100	0.160	0.000	0.000	xx	10.000	1.110	category1	[category1, category2]
2.000	f4f82708	Alt2	1.096	0.687	0.297	0.392	0.249	0.556	0.500	0.250	0.400	0.000	0.000	yy	20.000	2.220	category2	[category1, category2]
3.000	68ea1b1	Alt3	1.595	1.000	0.432	0.570	1.000	0.259	0.100	0.660	0.760	0.000	0.000	zz	30.000	3.330	category3	[category1, category2]

Datagrid | Calculated | Instructions | The Math Explained

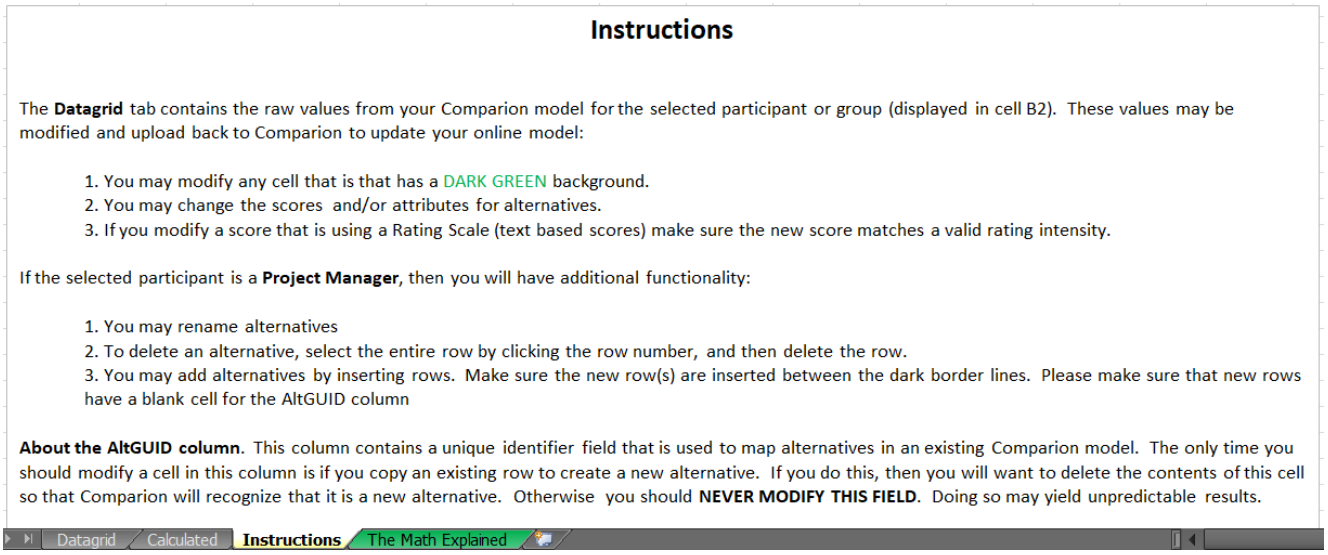
The Calculated sheet is similar to the Datagrid sheet but shows the ratio scale priorities derived from the specific measurement types of Pairwise, Ratings, Utility Curves and Step Functions:



						Goal												
All Methods																		
All Participants						Pairwise	Rating	Direct	UtilityCurve	StepFun								
Ideal mode					Local ->	0.203	0.211	0.172	0.185	0.228								
					Global ->	0.203	0.211	0.172	0.185	0.228								
#	Alt Name	% Minimum	% Maximum	Normalized	Total	Pairwise	Ratings	Direct	Utility Curve	Step	Cost	P.Failure	att_stri	att_intege	att_float	att_categ	att_multi	
1.000	Alt1	1.000	0.627	0.271	0.358	0.519	0.690	0.300	0.100	0.160	0.000	0.000	xx	10.000	1.110	category1	[category1, category2]	
2.000	Alt2	1.096	0.687	0.297	0.392	0.249	0.556	0.500	0.250	0.400	0.000	0.000	yy	10.000	1.110	category1	[category1, category2]	
3.000	Alt3	1.595	1.000	0.432	0.570	1.000	0.259	0.100	0.660	0.760	0.000	0.000	zz	10.000	1.110	category1	[category1, category2]	

Datagrid | Calculated | Instructions | The Math Explained

The Instructions sheet displays instructions you can follow when working with Datagrid:



Instructions

The **Datagrid** tab contains the raw values from your Comparion model for the selected participant or group (displayed in cell B2). These values may be modified and upload back to Comparion to update your online model:

1. You may modify any cell that is that has a DARK GREEN background.
2. You may change the scores and/or attributes for alternatives.
3. If you modify a score that is using a Rating Scale (text based scores) make sure the new score matches a valid rating intensity.

If the selected participant is a **Project Manager**, then you will have additional functionality:

1. You may rename alternatives
2. To delete an alternative, select the entire row by clicking the row number, and then delete the row.
3. You may add alternatives by inserting rows. Make sure the new row(s) are inserted between the dark border lines. Please make sure that new rows have a blank cell for the AltGUID column

About the AltGUID column. This column contains a unique identifier field that is used to map alternatives in an existing Comparion model. The only time you should modify a cell in this column is if you copy an existing row to create a new alternative. If you do this, then you will want to delete the contents of this cell so that Comparion will recognize that it is a new alternative. Otherwise you should **NEVER MODIFY THIS FIELD**. Doing so may yield unpredictable results.

Datagrid | Calculated | **Instructions** | The Math Explained

Datagrid for One of the Participants:

The Datagrid for one of the participants (in this case, the John Doe) is:

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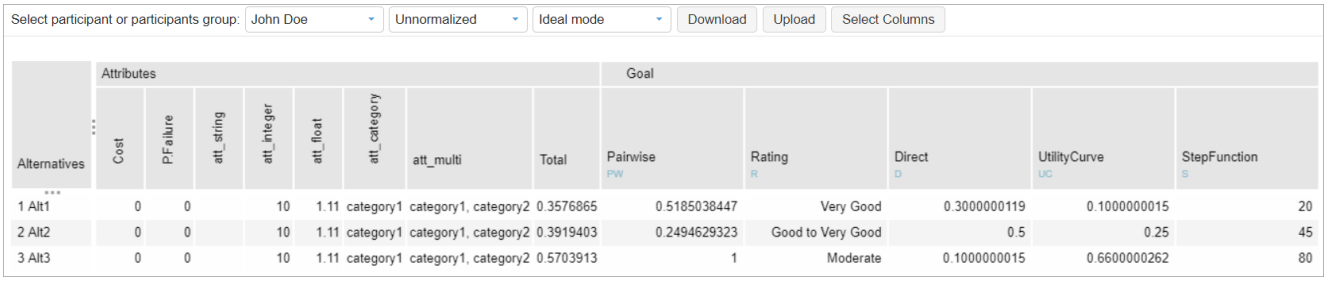
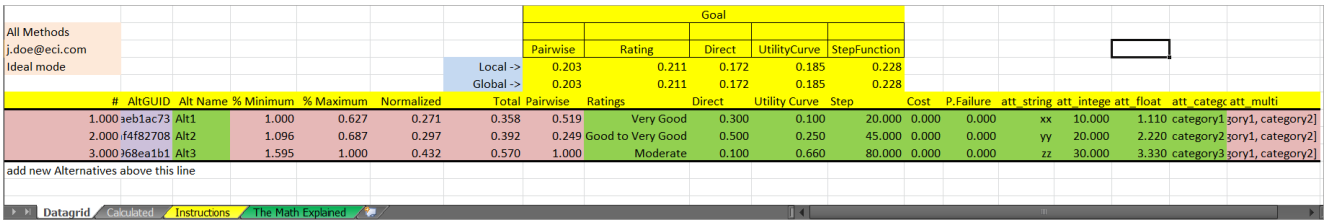


Select participant or participants group: John Doe | Unnormalized | Ideal mode | Download | Upload | Select Columns

Alternatives	Attributes								Goal				
	Cost	P.Failure	att_string	att_integer	att_float	att_category	att_multi	Total	Pairwise PW	Rating R	Direct D	UtilityCurve UC	StepFunction S
1 Alt1	0	0		10	1.11	category1	category1, category2	0.3576865	0.5185038447	Very Good	0.3000000119	0.1000000015	20
2 Alt2	0	0		10	1.11	category1	category1, category2	0.3919403	0.2494629323	Good to Very Good	0.5	0.25	45
3 Alt3	0	0		10	1.11	category1	category1, category2	0.5703913	1	Moderate	0.1000000015	0.6600000262	80

Since John Doe is the only participant with judgments/data, it looks the same as the Datagrid for "All Participants."

However, when we download the Datagrid for the John Doe, we see a difference in the Datagrid tab of the spreadsheet:



							Goal												
All Methods																			
j.doe@eci.com																			
Ideal mode							Pairwise	Rating	Direct	UtilityCurve	StepFunction								
						Local ->	0.203	0.211	0.172	0.185	0.228								
						Global ->	0.203	0.211	0.172	0.185	0.228								
#	AltGUID	Alt Name	% Minimum	% Maximum	Normalized	Total	Pairwise	Ratings	Direct	Utility Curve	Step	Cost	P.Failure	att_string	att_intege	att_float	att_categc	att_multi	
1.000	3eb1ac73	Alt1	1.000	0.627	0.271	0.358	0.519	Very Good	0.300	0.100	20.000	0.000	0.000	xx	10.000	1.110	category1	gory1, category2]	
2.000	f4f82708	Alt2	1.096	0.687	0.297	0.392	0.249	Good to Very Good	0.500	0.250	45.000	0.000	0.000	yy	20.000	2.220	category2	gory1, category2]	
3.000	368ea1b1	Alt3	1.595	1.000	0.432	0.570	1.000	Moderate	0.100	0.660	80.000	0.000	0.000	zz	30.000	3.330	category3	gory1, category2]	
add new Alternatives above this line																			

Datagrid | Calculated | Instructions | The Math Explained

The difference is that Ratings are shown as they were input by the participant; in this case, Very Good, Good to Very Good, and Moderate for the three alternatives respectively.

The Utility Curve and Step Function data are also displayed instead of the priorities.

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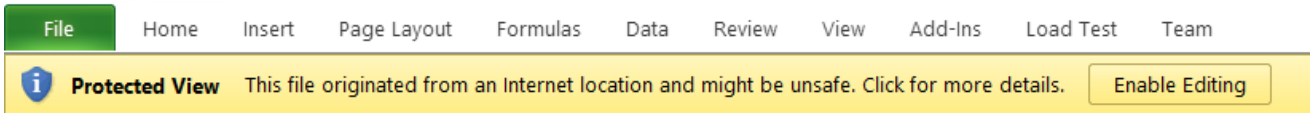
Upload Data Grid

After Downloading the Datagrid file of one of the participants, you can change data on the downloaded .xlsx file and upload it back to Comparion.

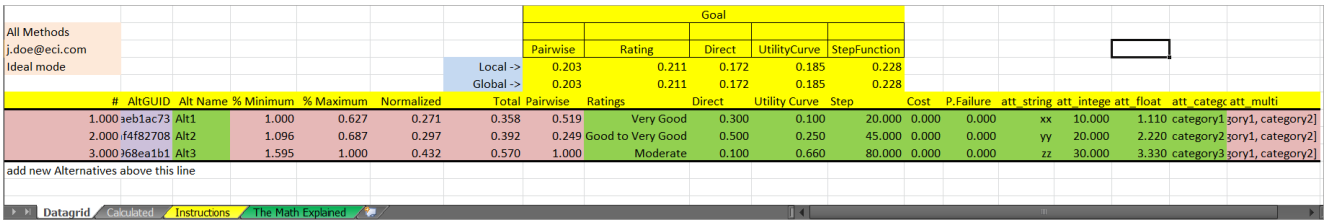
> Note: You cannot upload Datagrid for groups.

Entering or Changing Data for Uploading: Any of the cells in **green** can be changed either manually by pasting from the clipboard, or by using an Excel macro.

In order to edit the Datagrid, you need to click the Enable Editing button found at the top:



From our example, John Doe has the following data:



All Methods								Goal									
j.doe@eci.com								Pairwise	Rating	Direct	UtilityCurve	StepFunction					
Ideal mode					Local ->			0.203	0.211	0.172	0.185	0.228					
					Global ->			0.203	0.211	0.172	0.185	0.228					
#	AltGUID	Alt Name	% Minimum	% Maximum	Normalized	Total	Pairwise	Ratings	Direct	Utility Curve	Step	Cost	P.Failure	att_string	att_intege	att_float	att_categc	att_multi
1.000	3eb1ac73	Alt1	1.000	0.627	0.271	0.358	0.519	Very Good	0.300	0.100	20.000	0.000	0.000	xx	10.000	1.110	category1	gory1, category2]
2.000	f4f82708	Alt2	1.096	0.687	0.297	0.392	0.249	Good to Very Good	0.500	0.250	45.000	0.000	0.000	yy	20.000	2.220	category2	gory1, category2]
3.000	368ea1b1	Alt3	1.595	1.000	0.432	0.570	1.000	Moderate	0.100	0.660	80.000	0.000	0.000	zz	30.000	3.330	category3	gory1, category2]
add new Alternatives above this line																		

Datagrid | Calculated | Instructions | The Math Explained

We will edit the DataGrid of John Doe as follows:

- Rename Alt1 to Alt1_rename.
- Delete Alt_3.
- Add values for Costs (100, 200, 300).
- Change the Ratings (Good, Outstanding) for the two alternatives.
- Update the alternative attribute alt_string (aaa, bbb) and alt_categorical (category3,category4).
  - Note:
    - For non-categorical attributes, the values should satisfy the attribute type (string, integer, float, boolean), or else it will be ignored during upload.
    - For categorical attributes, if the category entered is not an existing category of the given attribute, the category will be added as a new category (in our example, category4 will be added as a new category).
    - For multi-categorical attributes, any changes will be ignored.
- Add new alternative'Alt4_new" and add 0.2 rating, 0.7 direct priority, 0.5 Utility Curve and 60 Step Function data.

The Datagrid after the changes will look like below:

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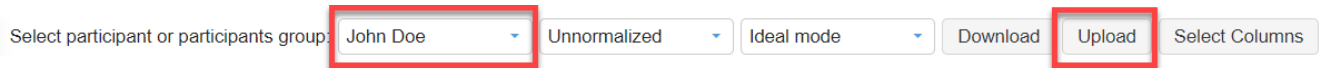
							Goal											
All Methods																		
j.doe@eci.com							Pairwise	Rating	Direct	UtilityCurv	StepFunction							
Ideal mode						Local ->	0.203	0.211	0.172	0.185	0.228							
						Global ->	0.203	0.211	0.172	0.185	0.228							
#	AltGUID	Alt Name	% Minimum	% Maximum	Normalized	Total	Pairwise	Ratings	Direct	Utility Curve	Step	Cost	P.Failur	att_string	att_intege	att_float	att_category	att_multi
1.000	aeb1ac73	Alt1_rena	1.000	0.913	0.477	0.358	0.519	Good	0.300	0.100	20.000	100.000	0.000	aaa	10.000	1.110	category3	category2]
2.000	f4f82708	Alt2	1.096	1.000	0.523	0.392	0.249	Outstanding	0.500	0.250	45.000	200.000	0.000	bbb	20.000	2.220	category4	category2]
		Alt4_new						0.200	0.700	0.500	60.000							
add new Alternatives above this line																		

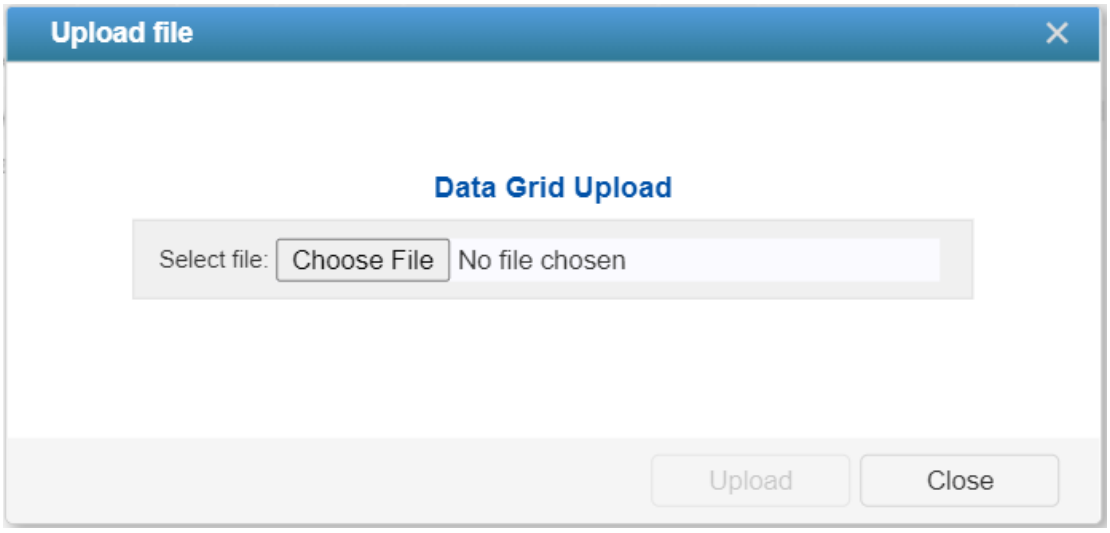
Note: Only the Project Managers can manage the alternatives (add, rename, delete) and update the Costs, Risks, and alternative attributes. For Participants, only changes for the judgments can be uploaded; any other changes will be ignored during the upload. In our example, John Doe is a Project Manager of the model.

After updating the Datagrid, simply save the file and upload it back in Comparion.

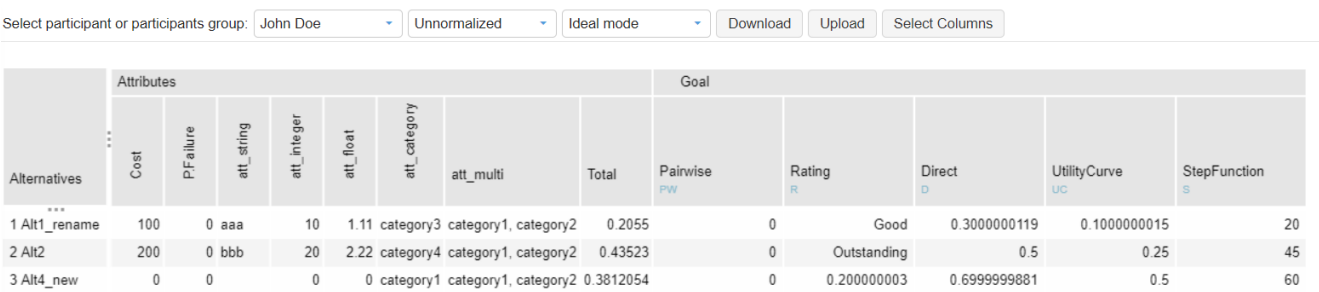
To upload, select John Doe and then click upload.



A model to browse for the file to upload will be displayed as shown below; click Choose File and browse for the DataGrid file, and then click the Upload button.



The resulting Datagrid is shown below:



	Attributes								Goal				
Alternatives	Cost	P.Failure	att_string	att_integer	att_float	att_category	att_multi	Total	Pairwise PW	Rating R	Direct D	UtilityCurve UC	StepFunction S
1 Alt1_rename	100	0	aaa	10	1.11	category3	category1, category2	0.2055	0	Good	0.3000000119	0.1000000015	20
2 Alt2	200	0	bbb	20	2.22	category4	category1, category2	0.43523	0	Outstanding	0.5	0.25	45
3 Alt4_new	0	0		0	0	category1	category1, category2	0.3812054	0	0.200000003	0.6999999881	0.5	60

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Note: The categories are populated for the newly added alternative "Alt4_new" even if they were not added by uploading the .xlsx file; this is because these are defaults for the alternative attributes, which were specified from the Alternatives page.

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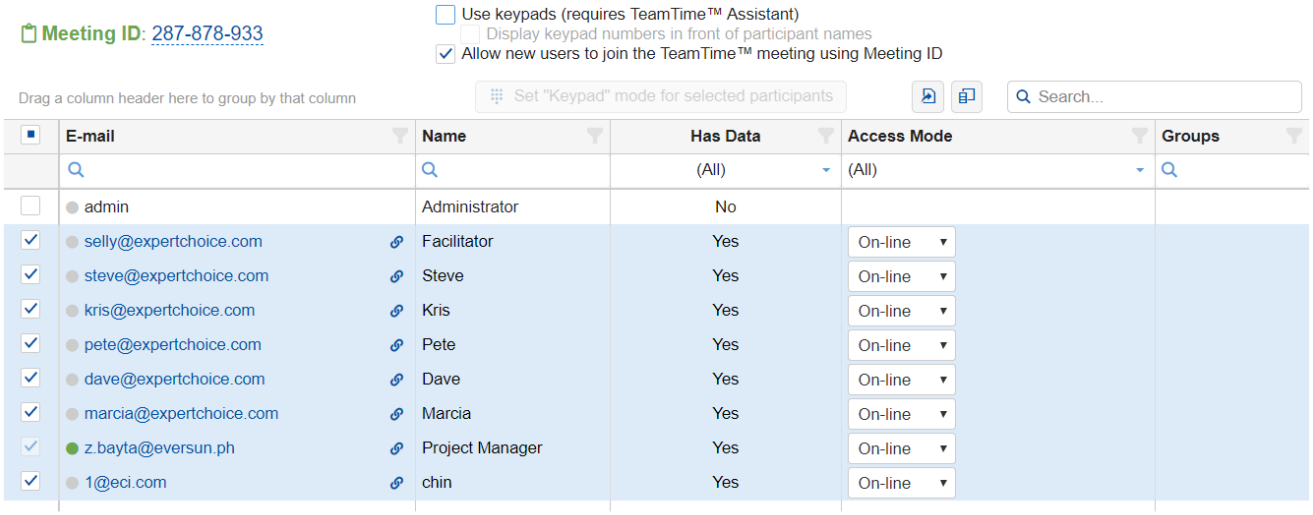
Select Participants for TeamTime Evaluation

All participants in the model are listed. You can select all or only some of them to participate in any TeamTime evaluation session by clicking the check box to the left or their names:



Participants can evaluate the objectives and/or alternatives in an Online mode from any location, and/or in the meeting room (in which the meeting facilitator has set up a keypad receiver) using keypads. The use of keypads and receiver requires a TeamTime Assistant license and the **Use keypads** check-box must be selected.

When **Allow new users to join TeamTime meeting using Meeting ID** is enabled, unregistered participants and the un-selected participants in the table above will be allowed to join the TeamTime meeting using the meeting ID and general links.

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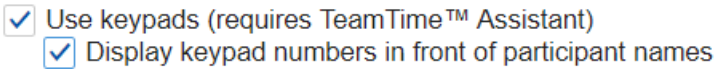
Setting Keypad mode in TeamTime Evaluation

Participants can evaluate the objectives and/or alternatives in an online mode from any location, and/or in the meeting room (in which the meeting facilitator has set up a keypad receiver) using keypads.

You can set the TeamTime mode in **COLLECT INPUT > TeamTime Evaluation > Select TeamTime Participants.**

The use of keypads and receiver requires a TeamTime Assistant license, and the **Use keypads** check-box must be selected.



If keypads are used, you can choose to display the keypad numbers in front of participant names for those who are using keypads.

You can assign keypad mode and keypad number to each participant from the Access Mode and Keypad columns respectively:

You can set keypad mode for all selected participants:

This will automatically assign keypad mode and keypad numbers to the selected participants.

The keypad icon will be available on the TeamTime meeting evaluation page when the Use Keypad option is checked. (This turns green when you hover over it). See Instructions for Using TeamTime Keypad Assistant.

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Instructions for Receiver and Keypads with TeamTime Evaluation

Plug the receiver into the USB port of the computer being used by the Facilitator.

The drivers should be loaded automatically.

Downloading and Installation of the TeamTime Keypad Assistant

To download and use the TeamTime Keypad Assistant, make sure that you enable the Use Keypads option in the TeamTime Select Participants setting.

When TeamTime evaluation is started, click on the keypad icon to launch the Team Time Keypad Assistant (the keypad icon turns green when you hover over it).

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Invite Participants for TeamTime Evaluation

After having selected participants to evaluate the project and assigning them roles to evaluate objectives and/or alternatives , you can invite the participants into TeamTime Evaluation.

This can be done in **COLLECT INPUT > TeamTime Evaluation > Invite Participants.**

In addition to the two ways of inviting participants to a TeamTime session from the Select Participants screen, you can invite participants in four ways from this screen:

(1) Invite by email

A template for the email is provided, which can be edited to explain the purpose of the evaluation and provide any other information or hyperlinks that you want to convey to the evaluators.

You can edit the invitation and add variables that Comparion will replace with the appropriate information before the email is sent. You can add links to any information that you would like the participants to see before the meeting, such as an agenda stored on a Website or in a Dropbox file.

(2) Invite by phone

Instructions are provided that you can give to a participant over the phone. The instructions include the URL of the site hosting the TeamTime meeting and the meeting ID. The participant must have already been added to the project and selected to participate beforehand.

(3) Copy and paste

Instructions are copied to the clipboard so you can send them to a participant via email, instant message, etc. The instructions include the URL of the site hosting the TeamTime meeting and the meeting ID. The participant must have already been added to the project and selected to participate beforehand.

(4) Participant Specific Links

The Participant Specific Links tab provides a (unique) Teamtime link, and an email address is generated for every **registered participant** in the model. The Project Manager can use these links in any way that they desire.

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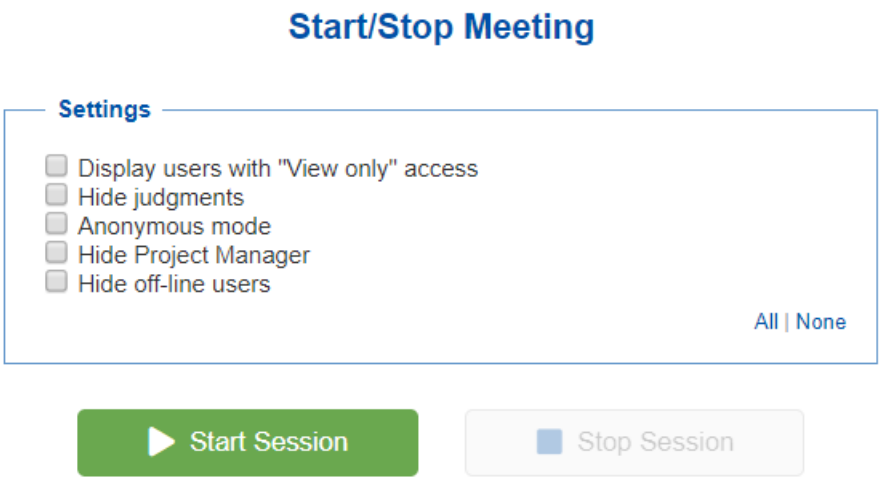
Start or Stop TeamTime Evaluation

After selecting and inviting participants to a TeamTime evaluation session, you can start the meeting (which can consist of both keypad users in the same room as well as remote users from any location).

This can be done in **COLLECT INPUT > TeamTime Evalaution > Start/Stop meeting** .

Before a TeamTime session, we can choose from various option as shown below:



- Display users with "View Only" access - whether to display the participants that are designated as "View Only" or not. The "View only" access is set to the participants from the TeamTime Evaluation | Select Participants screen.
- Hide Judgments - to hide the judgments of the participants. The Project Manager can also hide/unhide judgments while the TeamTime session is ongoing.
- Anonymous mode - hide the evaluator names.
- Hide Project Manager - hide the Project Manager in the TeamTime session participants list.
- Hide off-line users - hide the offline users in the TeamTime session participants list. The variances and results will not consider the judgments of the offline users when the offline users are hidden. The Project Manager can also hide or show the offline users from TeamTime settings.

Once you make your settings simply click the "Start Session" button, which will open a new window/tab and start the TeamTime evaluation session.

The TeamTime Session will open in a new browser window. Each participant that logs in will see a TeamTime Session specific to their judgments.

Note: When doing a Team Time Evaluation, the evaluation steps that are shown during the evaluation are determined by a combination of the what to evaluate option (objectives, alternatives, or both) as well as the roles for the Project

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Manager. You can, therefore, control which evaluation steps are to be displayed during a Team Time session by adjusting the Project Manager's roles for evaluating objectives and/or alternatives.

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TeamTime Evaluation Welcome

The welcome screen has been prepared by the Project Manager and typically contains instructions and possibly links for you to explore.

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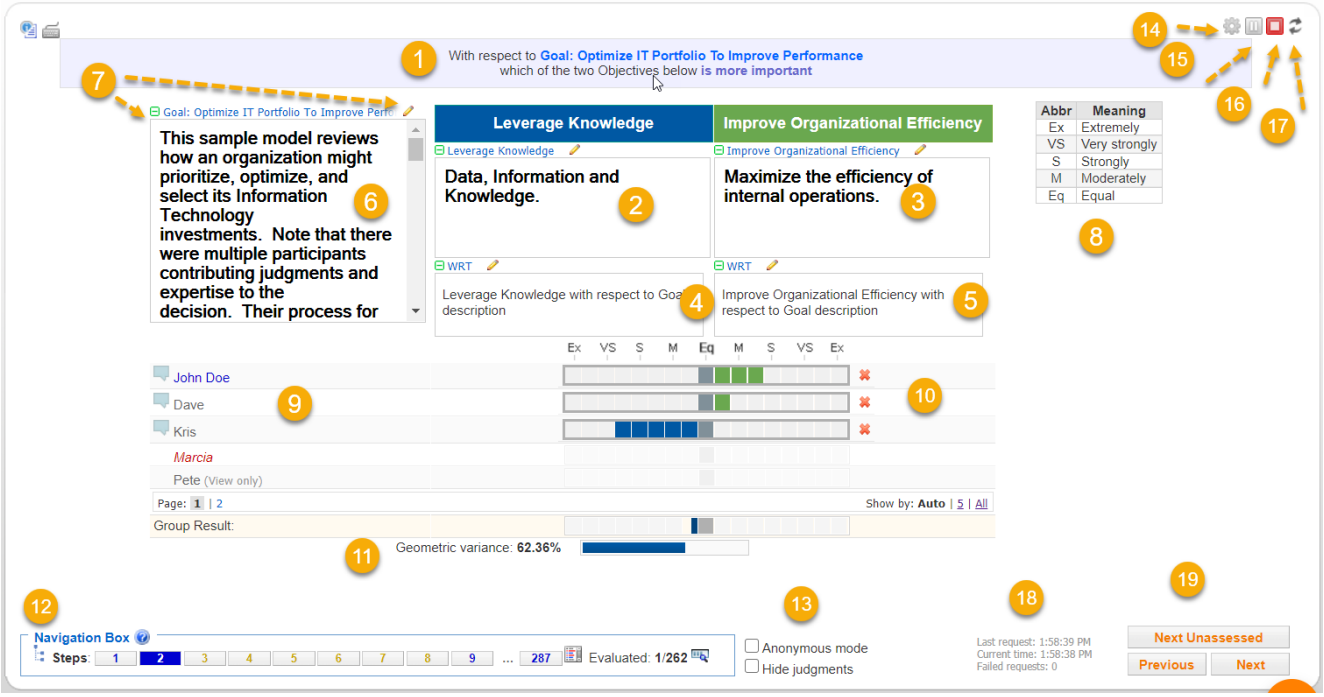
TeamTime Pairwise Verbal Comparisons

Pairwise Verbal judgments can be used to evaluate alternatives and/or objectives with respect to another objective or criterion.



Participants enter pairwise comparisons in TeamTime by using either keypads (see Select Participants) or by logging in to the Comparion TeamTime Session using an invitation sent by the Project Manager (see Invite Participants).

Legend:

1) Sentence describing the comparison being made.

Pairwise comparisons are made by the participants by clicking on or between words that express their judgments about the relative importance or preference (see Pairwise Comparisons Contexts) of the two elements shown.

2) Description of one of the two elements being compared.

3) Description of the other element being compared.

4) Description of one of the two elements being compared with respect to the objective or criterion for which this alternative is being compared.

5) Description of the other element being compared with respect to the objective or criterion for which this alternative is being compared.

6) Information document for the parent of the two elements being compared.

You can show the information document or descriptions in a frame or in the tooltip by clicking the information document icon.

7) The pencil icons allow the Project Manager to edit or create information documents for the parent of the two elements

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being compared, for each of the two elements being compared with respect to information documents, or for information documents for each element being compared as they relate to the parent.

Information documents for each of the elements being compared as well as information documents for each element being compared as they relate to the parent. Information documents can be collapsed or expanded.

8) The legend of the pairwise verbal intensities and their corresponding meaning. The keypad numbers are also shown when the TeamTime keypad is enabled.

9), 10) Names and judgments for participants.

The names are shown formatted as follows:

- **Bold** – a change made; appears for only a few seconds
- Blue – participant is online.
- Normal (gray) – offline
- Red – no roles for making judgments on the current step

If the participant is only in view-only mode, you can see a (View-only) note right beside the participant.

When there are many participants, the list will be paginated. By default, the " **Smart"** option is selected which auto-detects the number of participants to display that will best fit the screen and makes the loading faster. You can select users per page by clicking on the links at the right. You can then navigate through the pages using the page numbers at the left.

You can enter comments about judgments you have a role for by clicking .

Participants can select a word or verbal judgment representing the intensity of their judgment according to AHP's fundamental verbal scale shown in (10) or by choosing an intensity between any of the words, such as between moderately and strongly.

A verbal intensity, such as "strong," may mean different things to different people. As long as people are relatively consistent, it doesn't matter much if one person tends to use more extreme words than another -- they will come up with comparable priorities. However, the word "Equal" should mean the same to everyone. Additionally, the word "Extremely" means an order of magnitude (about 10 to 1) or more and we advise avoiding using Extremely for comparisons where the participant does not feel the elements differ by an order of magnitude or more.

The Project Manager can click on a judgment (or erase with the icon) for a participant in cases where the participant needs help.

11) The geometric mean of the judgments is shown, along with the geometric variance.

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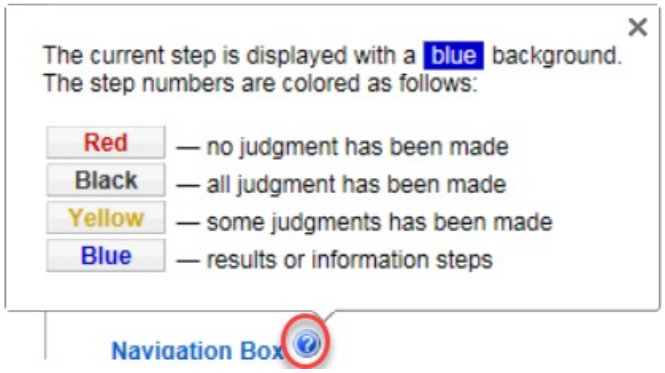
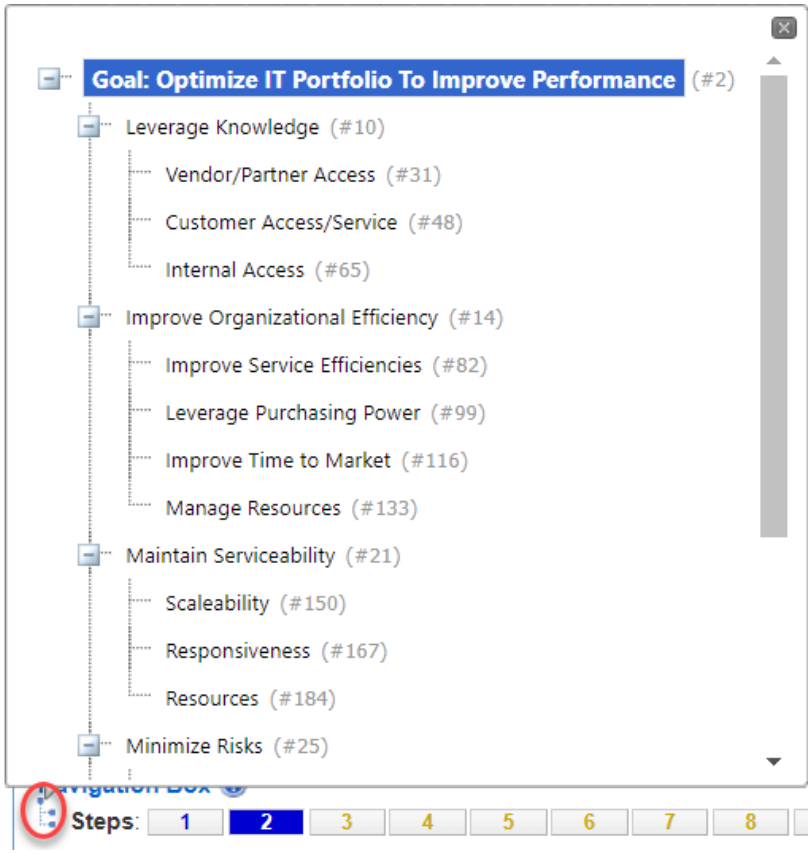
12) A **Navigation Box** at the bottom of the screen contains a number for each step in the evaluation sequence.

a. Steps - The number of steps is NOT the same as the number of evaluations because (1) there may be additional pages showing results (2) some pages may have multiple evaluations.

You can click the "?" icon to see what the step colors pertain to:



b. Click the "Current Cluster" icon to open the Objectives hierarchy where you can select the parent to jump to the first step "with respect to" the selected node.



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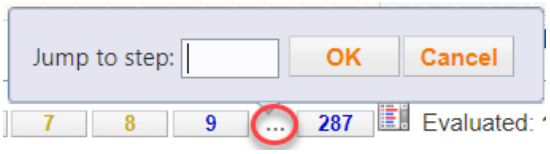
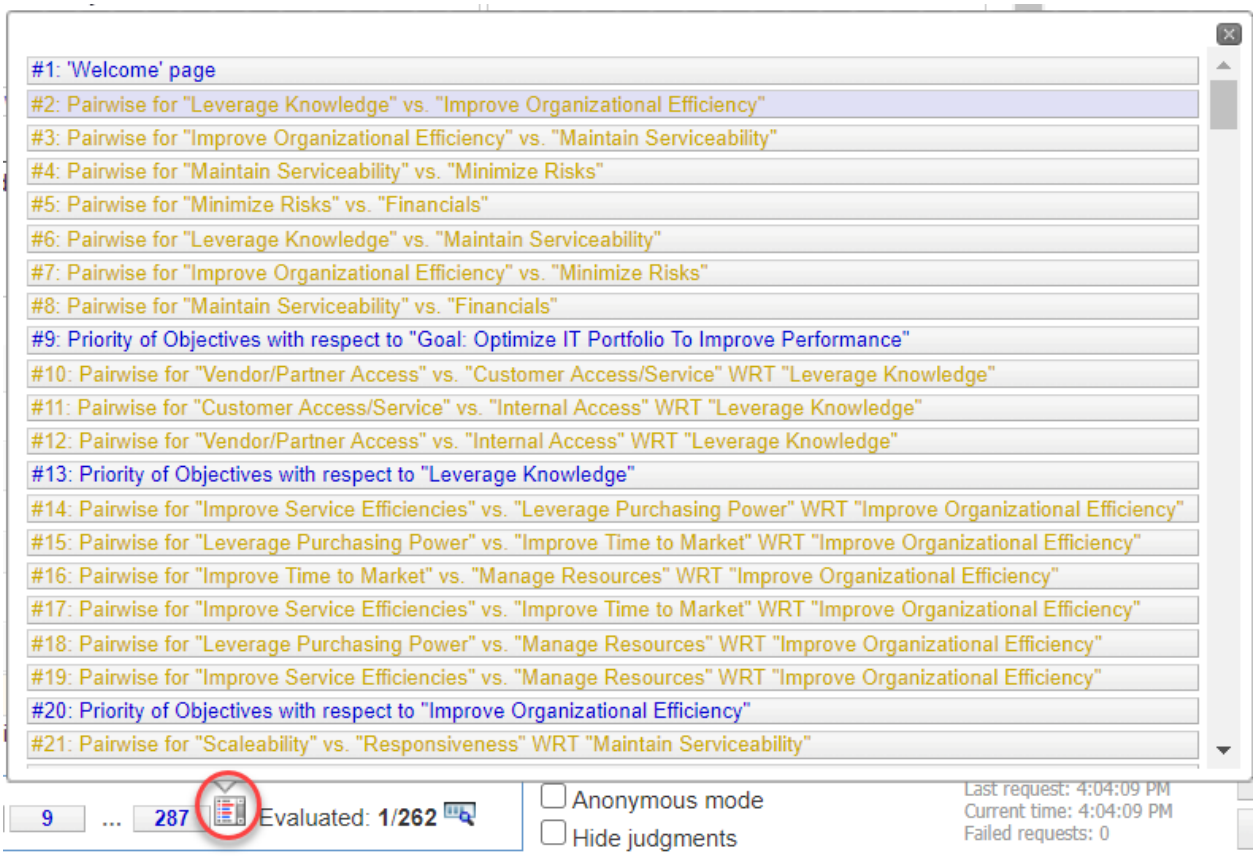
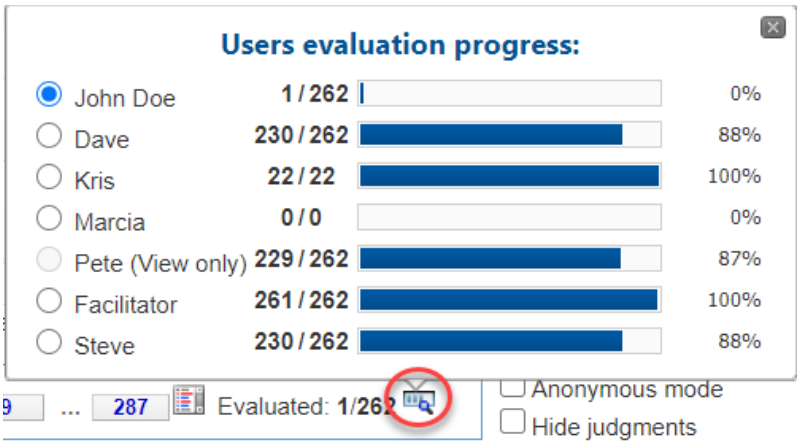
c. Jump to a step by clicking on the ellipses 

, and then entering the step number.

d. Click the steps list and select a step.



e. Click to show the participants' evaluation progress.



By default, the Project Manager's evaluation progress is displayed in the navigation box. The Project Manager can select another user to display by selecting the radio button beside the user's name.

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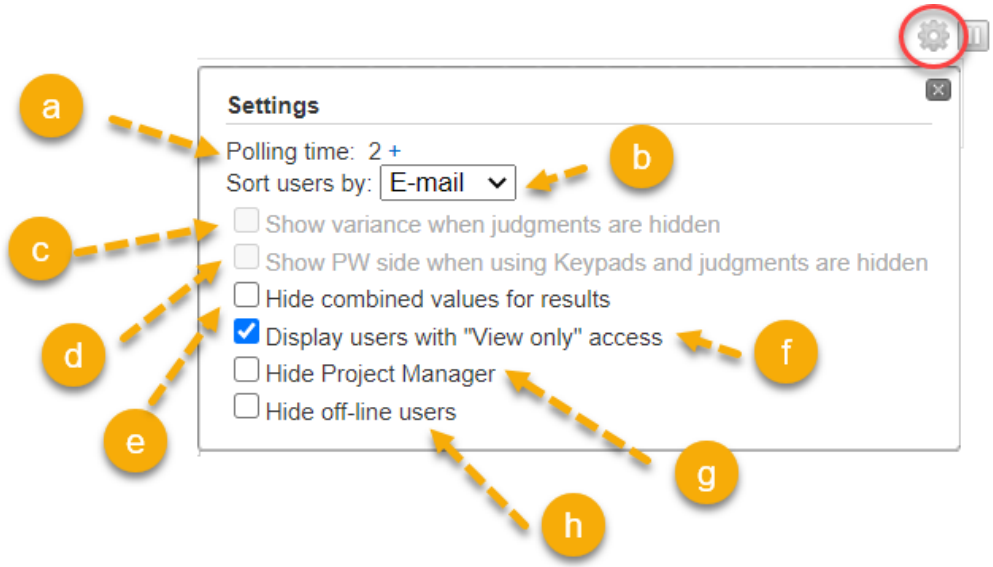
The "Next Unassessed" button will also depend on the selected participant.

When a user other than the Project Manager is selected, a person icon will appear, hovering on it will show the user's name/email the evaluation progress data was based on.

13) Checkboxes are provided for an anonymous mode where participant's names are replaced by nominal names, and a mode to Hide Judgments. A typical and recommended process consists of hiding judgments when entering a step, and then showing the judgments for discussion once they have been made. The time since the last judgment is indicated in (19) as discussed below.

14) TeamTime Evaluation option settings:



a) The polling time interval for sending judgments to the server is set to 1 second. This can be increased if desired by clicking on the + sign.

b) Select the sorting of the evaluator's list (by name, email or keypad number. (if any))

c) Option to show the variance when the judgments are hidden

d) Option to show the pairwise side when using Keypads and when the judgments are hidden

e) Option to hide the combined results in the results page

f) Option to hide the participants in "View Only" mode

g) Option to hide the project manager in the list

15) The project manager can pause collecting judgments by clicking on the pause icon

16) The TeamTime meeting can be ended by clicking on the end meeting button

17) The project manager can make changes to the project during the TeamTime session, including the objectives, alternatives, information documents, participants' roles, etc. The reload project icon can be used to reload the updated project into the TeamTime session. Normally the changes are automatically detected. There will be a prompt that will inform the Project

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Manager that there will be changes in the evaluation. Clicking OK will reload the page.

18) Current status of communications with server and time since last judgment.

19) Jump to the previous or next step.

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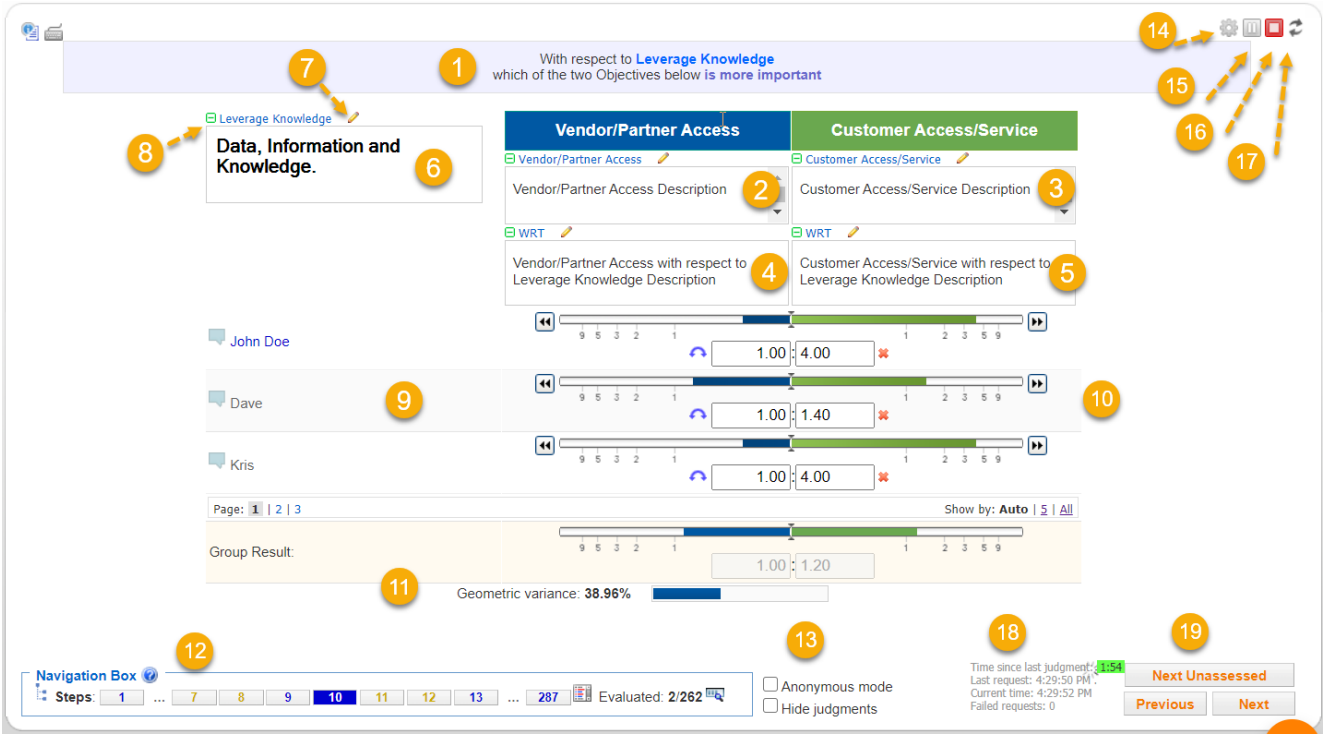
TeamTime Pairwise Graphical/Numerical Comparisons

Pairwise Graphical/Numerical Judgments can be used to evaluate alternatives and/or objectives with respect to another objective or criterion.



Participants enter pairwise comparisons in TeamTime by using either keypads (see Select Participants) or by having logged in to the Comparion TeamTime Session according to an invitation sent by the Project Manager (see Invite Participants).

The screen as seen by the Project Manager is shown below. (Participants who log in to the TeamTime session see a very similar screen with their name at the top of the list of participants.)

Legend:

1) Sentence describing the comparison being made.

Pairwise comparisons are made by the participants by clicking on, or between, words that express their judgments about the relative importance or preference (see Pairwise Comparisons Contexts) of the two elements shown.

2) Description of one of the two elements being compared.

3) Description of the other element being compared.

4) Description of one of the two elements being compared with respect to the objective or criterion for which this alternative is being compared.

5) Description of the other element being compared with respect to the objective or criterion for which this alternative is being compared.

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6) Information document for the parent of the two elements being compared.

You can show the information document or descriptions in a frame or in tooltip by clicking the information document icon.

7) The pencil icons allow the Project Manager to edit or create information documents for the parent of the two elements being compared, for each of the two elements being compared with respect to information documents, as well as information documents for each element being compared as they relate to the parent.

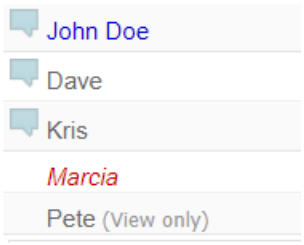
8) Information documents for each of the elements being compared as well as information documents for each element being compared as they relate to the parent. Information documents can be collapsed or expanded.

9), 10) Names and judgments for participants.

The names are shown formatted as follows:

- **Bold** – a change made; appears for only a few seconds
- Blue – participant is online.
- Normal (gray) – offline
- Red – no roles for making judgments on the current step

If the participant has the view-only role, you can see a (View-only) note right beside the participant.



When there are many participants, the list will be paginated. By default, the " **Smart**" option is selected which auto-detects the number of participants to display that will best fit the screen and makes the loading faster. You can select users per page by clicking on the links at the right. You can then navigate through the pages using the page numbers at the left.

You can enter comments by clicking . Participants with a restricted role can't enter a comment.

Participants can select a word representing the intensity of their judgment according to AHP's fundamental verbal scale shown in (10) or by choosing an intensity between any of the words, such as between moderately and strongly.

A verbal intensity such as "strong" may mean different things to different people. As long as people are relatively consistent, it doesn't matter much if one person tends to use more extreme words than another -- they will come up with comparable priorities. However, the word "Equal" should mean the same to everyone. Additionally, the word "Extremely" means an order of magnitude (about 10 to 1) or more. You should avoid using "Extremely" for comparisons where the participant does not feel the elements differ by an order of magnitude or more.

The Project Manager can click on a judgment (or erase with the icon) for a participant in cases where the participant needs help.

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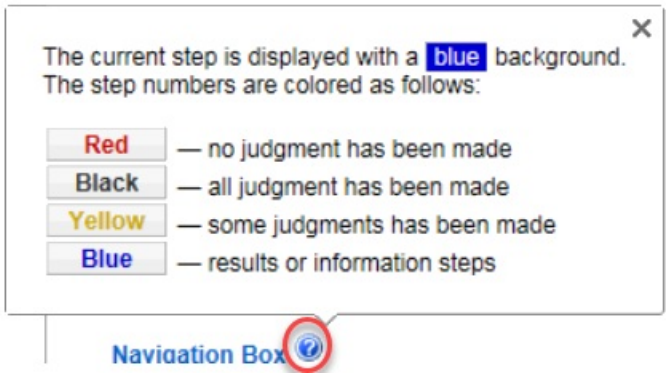
11) The geometric mean of the judgments is shown, along with the geometric variance.

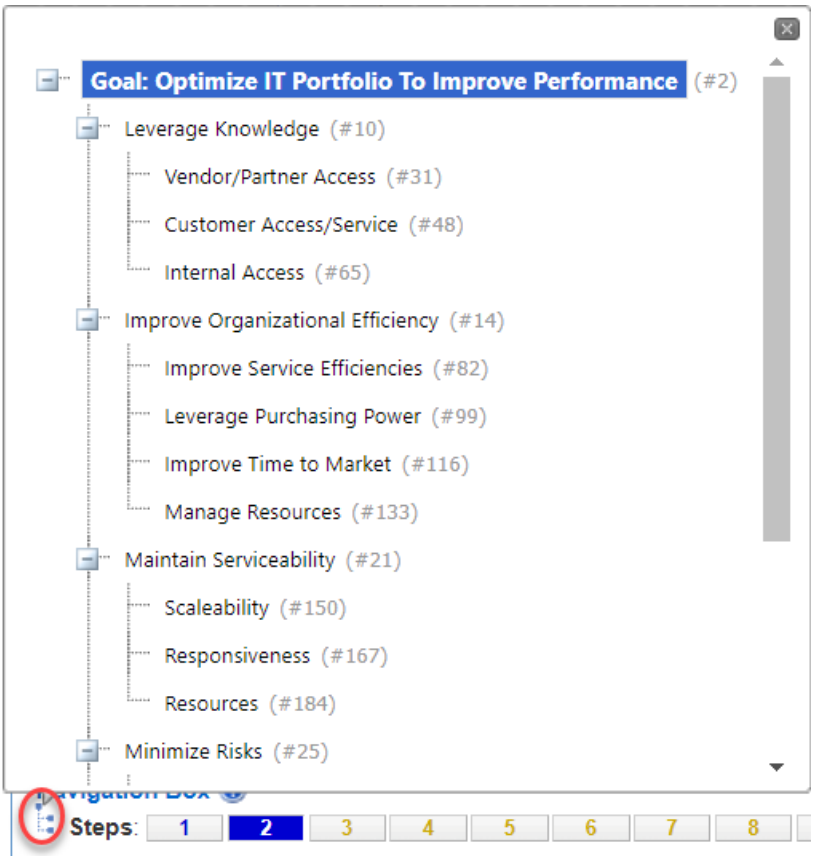
12) A **Navigation Box** at the bottom of the screen contains a number for each step in the evaluation sequence.

a. Steps - The number of steps is NOT the same as the number of evaluations because (1) there may be additional pages showing results, and (2) some pages may have multiple evaluations.

You can click the "?" icon to see what the step colors pertain to:



b. Click the "Current Cluster" icon to open the Objectives hierarchy where you can select the parent to jump to the first step "with respect to" the selected node.



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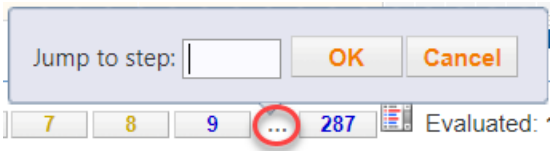
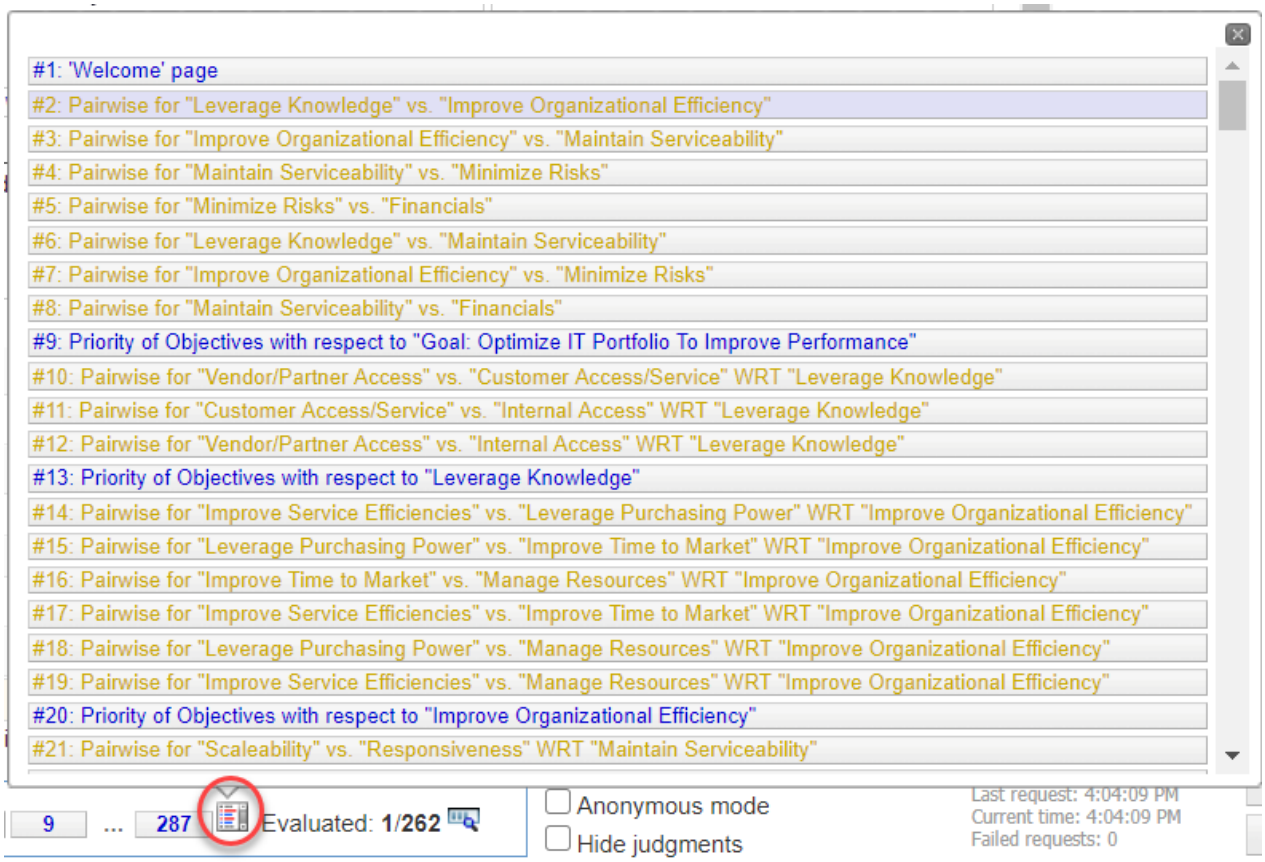
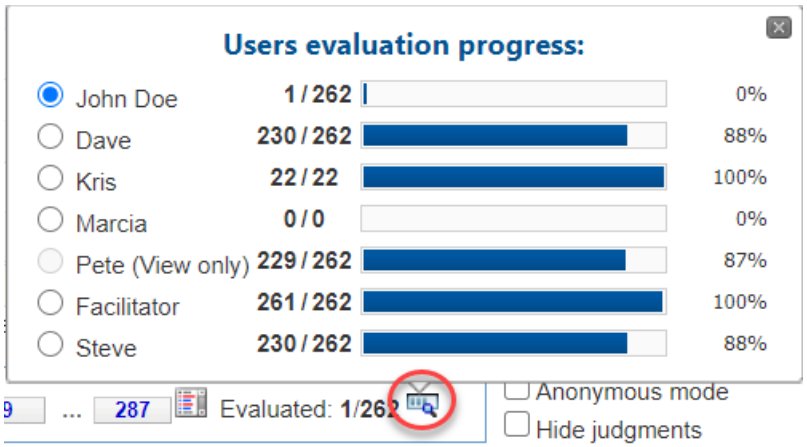
c. Jump to a step by clicking on the ellipses 

, and then entering the step number.

d. Click the steps list and select a step.



e. Click to show the participants' evaluation progress.



By default, the Project Manager's evaluation progress is displayed in the navigation box. The Project Manager can select another user to display by selecting the radio button beside the user's name.

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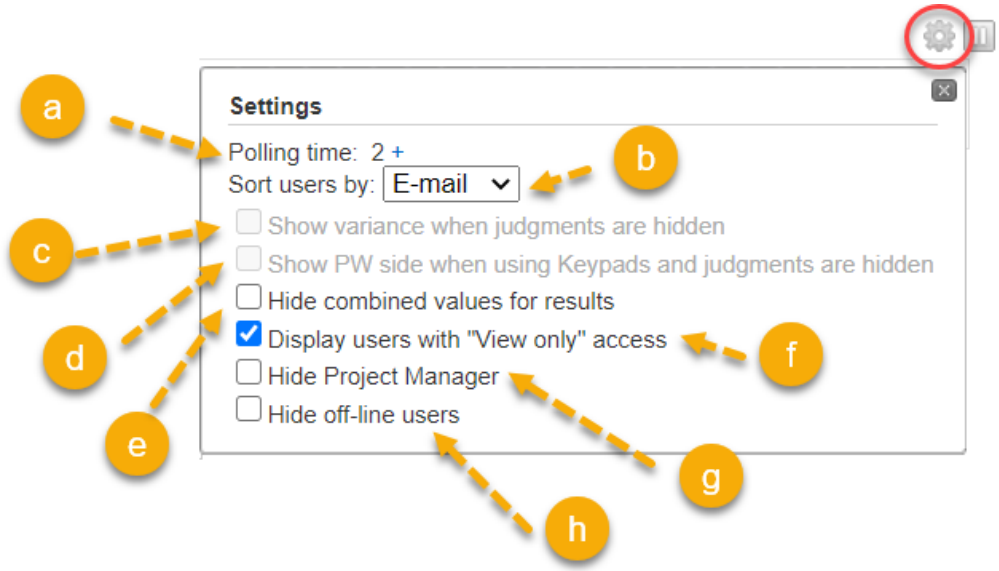
The "Next Unassessed" button will also depend on the selected participant.

When a user other than the Project Manager is selected, a person icon will appear; hovering on it will show the user's name/email that the evaluation progress data was based on.

13) Checkboxes are provided for an anonymous mode so that participants' names are replaced by nominal names and a mode to Hide Judgments. A typical and recommended process consists of hiding judgments when entering a step, and then showing the judgments for discussion once they have been made. The time since the last judgment is indicated in (19) as discussed below.

14) TeamTime Evaluation option settings:



a) The polling time interval for sending judgments to the server is set to 2 seconds. This can be increased if desired by clicking on the + sign.

b) Select the sorting of the evaluator list (by name, email or keypad number (if any)).

c) Option to show the variance when the judgments are hidden.

d) Option to show the pairwise side when using Keypads and when the judgments are hidden.

e) Option to hide the combined results page.

f) Option to hide participants in "View Only" mode.

g) Option to hide the project manager in the list.

15) The project manager can pause collecting judgments by clicking on the pause icon .

16) The TeamTime meeting is ended by clicking on the end meeting button .

17) The project manager can make changes to the project during the TeamTime session, including the objectives, alternatives, information documents, participants' roles, etc. The reload project icon can be used to reload the updated project into the

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TeamTime session. Normally the changes are automatically detected; there will be a prompt that will inform the Project Manager of changes in the evaluation. Clicking OK will reload the page.

18) Current status of communications with server and time since last judgment.

19) Jump to the previous or next step.

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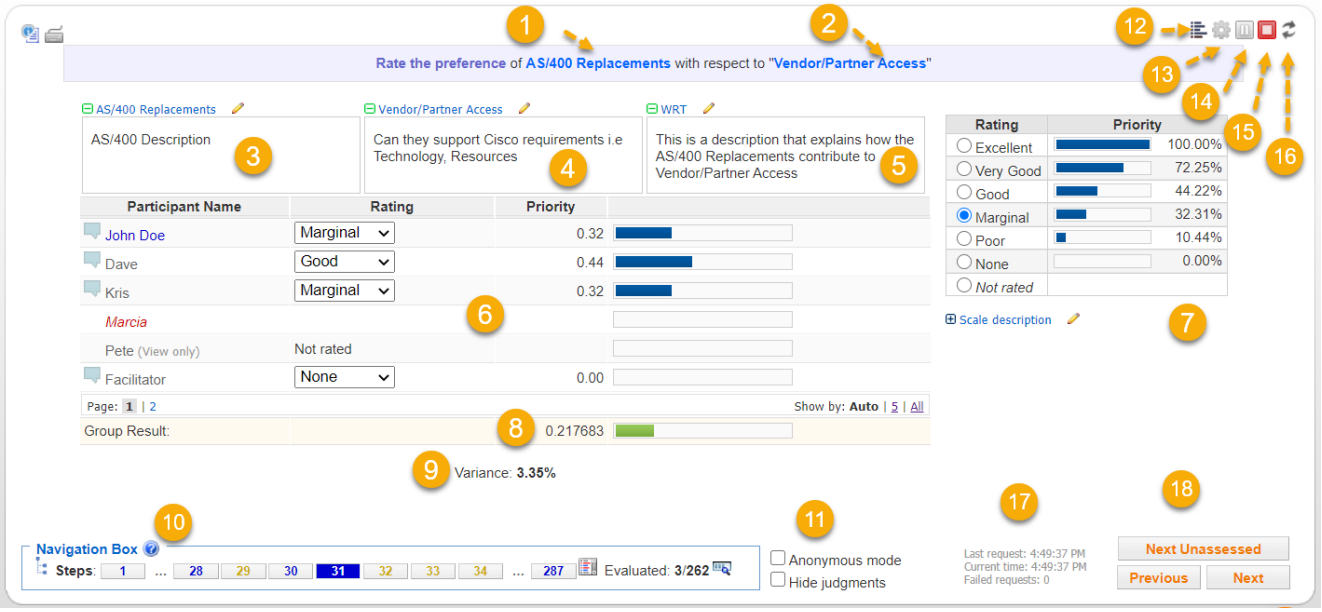
TeamTime Ratings

Ratings can be used to evaluate alternatives with respect to a covering objective. (A covering objective is an objective that has no sub-objectives.)



Participants enter Ratings in TeamTime by using either keypads (see Select Participants) or by logging in to the Comparion TeamTime Session using an invitation sent by the Project Manager (see Invite Participants).

The screen as seen by the Project Manager is shown below. Participants who log in to the TeamTime session see a very similar screen with their name at the top of the list of participants.

Legend:

1) Name of the alternative being rated.

Ratings are made by the participants by selecting the rating from the pull-down menu, or by using their keypad.

2) Name of the covering objective (or the complete objective path if specified in the project settings) for which this alternative is being rated.

3) Information document for the alternative being rated. The pencil icons allow the Project Manager to edit or create an information document.

You can show the information document content in a frame or a tool-tip by clicking the information document icon .

4) Information document for the covering objective for which this alternative is being rated. The pencil icons allow the Project Manager to edit or create an information document.

5) Information document for the alternative being evaluated with respect to the covering objective for which this alternative is being rated. The pencil icons allow the Project Manager to edit or create an information document.

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6) Names and ratings for participants. Rating is made by the participants by selecting an intensity from the drop-down menu or clicking the intensities in the legend (7).

The names are shown formatted as follows:

- **Bold** – a change made; appears for only a few seconds
- Blue – participant is online.
- Normal (gray) – offline
- Red – no roles for making judgments on the current step

If the participant is in view-only mode, you can see a (View only) note right beside the participant.

When there are many participants, the list will be paginated. By default, the " **Smart"** option is selected which auto-detects the number of participants to display that will best fit the screen and make the loading faster. You can select users per page by clicking on the links at the right. You can then navigate through the pages using the page numbers at the left.

You can enter comments by clicking .

Ratings are entered by participants by selecting an intensity from the drop-down menu or clicking the intensity in the legend (7).

7) Legend for the rating intensities and the corresponding ratio scale priorities and keypad number. Participants can enter judgments from the legend by clicking the desired intensity.

If the rating intensity descriptions are defined, they will be displayed below the intensity name.

Information documents for each of the elements being compared as well as information documents for each element being compared as they relate to the parent. Information documents can be collapsed or expanded.

8) The arithmetic mean of the rating priorities.

9) The arithmetic variance of the rating priorities.

10) A **Navigation Box** at the bottom of the screen contains a number for each step in the evaluation sequence.

a. Steps - The number of steps is NOT the same as the number of evaluations because (1) there may be additional pages showing results; and (2) some pages may have multiple evaluations.

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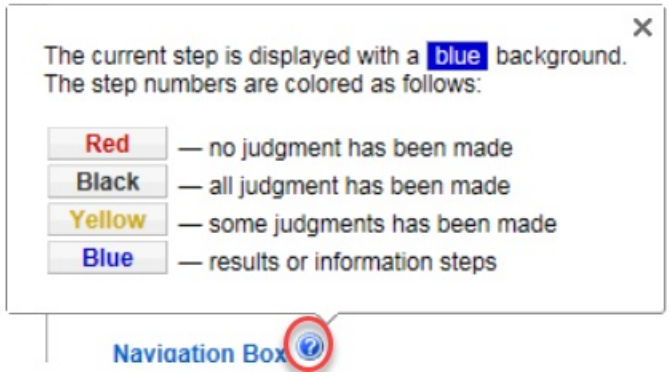
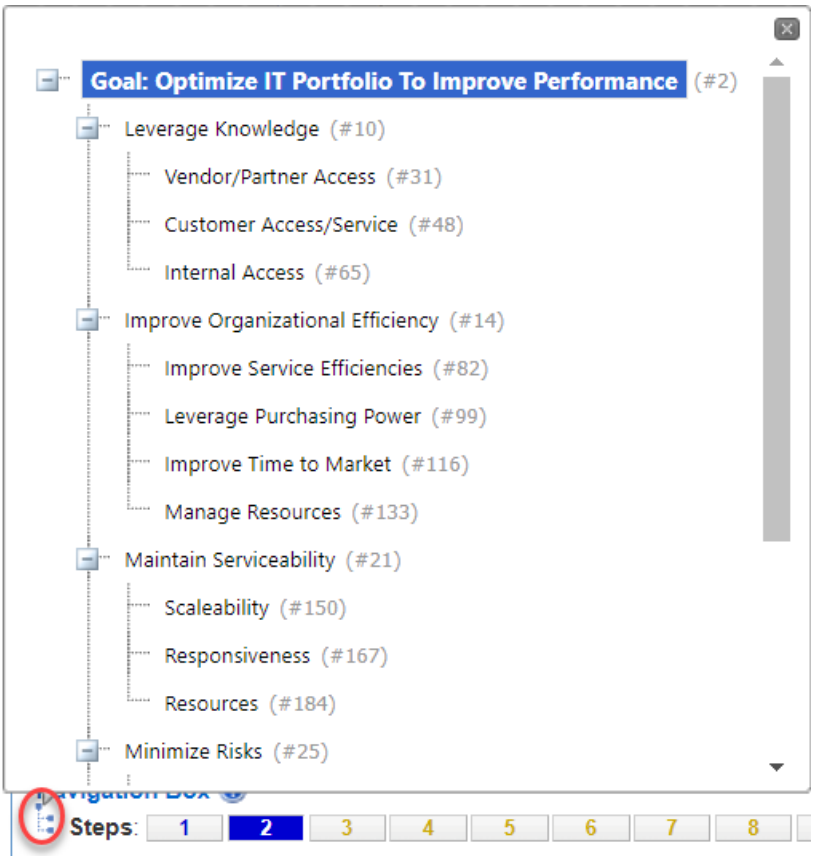
You can click the "?" icon to see what the step colors pertain to:



b. Click the "Current Cluster" icon to open the Objectives hierarchy, where you can select the parent to jump to the first step "with respect to" the selected node.



c. Jump to a step by clicking on the ellipses

, and then entering the step number.

d. Click the steps list and select a step.

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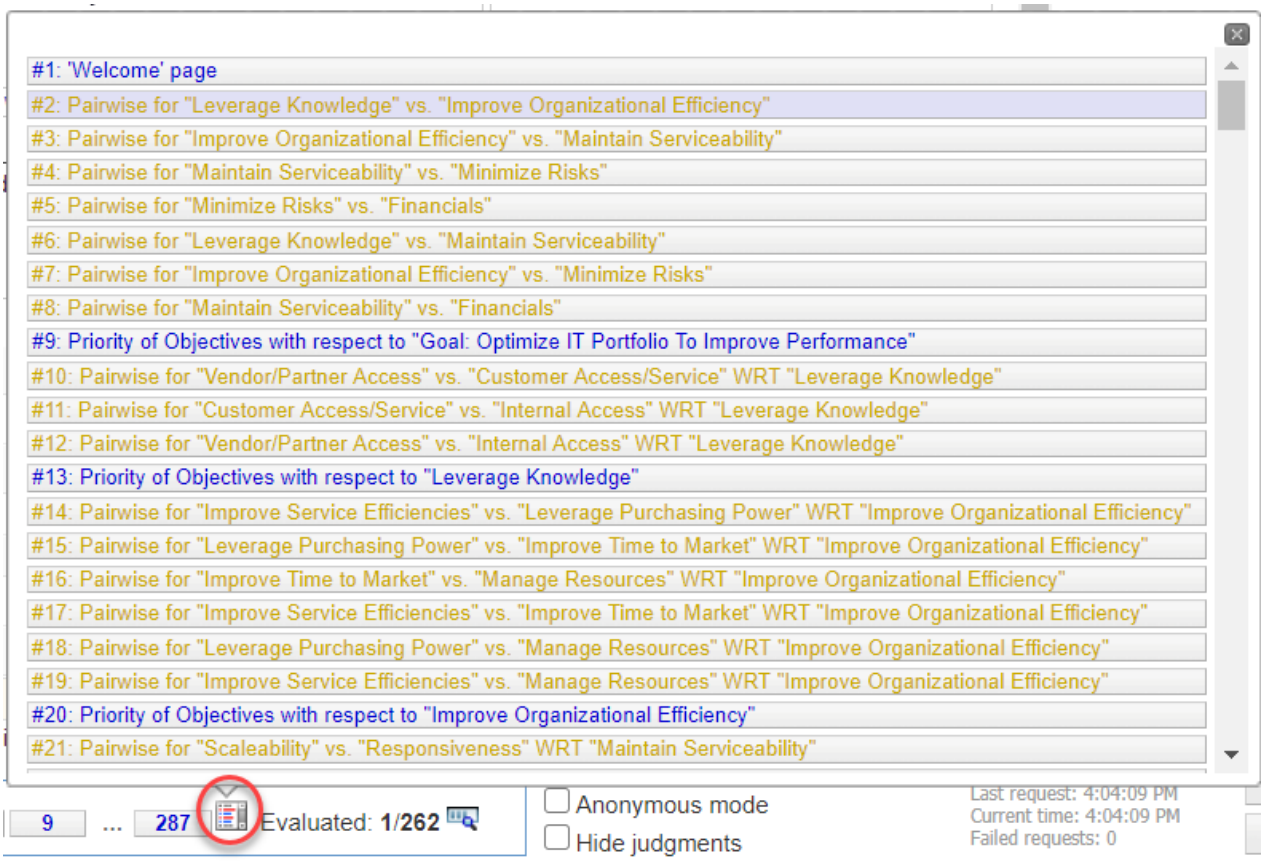
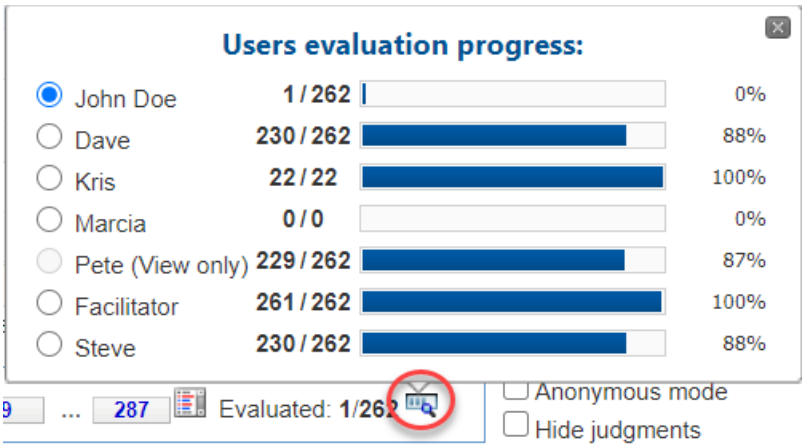


e. Click to show the participants' evaluation progress.



By default, the Project Manager's evaluation progress is displayed in the navigation box. The Project Manager can select another user to display by selecting the radio button beside the user's name.

The "Next Unassessed" button will also depend on the selected participant.

When a user other than the Project Manager is selected, a person icon will appear; hovering on it will show the user's name/email that the evaluation progress data was based on.

11) Check boxes are provided for an anonymous mode so that participants' names are replaced by nominal names and a mode to Hide Judgments. A typical and recommended process consists of hiding judgments when entering a step and then showing

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the judgments for discussion once they have been made. The time since the last judgment is indicated in (19) as discussed below.

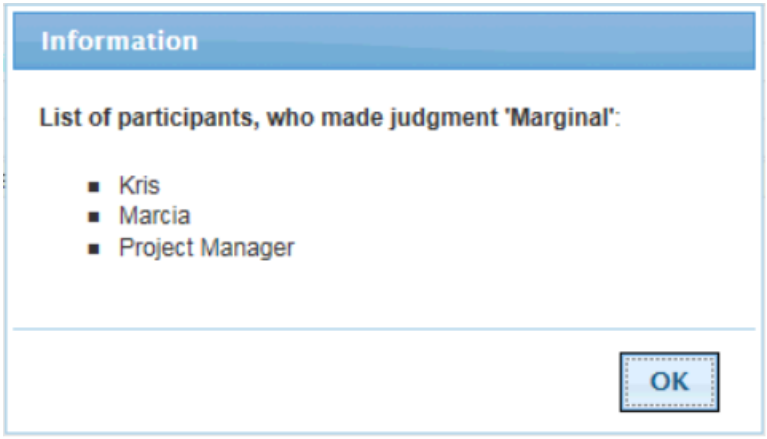
12) Switch to Distributions of Judgments View. Click to display the number of participants given a selected intensity.

Distributions of Judgments:

Rating	Priority	Judgments	
Excellent	100.00%	0	
Very Good	72.00%	0	
Good	44.00%	1	
Marginal	32.00%	2	
Poor	10.00%	0	
None	0.00%	2	
Not rated		2	

Variance: **3.35%**

Clicking the judgment count will display the users who rated the intensity.



Click to return to evaluation view.

13) TeamTime Evaluation option settings:

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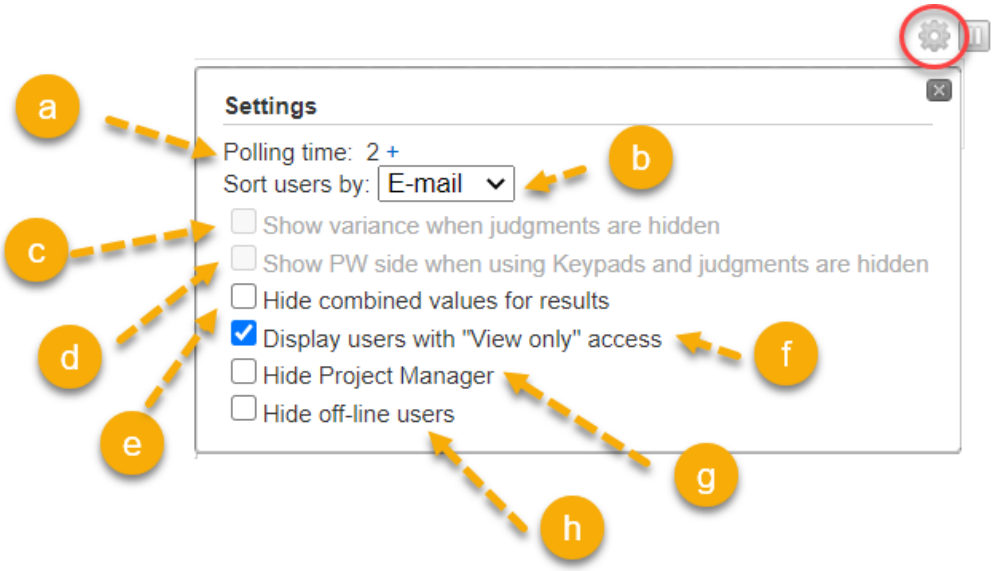

a) The polling time interval for sending judgments to the server is set to 2 seconds. This can be increased if desired by clicking on the + sign.

b) Select the sorting of the evaluator list (by name, email or keypad number (if any)).

c) Option to show the variance when judgments are hidden.

d) Option to show the pairwise side when using Keypads and when judgments are hidden.

e) Option to hide the combined results in the results page.

f) Option to hide the participants in "View Only" mode.

g) Option to hide the project manager in the list.

14) The project manager can pause collecting judgments by clicking on the pause icon .

15) The TeamTime meeting can be ended by clicking on the end meeting .

16) The project manager can make changes to the project during the TeamTime session, including the objectives, alternatives, information documents, participants' roles, etc. The reload project icon can be used to reload the updated project into the TeamTime session. Normally the changes are automatically detected; there will be a prompt that will inform the Project Manager of changes in the evaluation. Clicking OK will reload the page.

17) Current status of communications with server and time since the last judgment.

18) Jump to the previous or next or next un-assessed step.

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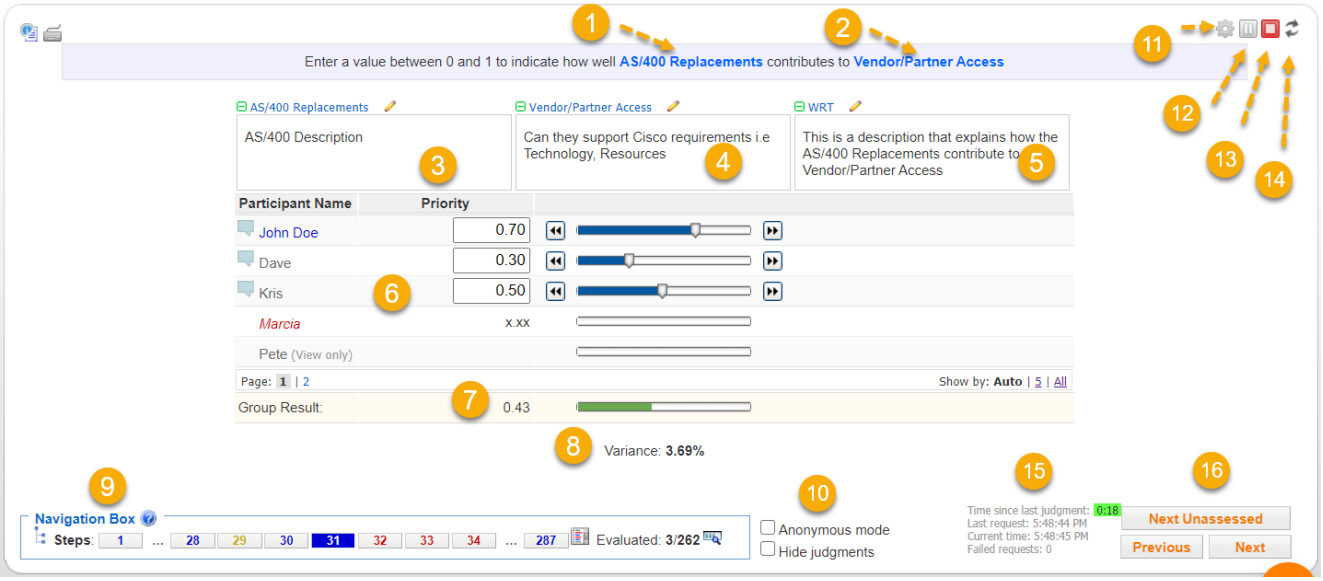
TeamTime Direct Entry

Direct Entry is a measurement method used to evaluate alternatives and/or objectives with respect to another objective or criterion. Direct Entry measurement accepts numbers from 0.0 to 1.0 (i.e. 0% to 100%)



Participants enter Direct priorities in TeamTime by using keypads (see Select Participants) or by logging in to the Comparion TeamTime Session using an invitation sent by the Project Manager (see Invite Participants).

The screen as seen by the Project Manager is shown above. Participants who log in to the TeamTime session see a very similar screen with their name at the top of the list of participants.

Legend:

1) Name of the element (objective or alternative) being evaluated. Direct Entries are made by typing the priority into the text box provided.

2) Name of the objective or criterion (or the complete objective path, if specified in the project settings) for which this alternative or objective is being rated.

3) Information document for the alternative being rated. The pencil icons allow the Project Manager to edit or create an information document.

You can show the information document or descriptions in a frame or in the tool-tip by clicking the information document icon .

4) Information document for the objective for which this alternative or sub-objective is being rated. The pencil icons allow the Project Manager to edit or create an information document.

5) Information document for the objective or sub-objective being evaluated with respect to (WRT) the alternative being rated. The pencil icons allow the Project Manager to edit or create an information document.

6) Names and direct entry judgments for participants. Direct Entry is made by the participants by typing in the priority (from 0

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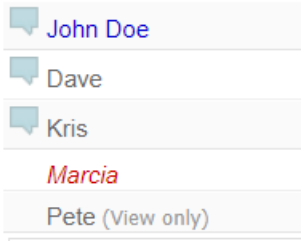
to 1) in the text box or by dragging the slider.

The names are shown formatted as follows:

- **Bold** – a change is made by the user; appears for only a few seconds
- Blue – participant is online
- Normal (gray) – offline
- Red – no roles for making judgments on the current step

If the participant is in view-only mode, you can see a (View only) note next to the participant name.



When there are many participants, the list will be paginated. By default, the " **Smart"** option is selected, which auto-detects the number of participants to display that will best fit the screen and make the loading faster. You can select users per page by clicking on the links at the right. You can then navigate through the pages using the page numbers at the left.

You can enter comments by clicking .

7) The arithmetic mean of the rating priorities.

8) The arithmetic variance of the rating priorities.

9) A **Navigation Box** at the bottom of the screen contains a number for each step in the evaluation sequence.

a. Steps - The number of steps is NOT the same as the number of evaluations because (1) there may be additional pages showing results; and (2) some pages may have multiple evaluations.

You can click the "?" icon to see what the step colors pertain to:

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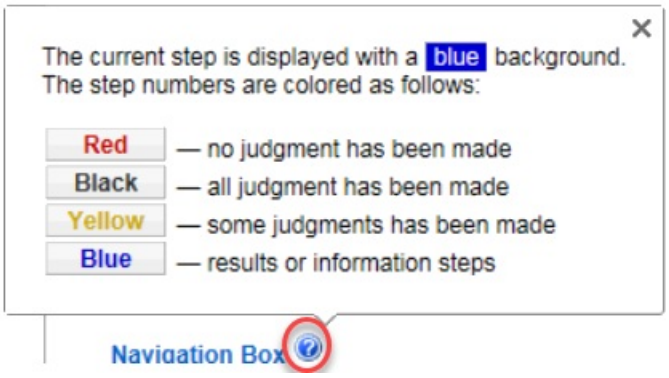
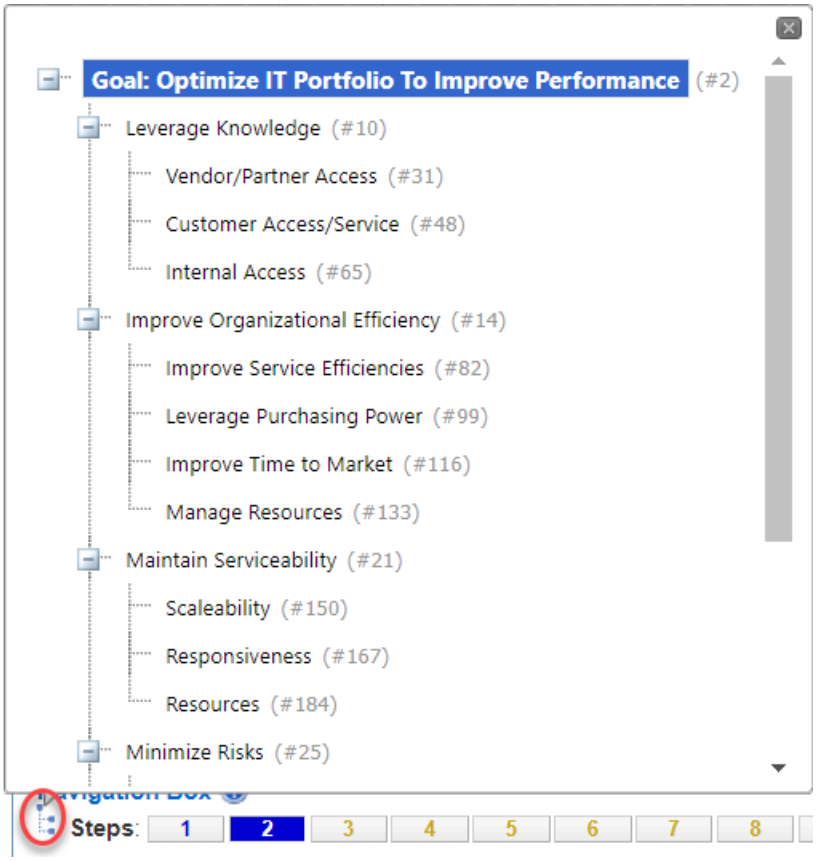
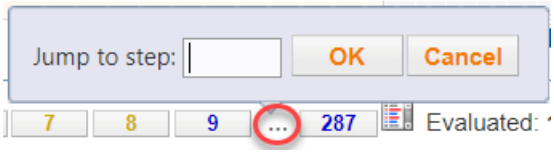


b. Click the "Current Cluster" icon to open the Objectives hierarchy, where you can select the parent to jump to the first step "with respect to" the selected node.



c. Jump to a step by clicking on the ellipses 

, and then entering the step number.

d. Click the steps list and select a step.

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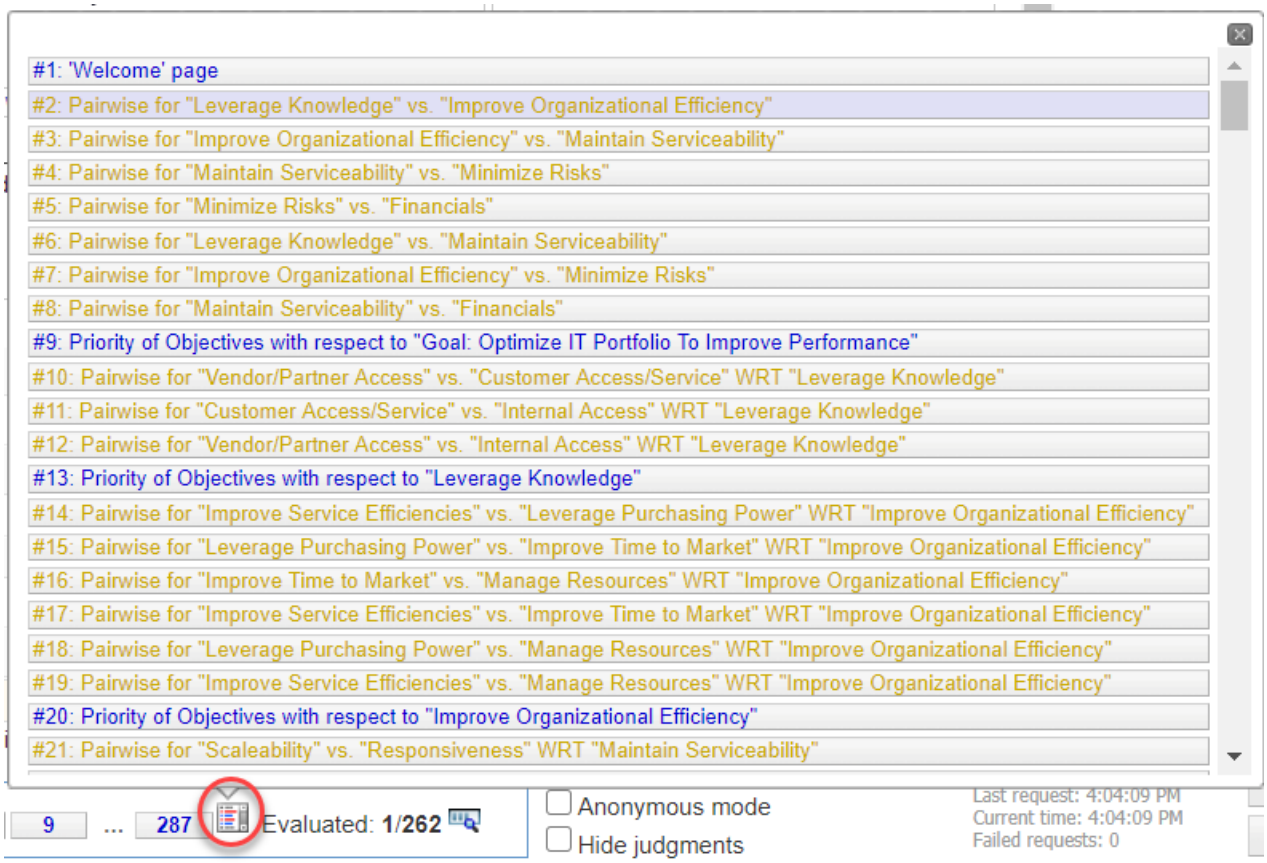
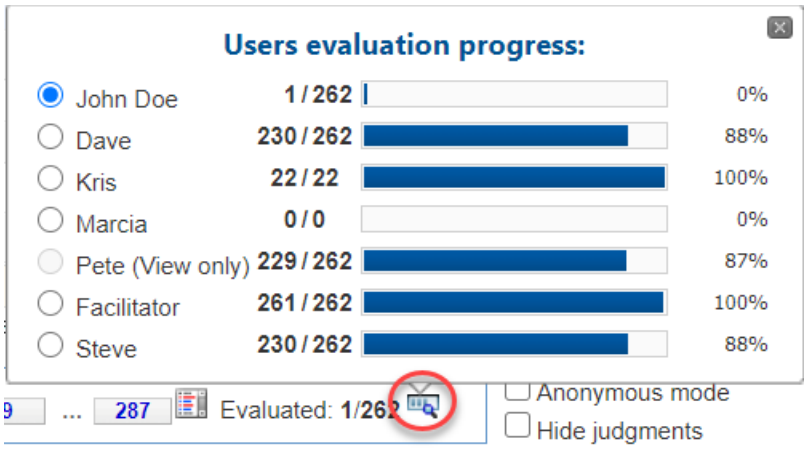


e. Click to show the participants' evaluation progress.



By default, the Project Manager's evaluation progress is displayed in the navigation box. The Project Manager can select another user to display by selecting the radio button beside the user's name.

The "Next Unassessed" button will also depend on the selected participant.

When a user other than the Project Manager is selected, a person icon will appear; hovering on it will display the user's name/email.

10) A check-box is provided to enter anonymous mode where participant names are replaced by nominal names; e.g., "Person 1."

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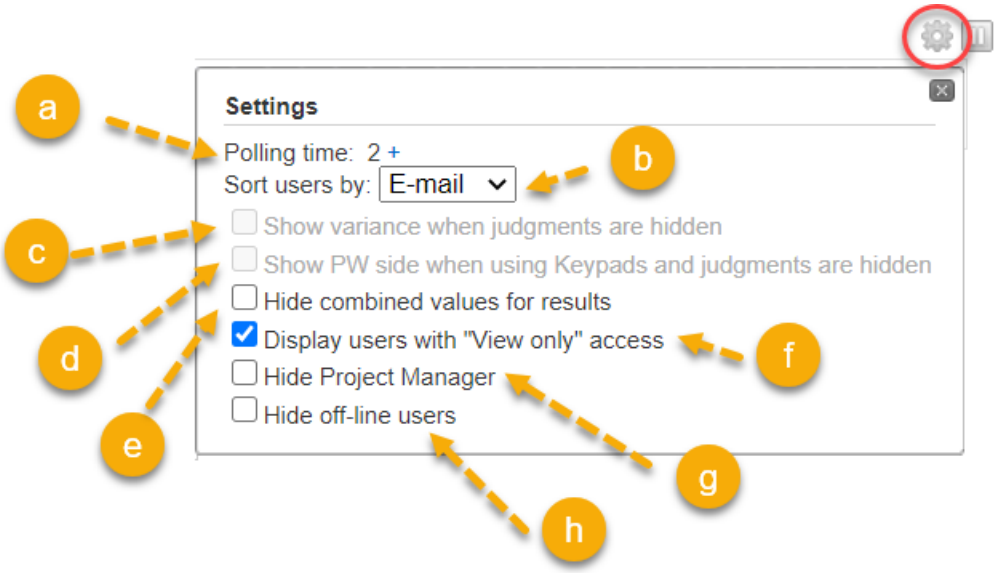
A check-box is also provided for hiding judgments. A typical and recommended process consists of hiding judgments when entering a step and then showing the judgments for discussion once they have been made. The time since the last judgment is indicated in (19) as discussed below.

11) TeamTime Evaluation option settings:



a) The polling time interval for sending judgments to the server is set to 2 seconds. This can be increased if desired by clicking on the + sign.

b) Select the sorting of the evaluator list (by name, email, or keypad number (if any)).

c) Option to show the variance when the judgments are hidden.

d) Option to show the pairwise side when using Keypads and when the judgments are hidden.

e) Option to hide the combined results on the results page.

f) Option to hide the participants in "View Only" mode.

g) Option to hide the project manager in the list.

12) The project manager can pause collecting judgments by clicking on the pause icon .

13) The TeamTime meeting can be ended by clicking on the end meeting .

14) The project manager can make changes to the project during the TeamTime session, including the objectives, alternatives, information documents, participants' roles, etc. The reload project icon can be used to reload the updated project into the TeamTime session. Normally the changes are automatically detected; there will be a prompt that will inform the Project Manager of changes in the evaluation. Clicking OK will reload the page.

15) Current status of communications with server and time since last judgment.

16) Jump to the previous or next or next unassessed step.

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What is Synthesize Results?

After structuring the model and collecting judgments, use the Synthesis Results menu to analyze the results.

Synthesize automatically combines qualitative judgments with quantitative data, if available. Qualitative judgments are based on the knowledge, experience, and judgment of the participants.

You can analyze objective priorities and alternative priorities. You can look at the results across all participants and/or one or more participant groups or individual participants.

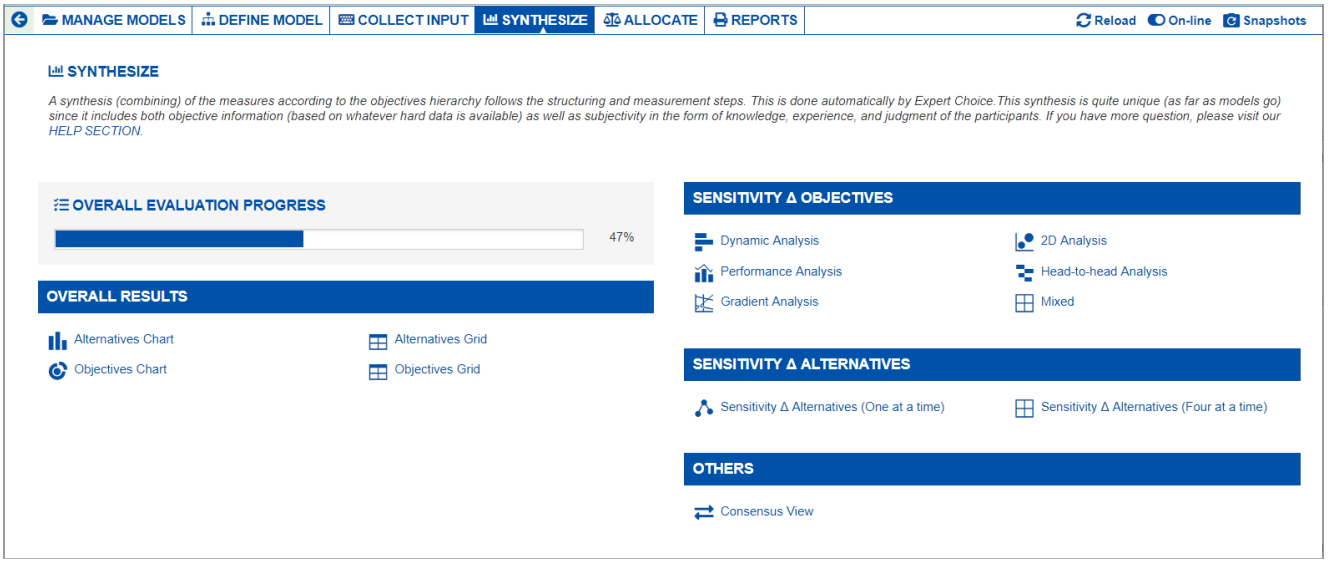
Charts display results in a graphical format, such as bar charts (called Column charts) and pie charts. These charts can be exported in .png, .pdf, .svg, or multipage pdf format.

Grids display results in tabular format. Grid data can be downloaded to in Excel .xlsx format.

Sensitivity Analysis with respect to changes in objective priority allows you to judge how sensitive (or insensitive) individual alternatives are to changes in objective priority.

Sensitivity Analysis with respect to changes in alternative priority allows you to judge how sensitive (or insensitive) individual alternatives are to changes in alternative priority. Sensitivity Analysis with respect to changes in alternative priorities is also useful for detecting bias - when looking at the results for individual participants.

Consensus View shows you the judgments with the highest level of disagreement and allows you to drill down to a teamtime view showing each participant's judgment. This can be very useful for uncovering bias, and for surfacing and sorting out information asymmetry among your participants.



The synthesis results include priorities for the competing objectives as well as overall priorities for the alternatives. Because of the structuring and measurement methods used by Expert Choice, the results are mathematically sound, unlike many traditional approaches such as using spreadsheets to rate alternatives.

But having mathematically sound results is not enough. The results must be intuitively appealing as well. The synthesis workflow step provides tools (such as **sensitivity analysis** and **consensus** measures) to allow you and your colleagues to

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examine the results from numerous perspectives. Using these tools, you can ask and answer questions such as, "What might be wrong with this conclusion? Why is Alternative Y not more preferable than Alternative X? If we were to increase the priority of the financial objective, why does Alternative Z become more preferable? Why might others in the organization feel that Alternative W should have a higher priority than alternative X?"

The answers to one or more of these questions might signal the need for iteration. If, for example, you feel that Alternative Y might be more preferable than Alternative X because of its style, and style is not one of the objectives in the model, iteration is necessary. If "style" is already in the model, then does increasing the importance of style shift the priorities so that Alternative Y becomes more preferable than alternative X? If not, then perhaps the judgments were entered incorrectly, and iteration to re-examine the judgments is called for. If "style" is already in the model and the judgments are reasonable, how much would the importance of style have to be changed before the decision was reversed? If it is just a little bit, then you might reconvene those whose role it was to prioritize style and ask that they discuss their judgments and determine that they are reasonable.

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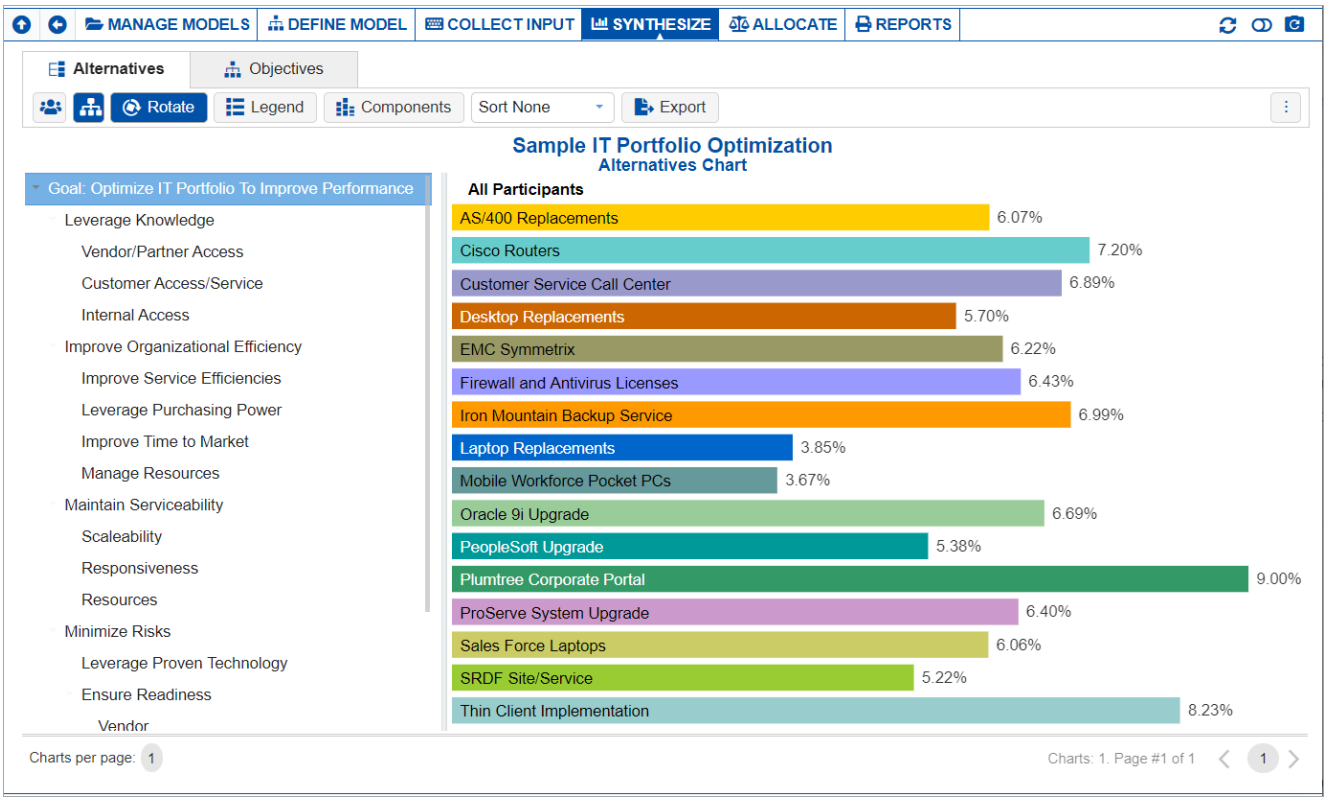
Alternatives Chart

The Alternatives Chart page displays the same priorities as the Alternatives Grid.

Alternative Charts Overview

By default, the Columns chart is displayed. The column chart below shows the alternatives priorities with respect to the overall Goal.

You can view other chart formats when Advanced mode is enabled.



Clicking another objective node on the Objectives hierarchy at the left will show the chart for the alternatives with respect to that node.

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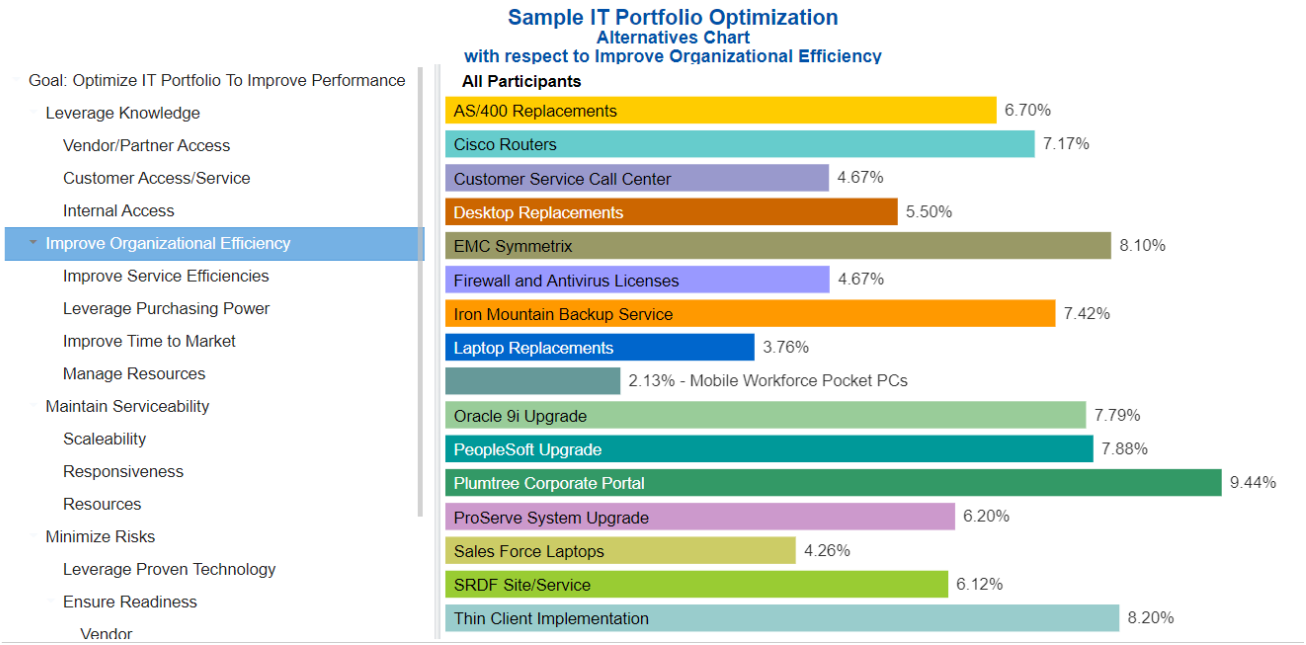
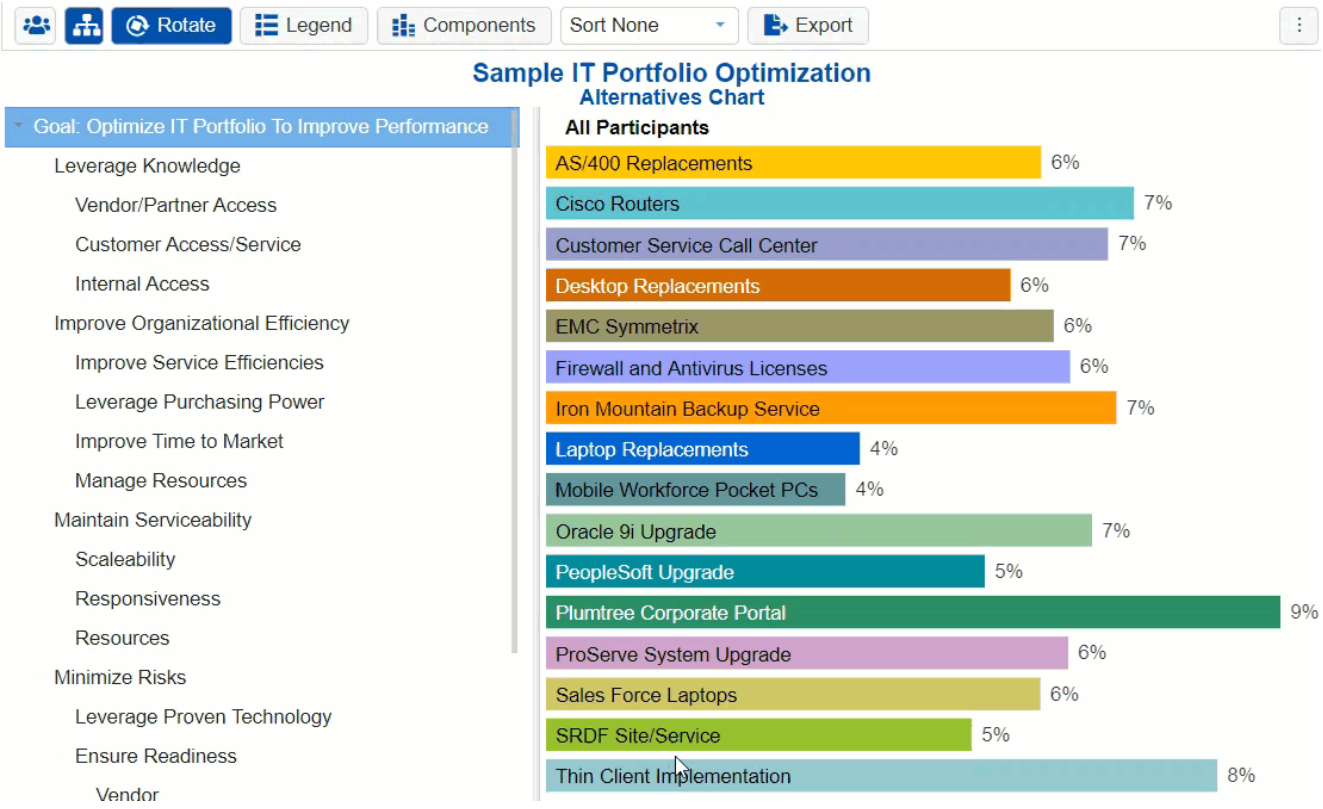


From the above, we can see the Alternatives with respect to the Objective "Improve Organization Efficiency."

You can hide the Objectives Hierarchy at the left using



You can select one or more participants or groups using the icon.

If more than one chart is available, pagination is displayed at the bottom of the page:

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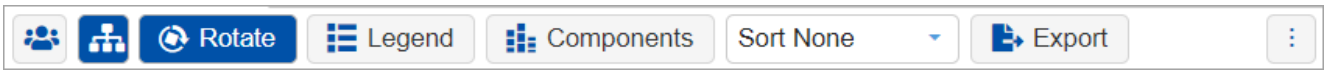
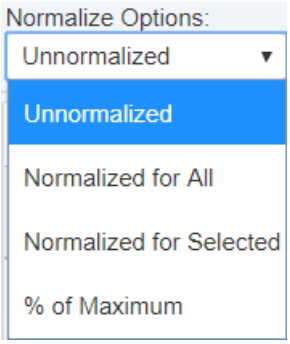
- Charts per page (left) - select how many charts to display per page
- Pagination (right) - paginate or select the page to display

Non-advanced Mode options (Normalization, Rotate, Legend, Sort, etc.)

Various options are displayed on the toolbar at the top of the charts. Depending on a chart type, options may only be available for a specific chart type.



- **Normalization -** By default, the Normalized results are displayed. When the Advanced mode is ON, you can display results based on other normalization options:



  - **Unnormalized** (The priority is the sum of the products of each covering objective's global priority times the priority of the alternative with respect to each covering objective). If an alternative has a priority of 1 for every covering objective, it will have an unnormalized priority of 1 and is referred to as an ideal alternative. Note: "Unnormalized" is not available and not applicable when using the Distributive mode.
  - **Normalized for All** (sum to 1 for all the alternatives).
  - **Percentage of Maximum** (the alternative with the highest priority is 1 and all others are a percentage of this).
  - **Normalized for Selected** (sum to 1 for the selected alternatives).
- **Rotate** - Click the rotate button to rotate the chart by 90 degrees at a time.

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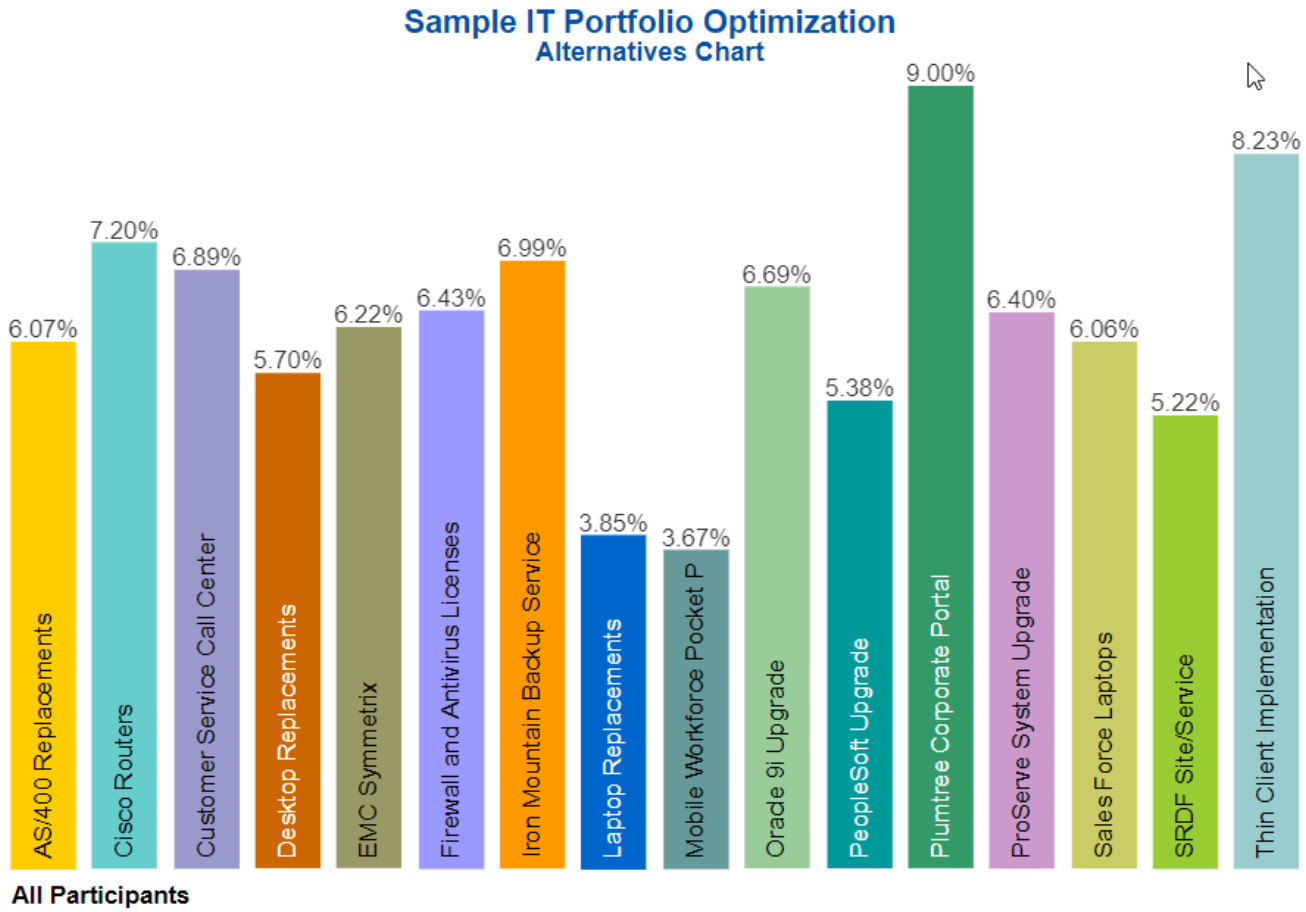
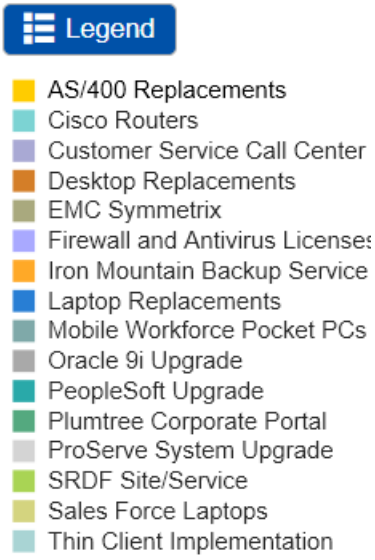


- **Legend** - show or hide the Legend.



- **Components** - Show or hide the alternative components. See more details here.

- **Sort** - sort chart by priority, name, or none (default: none).

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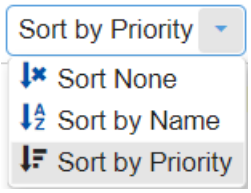
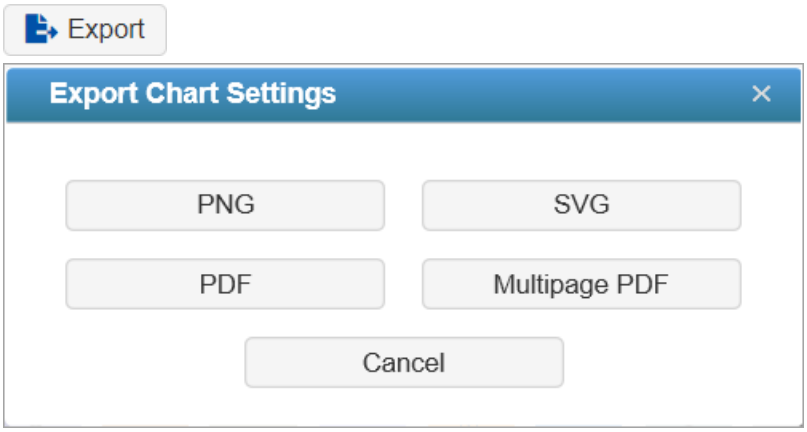
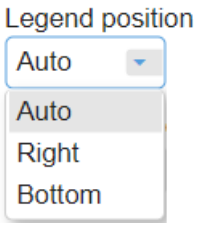


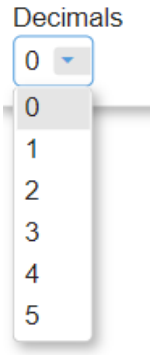
- **Export -** export as png, SVG, pdf, or multiple pdf.



- **Legend Position** - can be auto, right, or bottom of the chart (default: Auto). Legend position is only enabled when the Legend is displayed.



- **Decimals**



- **Font**

  Select from the Font size dropdown (14 as the default).

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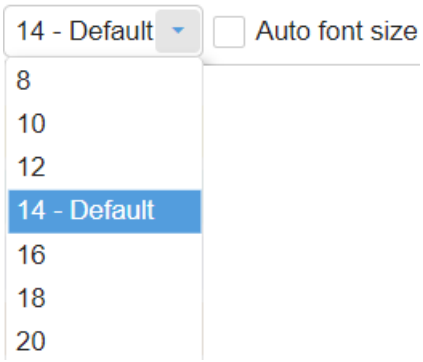
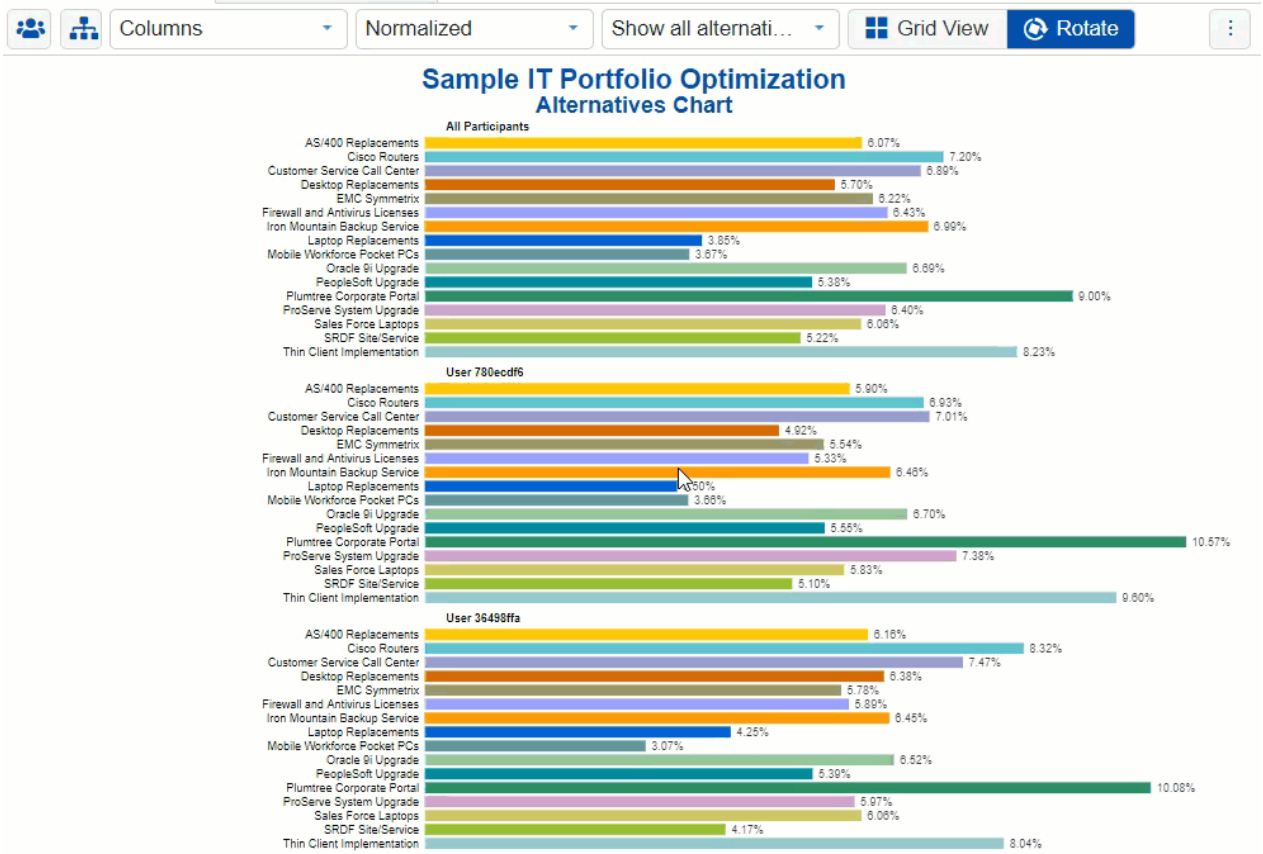


The Auto font size check box is only applicable for column charts

- **Grid View**

  This option is available for all chart types (except for Stacked Bars) when more than one participant or group is displayed. This allows you to display the charts in grid view (multiple columns) when ON, or a single column when OFF.



TIP: All chart types have the same common options as above for non-advanced mode -- except for Components which is only available for Columns.

HINT: For smaller screens, some of the options may be hidden. You may see the hidden options by clicking the ellipses

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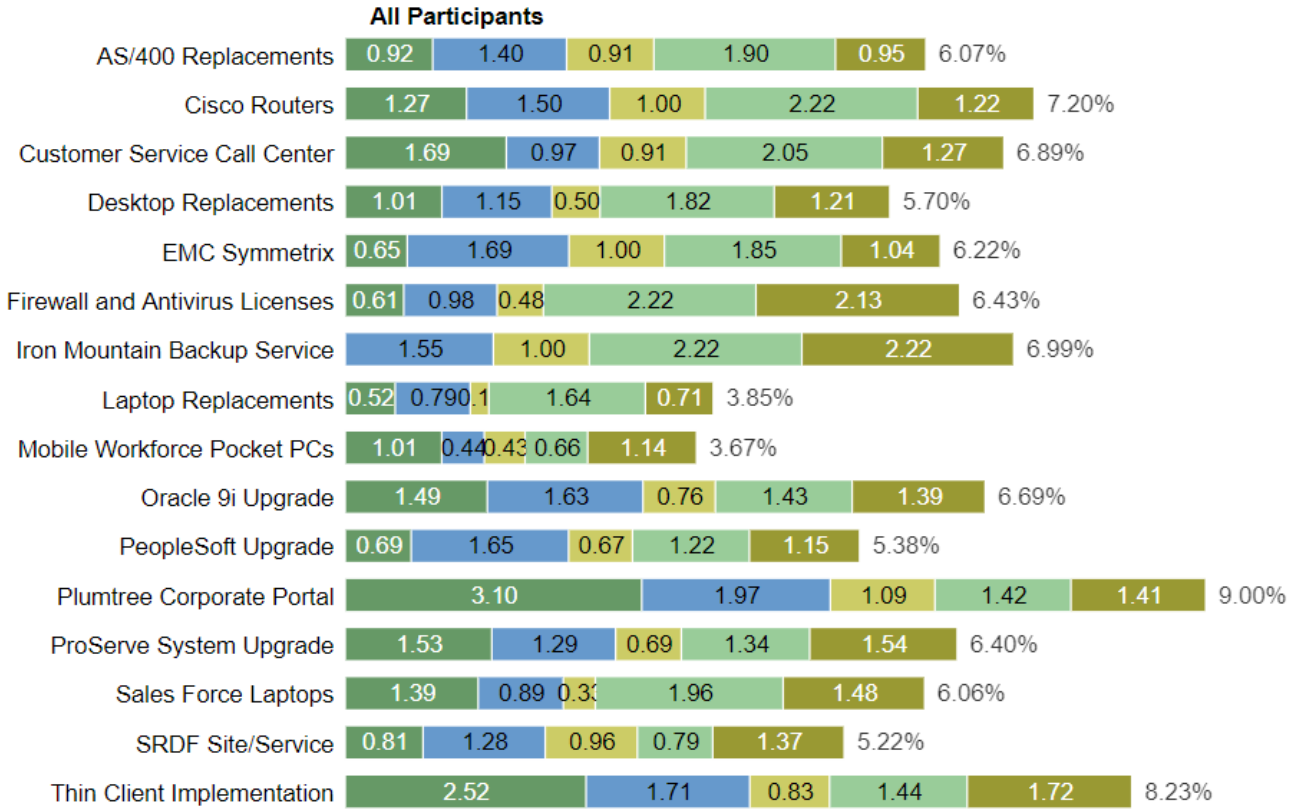
icon at the top right.

Alternatives Chart with Components

You can show the column charts with components by toggling the show (or hide) components button.

Alternative Charts with Components show the priority of each alternative divided into sections showing how much of the priority is due to its preference with respect to each of the objectives.



Hovering on a specific component will highlight that element for all the alternative bars. A tooltip will also be displayed to see its details -- ([Participant or Group Name]: Percentage Priority Alternative Name) as shown below:

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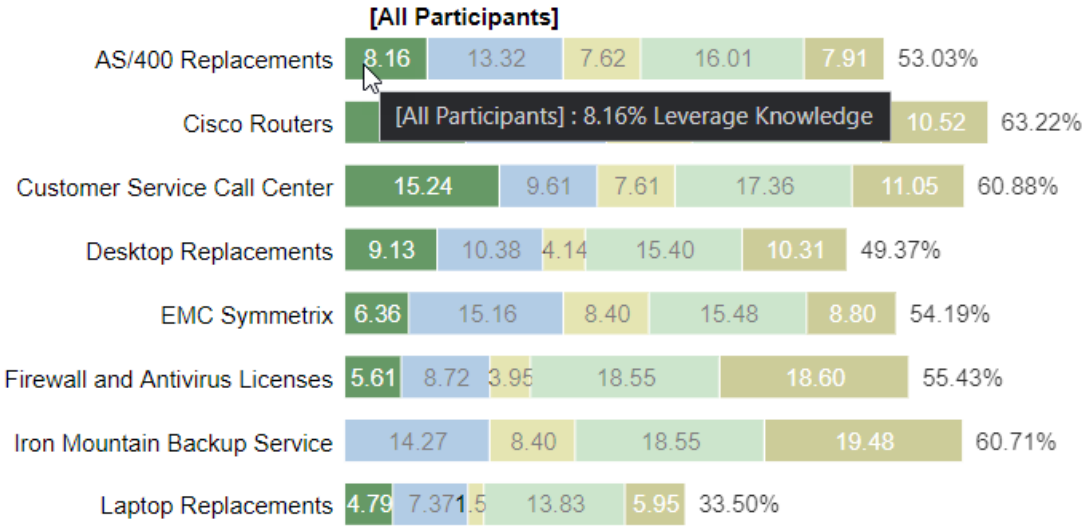
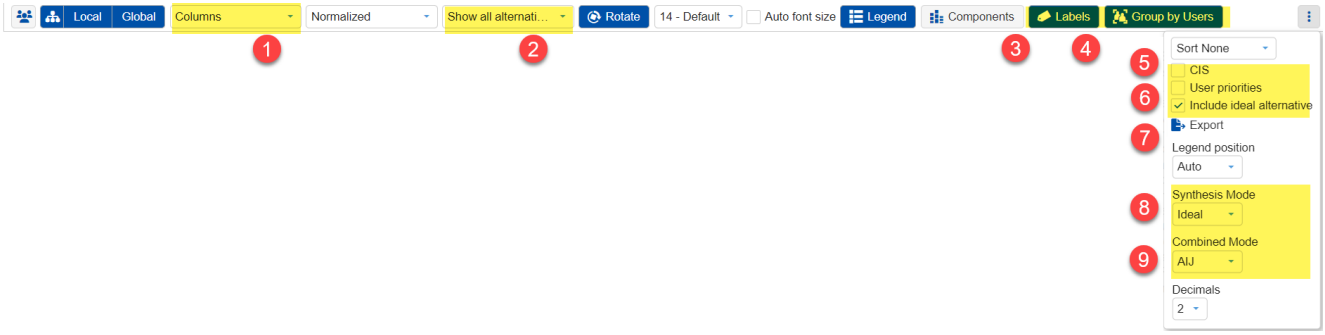


DIDN'T SEE THE OPTION YOU ARE LOOKING FOR? Try enabling the **Advanced Mode** switch at the bottom of the page; this will show the **advanced options on this page**.

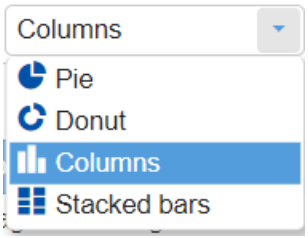
Advanced Mode Options

When Advanced mode is ON, you will see the advanced options on this page (see highlighted):



1. Chart Types

More chart formats are available in the advanced mode.



The Columns chart is selected by default. You can select from other chart types available. The selected chart format on the advanced mode will be remembered when you switch back to the non-advanced mode.

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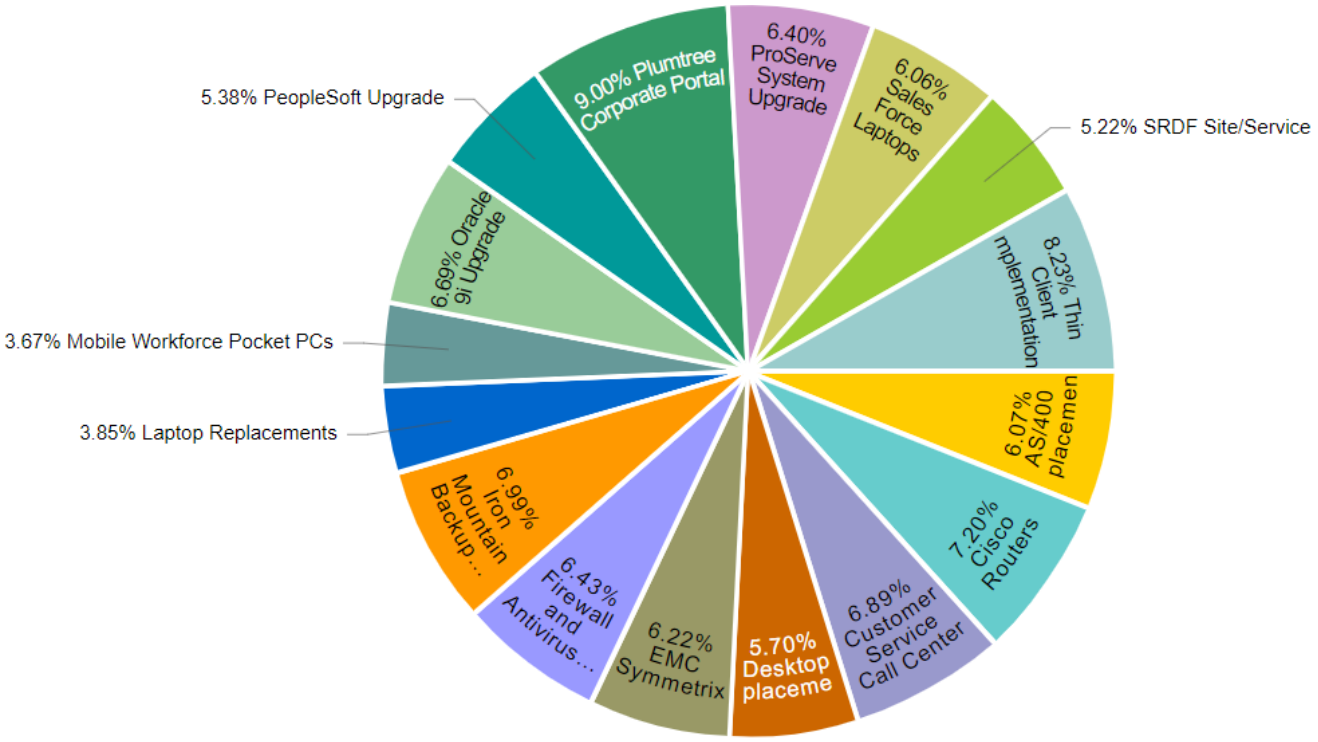
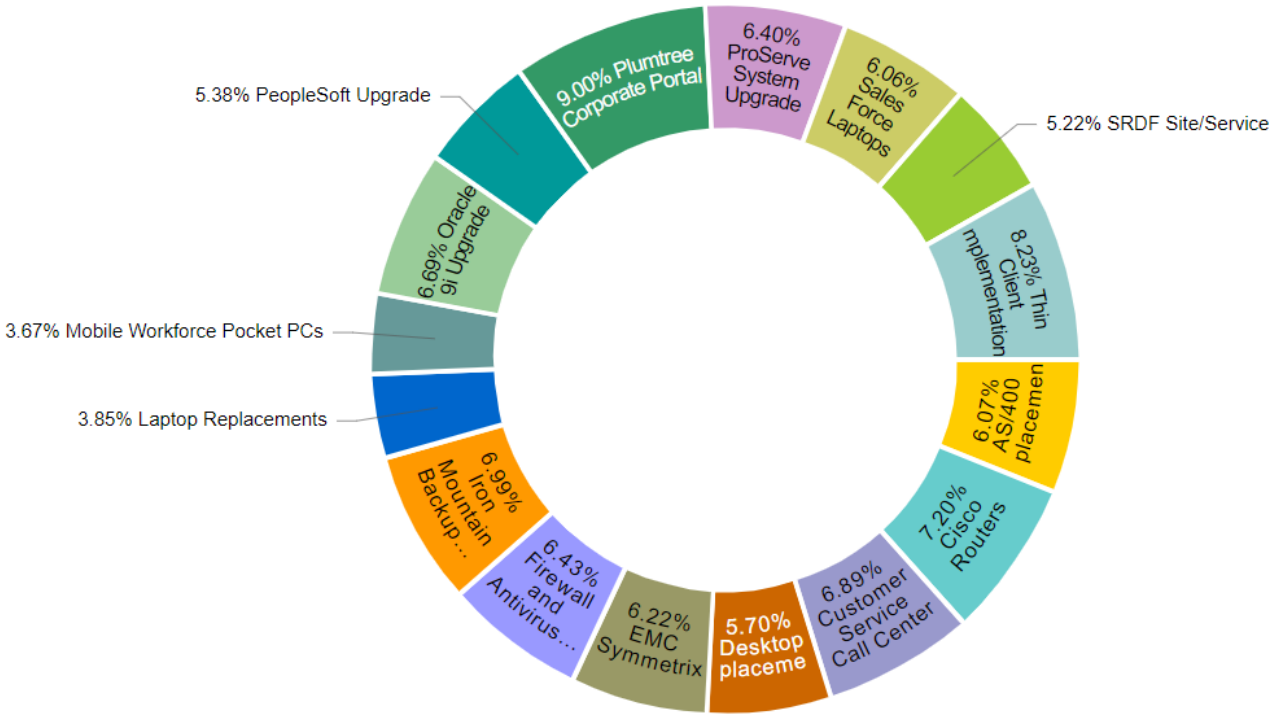
Pie chart



Donut Chart



Stacked bars

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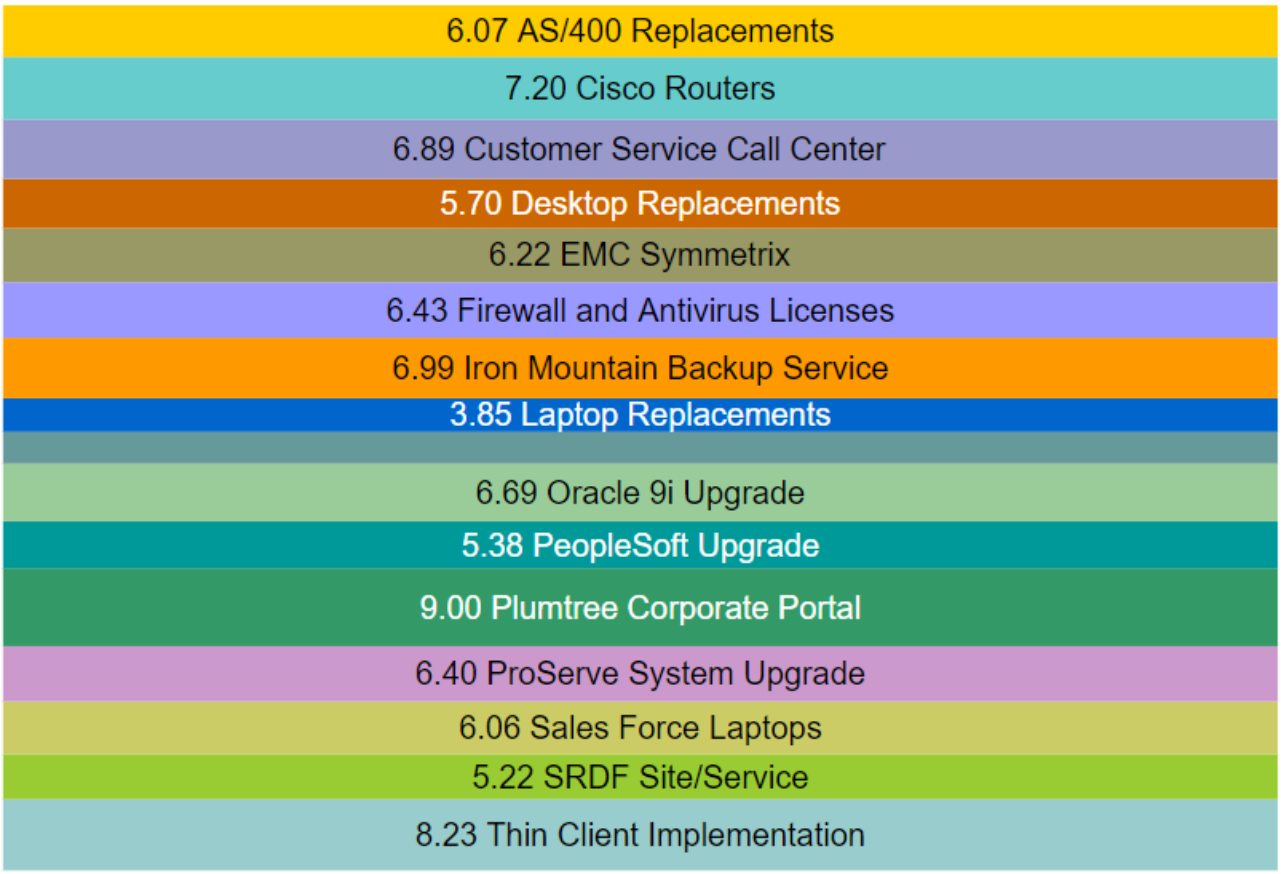
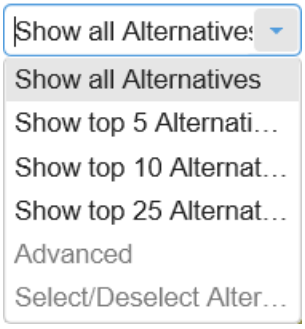


2. Filter Alternatives

By default, all alternatives are displayed.



You can display the top 5, 10, or 25 alternatives based on the "All Participants" group priorities.

3. Labels

Show or hide chart labels or objectives names on the chart. When hidden, only the priorities are shown on the chart. To compensate for the loss of labels, you can choose to show the legend instead.

4. Group by Users

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Group by Users is available for Column charts when multiple users or groups are selected. By default, this option is ON. When Group by Users is OFF, the chart is grouped by element or node.

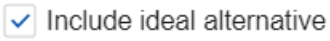
5. Combined Input Option (CIS)

If the Combined Input Option (CIS) is ON, then results for individuals are computed by combining the priorities derived from judgments or ratings for which they had roles, with the combined results for any parts of the model where they did not have a role.

6. Apply User Priorities

If priorities (weights) have been specified for participants, use the "User Priorities" check box to apply or ignore these priorities when calculating results.

7. Include Ideal Alternative



8. Ideal and Distributive Synthesis

Results can be computed as an **Ideal** mode (default) or D**istributive** mode synthesis. In most cases, the selected synthesis mode has very little, if any, impact on the results. Read the section below for more information.

Originally, AHP had only one synthesis mode – later called the "distributive" synthesis mode. A distributive synthesis distributes priorities from the goal down through the alternatives and is analogous to dividing priorities in a pie chart, which is intuitive for decision-makers to comprehend. The sum of the global priorities for each alternative with respect to each covering objective represents the overall priority of that alternative. The priorities have ratio scale properties (as well as, of course, interval, and ordinal properties) which means that they can be used in making a choice, or in allocating resources. This synthesis operation can be thought of as distributing the goals priority of 1.0 to the alternatives under consideration and is today called the distributive synthesis mode. Originally, this was the only synthesis mode of AHP. Critics of AHP pointed out situations where a different synthesis mode is more appropriate.

The **ideal synthesis mode** of AHP was introduced for situations where the introduction of new alternatives to a decision might - using the distributive synthesis mode - cause the ranks of existing alternatives to change, even when none of the judgments with respect to the original alternatives are changed. There are some situations where it is reasonable for the ranks of existing alternatives to change, and others where it is not.

For even more information, see https://comparion.knowledgeowl.com/help/ideal-and-distributive-synthesis-closed-and-open-systems

9. Aggregating Individual Priorities (AIP)

Selecting AIP from the Combined Mode drop-down will show results based on aggregating individual priorities, known as AIP, instead of aggregating individual judgments (AIJ). AIJ is the default. When AIP is selected, overall alternative priorities are

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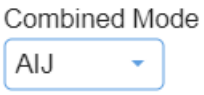
computed for each participant and then an average of these priorities is computed.



NOTE: Due to the nature of AIP, objectives charts, objectives grid, and all sensitivity analysis pages are disabled when AIP is selected.

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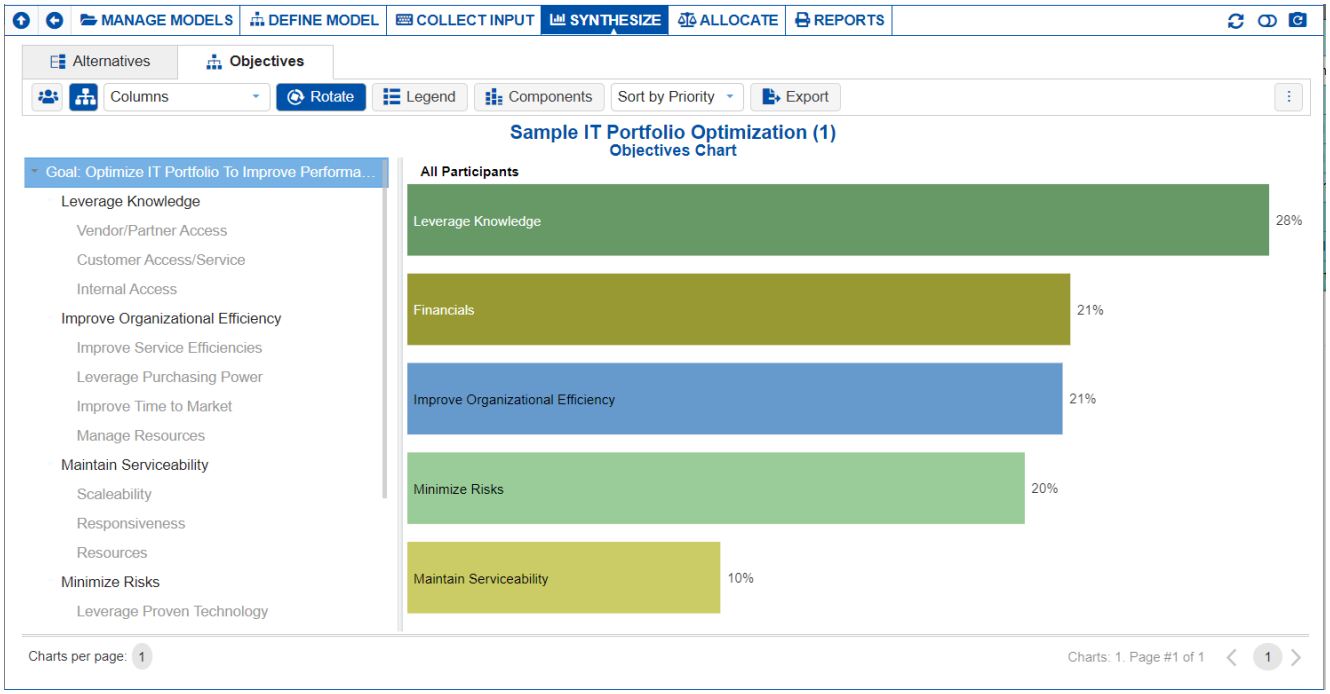
Objectives Chart

The Objectives Chart page displays a variety of charts for objectives and sub-objectives. It displays the same priorities as the Objectives Grid.

Columns Chart

By default, the Columns chart is displayed. The columns chart below has the hierarchy enabled, which is why you can see and traverse the objectives hierarchy on the left.



Clicking another objective node on the Objectives hierarchy at the left will show the chart for the sub-objectives with respect to that node.

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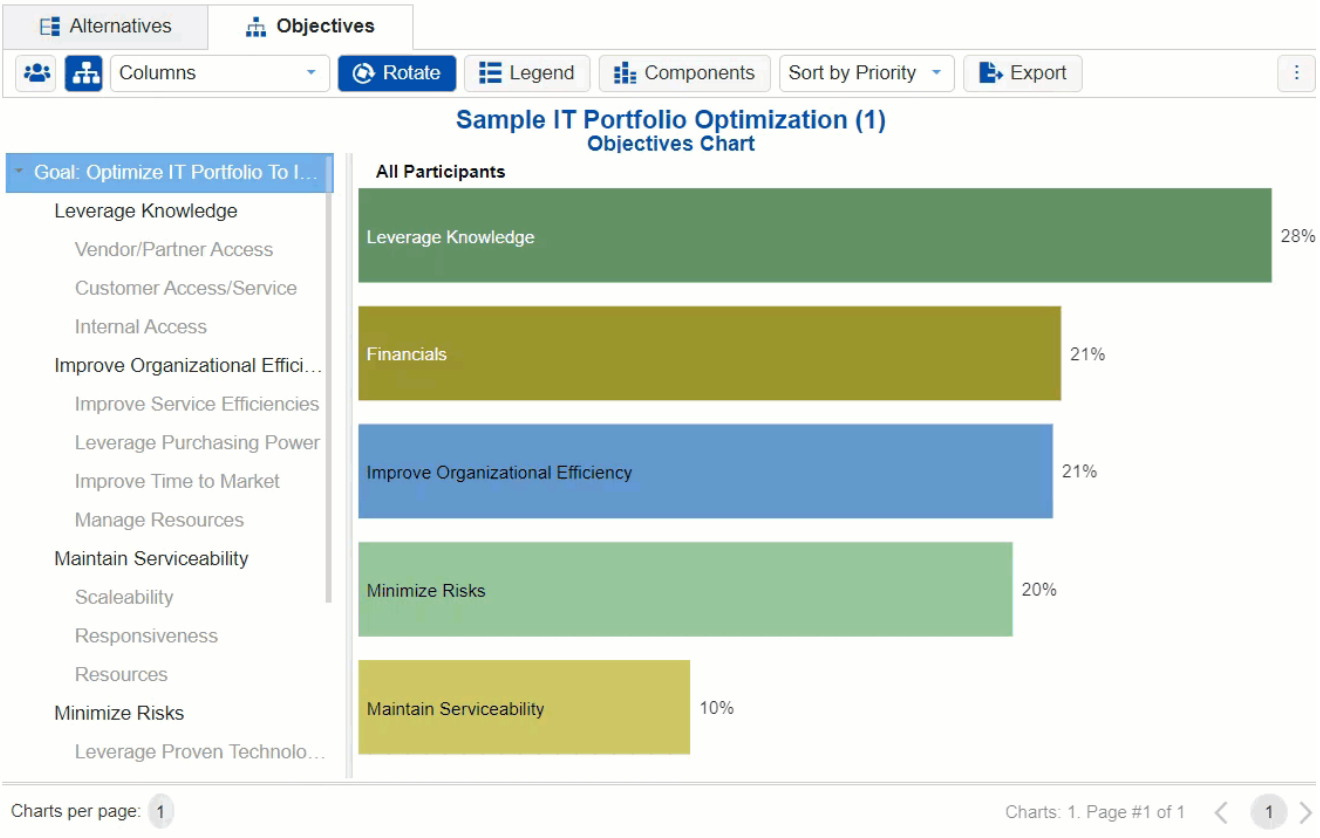

You can select one or more participants or groups using the icon.

If more than one chart is available, pagination is displayed at the bottom of the page:

- Charts per page (left) - select how many charts to display per page
- Pagination (right) - paginate or select the page to display

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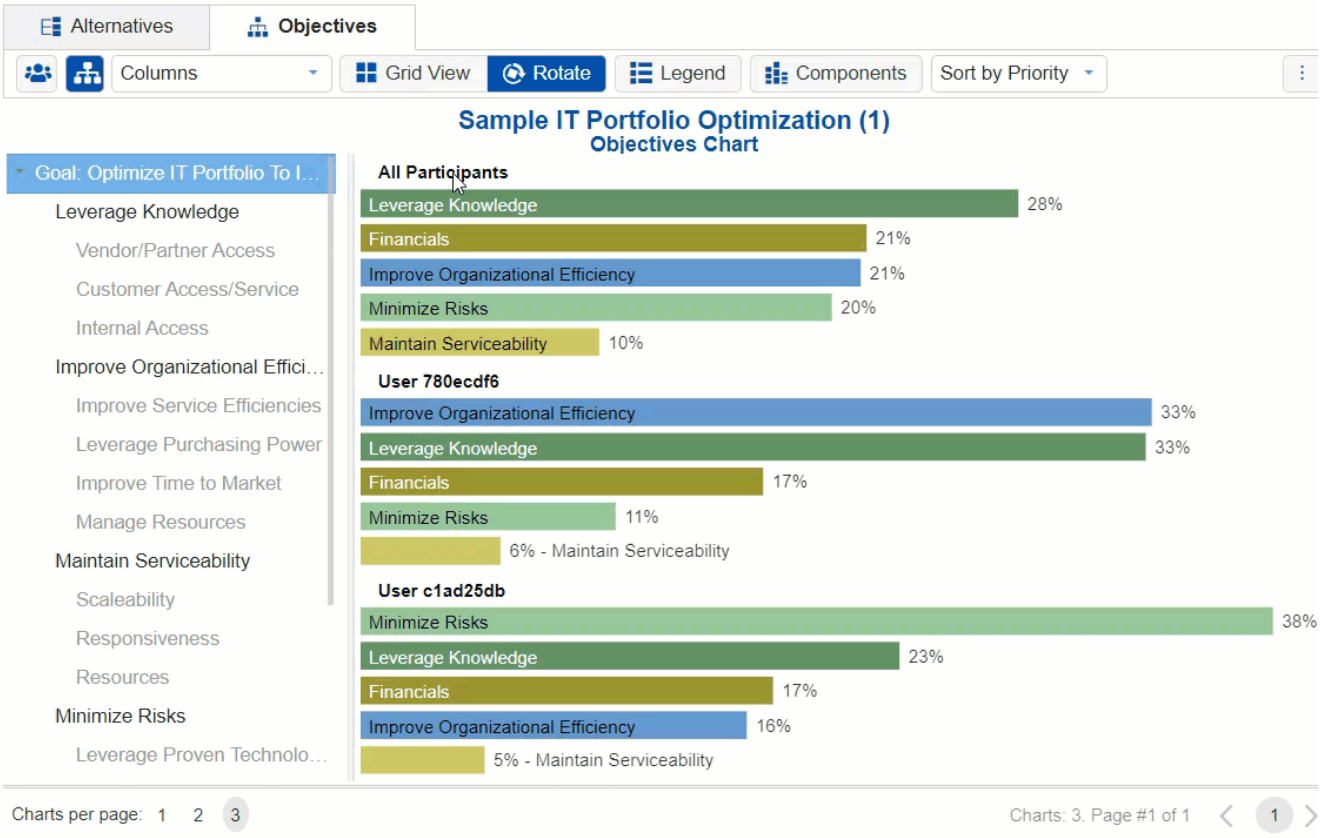
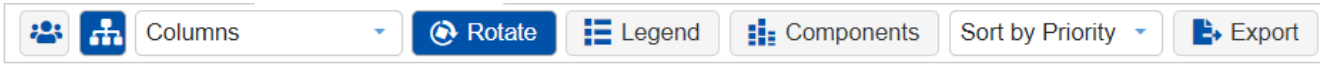


Various options are displayed on the toolbar at the top of the charts. Depending on a chart type, options may only be available to a specific chart type.

For non-advanced mode, the following options are available for Columns Chart.



- **Rotate** - rotate chart 90 degrees with each click.

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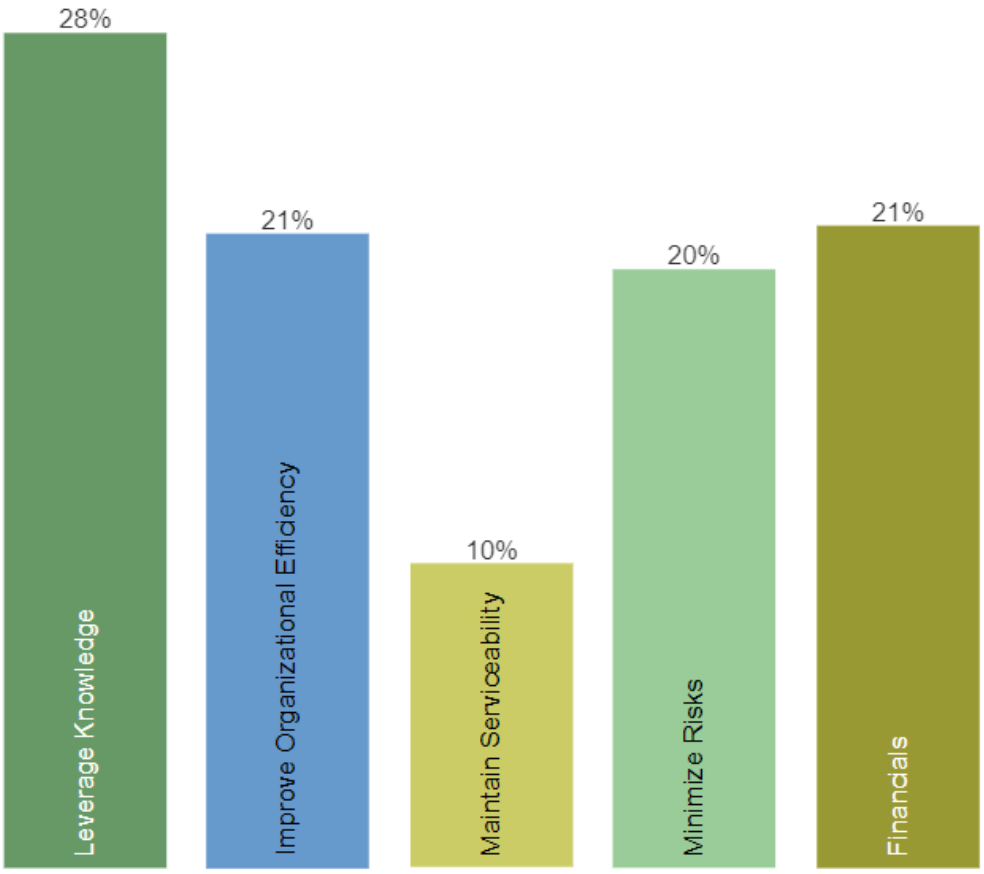
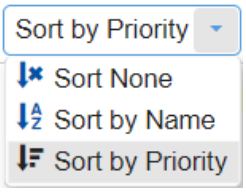


All Participants

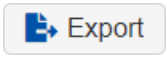
- **Legend** - Show or hide the objectives charts legend

- **Components** - Show or hide objective components

- **Sort** - sort chart by priority, name, or none (default: none)



- **Export -** export as png, SVG, pdf, or multiple pdf



- **Legend Position** - can be auto, right, or bottom of the chart (default: Auto)

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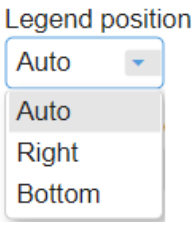
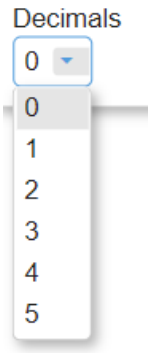


- **Decimals**



TIP: All chart types have the same common options as above for non-advanced mode, except for Components which is only available for Columns.

HINT: For smaller screens, some of the options may be hidden. You may see the hidden options by clicking the ellipses ⋮ (snowman) icon at the top right.

Columns Chart with Components

You can show the column charts with components by toggling the Components button.

Objectives Charts with Components displays the breakdown of each sub-objective's contribution to the priority of its parent objective.

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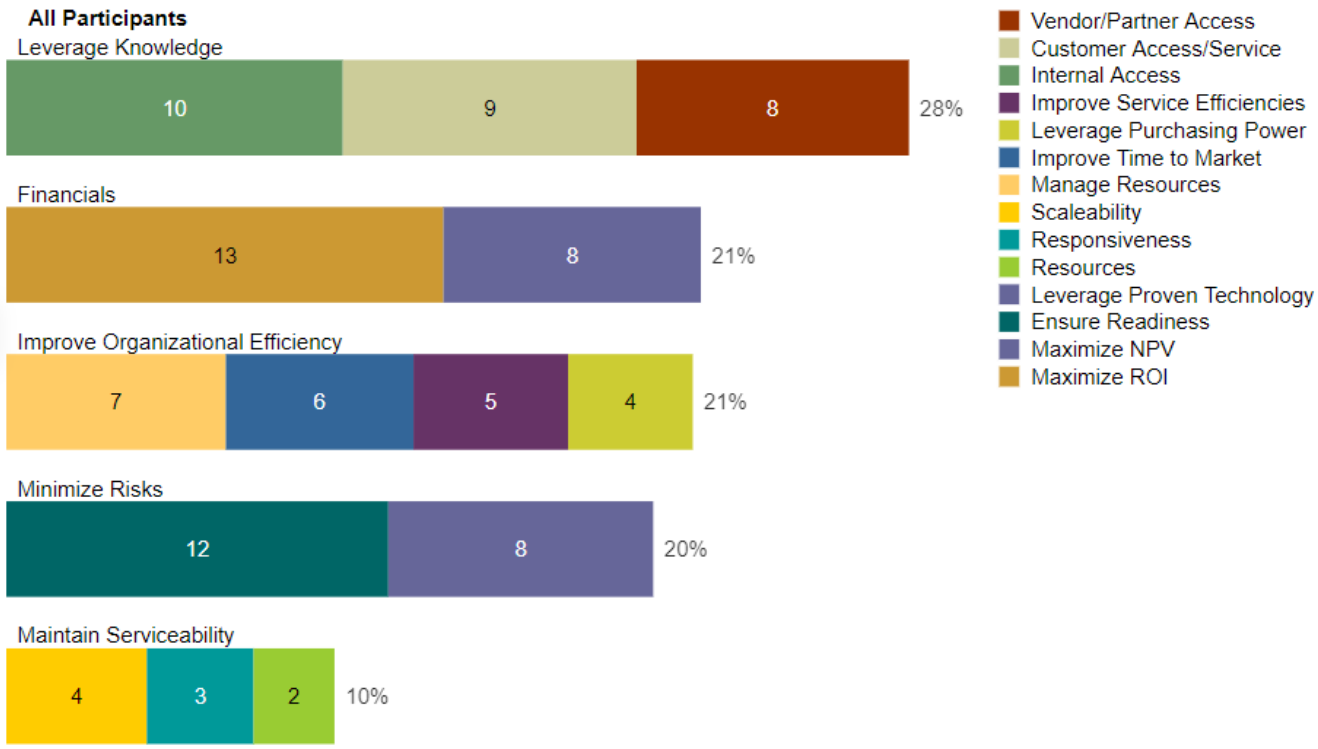
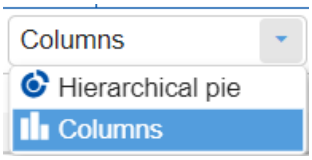


For Non-advanced mode, two chart types are available: Columns which is displayed above, and the Hierarchical pie:



Hierarchical Pie Chart

A *hierarchical pie chart* is a visual representation of the hierarchy of Objectives.

The center circle pertains to the Overall Goal.

The first layer segments are the first-level sub-objectives of the hierarchy -- the "Improve Organizational Efficiency," "Minimized Risks," and so on....

The second layer segments are the sub-objectives of the first-level nodes which have a lighter shade color of their parent.

In the example below, the "Maintain Serviceability" objective has sub-objectives: Scalability, Responsiveness, and Resources.

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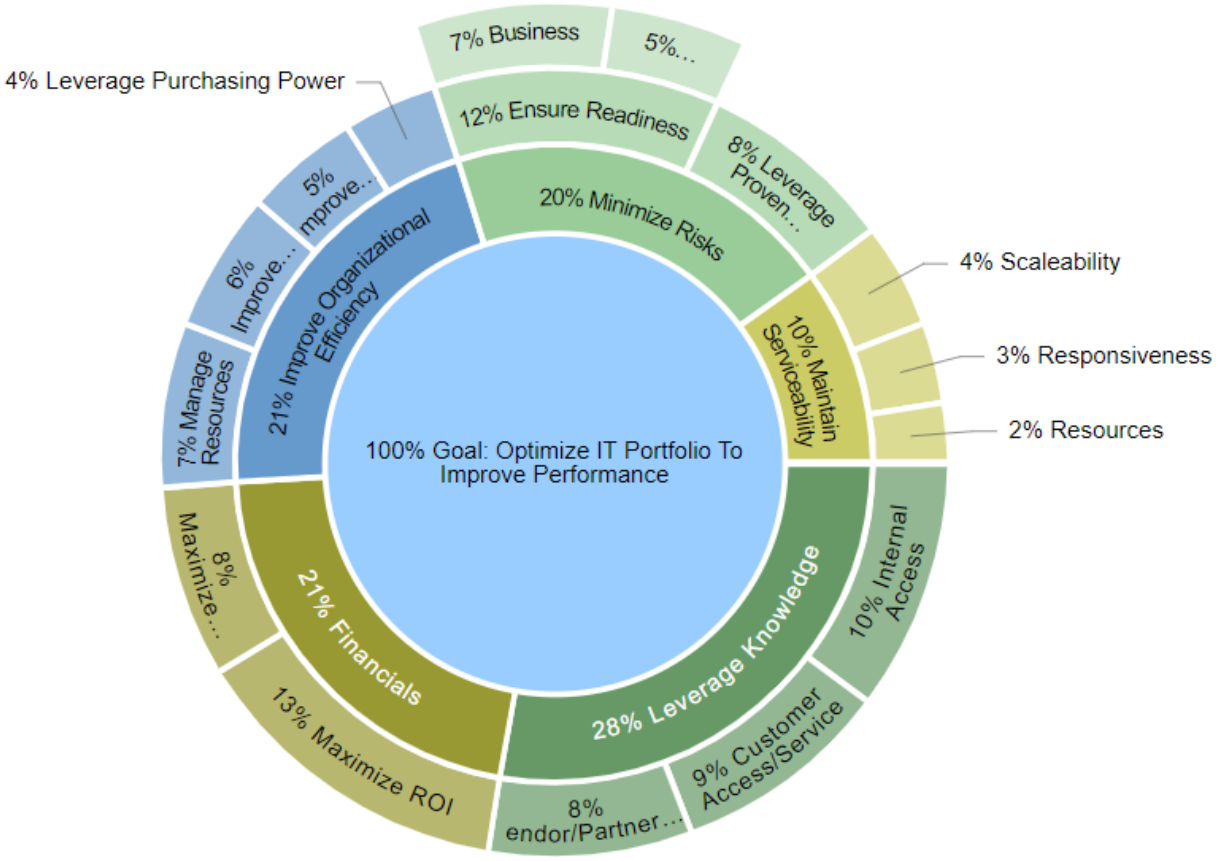

When the Advanced mode is ON, you can check or uncheck the ☑ Area Mode checkbox.

The chart above has the Area Mode ON; that is, the sum of the sub-objectives' segments area is equal to their parent's area.

When the Area Mode is OFF, all the segments will have the same height as shown below:

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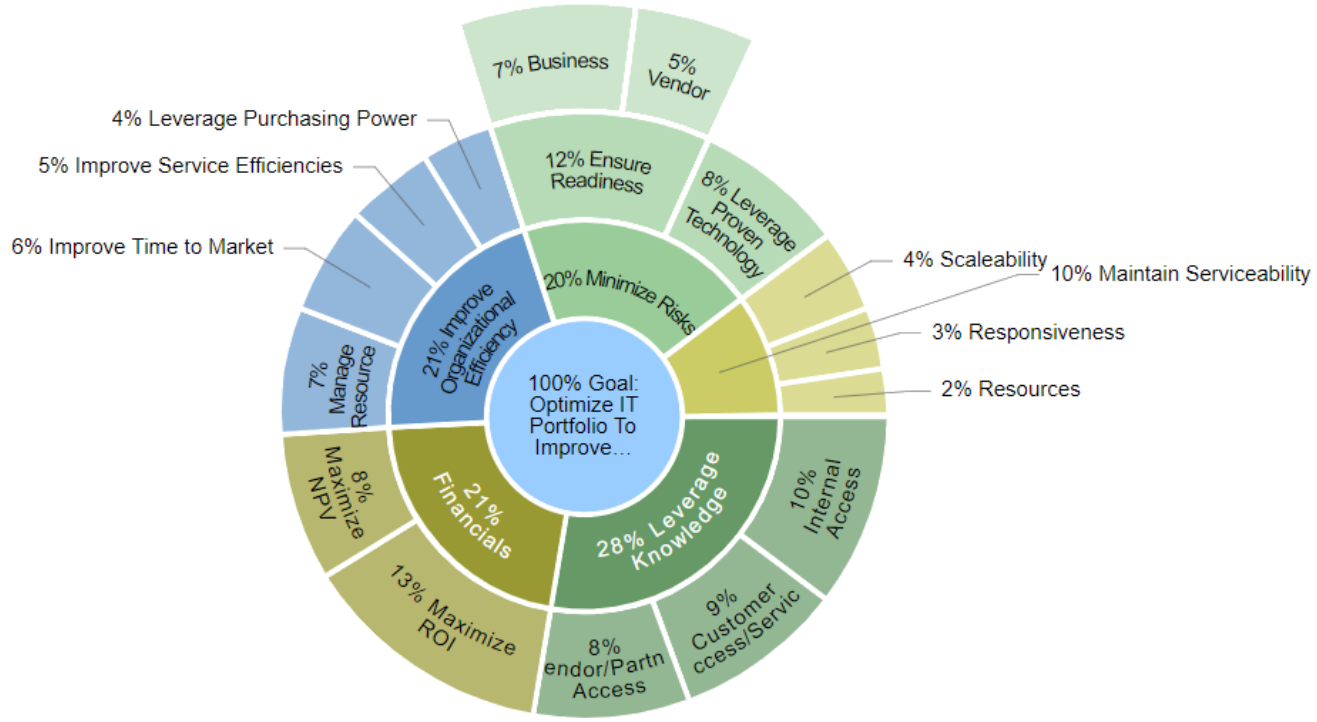
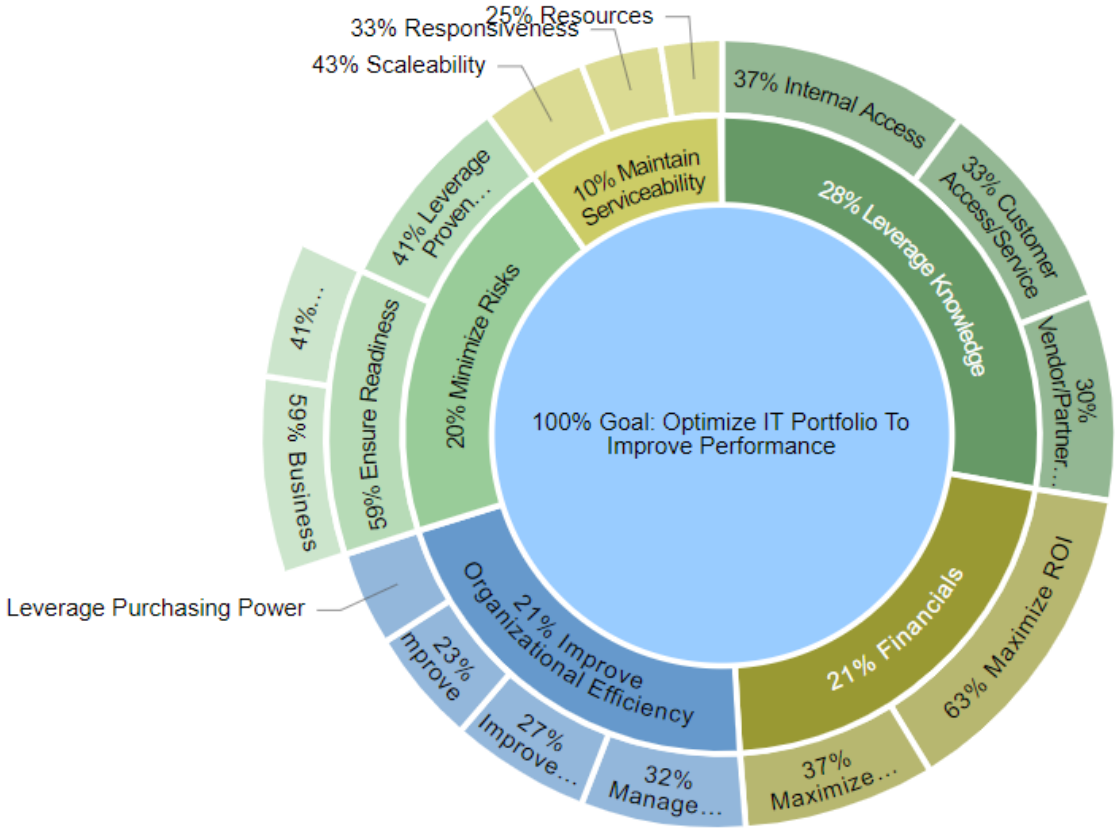


The hierarchical Rotate option rotates the chart counterclockwise by 45 degrees with each click.



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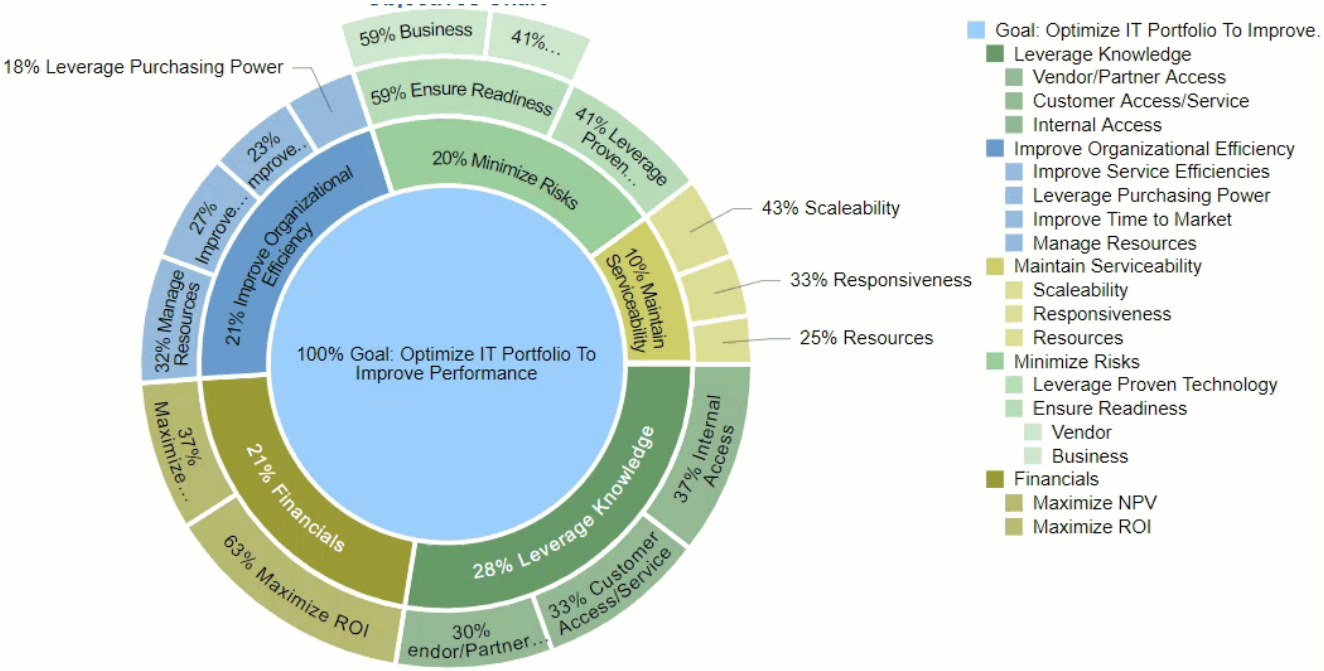
TIP: If some of the labels are being blocked by the toolbar at the top, the rotate option will be helpful.

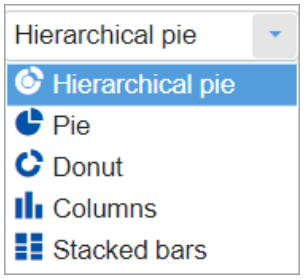
You can click on a parent node on the chart or from the legend, to zoom to a lower cluster of the hierarchy:



Clicking the same node will return to the overall chart.

Advanced Mode Charts (Pie, Donut, and Stacked Bars)

When the Advanced mode is ON, additional chart types are available:



Pie

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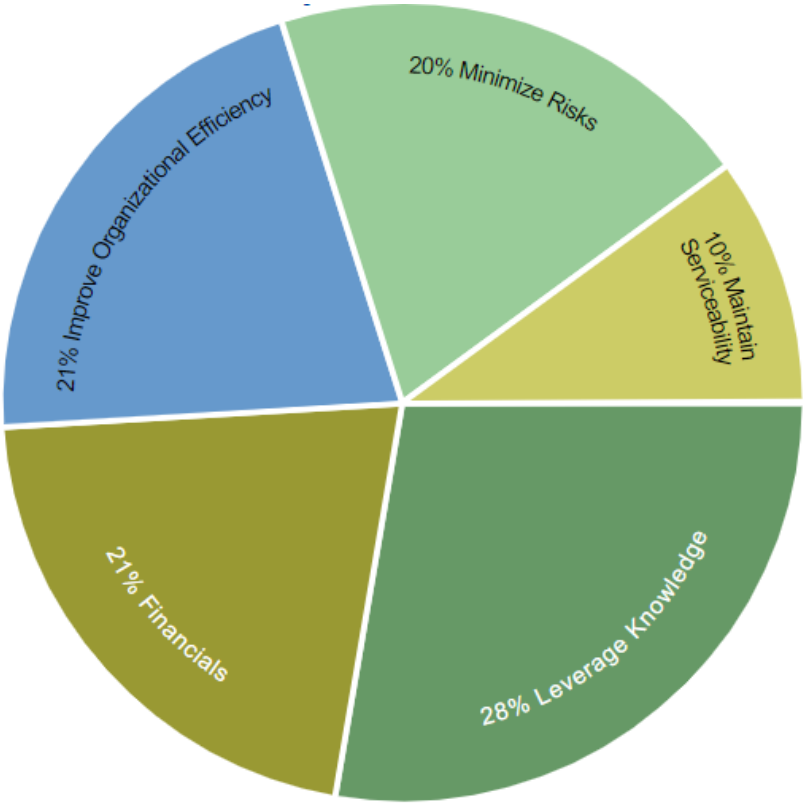
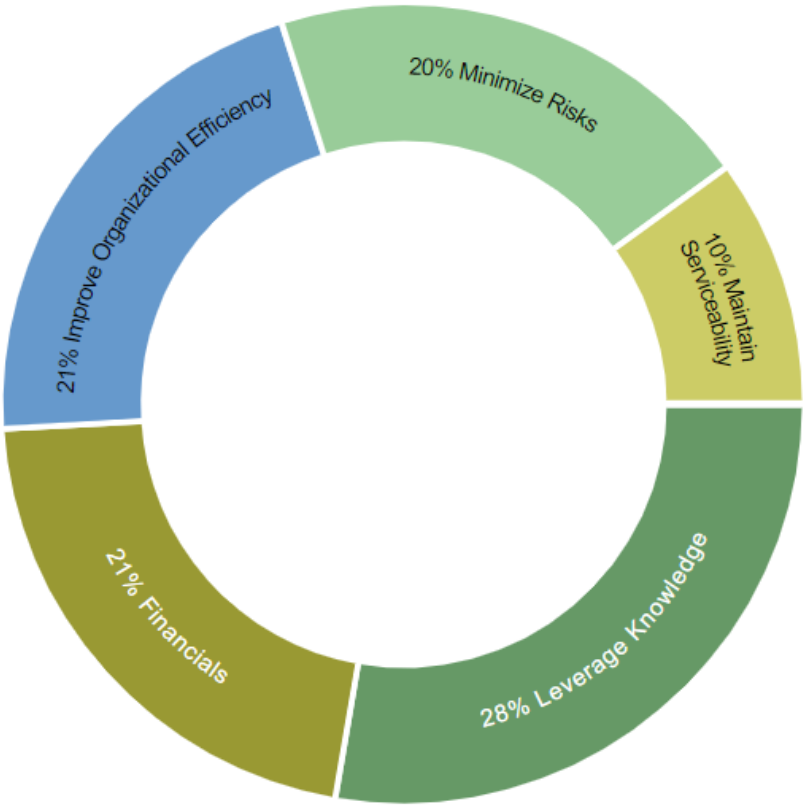


Donut



Stack Chart

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DIDN'T SEE WHAT YOU ARE LOOKING FOR? Try enabling the Advanced Mode switch at the bottom of the page; this will show the advanced options on this page.

Advanced Mode Options

When the Advanced mode is ON, additional options are available; some options may be available only on a specific chart type.

Available for all Chart types:

- **Labels** - show or hide chart labels or objectives names on the chart. This will only show the percentage priority on the chart. You can then show the legend instead.

- Local Priorities - toggle between local objectives priorities (blue button) or global objectives priorities (grey button).

- Font Size - decrease or increase the font size, or reset

- CIS - If the Combined Input Option (CIS) is ON, then results for individuals are computed by combining the priorities

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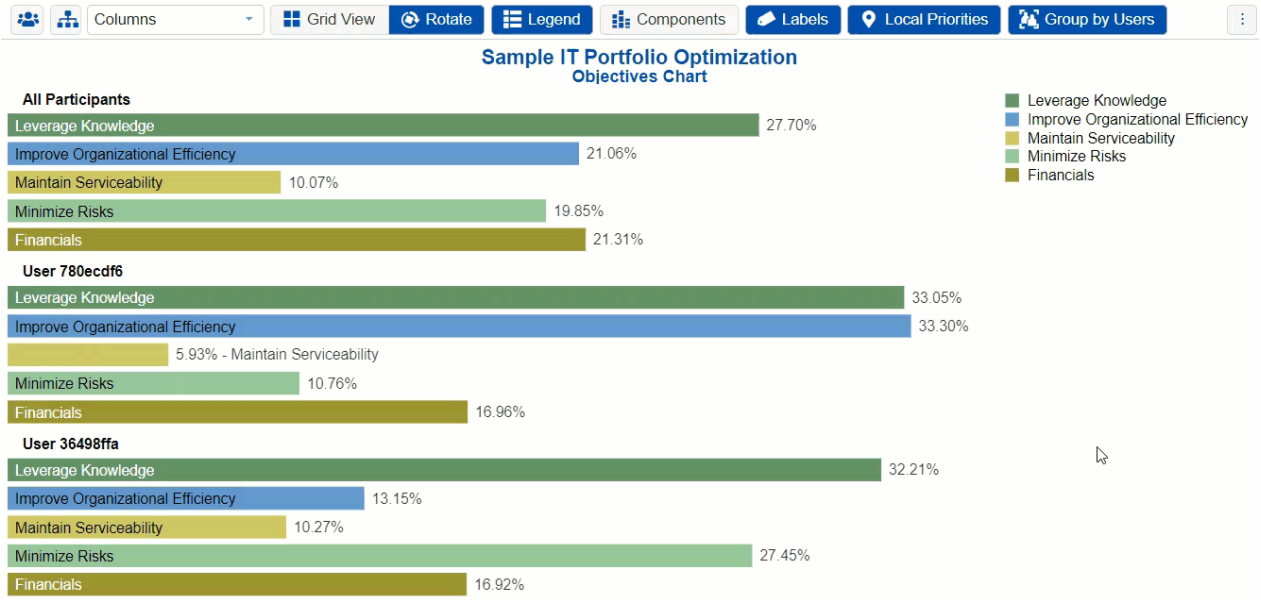
derived from judgments/ratings that they have roles for. For judgments that they do not have a role for, they are assigned the combined results for those who do have a role.

- User Priorities - If priorities (weights) have been specified for participants, you can use the "User Priorities" check box which enables you to apply or ignore these priorities in calculating the results. User Priorities is set up from the Participants screen.

Chart Specific Options:

- **Group by Users** - available for Columns chart when multiple users/groups are selected. By default, this option is ON. When Group by Users is OFF, the chart is grouped by elements or nodes.



- Area Mode - available for Hierarchical Chart. This displays the sub-objectives segments on the chart based on its parent's segment size. See the hierarchical pie chart section above for more details.

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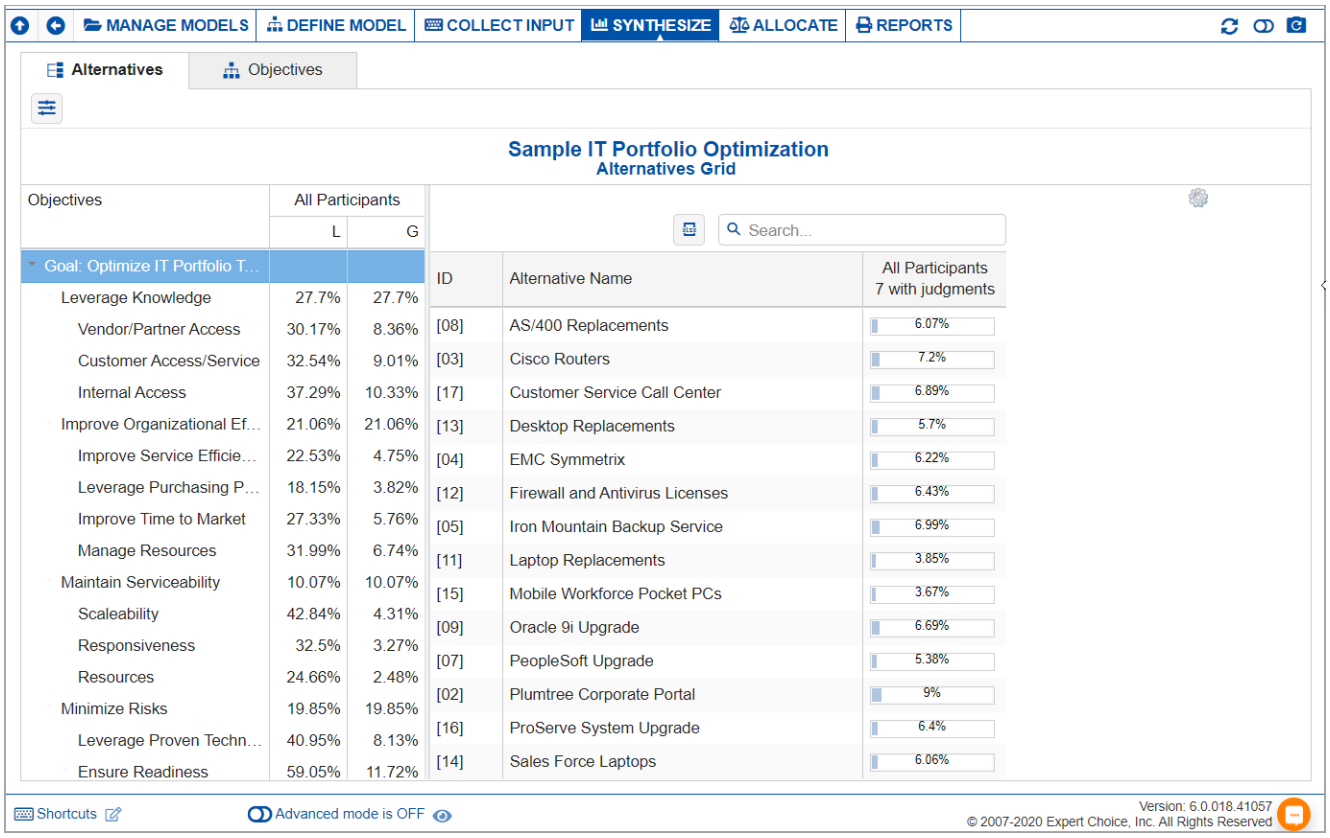
Alternatives Grid

Overview

The **Alternatives Grid** page shows the alternative priorities with respect to the decision goal for All Participants. These priorities are based on the normalized right eigenvector of the geometric average of the judgments for all participants who have roles for measures derived with pairwise comparisons, and for the arithmetic averages of priorities derived from ratings, utility curves, step functions, or direct input. This aggregation is known as **Aggregating Individual Judgments,** or **AIJ,** and is the default aggregation method.



By selecting an element in the hierarchy other than the goal, you can see the results with respect to (WRT) this element rather than the overall results with respect to the goal.

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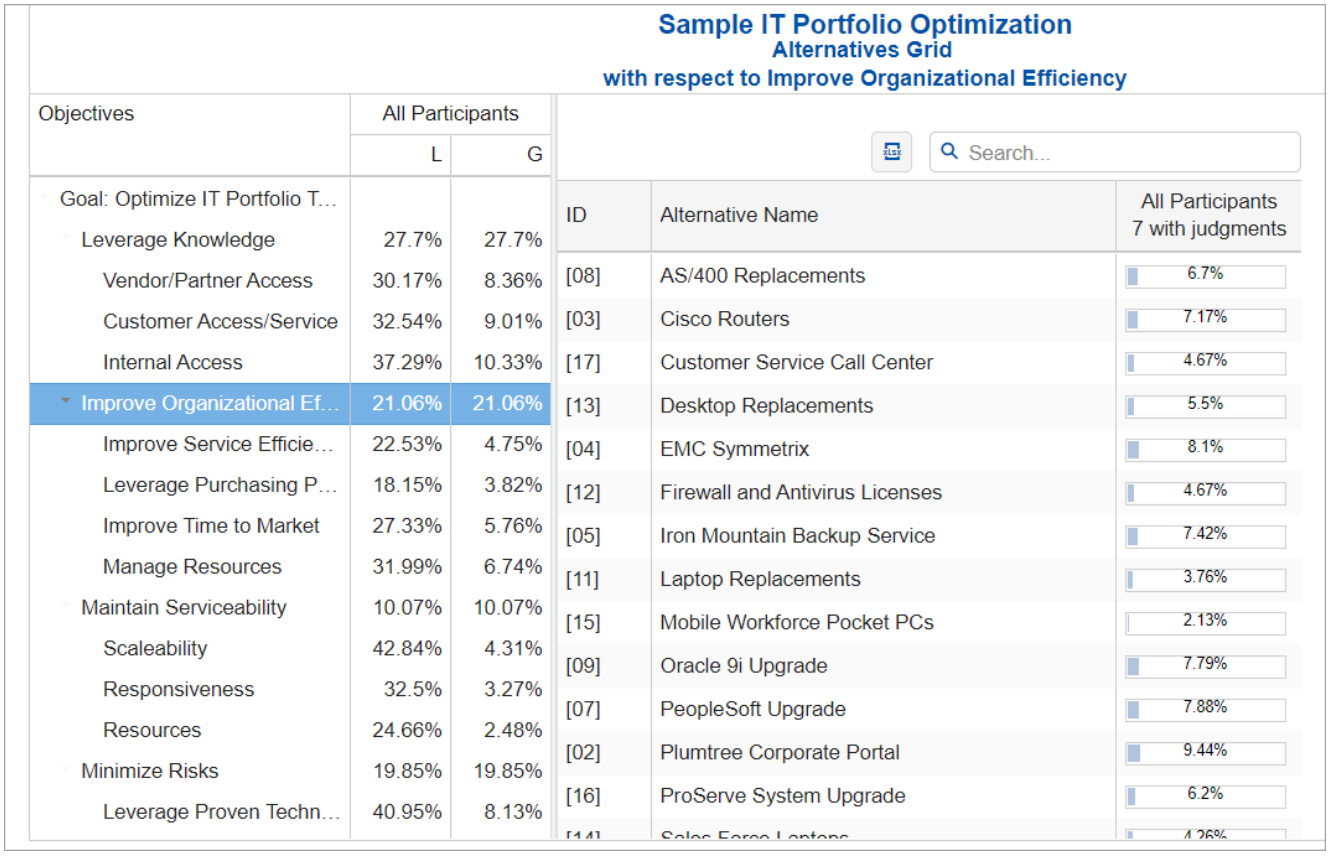
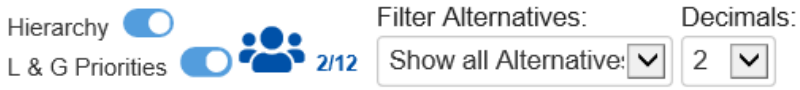


The grid above shows all the alternatives priorities with respect to the selected node Improve Organization Efficiency.

Click to show the toolbar options *(showing and hiding the toolbar is being remembered)*.



Toggle Hierarchy to show/hide the objectives hierarchy/tree at the left.

Toggle L & G Priorities to show/hide the Local and Global objectives priorities on the objectives hierarchy/tree.

Select Participants and Groups

You can choose to display results for individual participants or another group by clicking

.

The fraction in the image above designates the selected/total number of participants and groups.

Clicking the button opens a window listing the participants and groups in the model. You can select more than one user or group. Simply check the participants and groups you want to see results.

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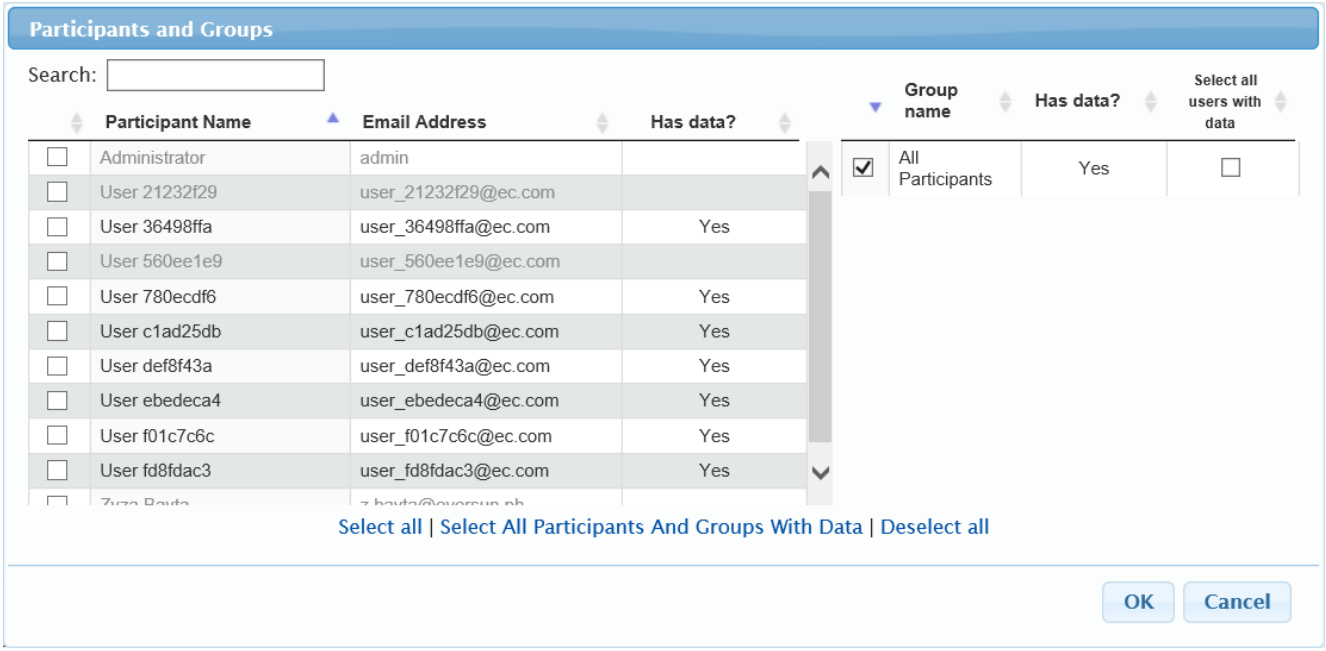
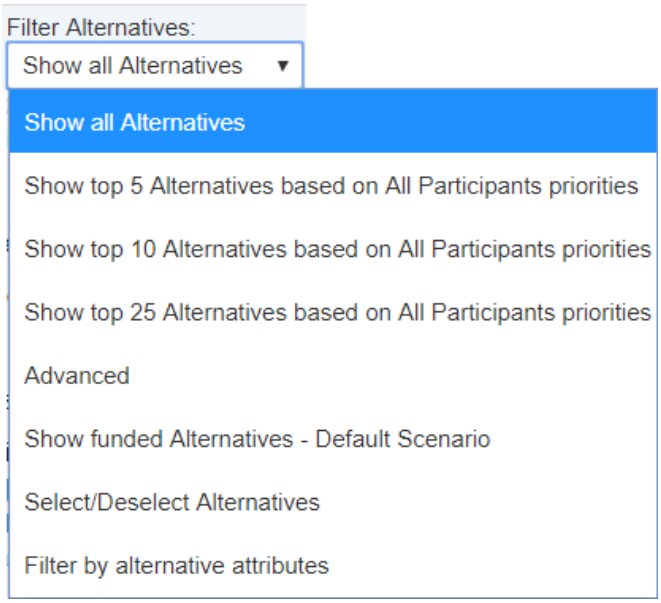


Filter Alternatives

By default, all alternatives are displayed.



- Show top N Alternatives. Select to display the top 5, 10, or 25 alternatives based on the "All Participants" group priorities.
- Advanced. Allows you to specify the top N based on the selected participant or group.

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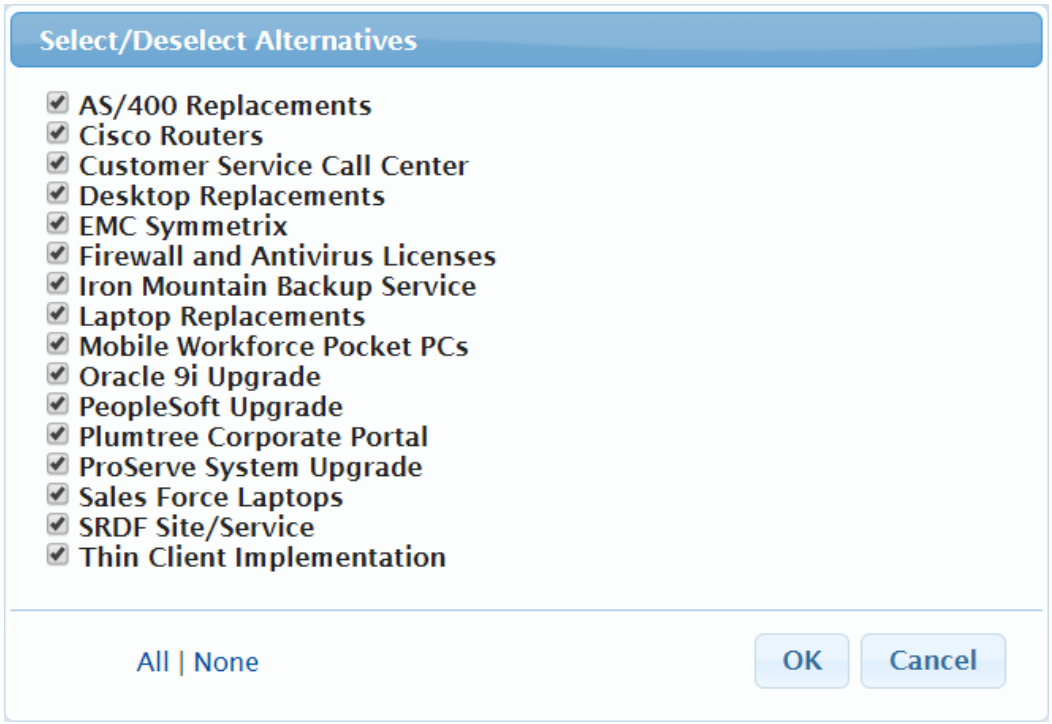
- Show funded alternatives from the active Resource Aligner scenario.
- Select/Deselect Alternatives.



- Filter by Alternative Attributes specified on the Alternatives page.

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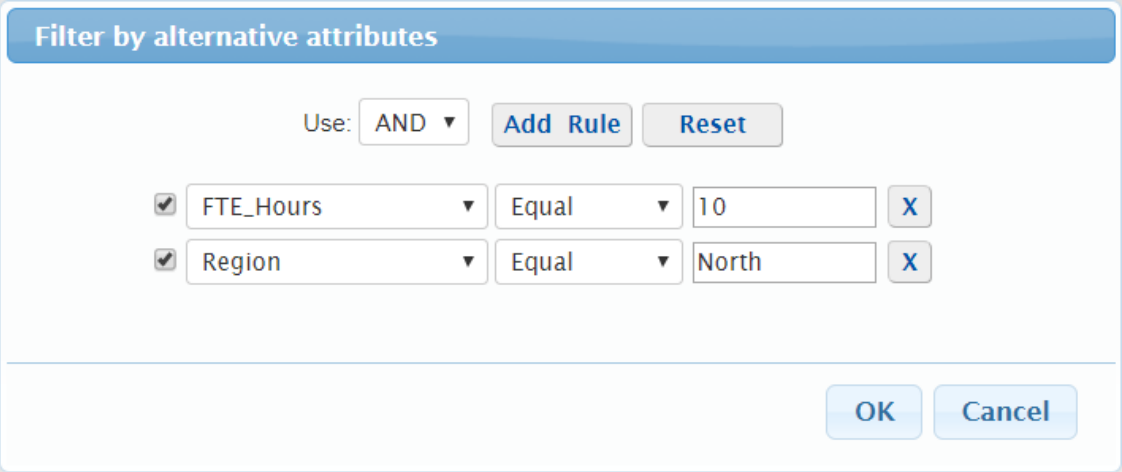

Change Alternatives Color

You can change the Alternatives color from the Alternatives Grid and Dynamic Analysis page; and the Objectives color from the Objectives Grid page.

From Grid, simply click or right-click the alternative or objective priority bar/cell, and then choose a color from the color picker:

ID	Alternative Name	All Participants 7 with judgments
[08]	AS/400 Replacements	52.74%
[03]	Cisco Routers	61.76%
[17]	Customer Service Call Center	60.38%
[13]	Desktop Replacements	49.19%
[04]	EMC Symmetrix	52.77%
[12]	Firewall and Antivirus Licenses	56.75%
[05]	Iron Mountain Backup Service	59.98%
[11]	Laptop Replacements	32.78%
[15]	Mobile Workforce Pocket PCs	32.71%
[09]	Oracle 9i Upgrade	57.69%
[07]	PeopleSoft Upgrade	45.32%
[02]	Plumtree Corporate Portal	77.52%
[16]	ProServe System Upgrade	55.37%
[14]	Sales Force Laptops	53.12%

DIDN'T SEE THE OPTION YOU ARE LOOKING FOR? Try enabling the **Advanced Mode** switch at the bottom of the page; this

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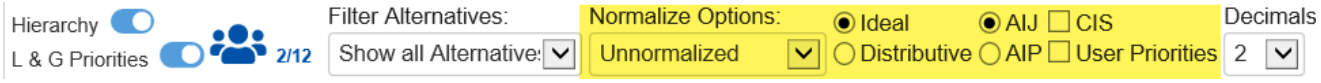
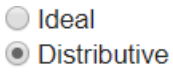
will show the **advanced options on this page**.

When the Advanced mode is ON, you will see the advanced options on this page:



Ideal and Distributive Synthesis

Results can be computed as an **Ideal** mode (default) or D**istributive** mode synthesis.



Originally, AHP had only one synthesis mode – later called the "distributive" synthesis mode. A distributive synthesis distributes priorities from the goal down through the alternatives and is analogous to dividing priorities in a pie chart, which is intuitive for decision-makers to comprehend. The sum of the global priorities for each alternative with respect to each covering objective represents the overall priority of that alternative. The priorities have ratio scale properties (as well as, of course, interval and ordinal properties), which means that they can be used in making a choice or in allocating resources. This synthesis operation can be thought of as distributing the goals priority of 1.0 to the alternatives under consideration, and is today called the distributive synthesis mode. Originally, this was the only synthesis mode of AHP. Critics of AHP pointed out situations where a different synthesis mode is more appropriate.

Aggregating Individual Priorities (AIP)

Clicking the **AIP** check-box will show results based on aggregating individual priorities, known as AIP, instead of aggregating individual judgments (AIJ). When AIP is checked, overall alternative priorities are computed for each participant and then an average of these priorities is computed.

NOTE: Due to the nature of AIP, objectives charts, objectives grid, and all sensitivity analysis pages are disabled when AIP is selected.

Normalization Options

By default, the results are Normalized. When the advanced mode is ON, you can select to display results as follows:

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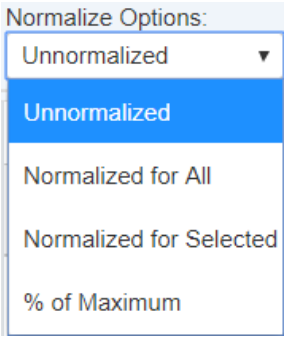


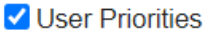
- **Unnormalized:** The priority is the sum of the products of each covering objective's global priority times the priority of the alternative with respect to each covering objective. If an alternative has a priority of 1 for every covering objective, it will have an unnormalized priority of 1 and is referred to as an ideal alternative. Note: "Unnormalized" is not available and not applicable when using Distributive mode.
- **Normalized for All: S**um to 1 for all the alternatives
- **Percentage of Maximum:** The alternative with the highest priority is 1 and all others are a percentage of this
- **Normalized for Selected:** Sum to 1 for the selected alternatives

Combined Input Option (CIS)

If the Combined Input Option (CIS) is ON, then results for individuals are computed by combining the priorities derived from judgments/ratings for which they had roles, with the combined results for any parts of the model where they did not have a role.

Apply User Priorities

If priorities (weights) have been specified for participants, you can use the "User Priorities" check box which enables you to apply or ignore these priorities in calculating the results.



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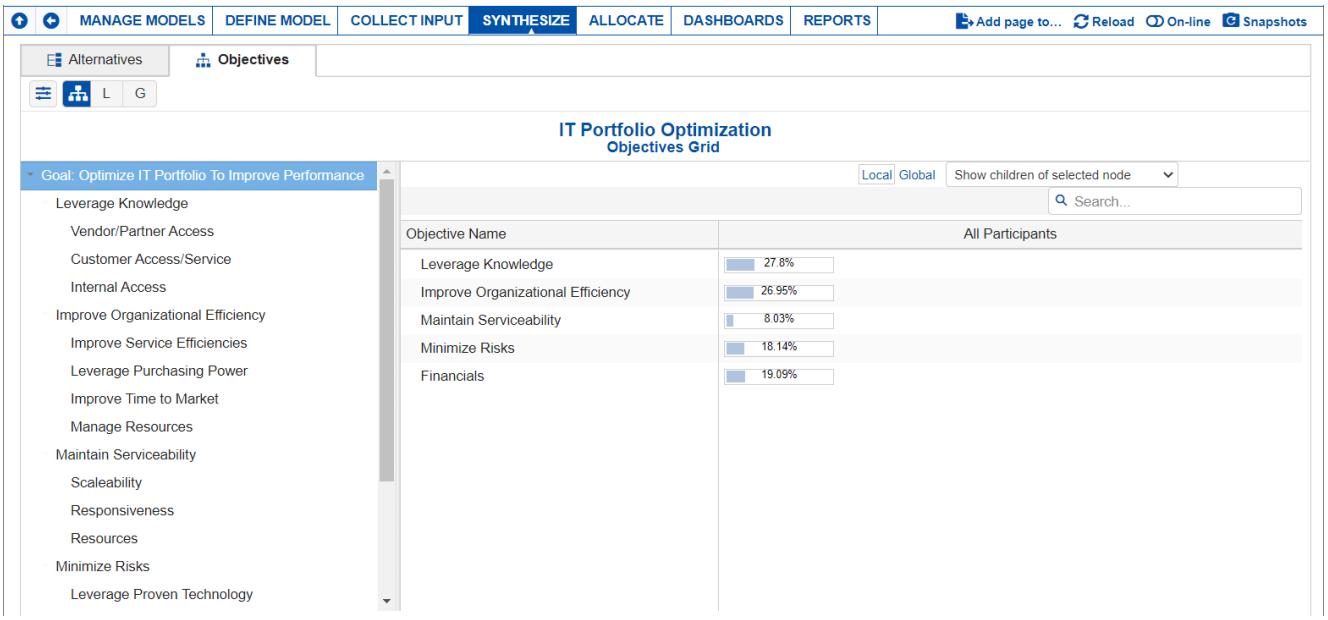
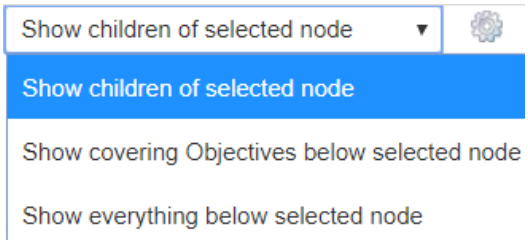
Objectives Grid

The **Objectives Grid** page shows the objectives priorities with respect to the decision goal for All Participants.



You can select to **show the children**, **covering objectives**, or **all objectives** below the selected node in the hierarchy:



"Show children of selected node" is selected by default as shown in the grid above.

By selecting an element in the hierarchy other than the goal, you can see the results with respect to (WRT) this element rather than the overall results with respect to the goal.

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Goal: Optimize IT Portfoli…	100%	100%
Leverage Knowledge	27.7%	27.7%
Vendor/Partner Access	30.17%	8.36%
Customer Access/S…	32.54%	9.01%
Internal Access	37.29%	10.33%
Improve Organizationa…	21.06%	21.06%
Improve Service Effi…	22.53%	4.75%
Leverage Purchasin…	18.15%	3.82%
Improve Time to Mar…	27.33%	5.76%
Manage Resources	31.99%	6.74%
Maintain Serviceability	10.07%	10.07%
Scaleability	42.84%	4.31%
Responsiveness	32.5%	3.27%
Resources	24.66%	2.48%

Objective Name	All Participants 7 with judgments
Improve Service Effi…	22.53%
Leverage Purchasin…	18.15%
Improve Time to Ma…	27.33%
Manage Resources	31.99%

The grid above shows all the objectives below the selected node Minimize Risks.

Click to expand the tool bar options, if collapsed.

Toggle Hierarchy to show or hide the Objectives Hierarchy and/or the Local and Global Objective priorities on the hierarchy.

Toggle L & G Priorities to show/hide the Local and Global objectives priorities on the objectives hierarchy/tree.

Select Participants and Groups

You can select to display results for an individual participant or another group by clicking

The number designates the number selected/total number of participants.

Clicking the button will open a window listing the participants and groups in the model. You can select more than one user. Simply check the participants and groups you want to see results.

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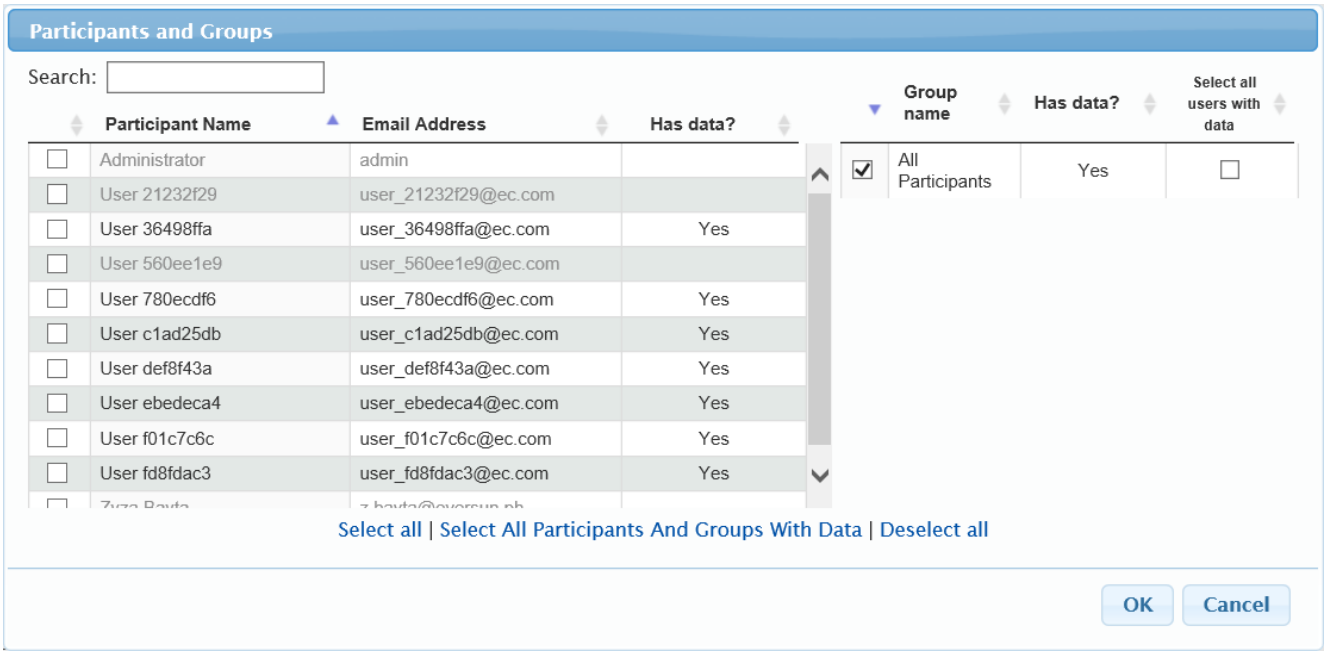

Change Objectives Color

You can change the Alternatives color from the Alternatives Grid and Dynamic Analysis page; and the Objectives color from the Objectives Grid page.

From Grid, simply click or right-click the alternative or objective priority bar/cell, and then choose a color from the color picker:

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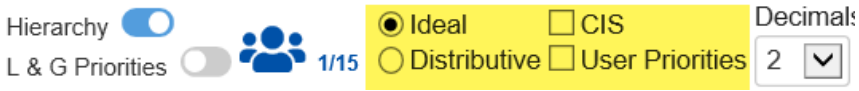
ID	Alternative Name	All Participants 7 with judgments
[08]	AS/400 Replacements	52.74%
[03]	Cisco Routers	61.76%
[17]	Customer Service Call Center	60.38%
[13]	Desktop Replacements	49.19%
[04]	EMC Symmetrix	52.77%
[12]	Firewall and Antivirus Licenses	56.75%
[05]	Iron Mountain Backup Service	59.98%
[11]	Laptop Replacements	32.78%
[15]	Mobile Workforce Pocket PCs	32.71%
[09]	Oracle 9i Upgrade	57.69%
[07]	PeopleSoft Upgrade	45.32%
[02]	Plumtree Corporate Portal	77.52%
[16]	ProServe System Upgrade	55.37%
[14]	Sales Force Laptops	53.12%

DIDN'T SEE THE OPTION YOU ARE LOOKING FOR? Try enabling the **Advanced Mode** switch at the bottom of the page; this will show the **advanced options on this page**.

When the Advanced mode is ON, you will see the advanced options on this page:



Ideal and Distributive Synthesis

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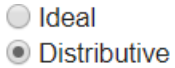

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distributive synthesis mode. Originally, this was the only synthesis mode of AHP. Critics of AHP pointed out situations where a different synthesis mode is more appropriate.

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If the Combined Input Option (CIS) is ON, then results for individuals are computed by combining the priorities derived from judgments/ratings for which they had roles, with the combined results for any parts of the model where they did not have a role.

Apply User Priorities

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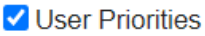

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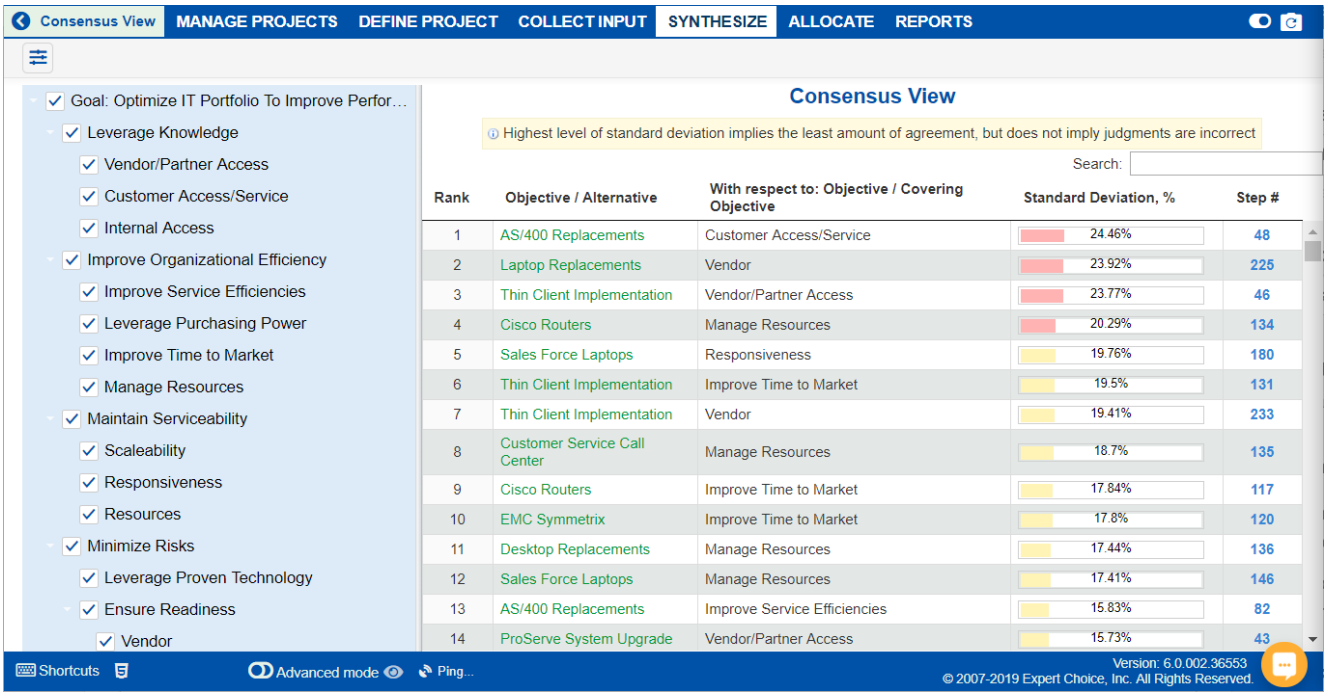
Consensus View

The consensus view shows the standard deviations (the square root of the variances) among evaluators for each judgment. The table is sorted from highest disagreement to lowest disagreement among evaluators for each node.



The entries are displayed for steps in the evaluation process, sorted from high to low standard deviation (square root of variance).

The standard deviation percentage has a bar with color-coding to give a visual indication of the consensus but is not to be interpreted as being acceptable or not. The red bar indicates high percentage, yellow for medium, and green for low.

The main purpose of the consensus view is to make it easy to revisit those steps in the evaluation process where that have high levels of disagreement. This analysis can help you detect bias, or can help you sort out information asymmetry among your participants.

Clicking on the step number in the row will open TeamTime in another browser window specific to the step for the chosen alternative/objective step. The variances are displayed in the TeamTime meeting instead of the Standard Deviation.

You can select those portions of the hierarchy to view standard deviation.

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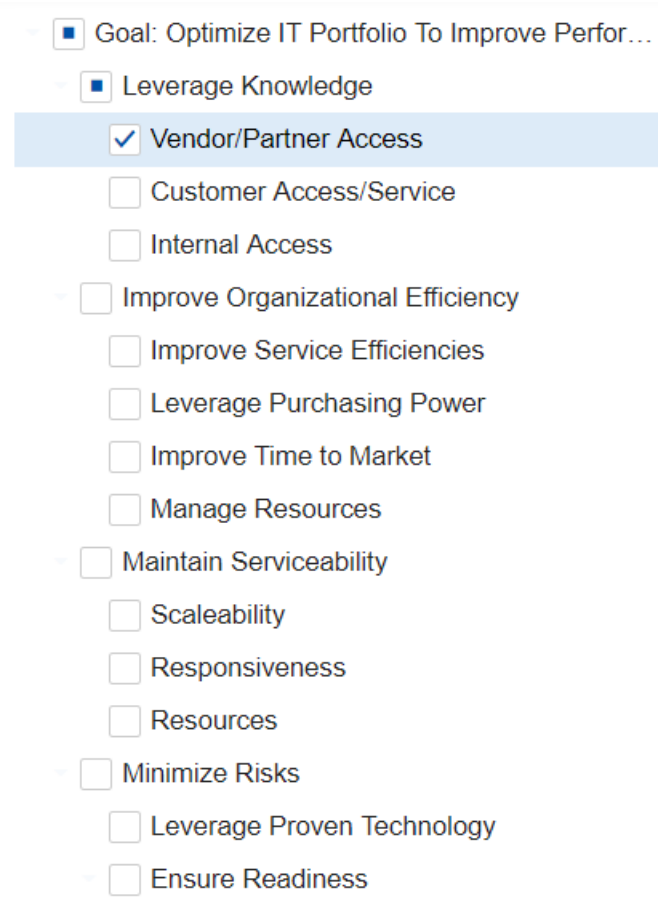

In the above example, only variances for those judgments with respect to **Vendor/Partner Access** will display.

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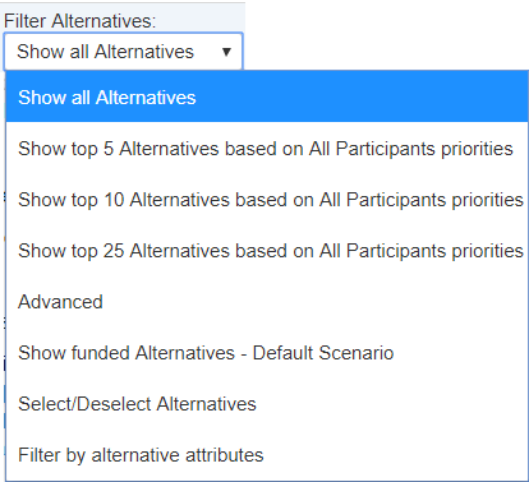
Filter Alternatives

You can specify alternatives be excluded or included in the Synthesize results using the Filter Alternatives dropdown.

Click to expand the toolbar options, if collapsed.

By default, all alternatives are displayed.



- Show top N Alternatives. Select to display the top 5, 10, or 25 alternatives based on the "All Participants" group priorities.
- Advanced. Allows you to specify the top N based on the selected participant or group.

- Show funded alternatives from the active Resource Aligner scenario.
- Select/Deselect Alternatives.

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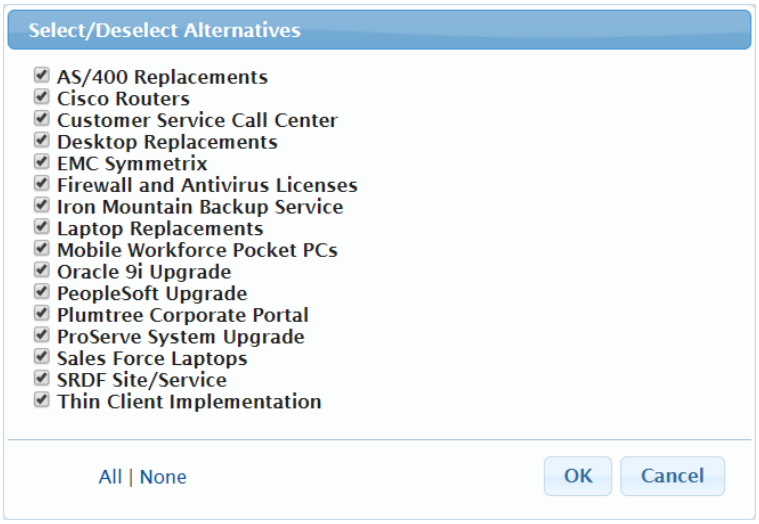

- Filter by alternative attributes specified in Alternatives page.

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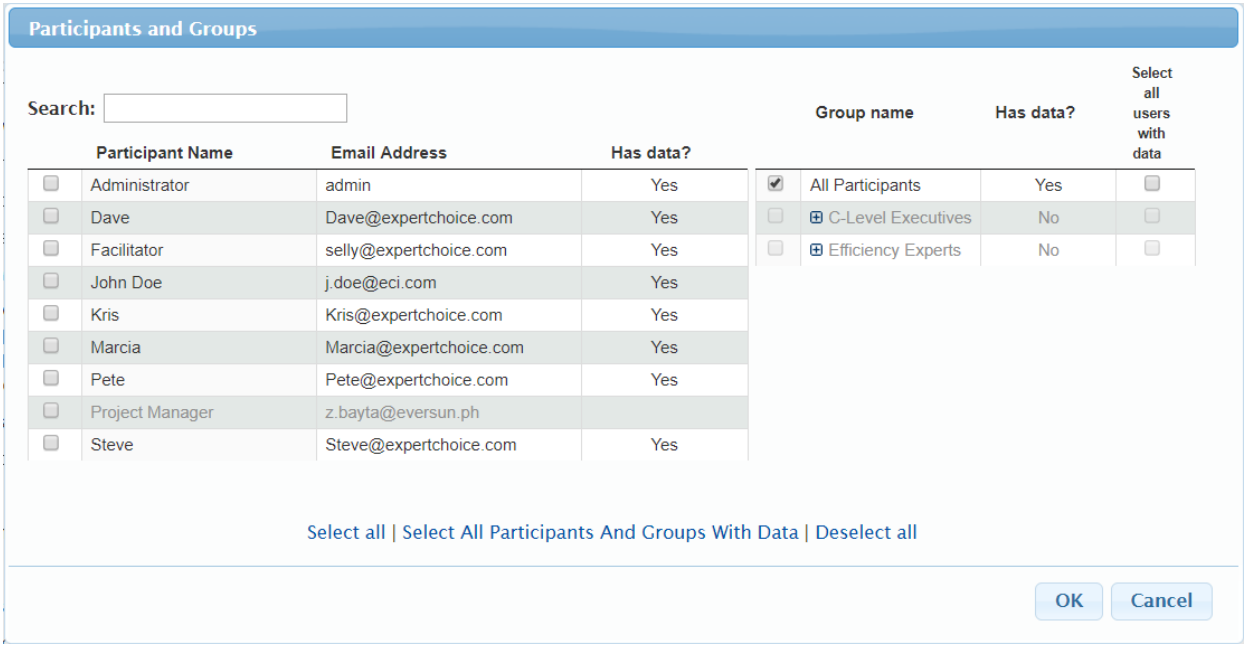
Select Participants and Groups

You can display the Alternatives and Objectives priorities in Grids and Charts for one or more participants or groups.

Click to expand the toolbar options, if collapsed.

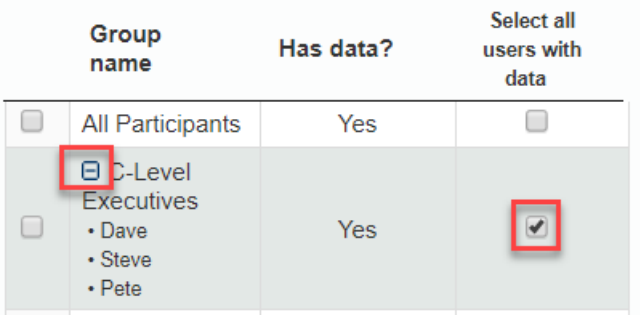
Clicking

will open a window displaying the participants and groups of the model as shown below:



Simply check the checkboxes to the left of the participants and groups you want to display results.

You can select to display all the participants with judgments on a specific group by checking the "Select all users with data" checkbox. You can also show or hide the participants who belong to a group by using the expand/collapsed icon.



The selected participants and groups are remembered even after closing the model.

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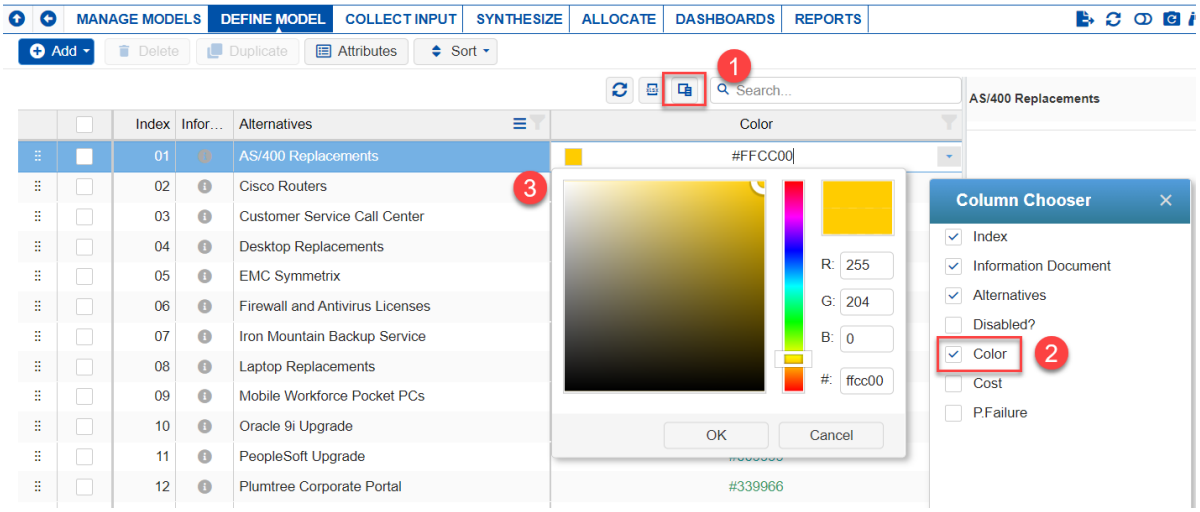
Change Alternatives and Objectives Color

You can change the Alternatives color on the following pages:

- **DEFINE MODEL > Review/Refine Model > Alternatives List**
  1. Click the column chooser
  2. Select "Colors" to show the Colors column
  3. Type in the HEX color code on the cell or use the color picker for each alternative



- **SYNTHESIZE** > Overall Results > **Alternatives Grid**
- **SYNTHESIZE** > **Dynamic Analysis**

You can change the Objectives color on:

- **SYNTHESIZE > Objectives Grid**

From the Alternative/Objectives Grids, simply click or right-click the alternative or objective priority bar/cell, and then choose a color from the color picker:

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ID	Alternative Name	All Participants 7 with judgments
[08]	AS/400 Replacements	52.74%
[03]	Cisco Routers	61.76%
[17]	Customer Service Call Center	60.38%
[13]	Desktop Replacements	49.19%
[04]	EMC Symmetrix	52.77%
[12]	Firewall and Antivirus Licenses	56.75%
[05]	Iron Mountain Backup Service	59.98%
[11]	Laptop Replacements	32.78%
[15]	Mobile Workforce Pocket PCs	32.71%
[09]	Oracle 9i Upgrade	57.69%
[07]	PeopleSoft Upgrade	45.32%
[02]	Plumtree Corporate Portal	77.52%
[16]	ProServe System Upgrade	55.37%
[14]	Sales Force Laptops	53.12%

From the Dynamic Analysis Chart, click an alternative bar to open the same color picker.

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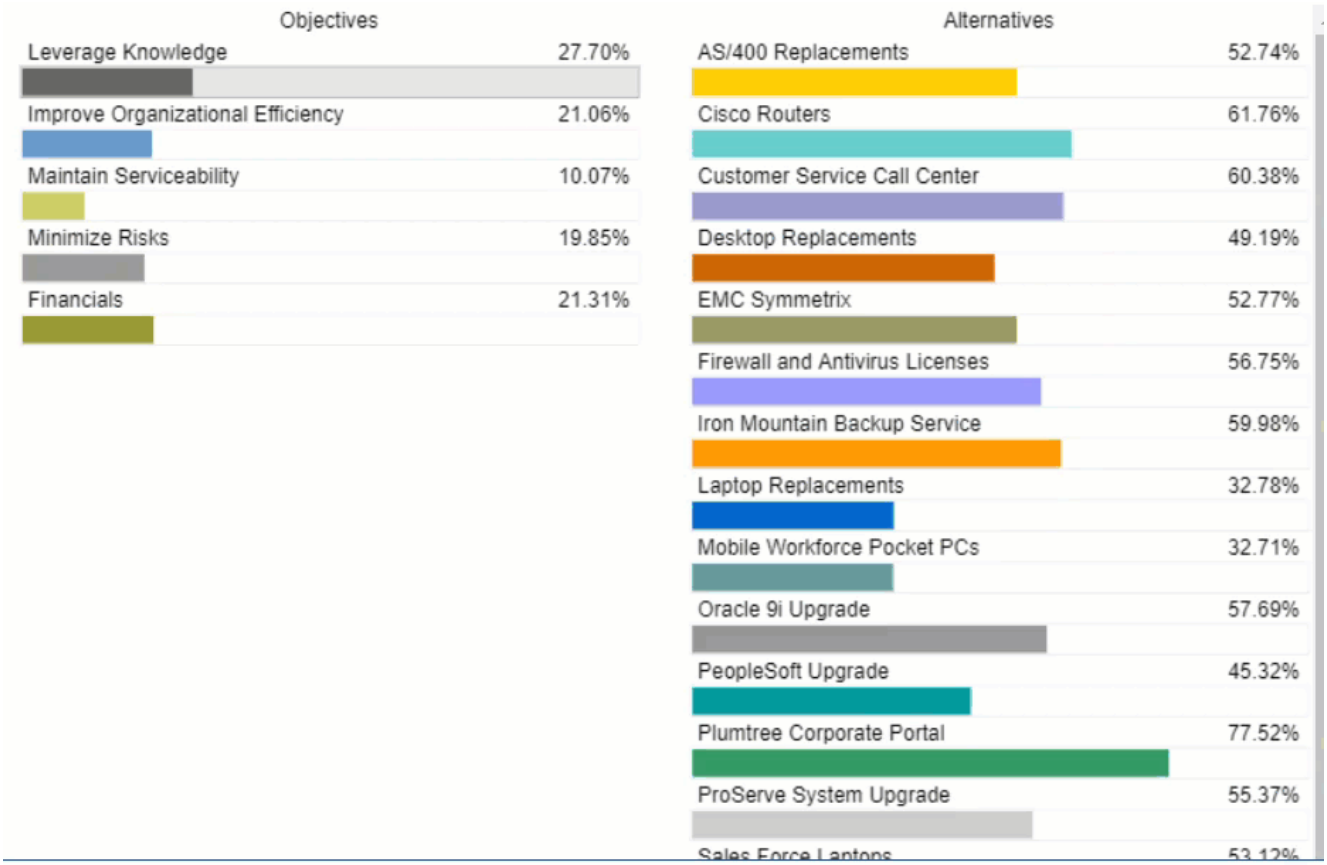

Click **Reset All** to revert to the default color assignment.

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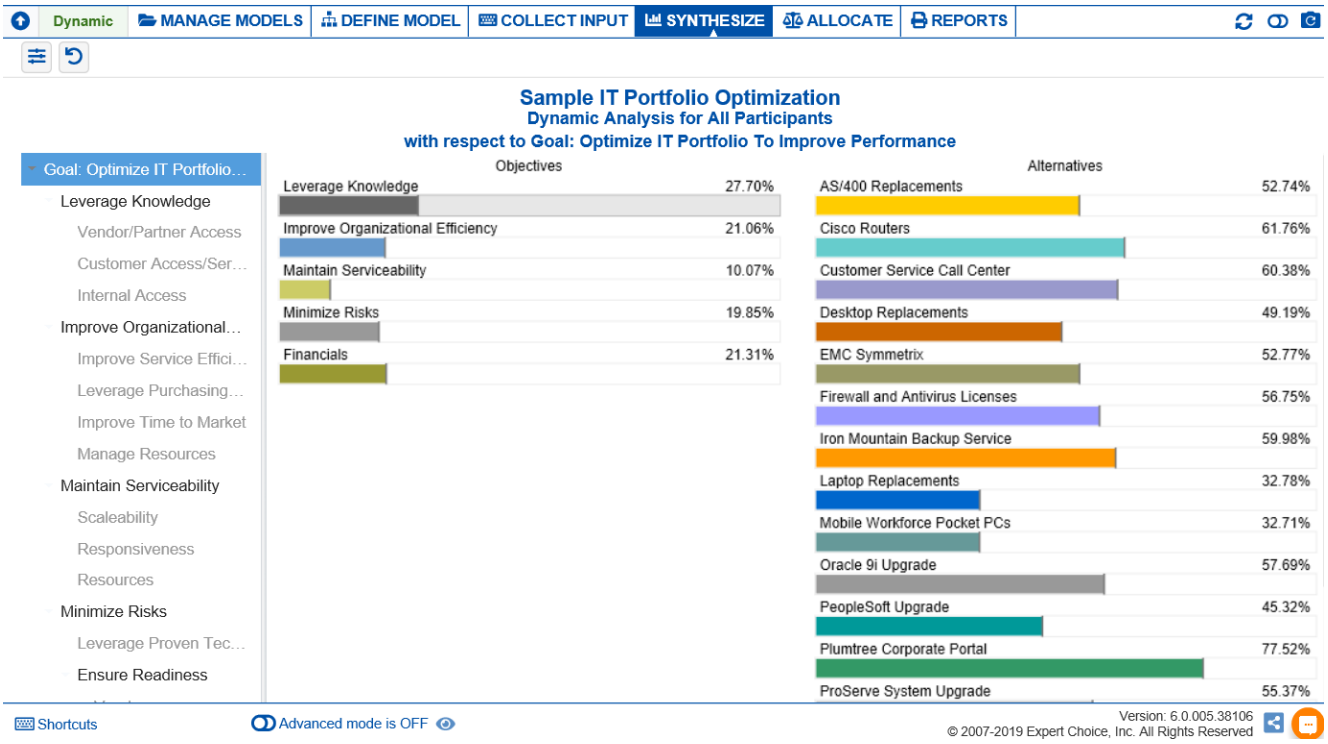
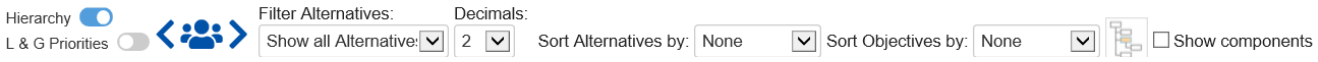
Dynamic Analysis

Overview

Dynamic Sensitivity analysis is used to dynamically change the priorities of the objectives to determine how these changes affect the priorities of the alternative choices.



Click to show/hide the toolbar options:



By dragging the objective's priorities back and forth in the left column, the priorities of the alternatives will change in the right column.

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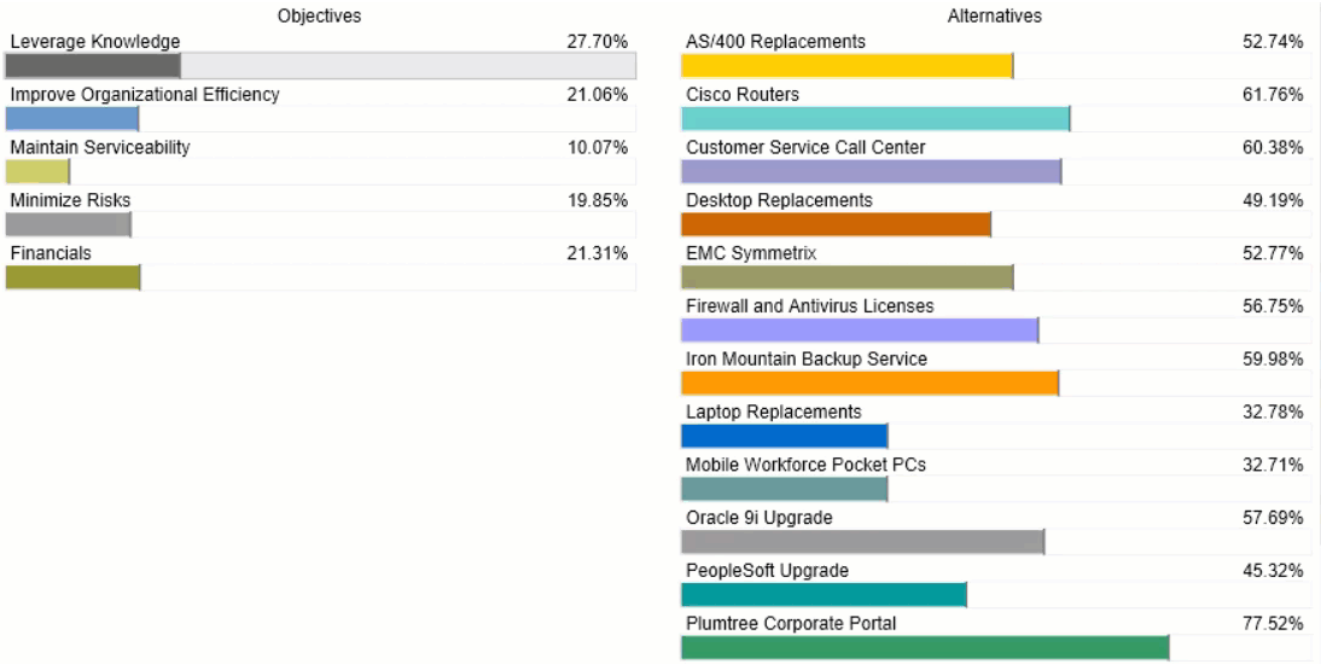
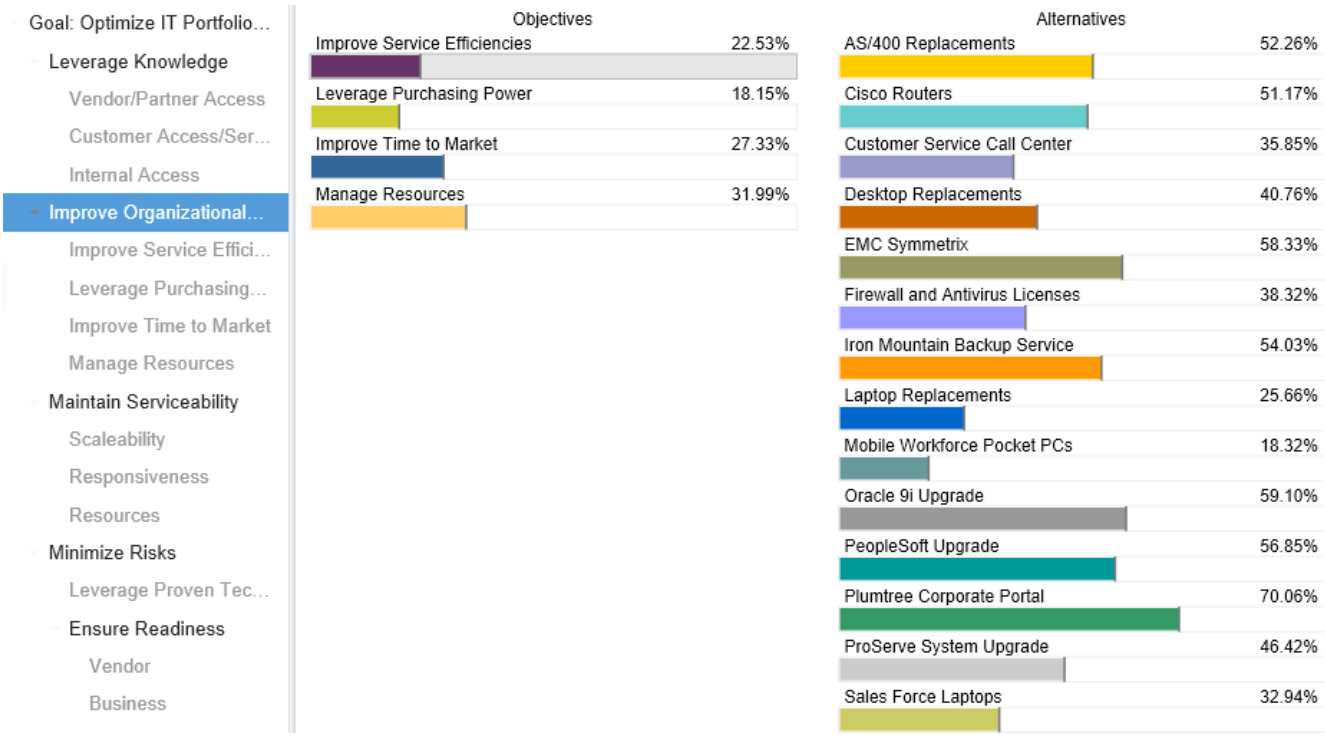


The black | markers on the objective and alternative bars indicate the original objectives and alternatives priorities.

After temporarily changing the priority of one or more of the objectives, you can press the reset icon.

By selecting an element in the hierarchy other than the Goal, you can see the results with respect to (WRT) this element rather than the overall results with respect to the goal:



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The dynamic analysis above shows all the alternatives priorities with respect to the selected node Improve Organizational Efficiency.

Toggle to show/hide the objectives hierarchy/tree at the left.

Toggle

to show/hide the Local and Global objectives priorities on the objectives hierarchy/tree.

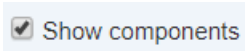
Select Participant and Group

You can select to display results for an individual participant or another group using .

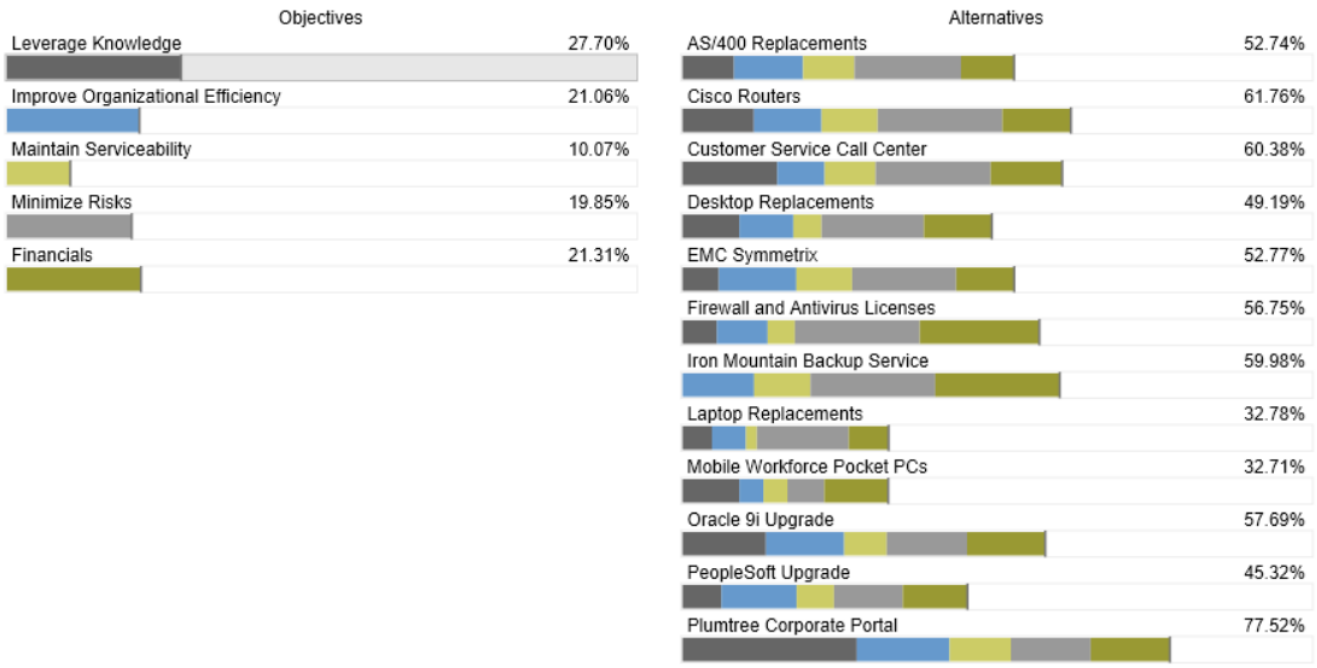
Clicking the button will open a window where you can select a participant or a group.

You can use the prev and next buttons to cycle through each participant or group.

Alternative Components



displays the breakdown of each of the objective's contributions or share to the priority of each of the alternatives.



The breakdown colors of the alternative bars at the right corresponds to each of the objectives at the left.

Change Alternatives Color

Clicking on the alternative bar will open a color picker where you can select and change the color assignment.

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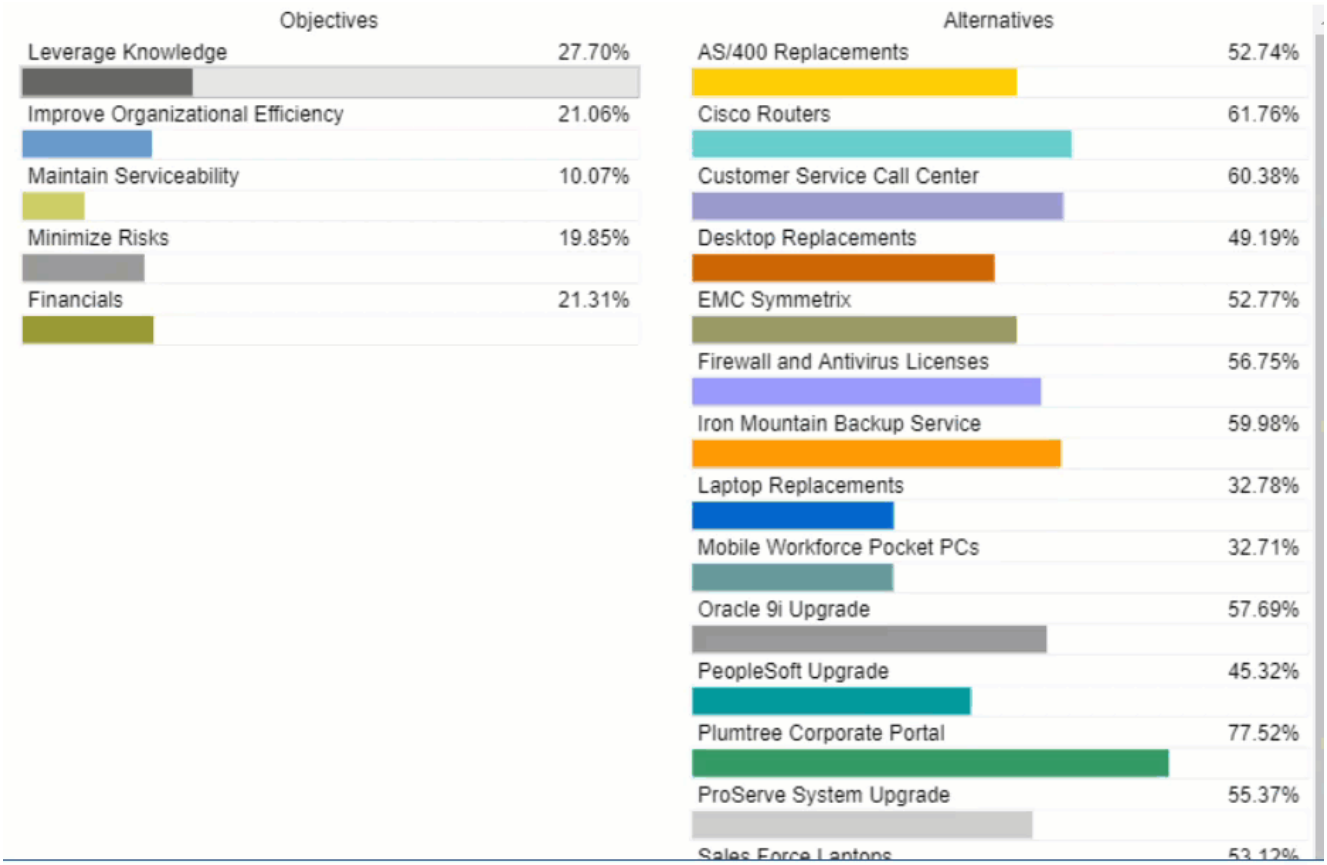
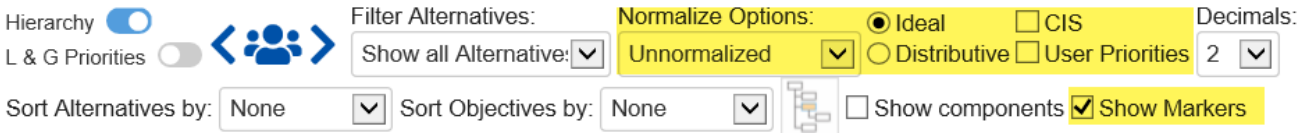


You can also change colors from the Alternatives and Objectives Grid.

DIDN'T SEE THE OPTION YOU ARE LOOKING FOR? Try enabling the **Advanced Mode** switch at the bottom of the page; this will show the **advanced options on this page**.

When the Advanced mode is ON, you will see the advanced options on this page:



Using Markers

The ☐ Show Markers option displays red | and blue | markers on the alternatives bars which indicate the alternative priority when the selected objective is dragged to the maximum (100%) or minimum (0%) respectively.

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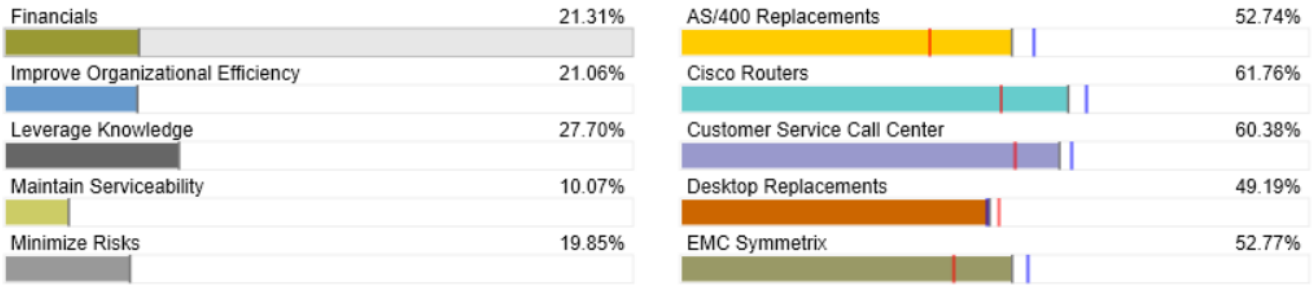

The selected objective in the example above is "Financials" as indicated by its light gray background.

When the "Financials" bar is dragged to the maximum (100%), the alternative bars at the right will be filled up to where the red marker is. When it is dragged to the minimum (0%), the alternative bars at the right will be filled up to where the blue marker is.

Depending on the alternative, red might be on the right and blue on the left, or vice-versa.

Ideal and Distributive Synthesis

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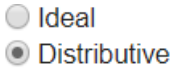

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Clicking the **AIP** check-box will show results based on aggregating individual priorities, known as AIP, instead of aggregating individual judgments (AIJ). When AIP is checked, overall alternative priorities are computed for each participant and then an average of these priorities is computed.

NOTE: Due to the nature of AIP, objectives charts, objectives grid, and all sensitivity analysis pages are disabled when AIP is selected.

Normalization Options

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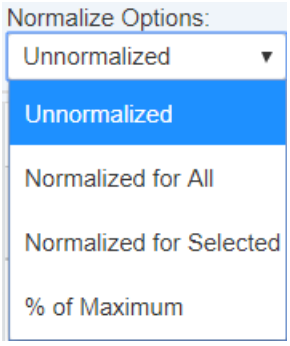
In Advanced mode, you can select to display results based on various normalization options:



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- **Normalized for All:** Sum to 1 for all the alternatives.
- **Percentage of Maximum:** The alternative with the highest priority is 1 and all others are a percentage of this.
- **Normalized for Selected:** Sum to 1 for the selected alternatives.

Combined Input Option (CIS)

If the Combined Input Option (CIS) is ON, then results for individuals are computed by combining the priorities derived from judgments/ratings for which they had roles, with the combined results for any parts of the model where they did not have a role.

Apply User Priorities

If priorities (weights) have been specified for participants, you can use the "User Priorities" check box which enables you to apply or ignore these priorities in calculating the results.

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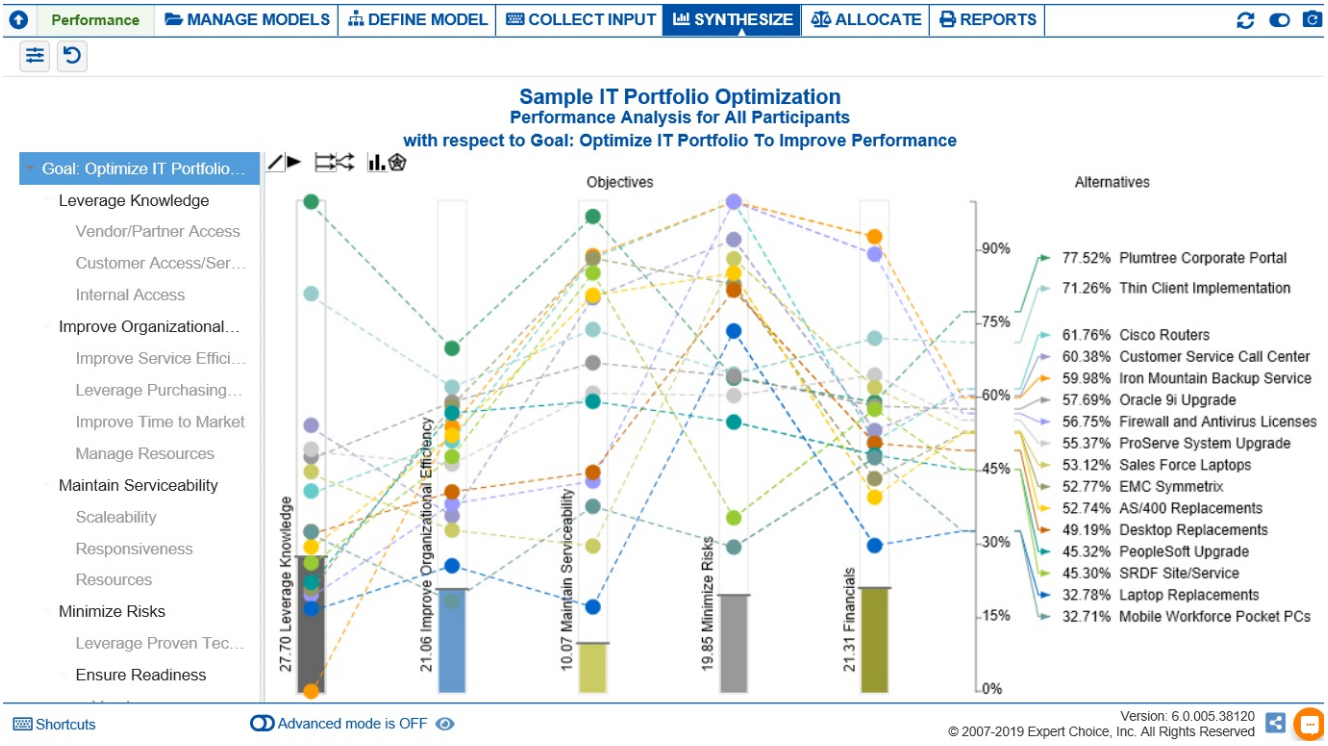
Performance Analysis

Overview

Performance analysis is used to dynamically change the priorities of the objectives to determine how these changes affect the priorities of the alternative choices.



Each performance sensitivity is composed of:

- The relative importance of the objectives as depicted by the vertical bars and shown numerically on the left side of each bar.
- The relative performance with respect to any of the objectives as shown by the intersection of alternatives line segment with the objective. Thus, for example, Cisco Routers is the best performing alternative with respect to Leverage Knowledge (green line).
- The intersection of the alternatives line segment with the overall axis on the right shows the relative overall priority of the alternative.

The options above the chart are explained below:

- to display the lines connecting the alternatives from one objective to another. Note: The connecting lines have no meaning; they are included to help you find where a particular alternative lies as you move from one objective to another.
- to hide the connecting lines and use horizontal ticks instead of circles to indicate the priority of the alternative wrt the objective.
- to align the alternative labels at the right to their corresponding overall priorities.
- to expand the alternative labels.

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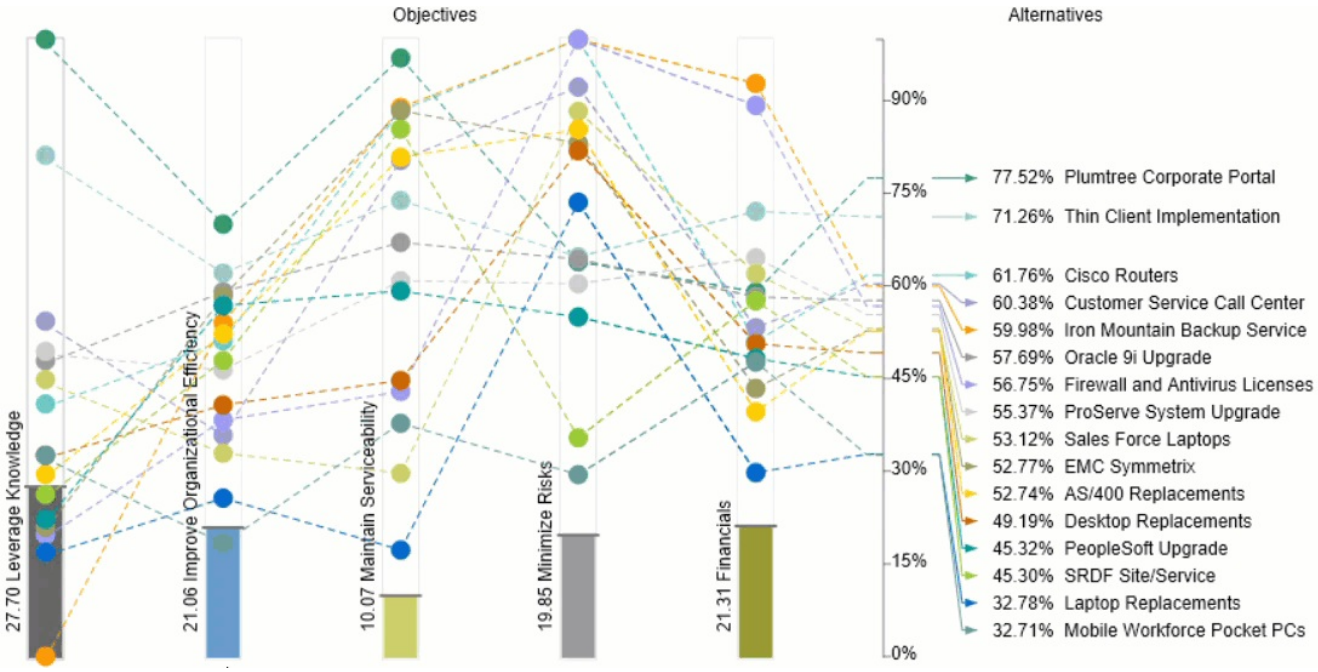
- to show the objectives as bars.
- to display the performance sensitivity as a radar chart.

Click to display the toolbar options:

The Performance graph is also dynamic, so you can temporarily alter the relationship between the alternatives and their objectives by dragging the objective bars up or down.

Note: If there is one alternative that is best on every objective, there is probably something missing from the model, or specific objectives were not considered adequately when the judgments were made. Iteration should almost always be performed in such a case since it is extremely rare that any alternative is best on every objective. If, for example, there was an alternative that was best on performance, appearance, reliability, ... then it would most likely cost more and therefore be less preferable with respect to cost.



After temporarily changing the priority of one or more of the objectives, you can press the reset icon.

By selecting an element in the hierarchy other than the goal, you can see the results with respect to (WRT) this element rather than the overall results with respect to the goal.

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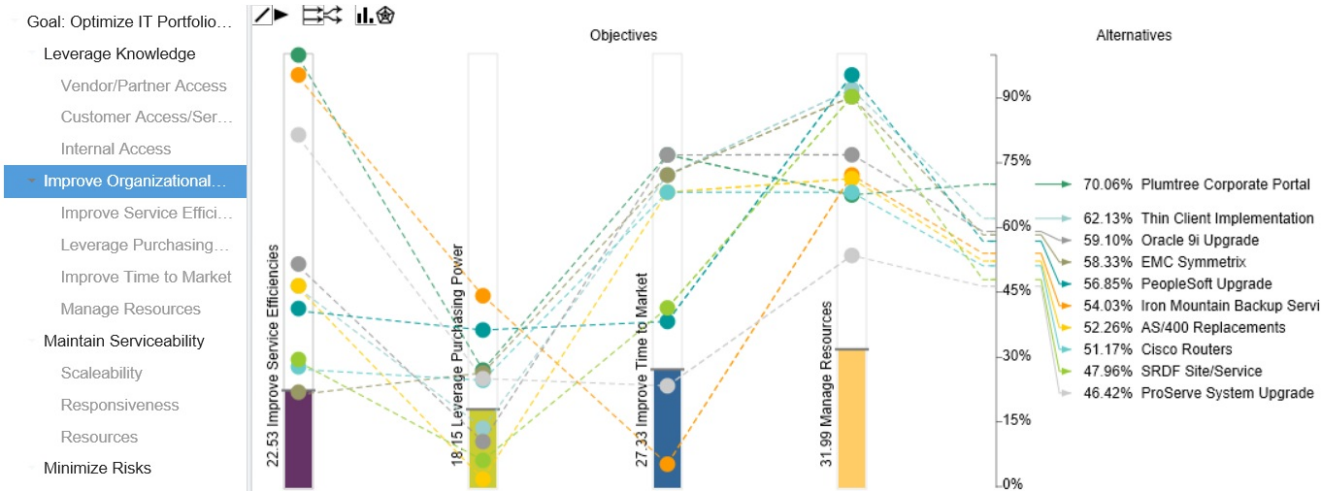

The performance above shows all the alternatives priorities with respect to the selected node Improve Organizational Efficiency.

You can toggle on to display the alternatives priorities with respect to the goal or to the selected objective node.

Toggle to show/hide the objectives hierarchy/tree at the left.

Toggle

to show/hide the Local and Global objectives priorities on the objectives hierarchy/tree.

Select Participant and Group

You can select to display results for an individual participant or another group using .

Clicking the button will open a window where you can select a participant or a group.

You can use the prev and next buttons to go through each participant or group.

Sort Objectives and Alternatives

You can sort the objectives and alternatives using the dropdowns:

Three options are available:

- None - based on sorting on the model
- Priority - descending by priority
- Name - ascending by name

Filter Alternatives

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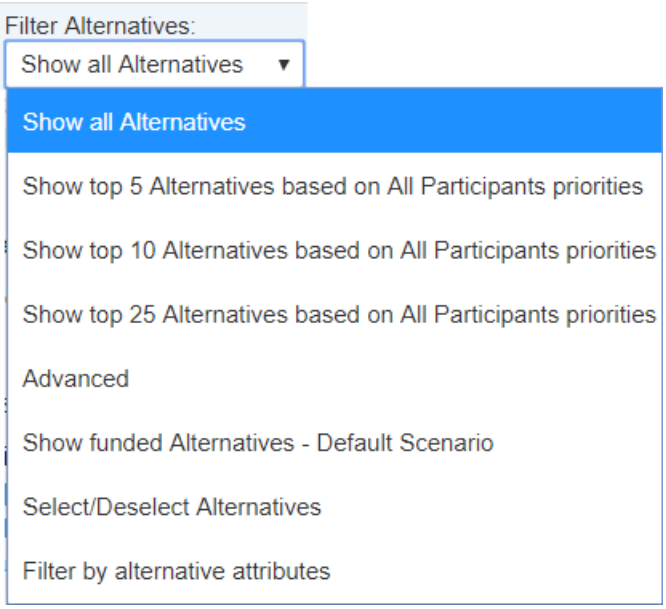
By default, all alternatives are displayed.



- Show top N Alternatives. Select to display the top 5, 10, or 25 alternatives based on the "All Participants" group priorities.
- Advanced. Allows you to specify the top N based on the selected participant or group.

- Show funded alternatives from the active Resource Aligner scenario.
- Select/Deselect Alternatives

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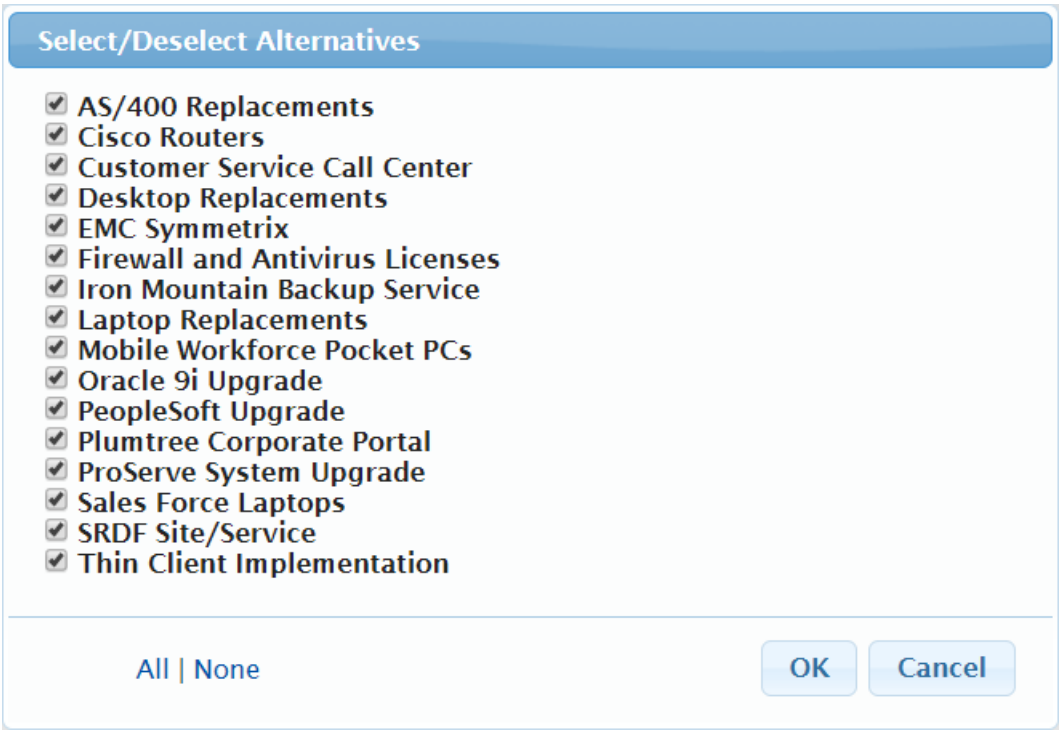
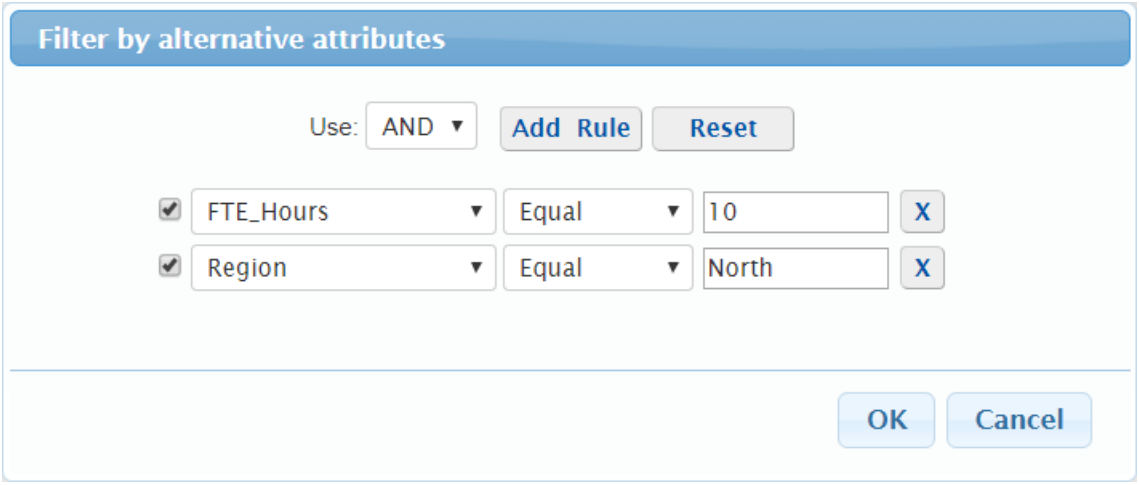


- Filter by alternatives attributes specified on the Alternatives page.



DIDN'T SEE AN OPTION YOU ARE LOOKING FOR? Try enabling the **Advanced Mode** switch at the bottom of the page; this will show the **advanced options on this page**.

When the Advanced mode is ON, you will see the advanced options on this page:

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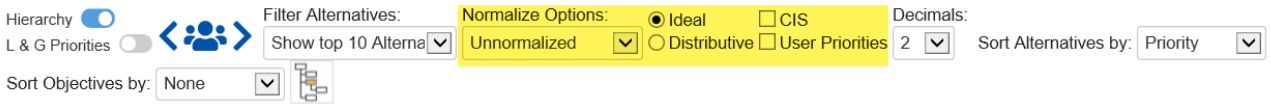
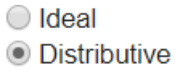


Ideal and Distributive Synthesis

Results can be computed as an **Ideal** mode (default) or D**istributive** mode synthesis.



Originally, AHP had only one synthesis mode – later called the "distributive" synthesis mode. A distributive synthesis distributes priorities from the goal down through the alternatives and is analogous to dividing priorities in a pie chart, which is intuitive for decision-makers to comprehend. The sum of the global priorities for each alternative with respect to each covering objective represents the overall priority of that alternative. The priorities have ratio scale properties (as well as, of course, interval and ordinal properties), which means that they can be used in making a choice, or in allocating resources. This synthesis operation can be thought of as distributing the goal's priority of 1.0 to the alternatives under consideration and is today called the distributive synthesis mode. Originally, this was the only synthesis mode of AHP. Critics of AHP pointed out situations where a different synthesis mode is more appropriate.

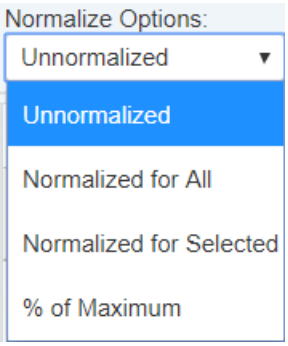
Aggregating Individual Priorities (AIP)

Clicking the **AIP** check-box will show results based on aggregating individual priorities, known as AIP, instead of aggregating individual judgments (AIJ). When AIP is checked, overall alternatives priorities are computed for each participant and then an average of these priorities is computed.

NOTE: Due to the nature of AIP, objectives charts, objectives grid, and all sensitivity analysis pages are disabled when AIP is selected.

Normalization Options

In Advanced mode, you can select to display results based on various normalization options:



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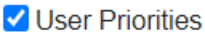
- **Unnormalized:** The priority is the sum of the products of each covering objective's global priority times the priority of the alternative with respect to each covering objective. If an alternative has a priority of 1 for every covering objective, it will have an unnormalized priority of 1 and is referred to as an ideal alternative. Note: "Unnormalized" is not available and not applicable when using Distributive mode.
- **Normalized for All:** Sum to 1 for all the alternatives.
- **Percentage of Maximum:** The alternative with the highest priority is 1 and all others are a percentage of this.
- **Normalized for Selected:** Sum to 1 for the selected alternatives.

Combined Input Option (CIS)

If the Combined Input Option (CIS) is ON, then results for individuals are computed by combining the priorities derived from judgments/ratings for which they had roles, with the combined results for any parts of the model where they did not have a role.

Apply User Priorities

If priorities (weights) have been specified for participants, you can use the "User Priorities" check box which enables you to apply or ignore these priorities in calculating the results.



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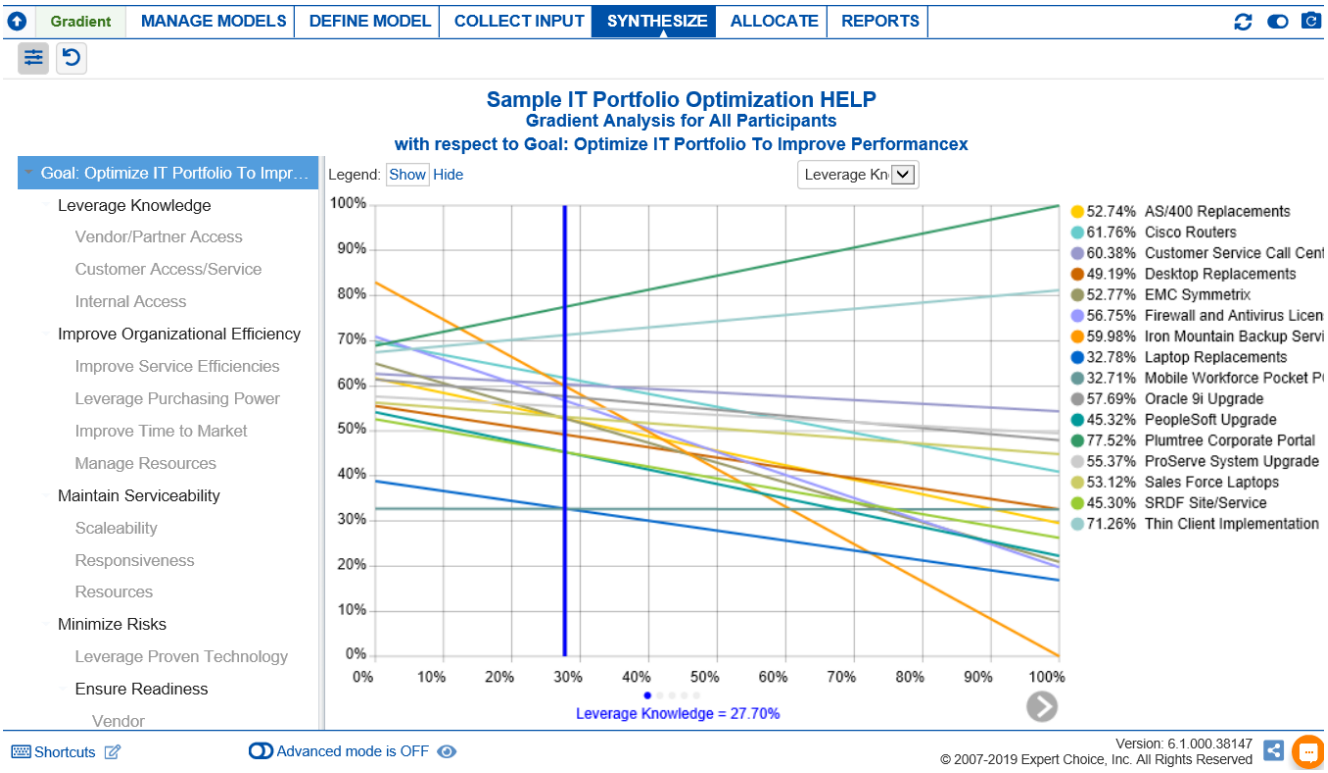
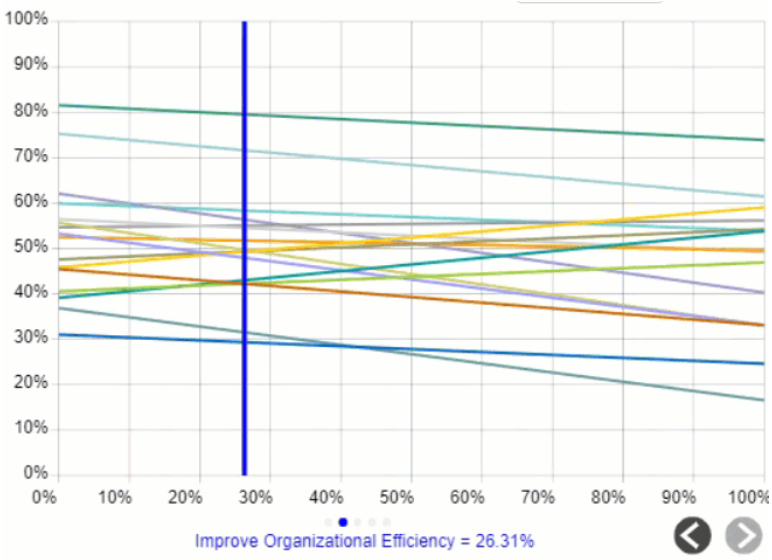
Gradient Analysis

A gradient analysis shows the rate of change of the priorities of alternatives with respect to the change in priority of one of the objectives.



Each gradient sensitivity is composed of:

- An objective on the x-axis -- which can be selected from buttons, such as:



- A curve for each of the alternatives.

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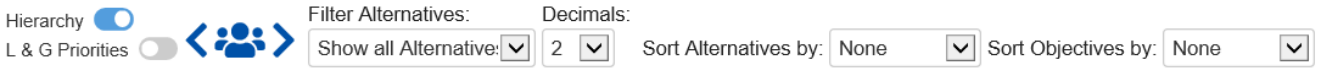
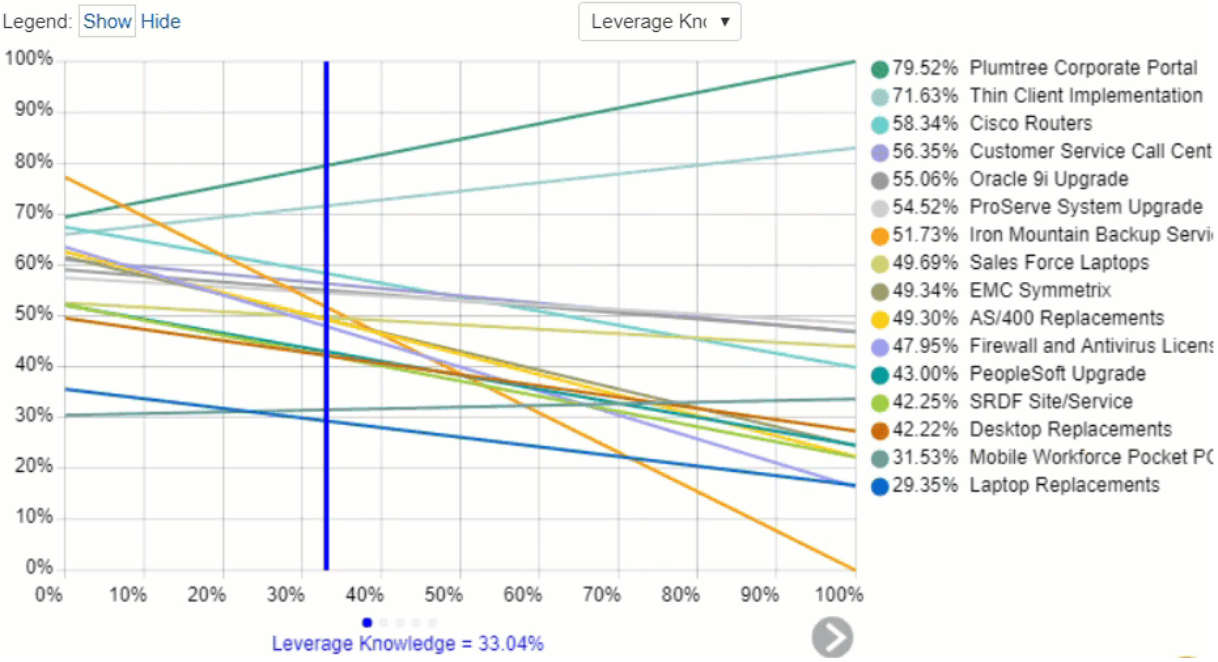
- A vertical bar representing the current priority of the objective being considered.

Click to show/hide the toolbar options:

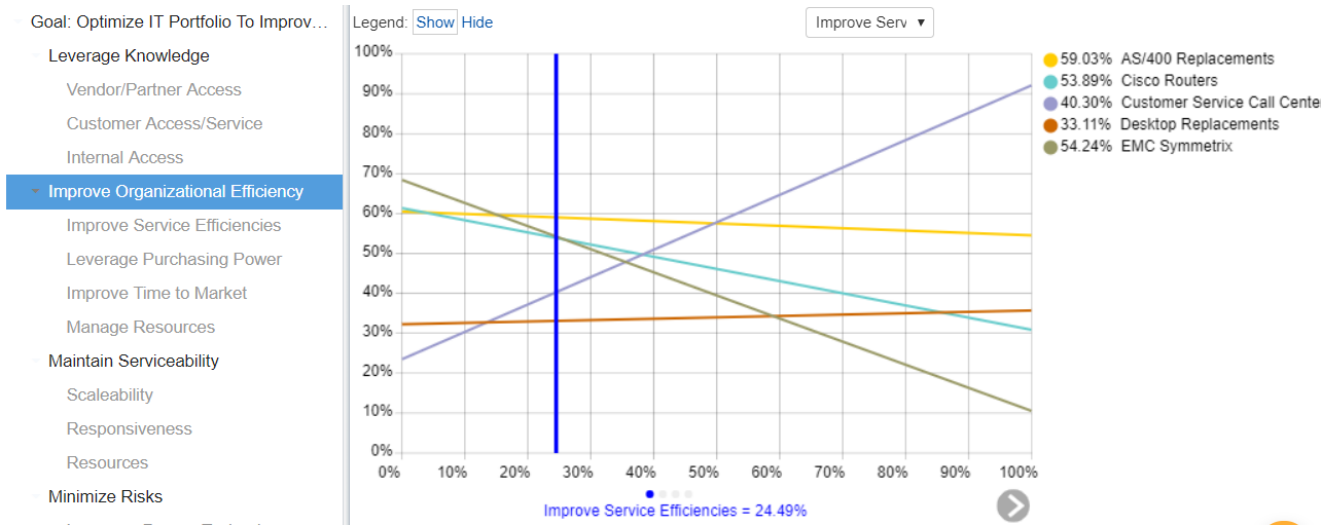


You can temporarily alter the relationship between the alternatives and their objectives by dragging the blue vertical bar left or right.



After temporarily changing the priority of one or more of the objectives, you can press the reset icon.

By selecting an element in the hierarchy other than the goal, you can see the results with respect to (WRT) this element rather than the overall results with respect to the goal:



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The gradient analysis above shows all the alternatives priorities with respect to the selected node Improve Organizational Efficiency.

Toggle to show/hide the objectives hierarchy/tree at the left.

Toggle

to show/hide the Local and Global objectives priorities on the objectives hierarchy/tree.

Select Participant and Group

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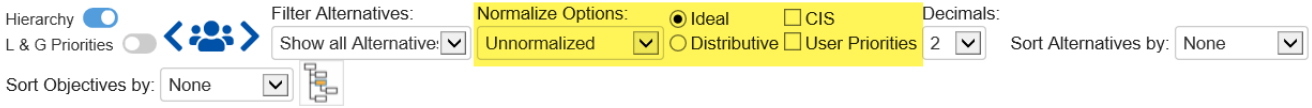

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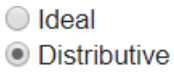

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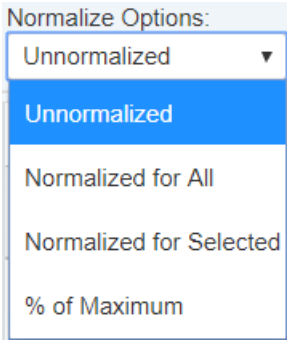

- **Unnormalized** (The priority is the sum of the products of each covering objective's global priority times the priority of the alternative with respect to each covering objective). If an alternative has a priority of 1 for every covering objective, it will have an unnormalized priority of 1 and is referred to as an ideal alternative). Note: "Unnormalized" is not available and not applicable when using Distributive mode.
- **Normalized for All** (alternative priorities sum to 1)
- **% of Maximum** (the alternative with the highest priority is 1 and all others are a percentage of this)
- **Normalized for Selected** (sum to 1 for the selected alternatives)

Combined Input Option (CIS)

If the Combined Input Option (CIS) is ON, then results for individuals are computed by combining the priorities derived from judgments/ratings for which they had roles, with the combined results for any parts of the model where they did not have a role.

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If priorities (weights) have been specified for participants, you can use the "User Priorities" check box which enables you to apply or ignore these priorities in calculating the results.

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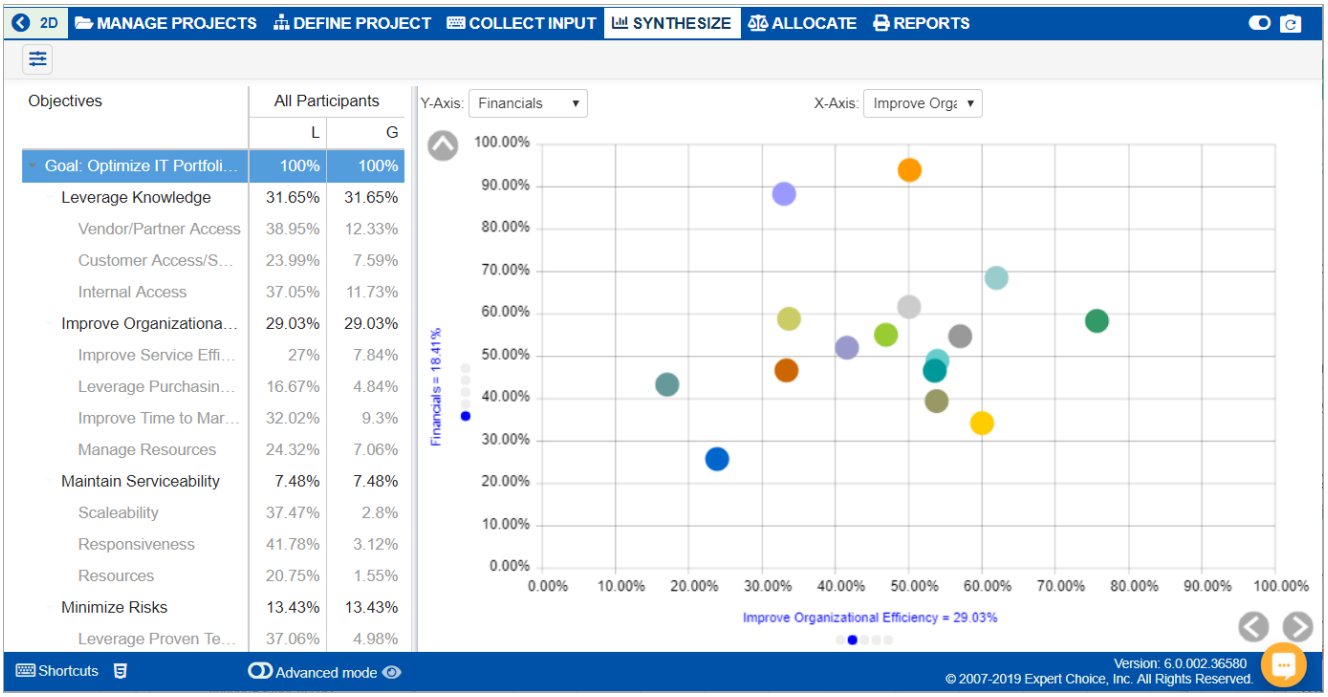
2D Analysis

The Two Dimensional sensitivity graph shows how well the alternatives perform with respect to any two objectives.

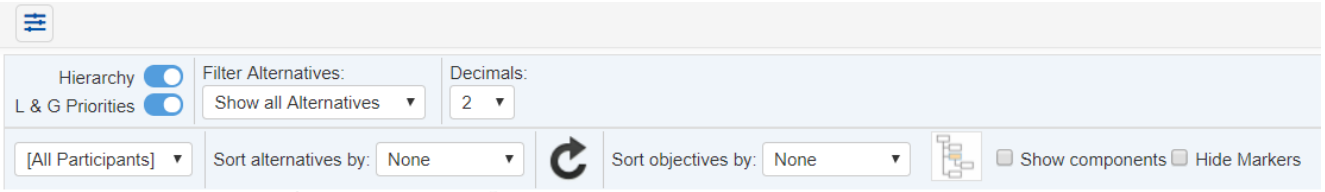


One objective is represented on the X-Axis and another on the Y-Axis. The circles represent the alternatives. If you think of the area of the 2D plot as divided into quadrants, the most favorable alternatives with respect to the two objectives shown will be in the upper right quadrant while, conversely, the least favorable alternatives will be shown in the lower left quadrant. Alternatives located in the upper left and lower right quadrants indicate key trade-offs where there is a conflict between the two objectives.

You can change the objectives being displayed on the x and y axes by selecting them in the pull-down menus:

or by clicking the (x-axis), or (y-axis)

Click to show/hide the toolbar options:



By selecting an element in the hierarchy other than the goal, you can see the results with respect to (WRT) this element rather

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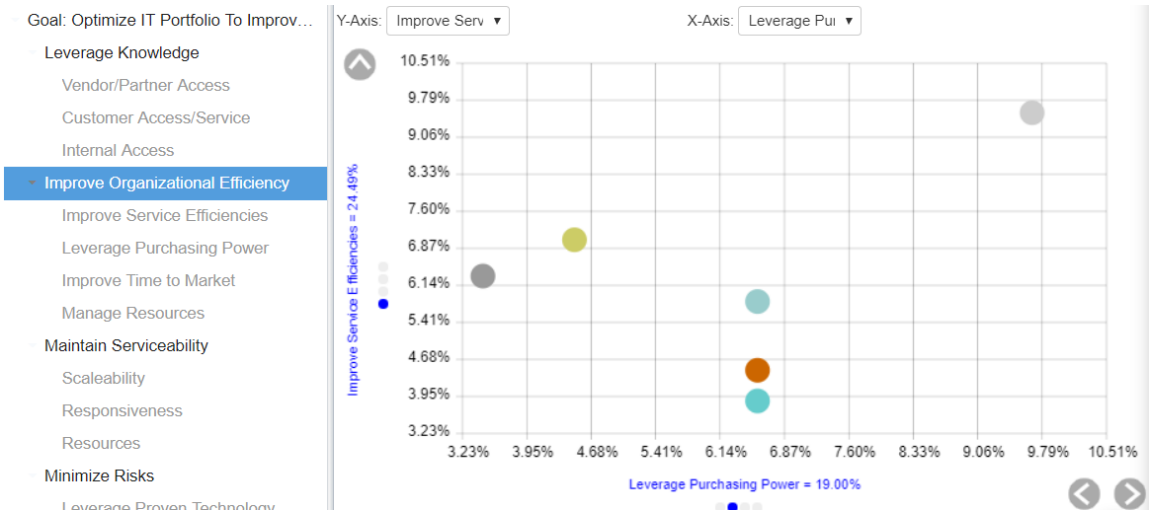
than the overall results with respect to the goal:



Toggle Hierarchy to show/hide the objectives hierarchy/tree at the left.

Toggle L & G Priorities to show/hide the Local and Global objectives priorities on the objectives hierarchy/tree.

Select Participant and Group

By default, the result shown is for the "All Participants" group. You can select to display results for individual participants or another group.

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DIDN'T SEE THE OPTION YOU ARE LOOKING FOR? Try enabling the **Advanced Mode** switch at the bottom of the page; this will show the **advanced options** on this page.

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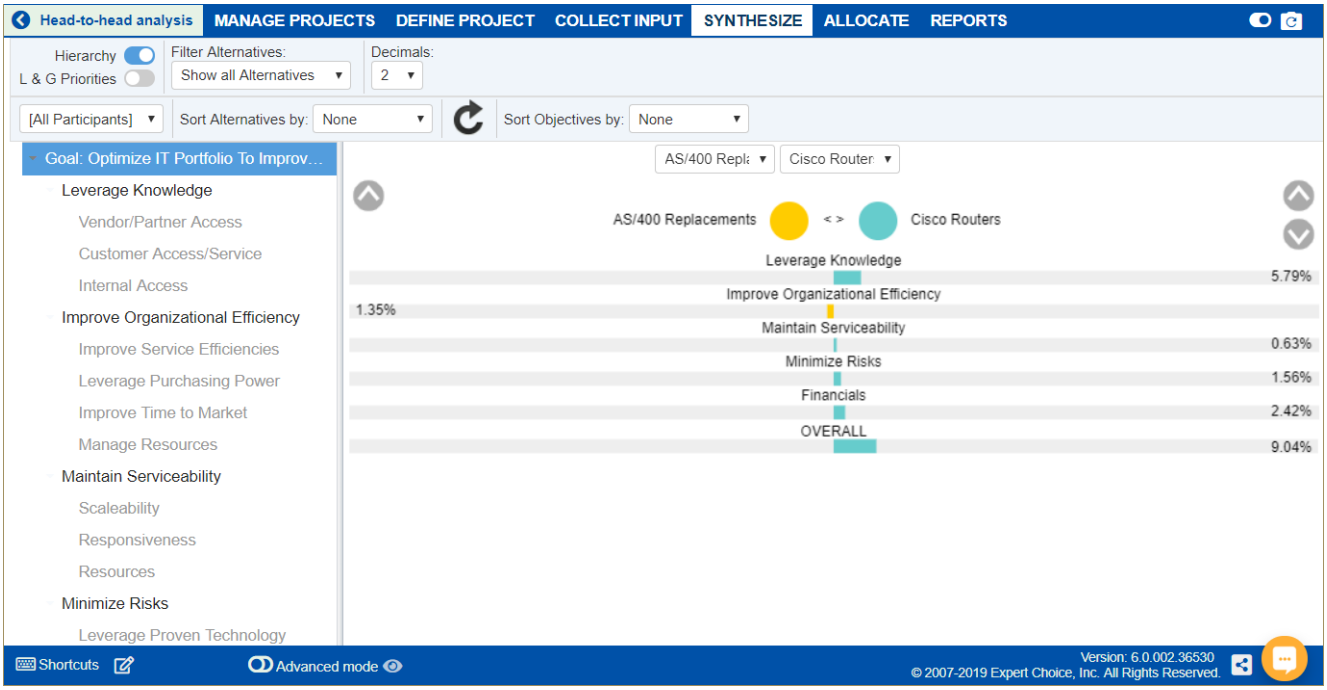
Head to Head Analysis

The Head-to-head- analysis shows how Alternatives compare to each other with respect to an Objective.



One alternative is listed on the left side of the graph and the other is listed on the right. Down the middle of the graph are the objectives in the decision. If the left-hand alternative is preferred to the right-hand alternative with respect to an objective, a horizontal bar is displayed towards the left. If the right-hand alternative is better, the horizontal bar will be on the right. If the two choices are equal, no bar is displayed. The overall result is displayed at the bottom of the graph and shows the overall percentage that one alternative is better than the other; this is the difference.

You can change the alternatives being compared by using the pull-down menu:

or by clicking the icons.

By selecting an element in the hierarchy other than the goal, you can see the results with respect to (WRT) this element rather than the overall results with respect to the goal:

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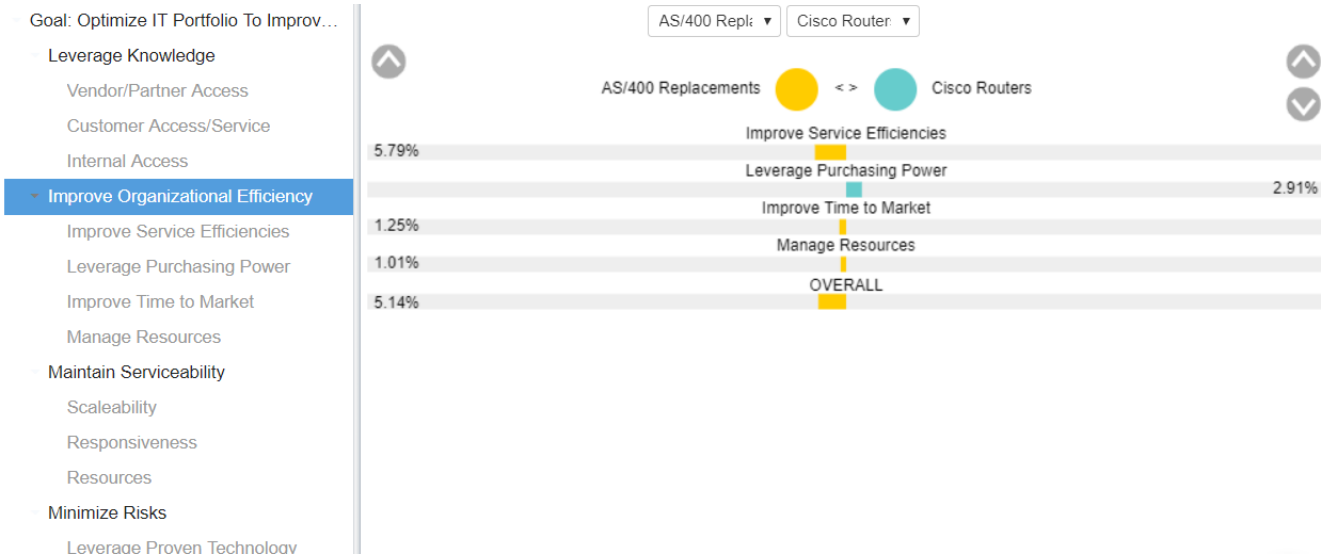

Select Participant and Group

By default, the result shown is for the "All Participants" group. You can display results for individual participants or another group.

DIDN'T SEE THE OPTION YOU ARE LOOKING FOR? Try enabling the **Advanced Mode** switch at the bottom of the page; this will show the **advanced options** on this page.

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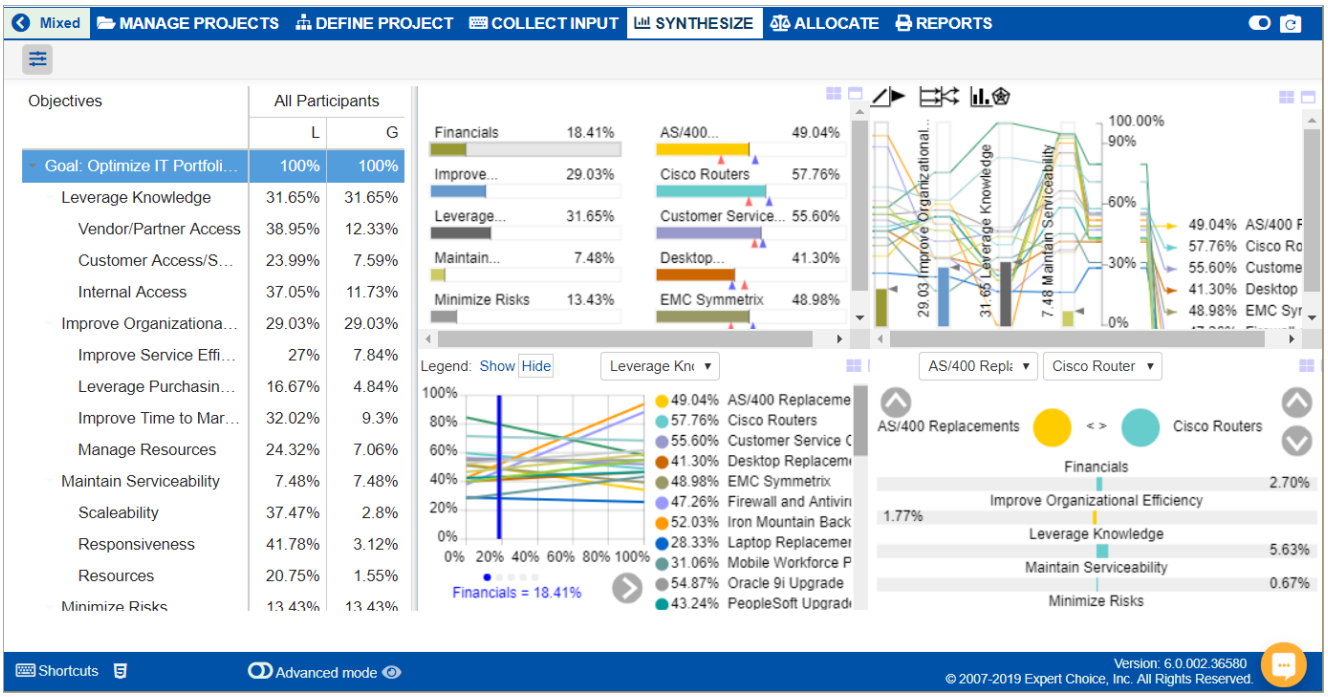
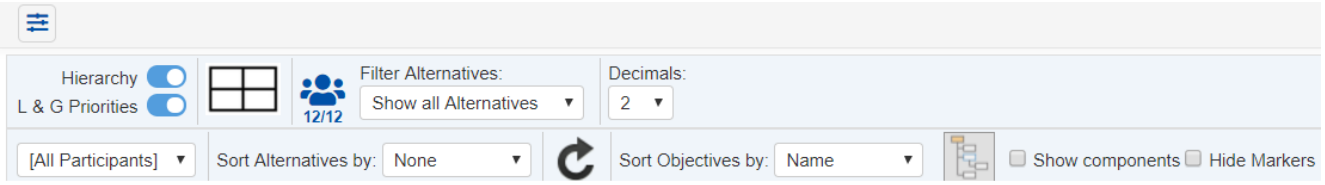
Mixed

The Mixed screen can display the five sensitivities, namely Dynamic Analysis, Performance Analysis, Gradient, 2D plot, and Head to Head, as well as the Alternative/Objectives Grid in one view.

By default, four sensitivities are displayed as shown below:



Click to show/hide the toolbar options:



By selecting an element in the hierarchy other than the goal, you can see the results with respect to (WRT) this element rather than the overall results with respect to the goal:

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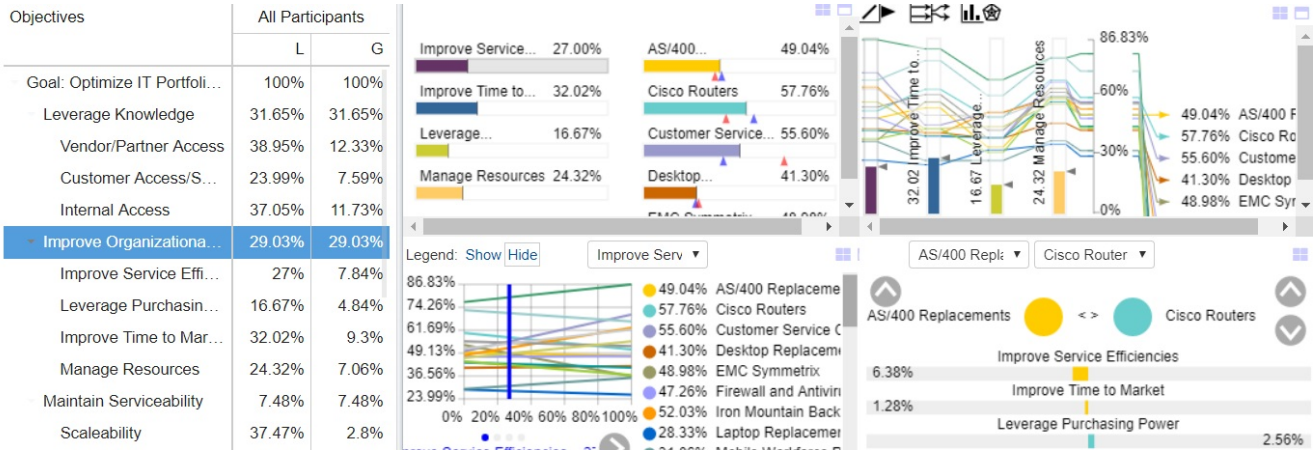
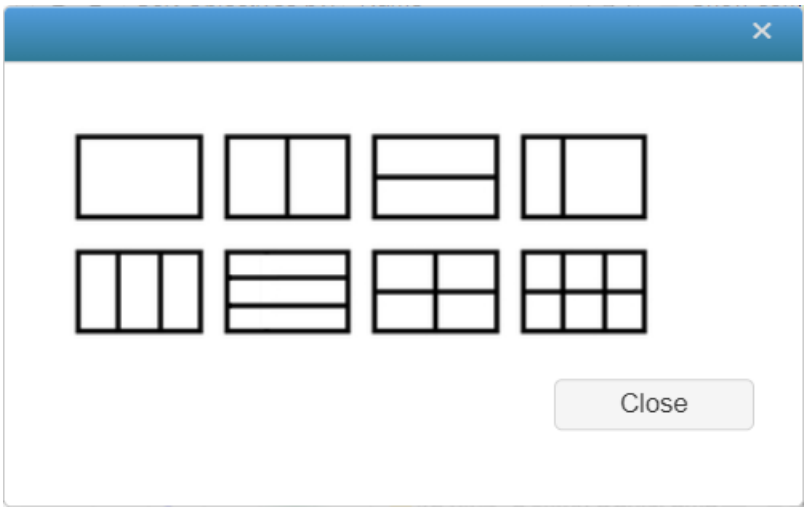


Click to select how the sensitivities and/or grid will be displayed:



At the top right of each view, click to replace the current view with another sensitivity or grid. Click to maximize a single view.

You can also temporarily alter the relationship between the alternatives and their objectives and it will be applied to other sensitivities (if applicable).

After temporarily changing the priority of one or more of the objectives, you can press the reset icon.

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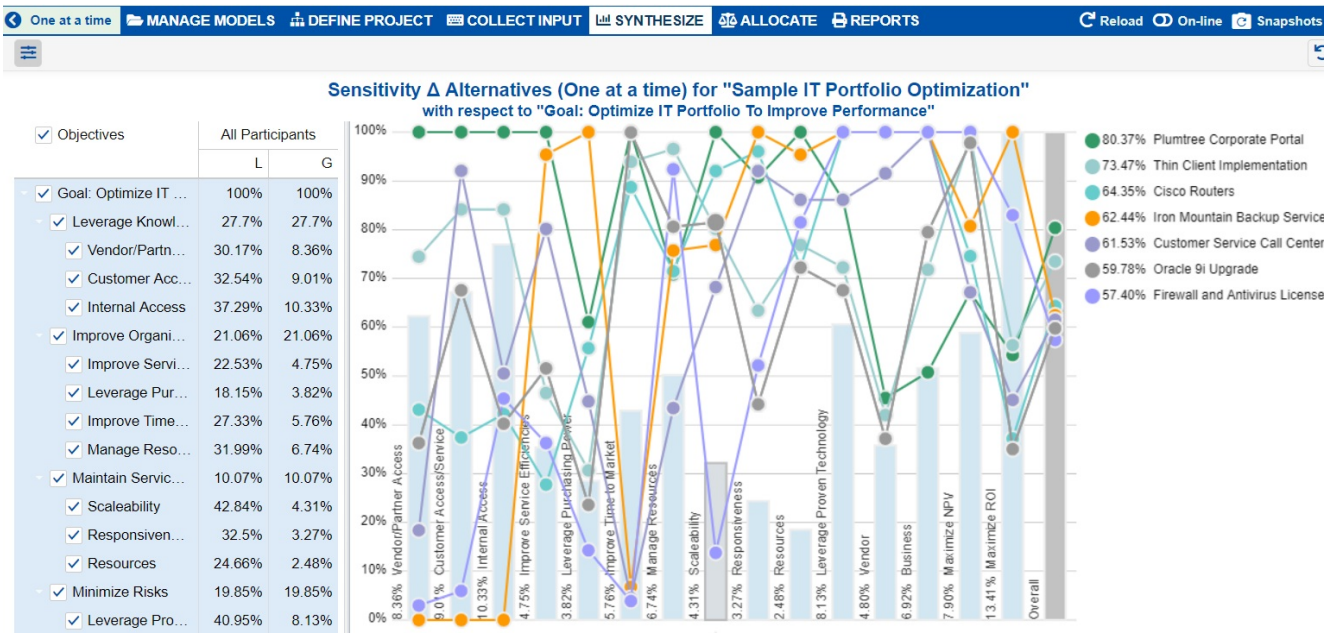
One at a time

Sensitivity Δ (delta) Alternatives page shows the changes in overall alternative priorities when alternative performance with respect to one or more covering objectives is changed. If you change an alternative's priority with respect to a single objective, you'll see the effect on the alternative's overall priority.

When the priority of an alternative is changed with respect to (wrt) an objective, we do not adjust the other alternative priorities (normalize to 1) as we do when we change the objective priorities in Sensitivity Δ delta Objectives.



Let's look at the information that is contained in this graph piece by piece.

First, the relative importance of the covering objectives are depicted by the vertical blue bars and shown numerically at the side of each bar or by hovering on the bars:

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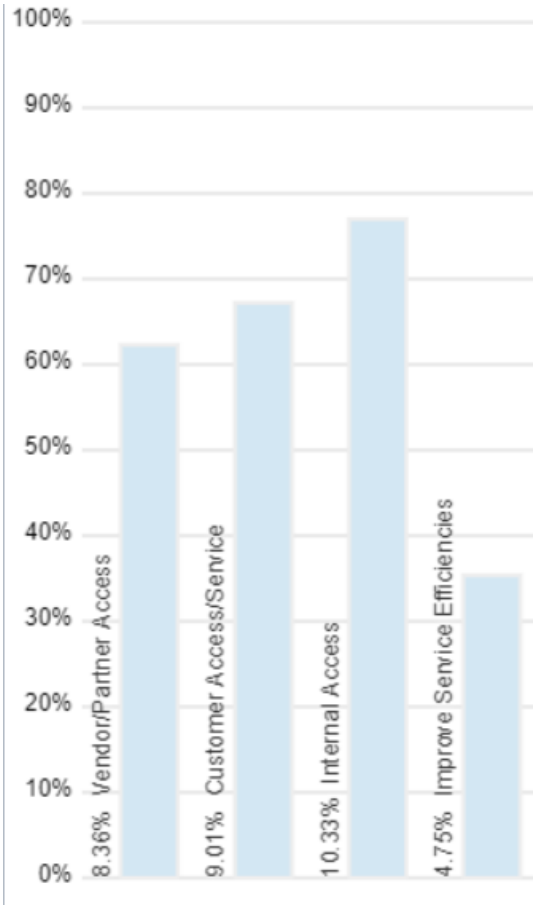

Second, the relative performance with respect to the covering objectives is shown by small circles representing each of the alternatives.

Hovering on a circle displays a tooltip with the designated alternative name, its priority with respect to the covering objective, and Delta (0% indicates that the priority is based on actual participant judgments).

Below shows that Plumtree Corporate Portal is the best performing alternative (100%) with respect to Vendor/Partner Access.

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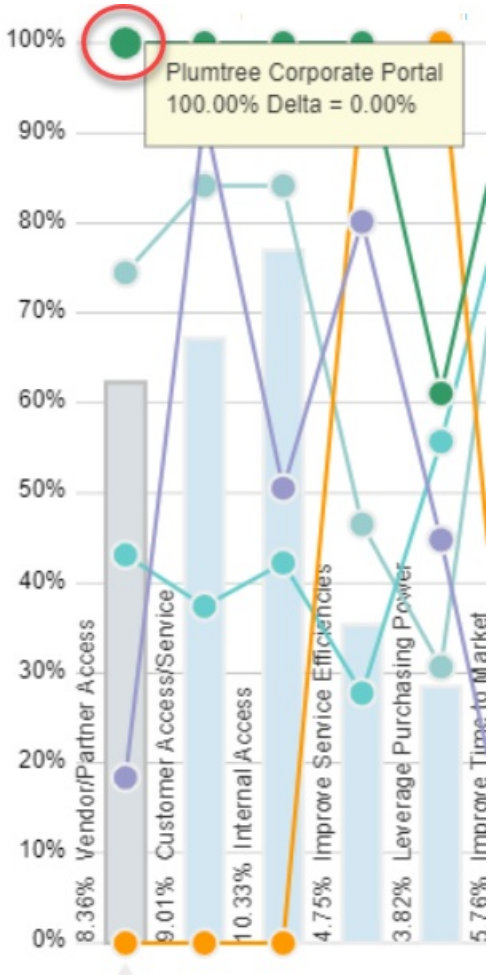

The lines connecting the alternatives from one objective serve to help you find a particular alternative as you move from one objective to another.

Finally, the intersection of the alternative line segment with the overall axis (gray vertical bar) shows the relative overall priority of the alternatives, which are also displayed at the right with the alternative names.

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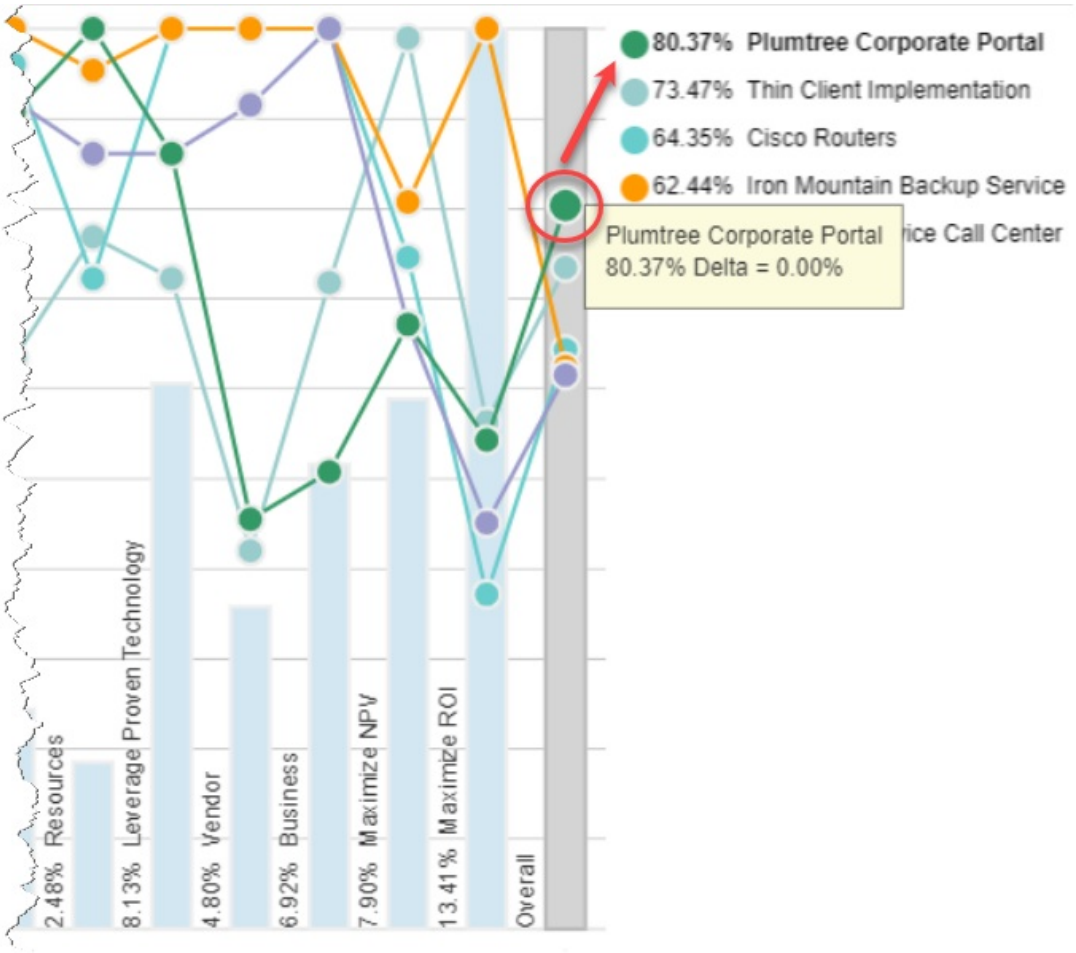

To temporarily change the performance of an alternative given a covering objective, and see how it will affect the overall performance of the alternatives, simply drag the alternative circles up (increase performance) or down (decrease performance). The %delta will increase or decrease as you drag the plot up or down.

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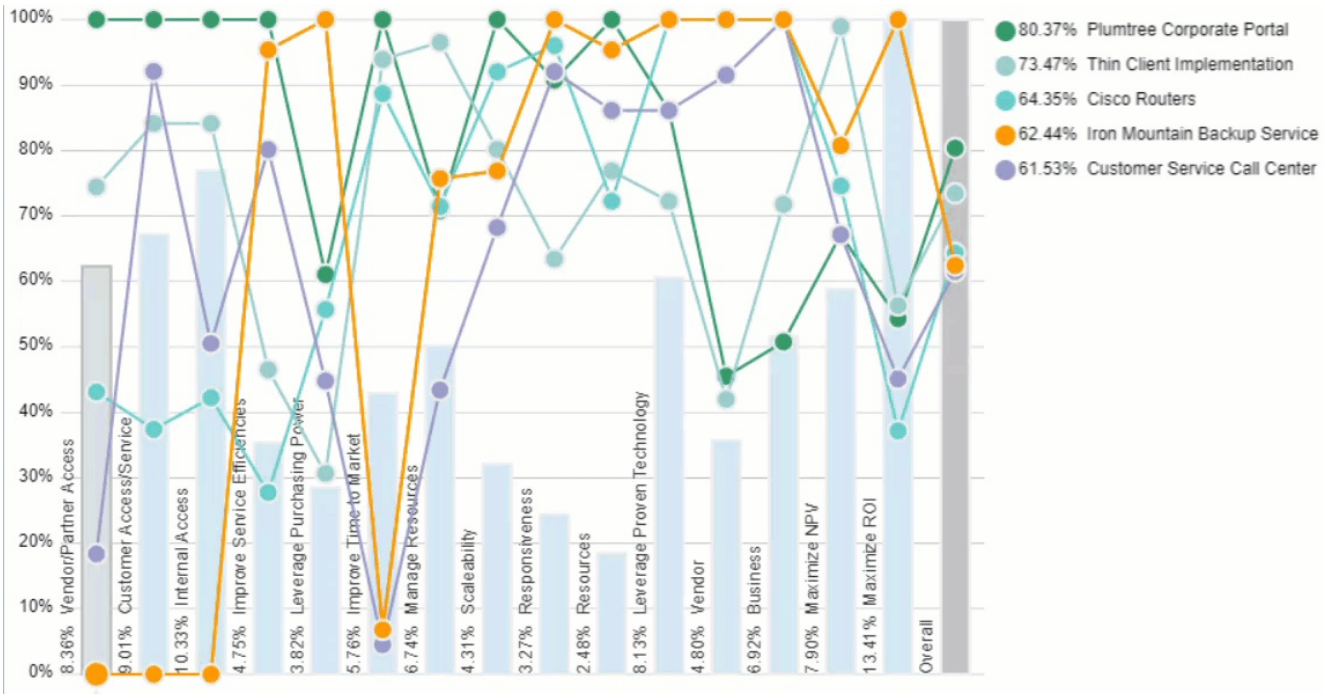

From above, we see that the original priority of Customer Service Call Center with respect to Vendor/Partner Access is 18.39% and it's the fifth most preferable alternative in the overall priorities. As we increase its priority by dragging the violet circle upward, we see that Customer Service Call Center becomes the third most preferable alternative in the overall alternative priorities.

You can select/deselect objectives so you can view only the alternative performance for fewer covering objectives or for a given cluster. This is done by checking/unchecking the checkboxes to the right of the objective nodes.

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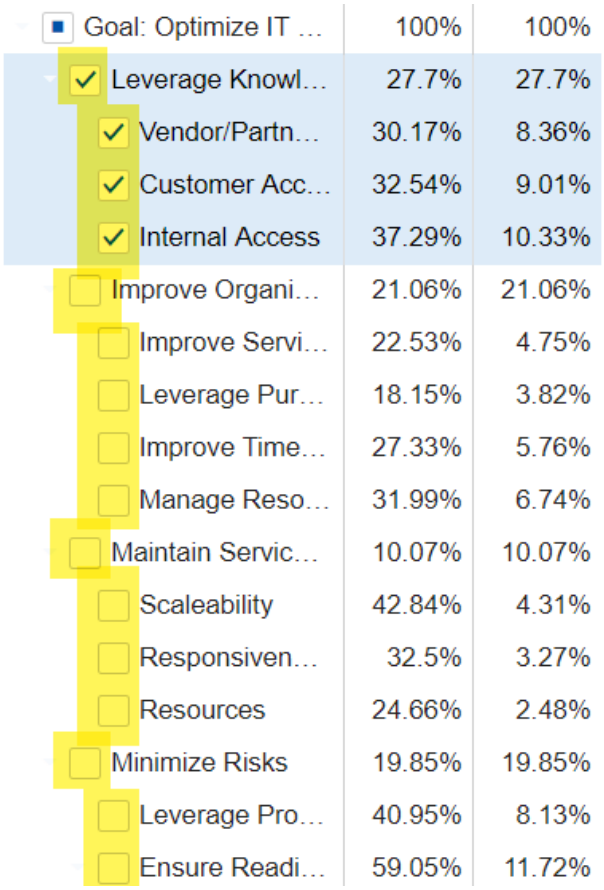
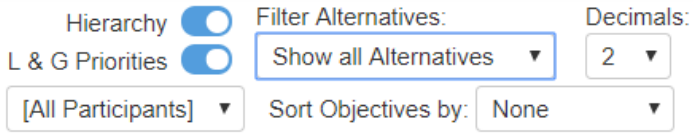
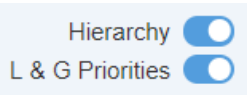


Click to show the toolbar options *(showing and hiding the toolbar is being remembered)*.



You can show or hide the Objectives Hierarchy and/or the Local and Global Objective priorities on the hierarchy:



You can **filter the alternatives:**

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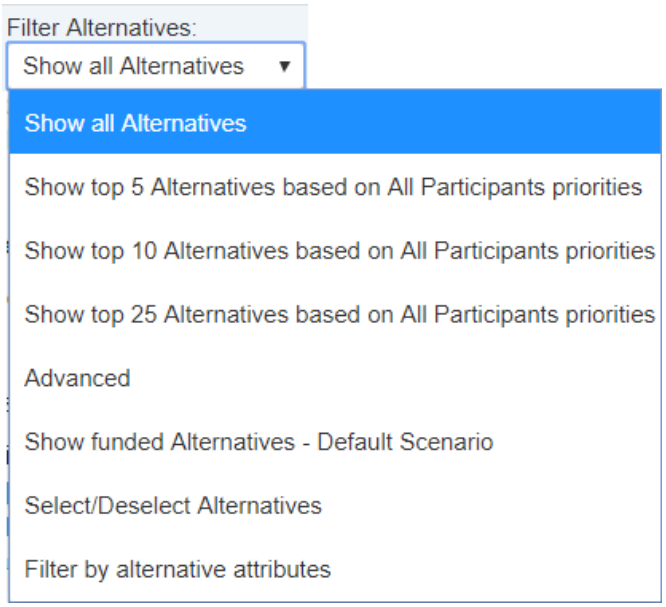

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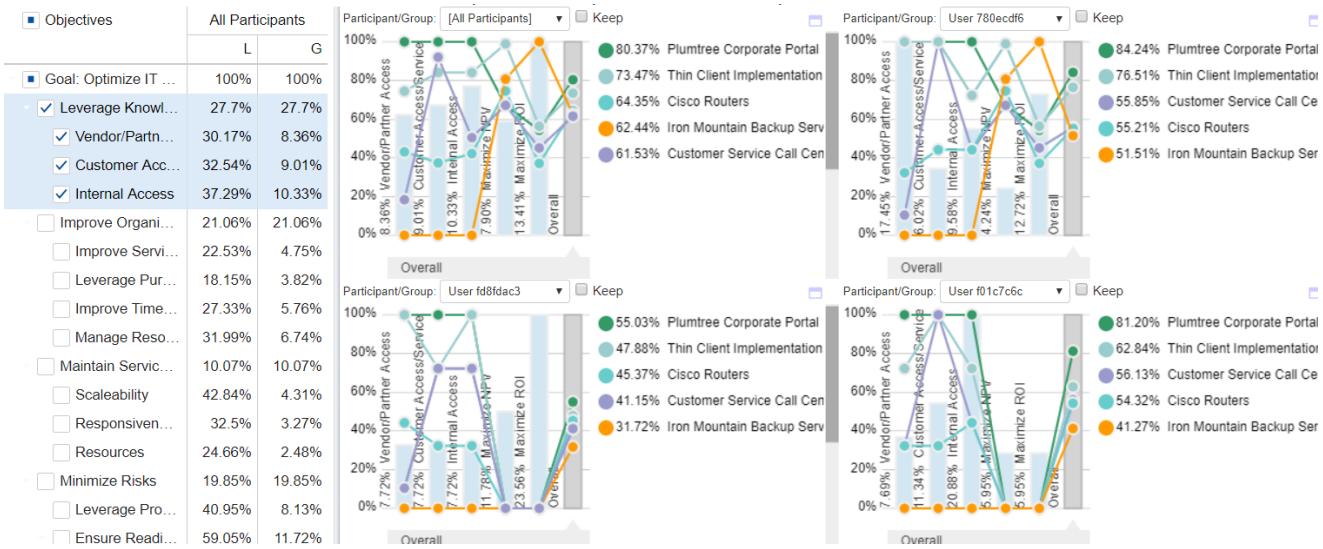
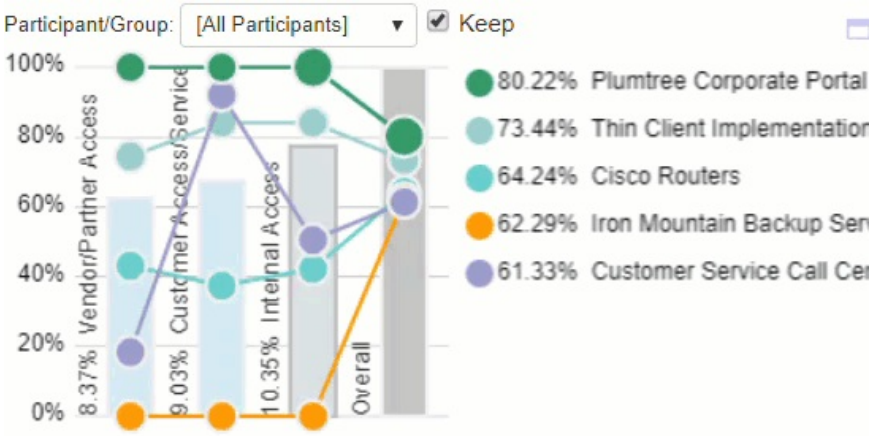
Four at a time

This page displays the same information as the Sensitivity Δ Alternatives sensitivity: One at a time but with four participants or groups at a time.



Sensitivity Δ (delta) Alternatives page shows the changes in overall alternative priorities, when alternative performance with respect to one or more covering objectives is changed. If you change an alternative's priority with respect to a single objective, you'll see the effect on the alternative's overall priority.



When the priority of an alternative is changed with respect to (wrt) an objective, we do not adjust the other alternative priorities (normalize to 1) as we do when we change the objective priorities in Sensitivity Δ delta Objectives.

You can select or deselect objectives to view a subset of alternative performance with respect to covering objectives.

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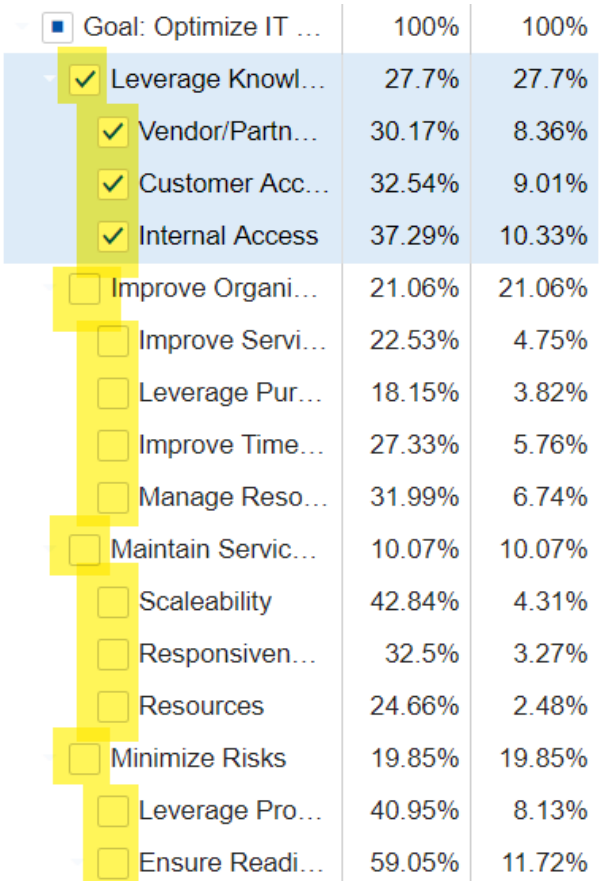
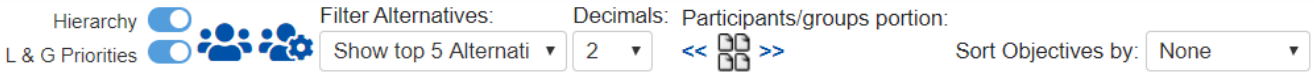
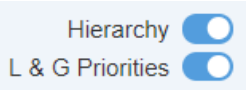


Click to show the toolbar options *(showing and hiding the toolbar is being remembered)*.



You can show or hide the Objectives Hierarchy and/or the Local and Global Objective priorities on the hierarchy:



You can **Filter the alternatives:**

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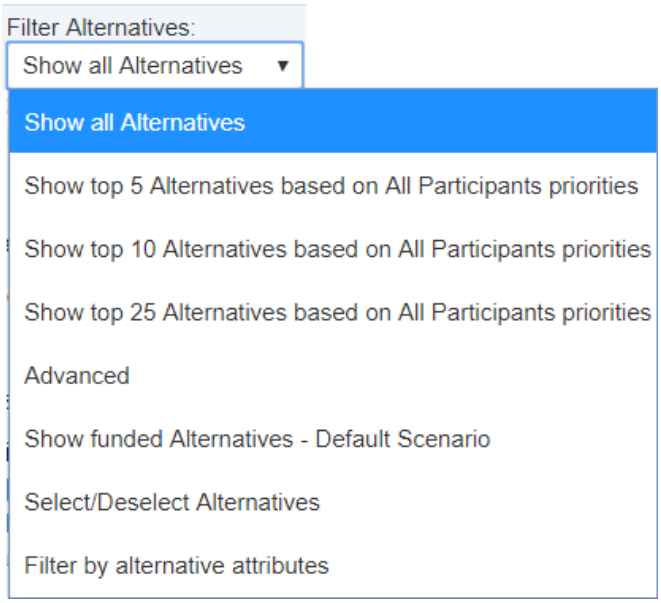
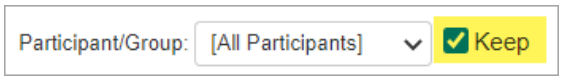


You can cycle through four participants/groups at a time by clicking **<<** (previous) and **>>** (next) chevrons.

When a participant or group is marked as "keep," the participant or group will remain selected as you cycle through using the prev/next buttons at the top.



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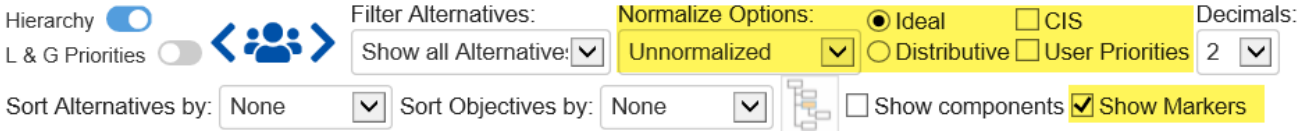
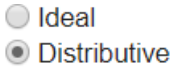
Advanced Mode: Synthesize (Distributive, Normalization, AIP, CIS, User Priorities)

When the Advanced mode is ON, you will see the advance options (if applicable) on Synthesize pages.



Ideal and Distributive Synthesis

Results can be computed as an **Ideal** mode (default) or D**istributive** mode synthesis.



Originally, AHP had only one synthesis mode – later called the "distributive" synthesis mode. A distributive synthesis distributes priorities from the goal down through the alternatives and is analogous to dividing priorities in a pie chart, which is intuitive for decision-makers to comprehend. The sum of the global priorities for each alternative with respect to each covering objective represents the overall priority of that alternative. The priorities have ratio scale properties (as well as, of course, interval and ordinal properties), which means that they can be used in making a choice, or in allocating resources. This synthesis operation can be thought of as distributing the goal's priority of 1.0 to the alternatives under consideration and is today called the distributive synthesis mode. Originally, this was the only synthesis mode of AHP. Critics of AHP pointed out situations where a different synthesis mode is more appropriate.

Aggregating Individual Priorities (AIP)

Clicking the **AIP** check-box will show results based on aggregating individual priorities, known as AIP, instead of aggregating individual judgments (AIJ). When AIP is checked, overall alternative priorities are computed for each participant and then an average of these priorities is computed.

NOTE: Due to the nature of AIP, objectives charts, objectives grid, and all sensitivity analysis pages are disabled when AIP is selected.

Normalization Options

In Advanced mode, you can display results based on various normalization options:

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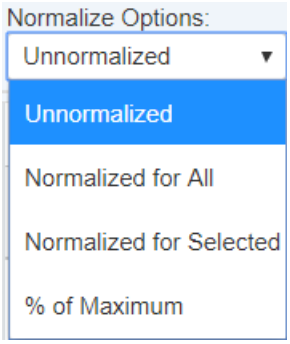


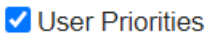
- **Unnormalized:** The priority is the sum of the products of each covering objective's global priority times the priority of the alternative with respect to each covering objective. If an alternative has a priority of 1 for every covering objective, it will have an unnormalized priority of 1 and is referred to as an ideal alternative. Note: "Unnormalized" is not available and not applicable when using Distributive mode.
- **Normalized for All:** Sum to 1 for all the alternatives.
- **Percentage of Maximum:** The alternative with the highest priority is 1 and all others are a percentage of this.
- **Normalized for Selected:** Sum to 1 for the selected alternatives.

Combined Input Option (CIS)

If the Combined Input Option (CIS) is on (see below), then results for individuals are computed by combining the priorities derived from judgments or ratings for which they had roles, with the combined results for any parts of the model where they did not have a role.

Apply User Priorities

If priorities (weights) have been specified for participants, the "User Priorities" check box will enable you to apply or ignore these priorities in generating the results.



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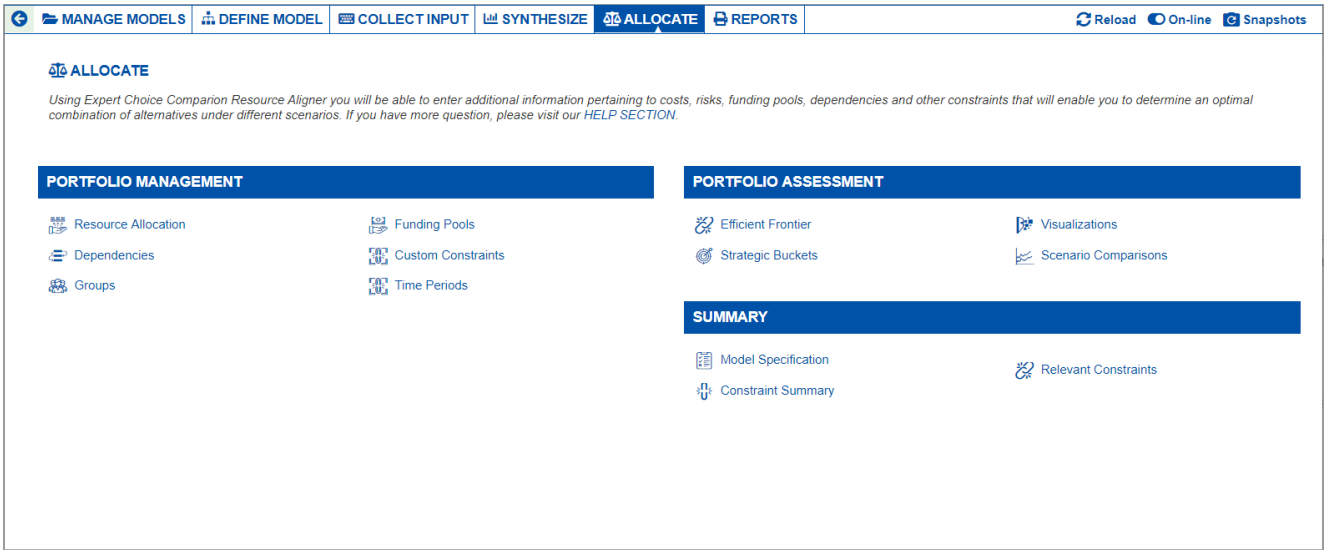
What is Allocate?

Comparion Resource Allocation helps you if you are deciding on a combination of actions to take, such as a portfolio of capital investments or models. The allocation step is a powerful way to determine an optimal combination of actions or investments subject to constraints such as budget, personnel, space, materials, coverage, balance, and dependencies.

Using Expert Choice Comparion Resource Allocation allows you to enter additional information pertaining to costs, risks, funding pools, dependencies, time periods, and other constraints that will enable you to easily construct optimal combinations of alternatives under different scenarios.



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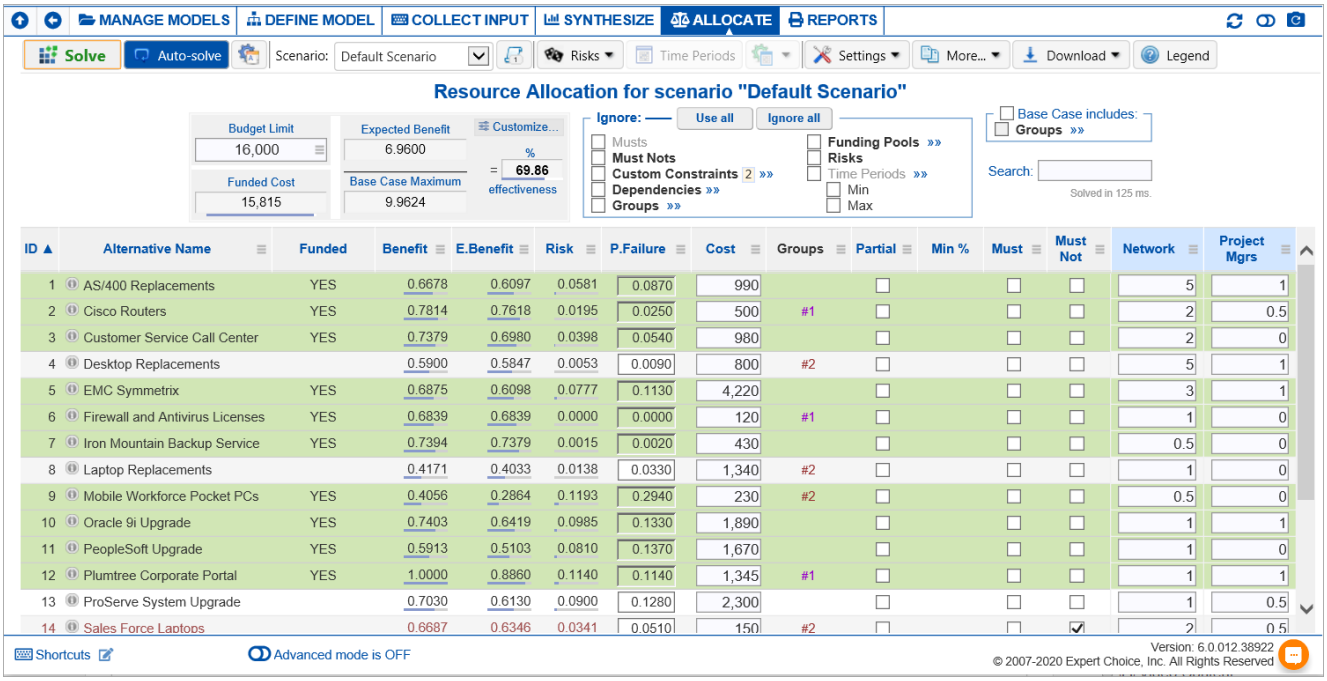
Portfolio View Overview

The Portfolio View page contains all the alternatives, their benefits (priorities), e.benefits (expected benefits), risks (by default, the risk and e.benefits columns are hidden when there are no risks defined), and costs. The Partial column is used to specify that an alternative can be partially funded instead of funding it in its entirety, while the Min% column for partially funded alternatives specifies the minimum percentage that can be funded. The Must and Must Not columns are used to specify that an alternative must or must not be funded.



The **Funded** column will display YES for alternatives that the optimization determines should be funded in their entirety or a percentage, if the alternative can be partially funded. The total cost to fund the alternatives identified in the optimal solution is shown in the Funded Cost box.

The **Benefit** for the optimized solution (the sum of the benefits for the alternatives to be funded) is shown in the Benefits box. When there are risks specified and are in use, Expected Benefits is displayed instead of benefits.

The **Base Case Maximum** is the maximum benefit achievable if the Budget Limit is at least large enough to fund all of the alternatives.

The **Ignore** options can be used to request that any of the constraints (or risk specifications) be ignored in the optimization. This is convenient if it is desired to temporarily disable one or more constraint types and see what effect it has on the solution. Note: If you check a constraint type in both the Set Base Case and in the Ignore options – something that doesn't really make sense to do – then it is possible to achieve a Benefits Percentage greater than 100%.

In some cases, there may not be any feasible solution – that is, it may not be possible to satisfy all of the constraints specified. Expert Choice will, of course, report that there is no feasible solution when this condition arises. However, when this happens, there is no unique set of constraints that lead to this condition. For example, you may have specified that at least one alternative in each of five groups is funded, but the budget isn't large enough to fund these alternatives. If the available

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budget constraint were relaxed by making more funding available, then a feasible solution might be found. Alternatively, if the amount required to fund one or more of the alternatives were decreased, or if the number of groups that had to have at least one alternative funded was decreased, a feasible solution might be found. The number of combinations of constraints that result in infeasibility can be quite large when we consider must constraints, must-not constraints, custom constraints such as full-time equivalents, floor space, funding pool constraints, and so on.

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Portfolio Solve and Auto-Solve

Solve

Solve – solves the optimization when executed.

If Auto-solve is checked then a solution is sought whenever a variable or constraint is changed.

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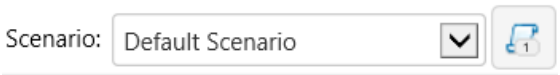
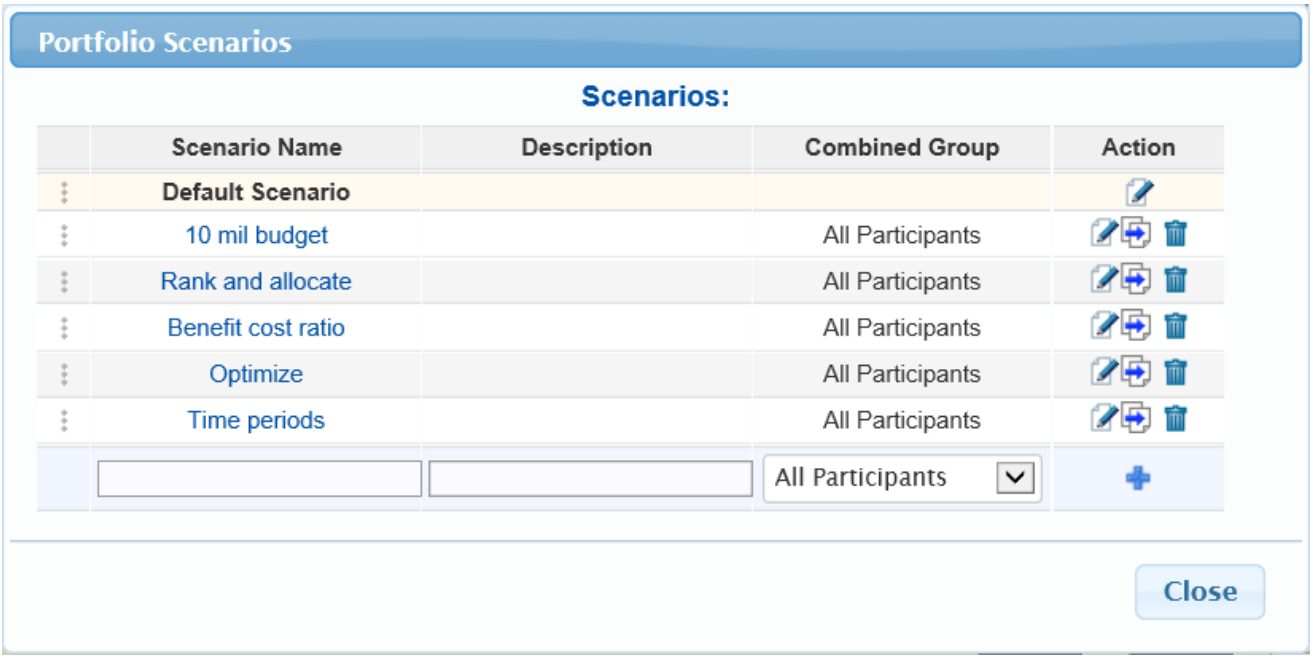
Portfolio Scenario

Scenarios provide the ability to save different Resource Aligner constraint sets (e.g., budget limit, musts, must-nots, custom constraints, dependencies, funding pools, and groups). You can then compare these scenarios in a Pareto Curve (see Efficient Frontier) or in several other views available on the Scenario Comparison page.

The Default Scenario is provided by default. You can switch to the different scenarios using the Scenario dropdown below.

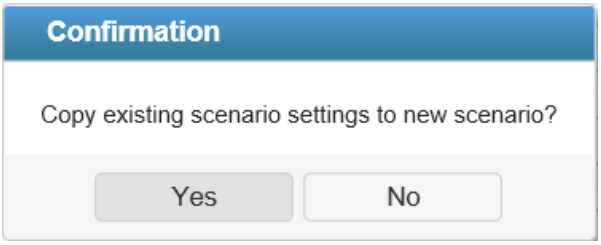


Click to manage portfolio scenarios *(1 indicates the number of available scenarios).*



To add a new scenario, enter the scenario name, description, and select from the Combined Group drop-down, and then click . The scenario description is optional. The Combine Group drop-down is the predefined group that the priorities of the scenario will be based on.

You will be asked if you want to copy the active scenario to the new scenario. This is handy if you only want to change a few variables. The new scenario will be displayed for you to alter.



You can also switch to different scenarios by clicking on the scenario name. The active scenario is displayed in black bold font.

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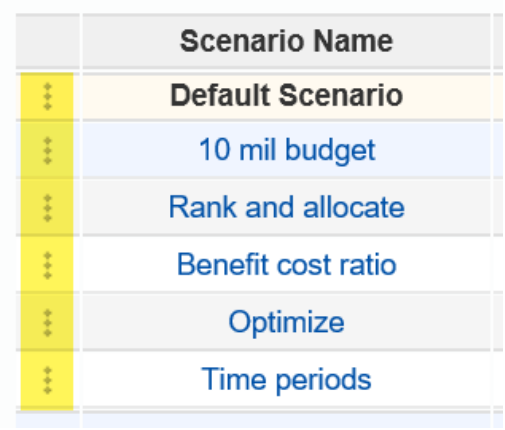
You can copy the active scenario to another scenario by clicking .

Click to delete a scenario.

You can reorder the scenarios by clicking and dragging the three dots:



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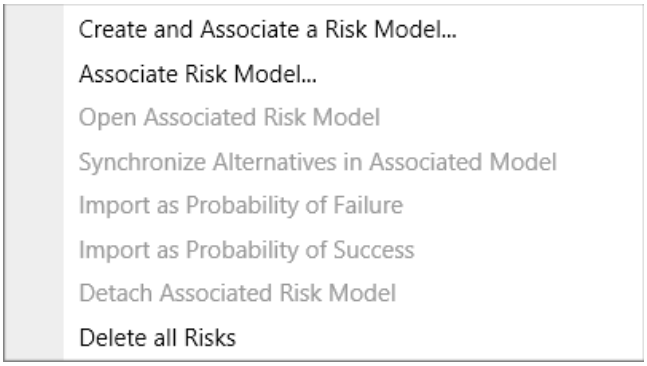
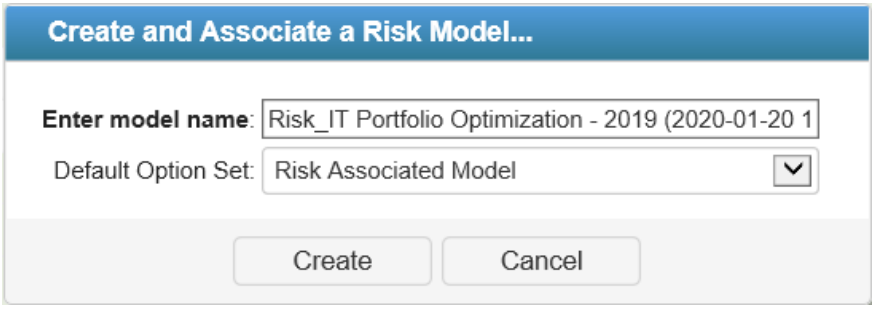
Risks (Probability of Success and Failure)

Project risk is one of the three types of risk that can impact the performance of projects. It is determined by the P.Failure*Benefits.

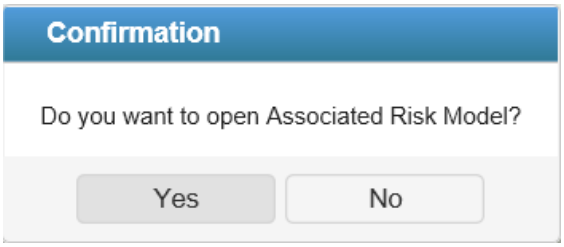
The risks should be ratio scale estimates of the relative risk of the alternatives or projects. If you need to *derive* such estimates, you can create and evaluate an "associated risk model" using the Risks drop-down menu:



Click **Create and Associate a Risk Model...** to create and associate a risk model. A prompt will be displayed where you can specify the risk model name and the default options set:



You will then be asked to open the created Risk Model:



Clicking Yes will open the associated model where you can estimate the relative risks of the alternatives or projects.

Initially, the Risks menu has black font color, as shown above; it will turn to blue

when there is an associated risk model.

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You can also associate a risk model that already exists in your workgroup by clicking **Associate Risk Model...** . A dialog box will display all the projects available in your workgroup.

Simply select the model and then click Select.

Click Open Associated Risk Model to open the associated model.

You can import the combined results from the Associated Risk Model as **Probability of Success** or **Probability of Failure.**

Risk = P. Failure* Benefits

Risk = (1 - P. Success)* Benefits

If you have more than one scenario, you will have an option to import into all scenarios or only into the active scenario.

Click **Detach Associated Risk Model** to detach the model.

Click **Delete All Risks** to delete all the existing risks.

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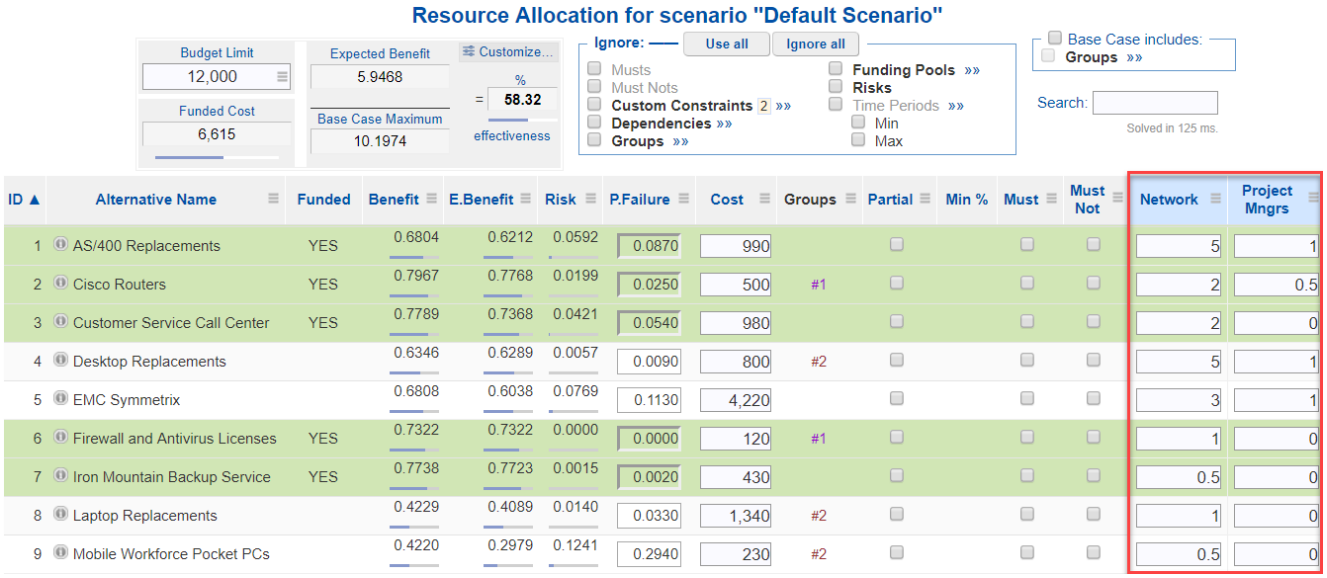
Custom Constraints in Portfolio View

Custom Constraints added from Allocate > Project Management > CUSTOM CONTRAINTS are displayed as columns on the Portfolio View page.

Below we see the Network and Project Managers custom constraints:



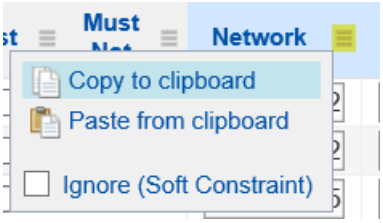
ID ▲	Alternative Name	Funded	Benefit	E.Benefit	Risk	P.Failure	Cost	Groups	Partial	Min %	Must	Must Not	Network	Project Mngrs
1	AS/400 Replacements	YES	0.6804	0.6212	0.0592	0.0870	990						5	1
2	Cisco Routers	YES	0.7967	0.7768	0.0199	0.0250	500	#1					2	0.5
3	Customer Service Call Center	YES	0.7789	0.7368	0.0421	0.0540	980						2	0
4	Desktop Replacements		0.6346	0.6289	0.0057	0.0090	800	#2					5	1
5	EMC Symmetrix		0.6808	0.6038	0.0769	0.1130	4,220						3	1
6	Firewall and Antivirus Licenses	YES	0.7322	0.7322	0.0000	0.0000	120	#1					1	0
7	Iron Mountain Backup Service	YES	0.7738	0.7723	0.0015	0.0020	430						0.5	0
8	Laptop Replacements		0.4229	0.4089	0.0140	0.0330	1,340	#2					1	0
9	Mobile Workforce Pocket PCs		0.4220	0.2979	0.1241	0.2940	230	#2					0.5	0

Hovering on the total number of custom constraints will display the custom constraints details:

You can jump to the "Custom Constraints" page by clicking the right head arrow:

You can input custom constraints for the Alternatives by typing into the cells provided.

You can copy and/or paste custom constraints values to or from excel, notepad, etc.



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Soft Constraints is a special type of Custom Constraint. Soft constraints are displayed with a grey background and strikethrough font attribute, and constraint values are *gray* and *italicized.*

You can ignore constraints by checking the Ignore (Soft Constraint) check box above or from the Custom Constraints page.

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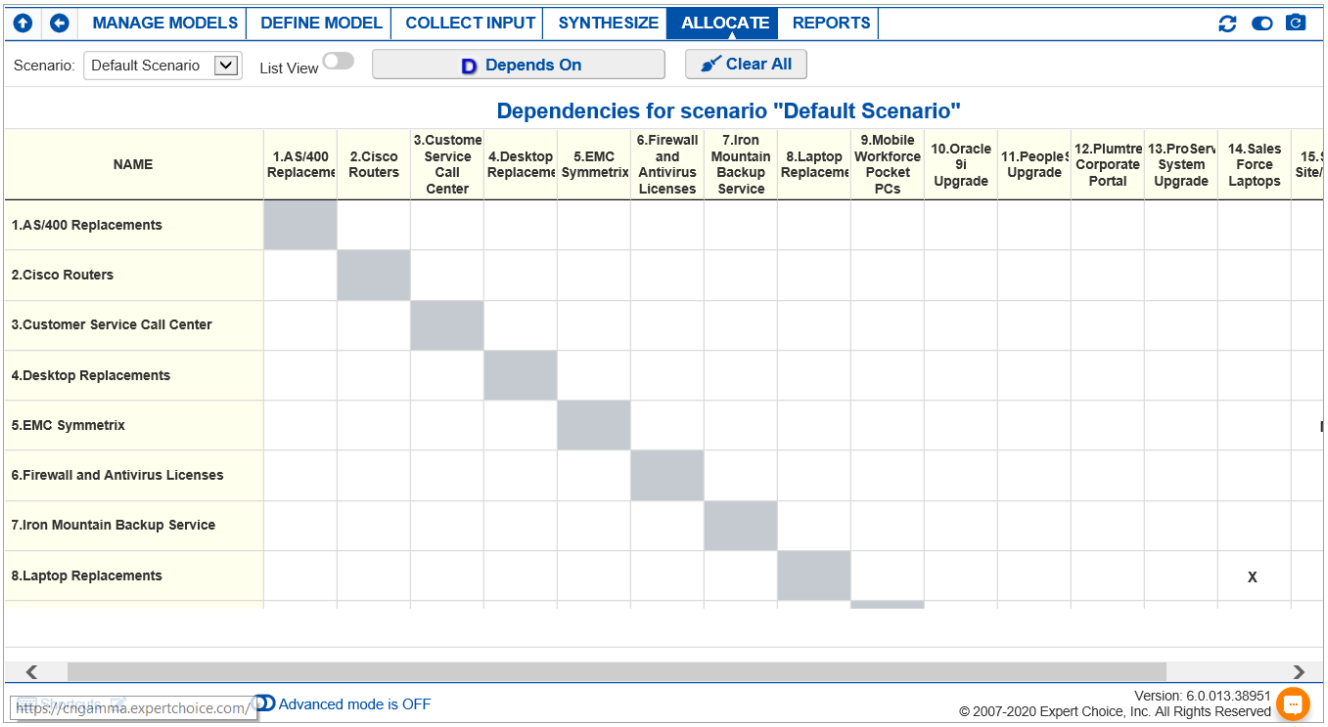
Dependencies Constraints

Dependencies are one of the constraints that can be defined when determining the alternatives to be funded in Resource Allocation.

You can display the dependencies in **Table** or **List** view.

Dependencies are displayed in the Table view by default as shown below:



The "List View" will be ON by default (grid view is disabled) when the system detects so many alternatives as to make the grid view slow or to hang up.

By clicking on the intersecting cell of the column and row, you can specify one of the three dependencies between controls in the Resource Allocation process:

- **D (Depends on)** – the row alternative depends upon the column alternative. The optimization assures that the row alternative is not funded unless the column alternative is funded. When there are Time Periods, the "depends on" dependency can either be **concurrent** or **non-concurrent**. **Concurrent** means that the row and column alternative can be funded at the same period, while non-concurrent is not.
- **M (Mutually dependent)** – the row and the column are mutually dependent; both must be funded or neither is funded.
- **X (Mutually Exclusive)**– the row and the column are mutually exclusive; funding one precludes funding the other.

The clicked cell will display any of the letters explained above (**D, M, X**) depending on the currently selected dependency type (or clear to remove) on the button at the top.

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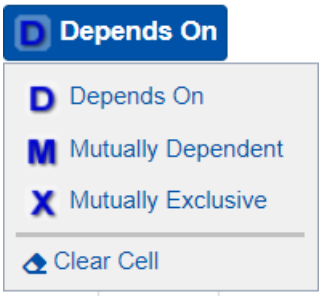
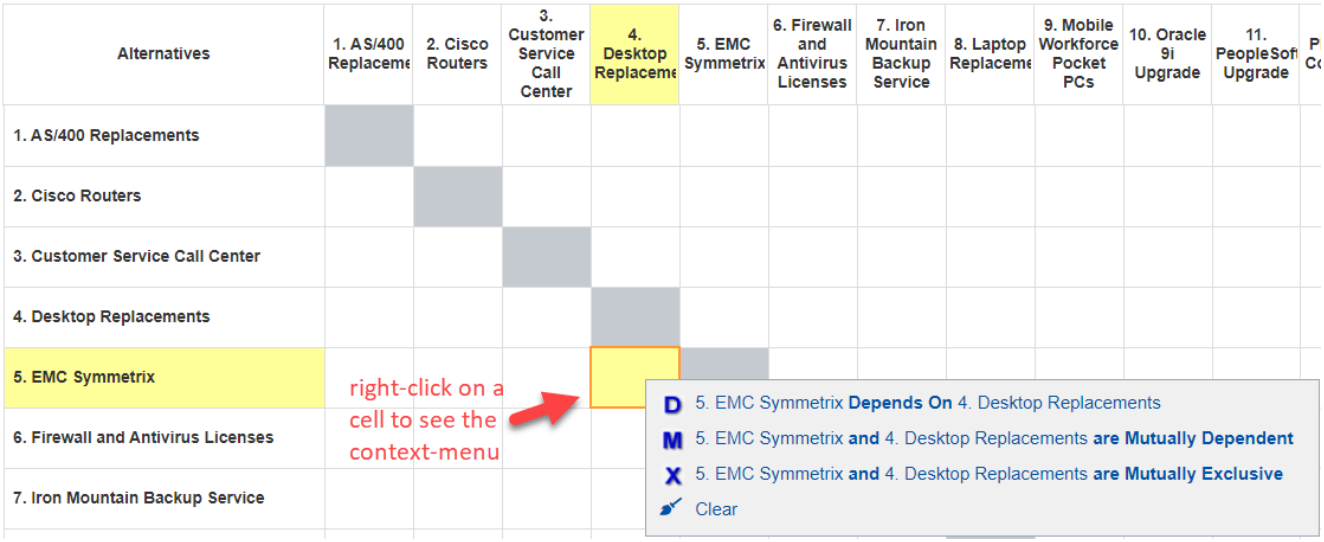


Alternatively, you can right-click on a cell and then select the dependency you want to define for that row and column controls:



The row and column alternatives are being highlighted with yellow as you hover on their intersecting cells.

Toggle the List View switch

to display the dependencies list view:

Here you see the existing dependencies in a "statement" format.

Click the + icon to add a new dependency.

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Click the to see options to edit and delete.

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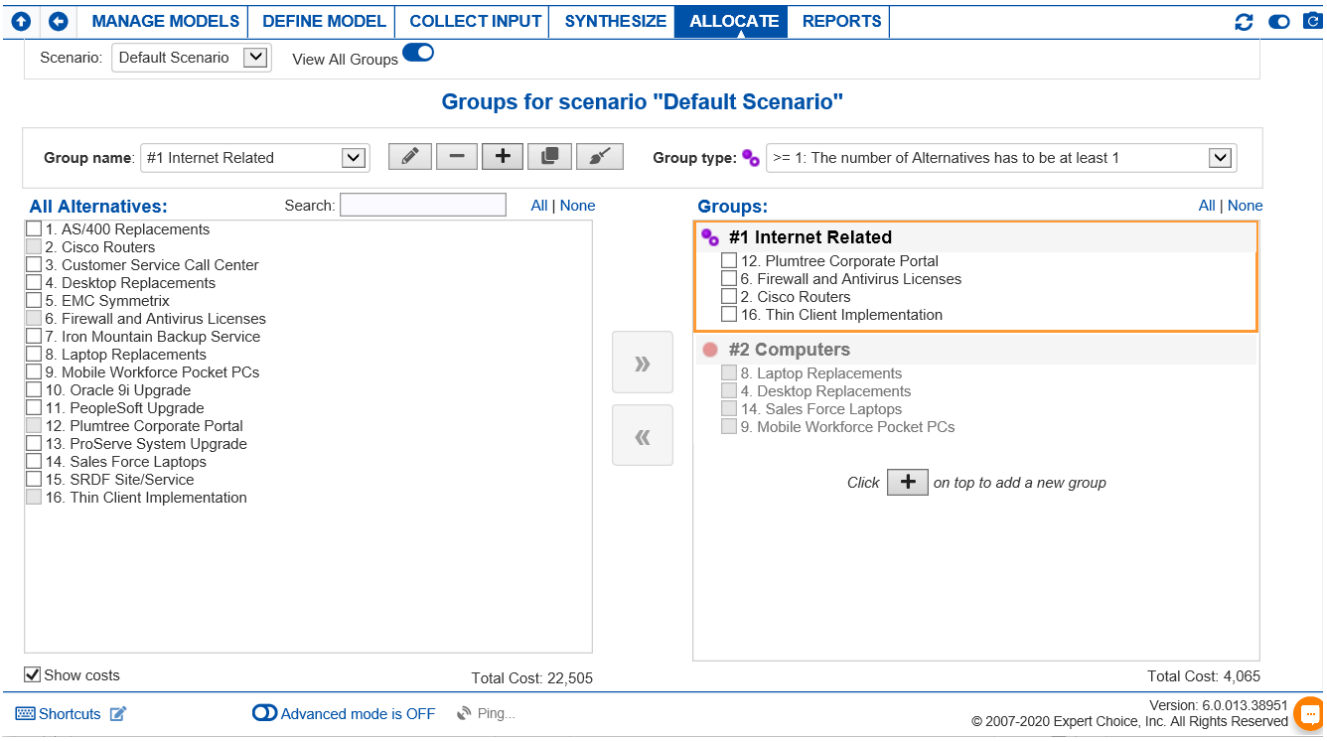
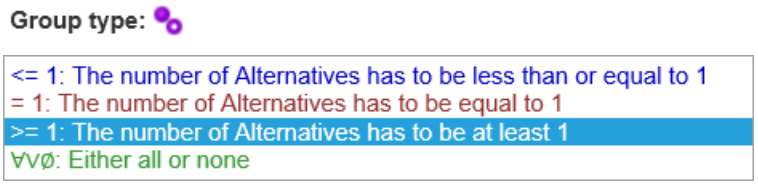
Groups Constraints

The Groups page is where you can add or delete group constraints to be used in the optimization.



When using our Resource Aligner, groups of alternatives can be defined to assure that one of the following four relationships exist among the alternatives in a group:



- At most one alternative in the group will be selected (i.e., no alternatives or one alternative in the group will be selected).
- Exactly one alternative in the group will be selected.
- At least one alternative in the group will be selected.
- Either all or none will be selected.

Click + to create a new group

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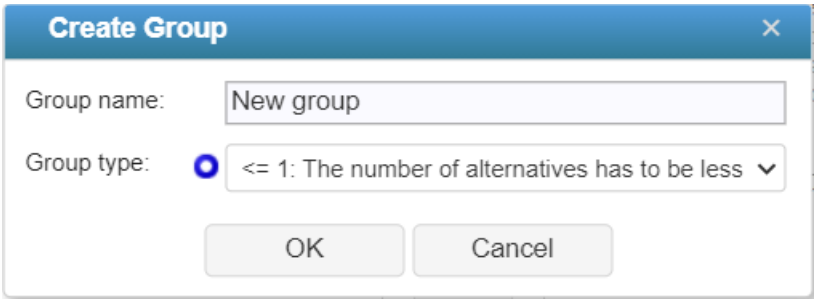
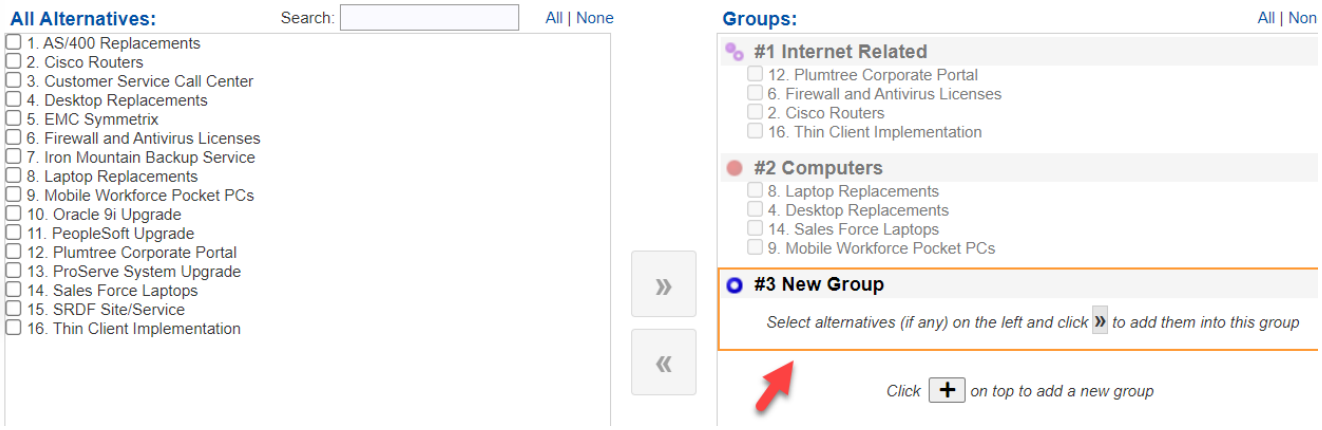


Enter the group constraint name and select from the group type pull-down menu.

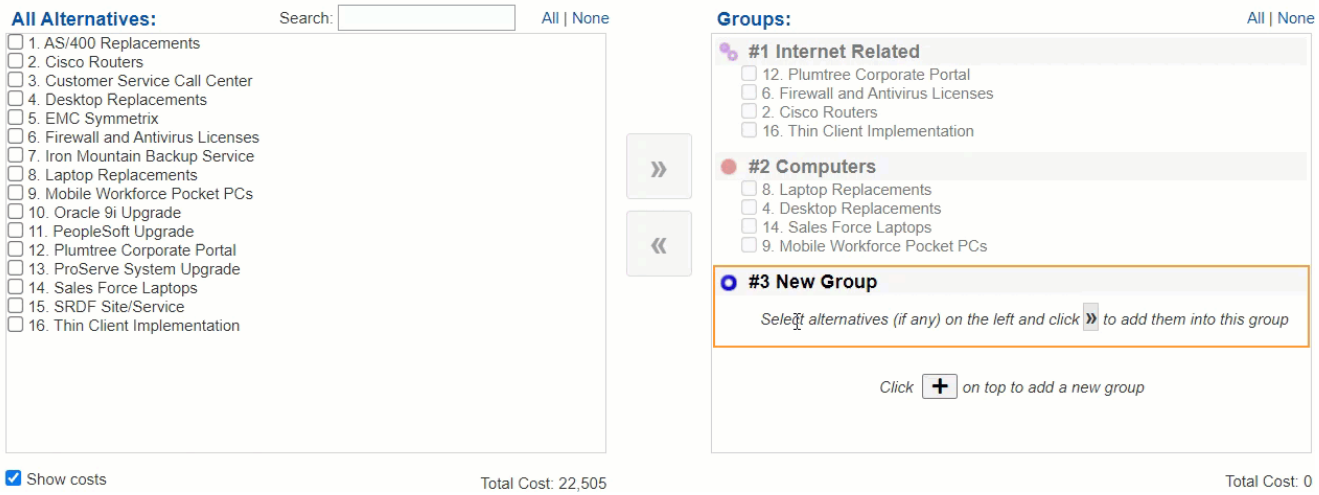
Click OK.

The added group will be displayed on the right



You can add controls to be a member of the group by selecting from the controls at the left and then clicking the

You can then remove controls from the group by selecting them from the right side list and then clicking the



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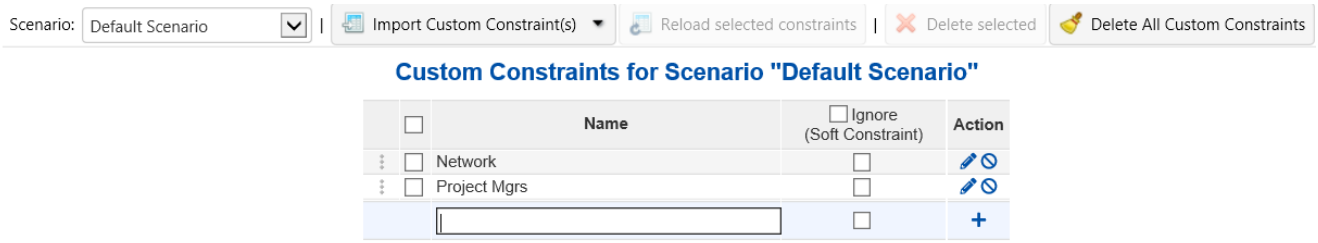
Add, Edit, Delete Custom Constraints

You can add, edit, or delete custom constraints from Allocate > Portfolio Management **CUSTOM CONSTRAINTS** page.



To add new Custom Constraints, simply type the Custom Constraint Name in the text box provided and then click the + button.

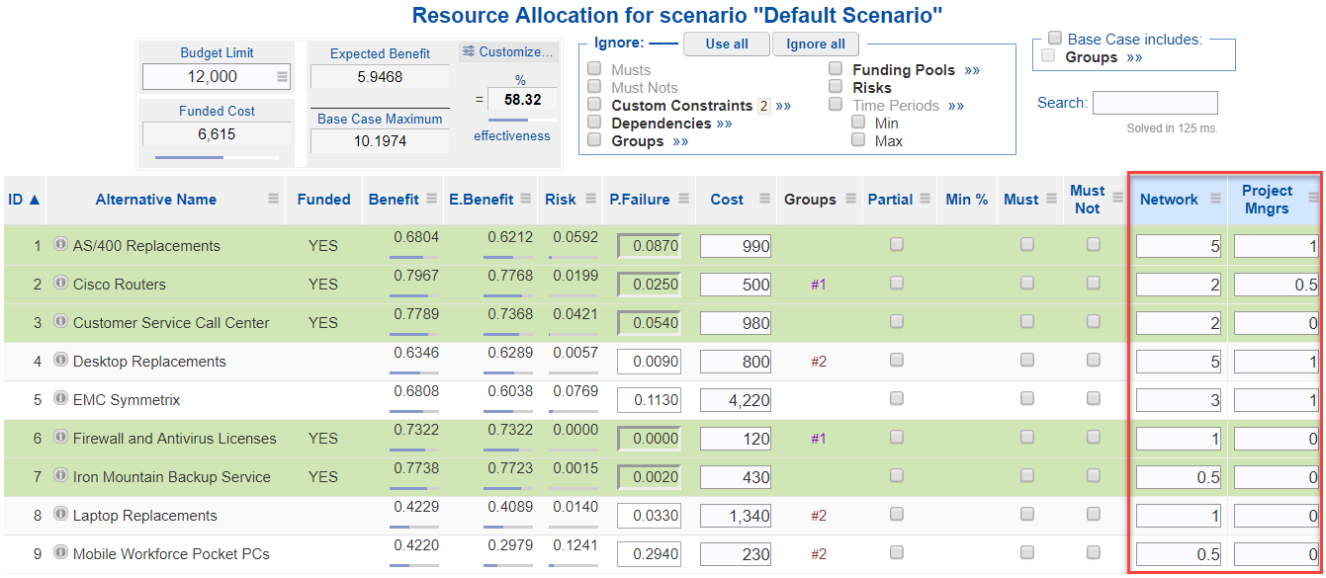
To edit the Custom Constraint name, click the icon.

To delete a Custom Constraint, click the icon.

You can also delete one or multiple custom constraints by checking the checkboxes to the left of the custom constraints you want to delete and then clicking the Delete selected button.

You can clear all the Custom Constraints by clicking the Delete All Custom Constraints .

Custom constraints added are displayed as columns in the Portfolio View Grid. Below are the Network and Project Managers custom constraints.



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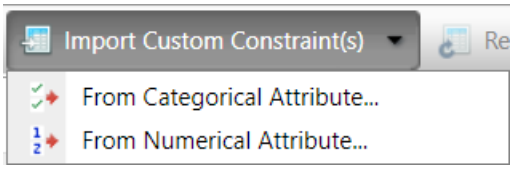
Import Custom Constraints

You can import custom constraints from:

- Categorical Alternative Attributes - establish strategic buckets for use use in "Balance and Coverage" analysis and to for use as a constraint
- Numerical Alternative Attributes - useful as constraints and for analysis

Navigate to Allocate > Custom Constraints, then click the Import Custom Constraints button:



From Categorical Alternative Attributes (Strategic Buckets)

You can view and manage alternative attributes from the Alternatives or Strategic Buckets pages.

For example, from the Strategic Buckets page below we see an attribute named "Time frame" with Short, Medium, and Long term category items:

Strategic Buckets for Model "Sample IT Portfolio Optimization"
("Default Scenario")

Search:

No ▲	Alternative	Funded	Total	Costs	Time Frame
1	AS/400 Replacements	Yes	0.527	990	Long
2	Cisco Routers	Yes	0.618	500	Medium
3	Customer Service Call Center	Yes	0.604	980	Long
4	Desktop Replacements		0.492	800	Medium
5	EMC Symmetrix		0.528	4,220	Medium
6	Firewall and Antivirus Licenses	Yes	0.568	120	Short
7	Iron Mountain Backup Service	Yes	0.600	430	Medium
8	Laptop Replacements		0.328	1,340	Medium
9	Mobile Workforce Pocket PCs		0.327	230	Medium
10	Oracle 9i Upgrade		0.577	1,890	Short
11	PeopleSoft Upgrade		0.453	1,670	Short
12	Plumtree Corporate Portal	Yes	0.775	1,345	Medium
13	ProServe System Upgrade		0.554	2,300	Short
14	Sales Force Laptops	Yes	0.531	150	Medium
15	SRDF Site/Service		0.453	3,440	Long
16	Thin Client Implementation	Yes	0.713	2,100	Long

To import the Time Frame attribute as a custom constraint, select Import Custom Constraints > From Categorical Attribute...

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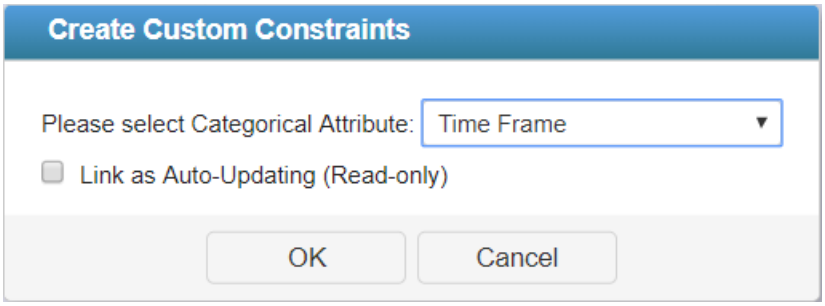


You can link any custom constraint that came from an Alternative Attribute to its source attribute as "Auto-Updating" (Read-Only).

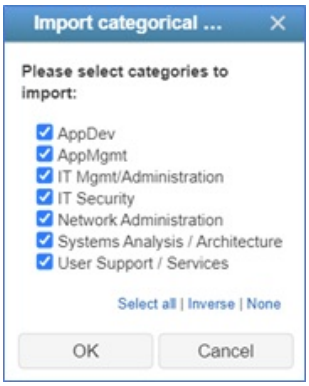
When this option is checked, any updates to the attribute will automatically update the constraint. The constraints in the Allocate Main grid will be disabled for editing (Read-only).

When "Auto-Updating" is unchecked, when you want to update or reload the constraints, use the

button. This button is also available in the Allocate Main Grid.

Custom constraints that are linked to an alternative attribute have a blue chain icon when auto-updating is checked, and a gray chain icon when auto-updating is unchecked. You can click the icon to toggle on and off.

When creating custom constraints created from a categorical alternative attribute, all attribute categories are selected by default. You can create a separate custom constraint for each categorical alternative or, by deselecting some categories, a sub-set of the attribute categories. In the image below, all the categories of the Sponsor attribute are selected and a separate constraint will be created for each category.



In the image below, the Long, Medium, and Short constraints belong to the Alternative Attribute named "Timeframe." When a project has a particular alternative attribute, a "1" will be placed in the appropriate column. The primary purposes of this is to

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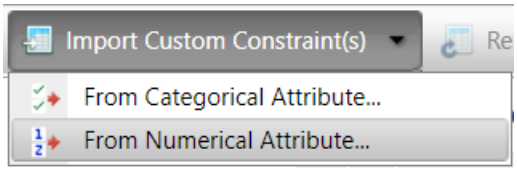
get a count and to allow for balance and coverage constraints (the totals and constraint rows are not shown in the image below). For example, you can constrain the portfolio to fund a minimum of 3 projects for each of Long, Medium, or Short timeframe.

ID ▲	Alternative Name	Funded	Benefit	E.Benefit	Risk	P.Failure	Cost	Groups	Partial	Min %	Must	Must Not	Network	Project Mngrs	Long	Medium	Short
1	AS/400 Replacements	YES	0.6804	0.6212	0.0592	0.0870	990						5	1	1		
2	Cisco Routers	YES	0.7967	0.7768	0.0199	0.0250	500	#1					2	0.5		1	
3	Customer Service Call Center	YES	0.7789	0.7368	0.0421	0.0540	980						2	0	1		
4	Desktop Replacements		0.6346	0.6289	0.0057	0.0090	800	#2					5	1		1	
5	EMC Symmetrix		0.6808	0.6038	0.0769	0.1130	4,220						3	1		1	

From Numerical Alternative Attributes

Navigate to Allocate > Custom Constraints, then click the Import Custom Constraints button and select From Numerical Attribute:



Then select the desired custom constraint to import.

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Soft Custom Constraints

Soft Constraints have the following properties:

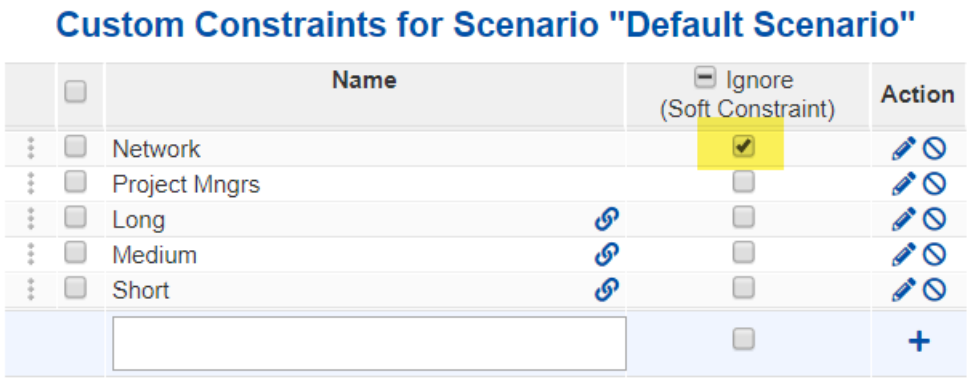
- As a type of Custom Constraint, Soft Constraints are always numeric.

- Soft Custom Constraints are ignored by the Solver in arriving at optimal funding solutions.

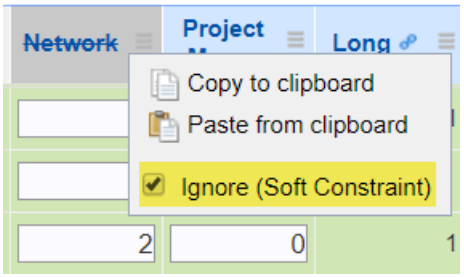
- Soft Custom Constraint column headers are displayed with a light grey background and a strike-through font.

- Soft Custom Constraints can be used to calculate surplus or shortage by entering a number in the “Max” row and selecting the “Calculate Soft Constraints” setting.

To designate a Custom Constraint as a Soft Constraint, check the Ignore check box for the Custom Constraint(s) you want to ignore.



For example, to ignore the custom constraint "Network" from the Allocate Main, click the ≡ of the constraint you want to ignore and then check the Ignore check box. To un-ignore a constraint, uncheck the Ignore checkbox.



The Soft Constraint "Network" will be ignored in the Resource Allocation. Totals, overages, or shortages are available in the footer rows of the grid.

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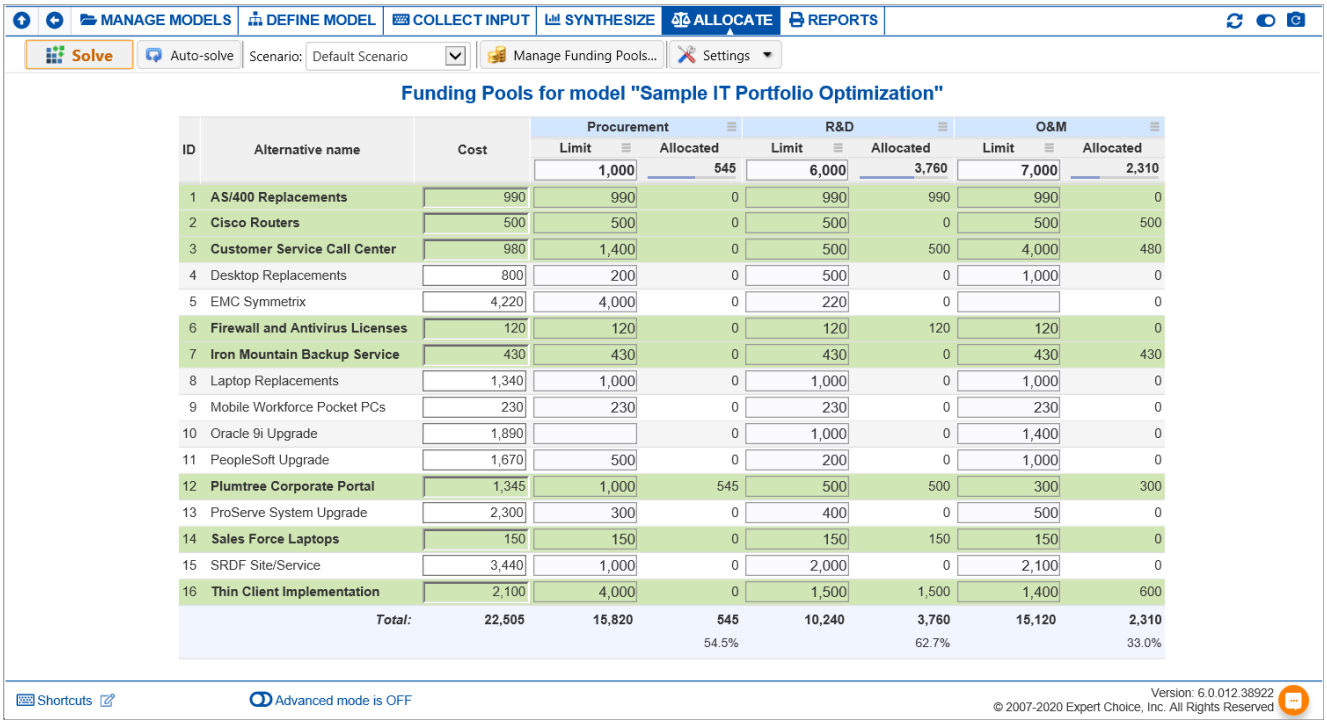
Funding Pools

Funding Pools allow specification of sources of funds as well as what the funds can be used for. For example, funds from state governments and local governments might be restricted to be used only for certain alternatives (projects). When setting up a funding pool, the total amount for that pool is specified as well as how much of the pool can be used for each of the alternatives.

Use this feature to create pools of funds that will be used in the resource allocation optimization as another constraint when selecting the optimal set of alternatives. The sample window below contains the name of the alternatives and costs that were extracted from the Portfolio View page.

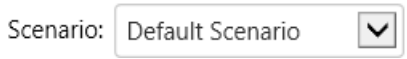
The window below shows that we have defined three funding pools - Procurement, R&D, and O&M - with the respective limits of 9,000, 6,000, and 7,000. The number of funds entered for each alternative is shown in the figure below.

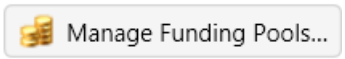


ID	Alternative name	Cost	Procurement Limit	Procurement Allocated	R&D Limit	R&D Allocated	O&M Limit	O&M Allocated
			1,000	545	6,000	3,760	7,000	2,310
1	**AS/400 Replacements**	990	990	0	990	990	990	0
2	**Cisco Routers**	500	500	0	500	0	500	500
3	**Customer Service Call Center**	980	1,400	0	500	500	4,000	480
4	Desktop Replacements	800	200	0	500	0	1,000	0
5	EMC Symmetrix	4,220	4,000	0	220	0		0
6	**Firewall and Antivirus Licenses**	120	120	0	120	120	120	0
7	**Iron Mountain Backup Service**	430	430	0	430	0	430	430
8	Laptop Replacements	1,340	1,000	0	1,000	0	1,000	0
9	Mobile Workforce Pocket PCs	230	230	0	230	0	230	0
10	Oracle 9i Upgrade	1,890		0	1,000	0	1,400	0
11	PeopleSoft Upgrade	1,670	500	0	200	0	1,000	0
12	**Plumtree Corporate Portal**	1,345	1,000	545	500	500	300	300
13	ProServe System Upgrade	2,300	300	0	400	0	500	0
14	**Sales Force Laptops**	150	150	0	150	150	150	0
15	SRDF Site/Service	3,440	1,000	0	2,000	0	2,100	0
16	**Thin Client Implementation**	2,100	4,000	0	1,500	1,500	1,400	600
	Total:	**22,505**	**15,820**	**545**	**10,240**	**3,760**	**15,120**	**2,310**
				54.5%		62.7%		33.0%

When funding pools are added to the model, two sub-columns will be displayed. The first column shows each pool limit while the second column shows what is allocated. The alternatives funded are highlighted in green.

You can specify the funding pools for each scenario by selecting the desired scenario in the scenario drop-down:



Click 

to add, edit, or delete funding pools.

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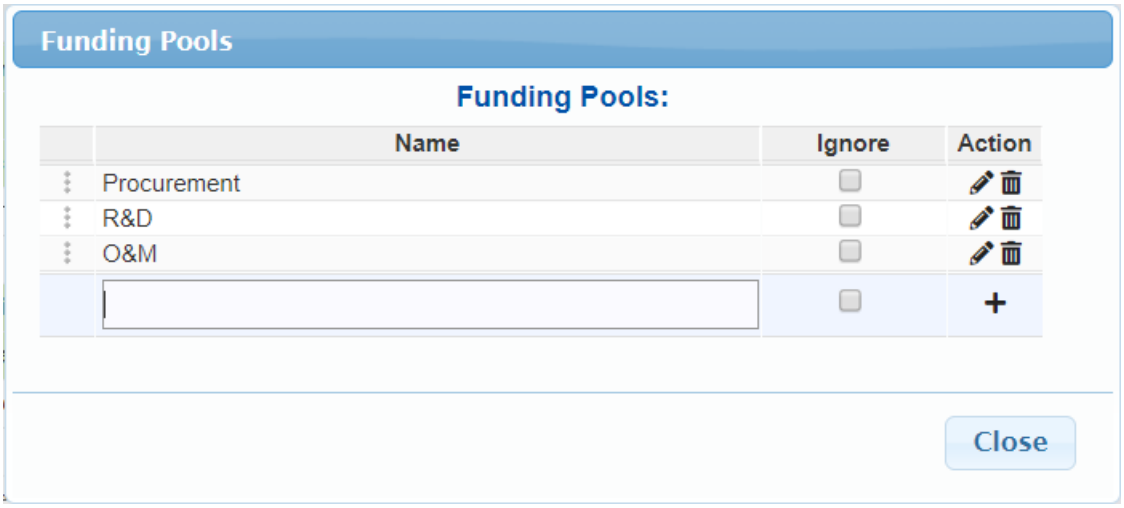
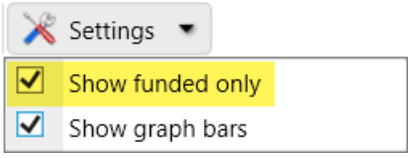


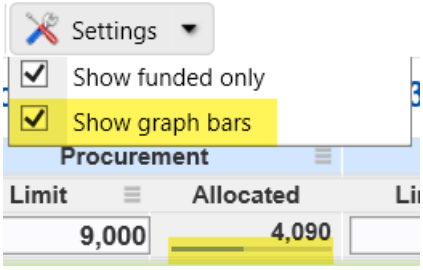
You can Ignore a funding pool individually using the Ignore check box.

If Auto-solve is enabled, then a solution is sought whenever a limit is changed or do it manually using the Solve button.

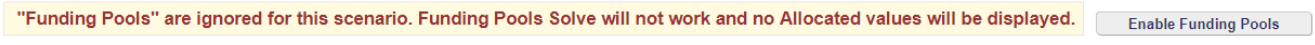
You can show only the funded alternatives:



You can show the bar graph below on the Allocated column:



When Funding Pool is ignored in the selected scenario, a message will be displayed as shown below:



Simply click the **Enable Funding Pools** button to enable it without going to the Portfolio View grid.

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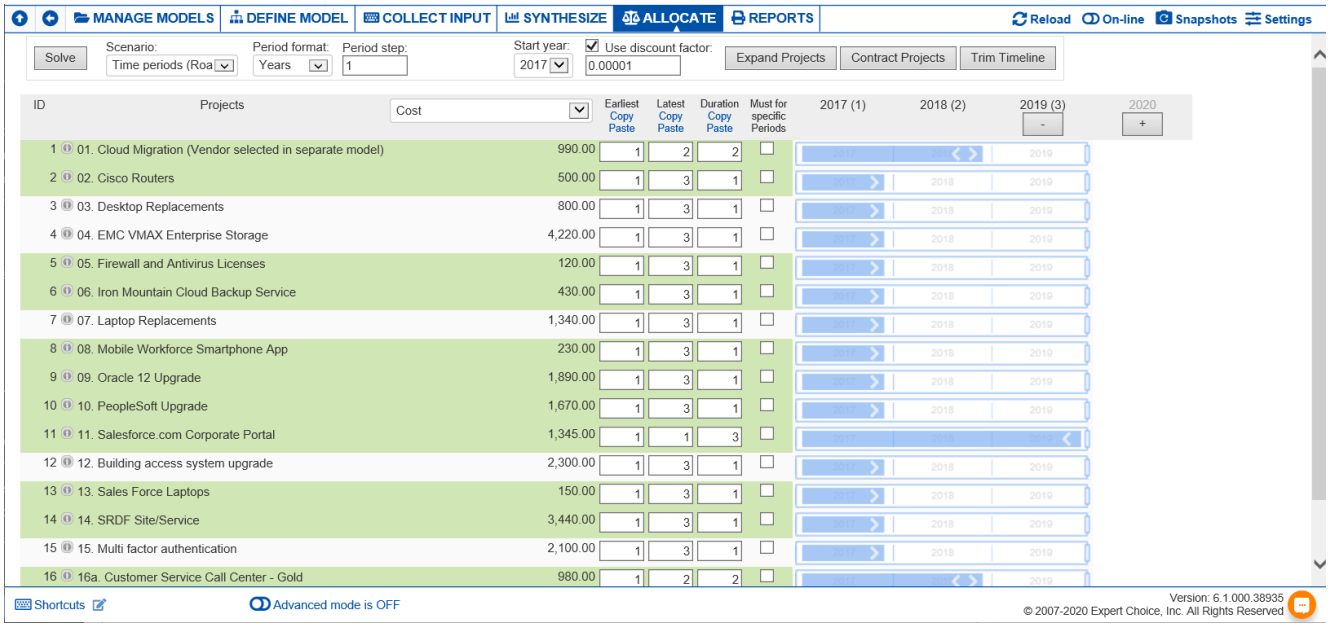
Time Periods Settings

You can manage the Time Periods in Allocate > **TIME PERIODS SETTINGS**.

Below is a sample of a scenario with Time Periods.

Time Periods allows you to have one or more sets of alternatives that will span one or more periods.



You can specify Time Periods for each scenario. You can select a scenario from the scenario drop-down:

To illustrate how to add Time Periods, below is a scenario without Time Periods:

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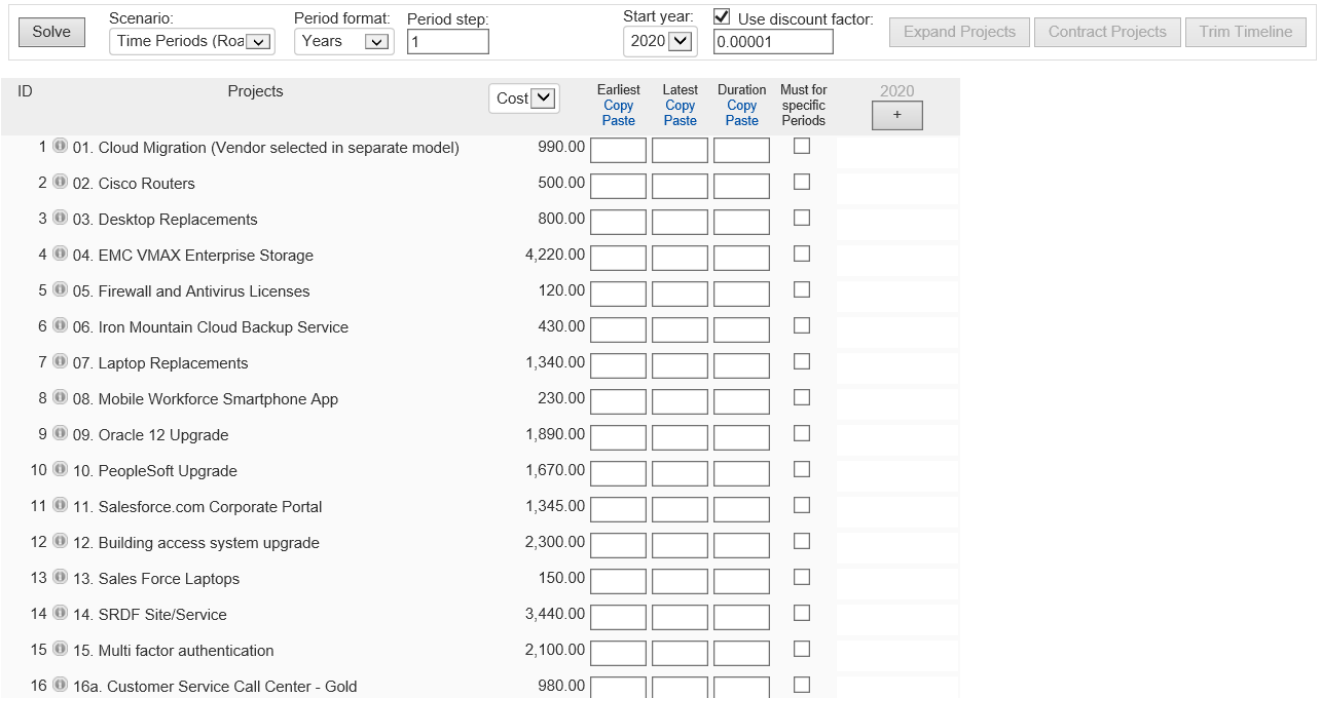
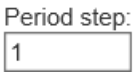


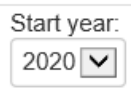
By default, the period format is in Years, which you can change from the drop-down below:

The period step is 1 by default and can be changed:

The period step is the interval of the periods. For example, when set to 1, the period years will be 2020, 2021... and then when set to 5 will be 2020, 2025, 2030...

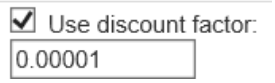


Click the start year and select from the drop-down:



By default, the selected is the current year.

You can select to use the discount factor. The default discount factor is 0.0001, which you can change as desired.



To add a period simply click the plus button:

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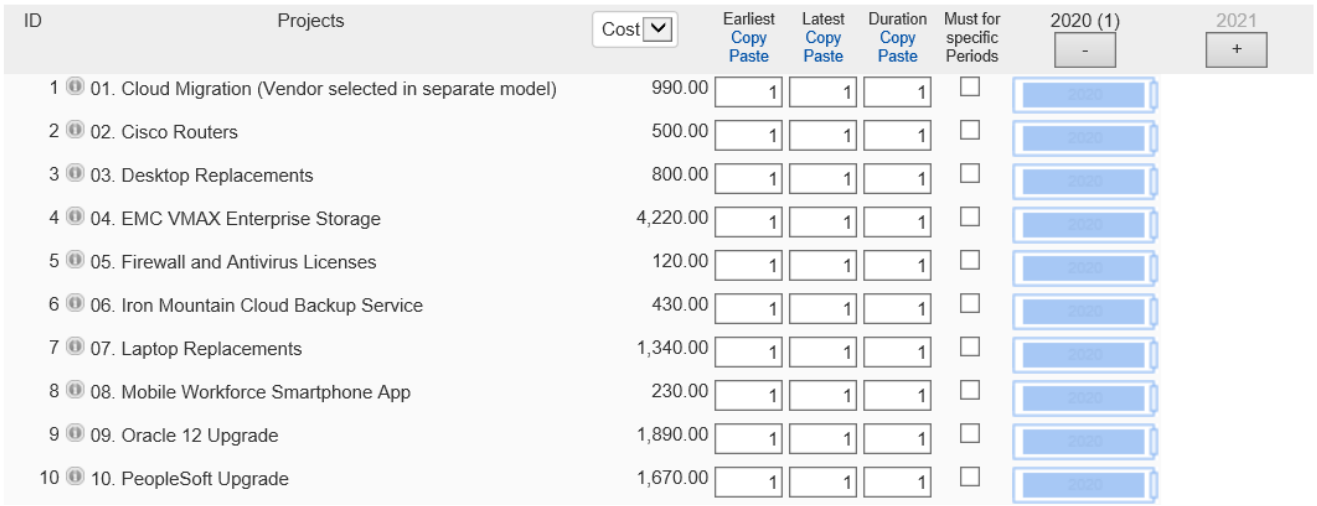
The period name is based on the format you selected - in this case, the year 2020 (current year).

After clicking the plus button, the blue bars will be displayed as shown below. Another column (2021) will then be displayed and is ready to be added:



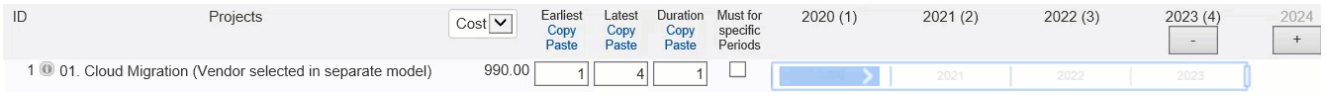
Here we added four periods (2020-2023):

You can drag the blue bars to adjust the periods.

For example, click the small handle at the right of the blue bar, and then drag the handle until it extends to the desired column:

From above, **1. Cloud Migration (Vendor selected in separate model)** can start on any period from 2020 to 2023.

To specify the duration, extend the inner blue bar:



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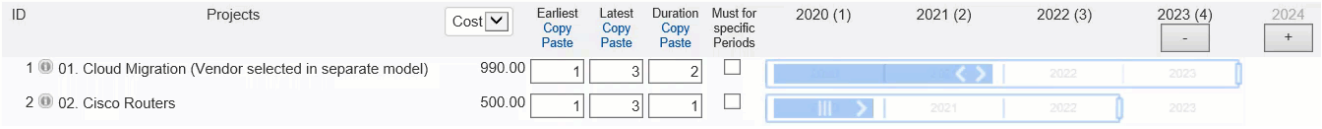
From above, we specified that the alternative can span by two periods from 2020-2023.

You can also specify the earliest/latest period to fund the alternative by grabbing and dragging the |||. Below, the alternative **02. Cisco Routers** can be funded from the year 2021 to 2023.



The **Earliest**, **Latest,** and **Duration** are displayed in the corresponding columns.

You can also enter from the Earliest, Latest, and Duration columns to adjust the Time Periods instead of dragging the blue bars.

Earliest is the earliest period the alternative can start.

Latest is the latest period the alternative can start.

Duration is the span the resource can be distributed.

You can also copy/paste the Earliest, Latest, and Duration columns. When pasting to the Earliest column, keep in mind the following:
1. Earliest > 0
2. Earliest <= Latest
3. Earliest + Duration < Total Periods

> We recommend pasting values to the **Latest** column first, before pasting to the Earliest column. This is to make sure that the Earliest will be less than or equal to the Latest.

Click **Expand Projects** to expand the blue outline up to the latest period.

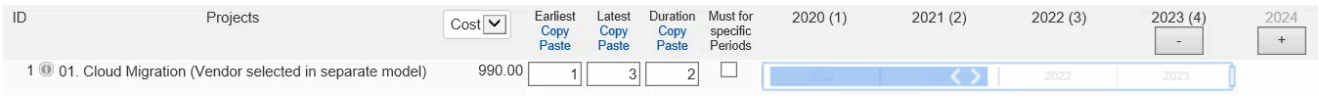
Click **Contract Projects** to contract the blue outline.

Click **Trim Timeline** to delete unused periods.

You can delete periods individually using the minus (-) button.

You can check Must for certain Periods to force the funding on certain periods.

You can specify a resource **must** be funded on a specific period(s) by checking the "Must for certain Periods" option. The solid bar will switch to dark blue:



You can then drag the "must" bar to the period you want to be a Must. Above, we made that **1. Cloud Migration (Vendor selected in separate model)** must be funded in the years 2022-2023.

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You can also specify dependencies on the Time Periods -- for example, you want to specify that alternative A must start only after B is finished (Non-concurrent), or Alternative A may start on the same period or later than alternative B (Concurrent). This can be done in Resource Allocation > Dependencies page.

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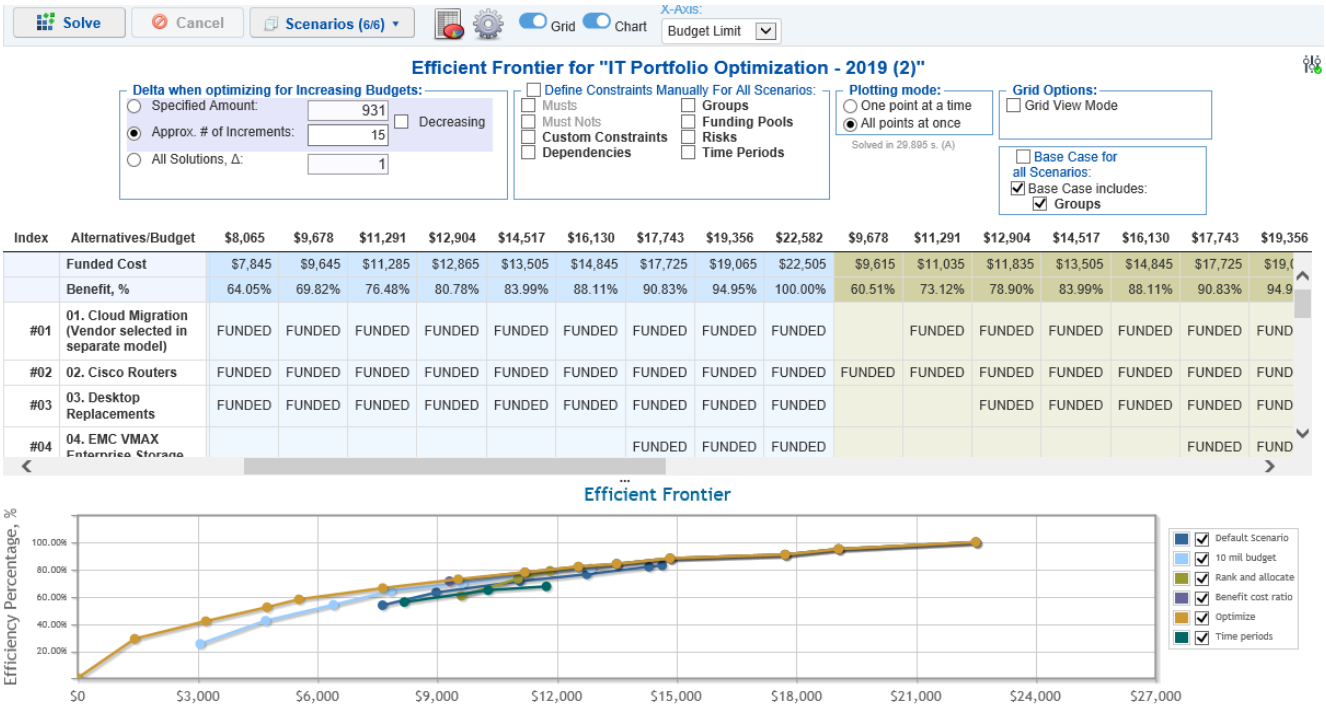
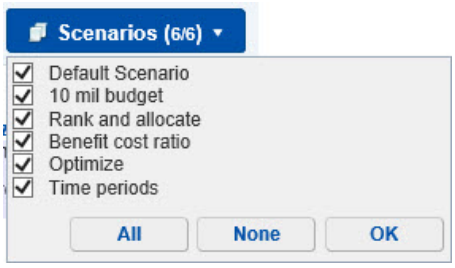
Efficient Frontier

The Efficient Frontier results make it easy to compare several scenarios and see the effects of lower or higher budgets.

Click to display results:

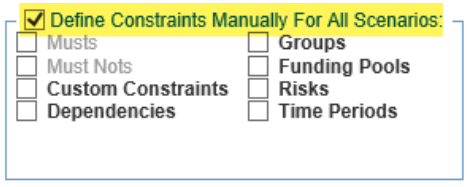


You can select the scenarios to display by using the Scenarios drop-down:



When there is more than one selected scenario, you can temporarily specify the ignore and base case settings for all the scenarios and view the results:

Simply check the "Define Constraints Manually for All Scenarios,"



and the "Base Case for All Scenarios":

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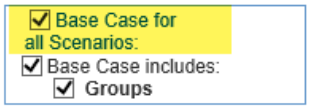

You can select the Grid, Chart, or Both at the same time:

The Grid displays the Alternatives, the budget amount, the benefit expressed as a percentage based on the derived alternatives priorities from Comparion, and the cost to implement the budget in a table format.

Index	Alternatives/Budget	$8,065	$9,678	$11,291	$12,904	$14,517	$24,195
	Funded Cost	$7,640	$8,985	$11,085	$12,755	$14,315	$14,645
	Benefit, %	53.57%	62.97%	71.27%	76.36%	81.94%	82.91%
#01	01. Cloud Migration (Vendor selected in separate model)	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
#02	02. Cisco Routers	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
#03	03. Desktop Replacements	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
#04	04. EMC VMAX Enterprise Storage						
#05	05. Firewall and Antivirus Licenses	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
#06	06. Iron Mountain Cloud Backup Service	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
#07	07. Laptop Replacements					FUNDED	
#08	08. Mobile Workforce Smartphone App	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
#09	09. Oracle 12 Upgrade					FUNDED	FUNDED
#10	10. PeopleSoft Upgrade				FUNDED		FUNDED

Checking the **Grid View Mode**

option displays the same information, but lists the funded alternatives for each budget in each column:

Alternatives/Budget	$8,065	$9,678	$11,291	$12,904
Funded Cost	$7,640	$8,985	$11,085	
Benefit, %	53.57%	62.97%	71.27%	
Funded alternatives	#14 14. SRDF Site/Service #03 03. Desktop Replacements #02 02. Cisco Routers #06 06. Iron Mountain Cloud Backup Service #13 13. Sales Force Laptops #05 05. Firewall and Antivirus Licenses #08 08. Mobile Workforce Smartphone App #01 01. Cloud Migration (Vendor selected in separate model) #16 16a. Customer Service Call Center - Gold	#11 11. Salesforce.com Corporate Portal #14 14. SRDF Site/Service #03 03. Desktop Replacements #02 02. Cisco Routers #06 06. Iron Mountain Cloud Backup Service #13 13. Sales Force Laptops #05 05. Firewall and Antivirus Licenses #08 08. Mobile Workforce Smartphone App #01 01. Cloud Migration (Vendor selected in separate model) #16 16a. Customer Service Call Center - Gold	#11 11. Salesforce.com Corporate Portal #14 14. SRDF Site/Service #03 03. Desktop Replacements #02 02. Cisco Routers #06 06. Iron Mountain Cloud Backup Service #13 13. Sales Force Laptops #15 15. Multi factor authentication #05 05. Firewall and Antivirus Licenses #08 08. Mobile Workforce Smartphone App #01 01. Cloud Migration (Vendor selected in separate model) #16 16a. Customer Service Call Center - Gold	#11 11. Salesforce.com Corporate Portal #14 14. SRDF Site/Service #03 03. Desktop Replacements #02 02. Cisco Routers #06 06. Iron Mountain Cloud Backup Service #13 13. Sales Force Laptops #15 15. Multi factor authentication #05 05. Firewall and Antivirus Licenses #10 10. PeopleSoft Upgrade #08 08. Mobile Workforce Smartphone App #01 01. Cloud Migration (Vendor selected in sep #16 16a. Customer Service Call Center - Gold

Hovering on a plot in the Chart will show a tooltip with its details and will highlight the corresponding column in the Grid.

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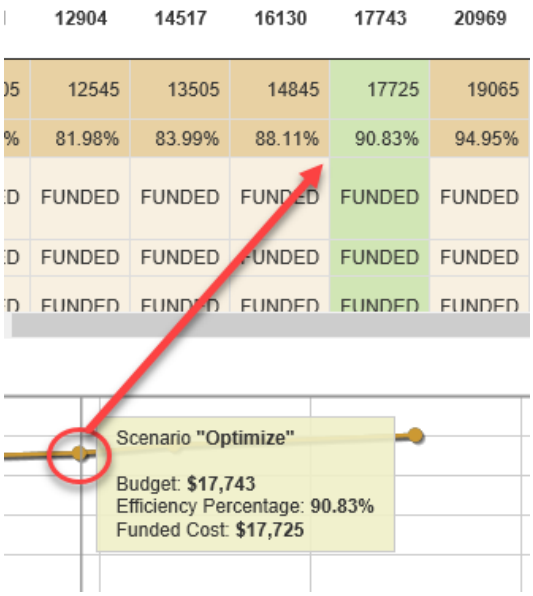

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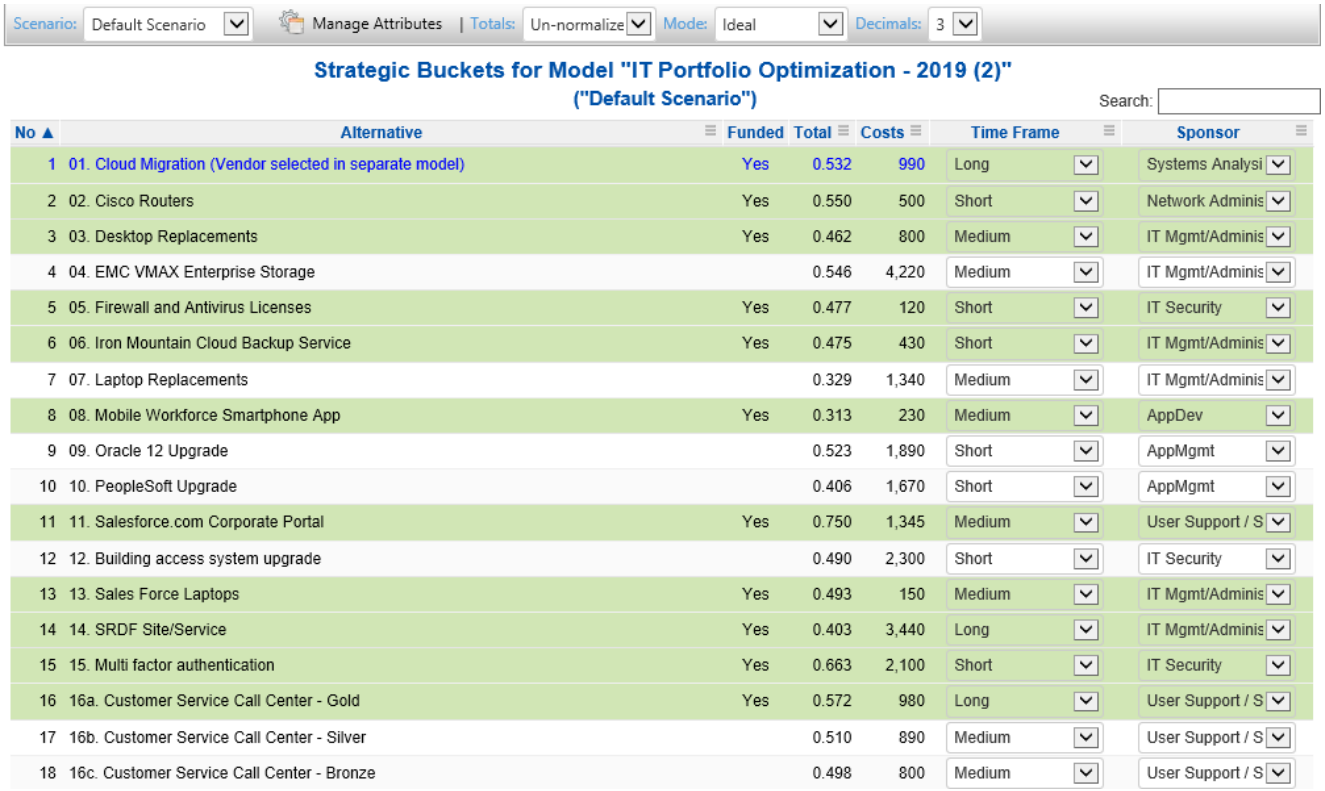
Strategic Buckets

You can set up "Strategic Buckets" by designating categories for the alternatives/projects. Typical categories might include the type of project, business area addressed, time frame, level of risk, geographical region, etc.

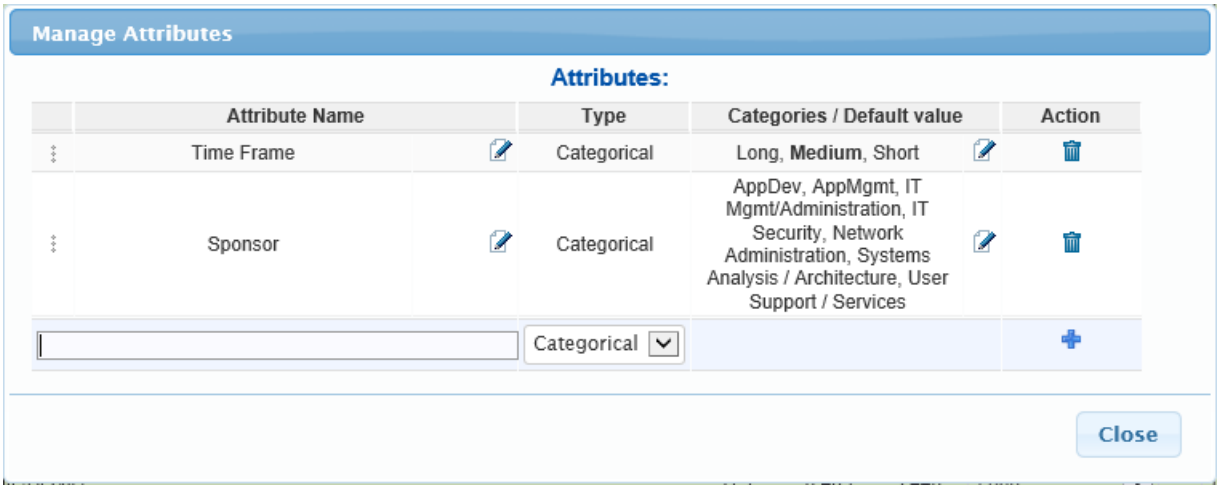
Strategic buckets are the same as Categorical Alternative Attributes.

The figure below shows a "Time frame" category with Short, Medium, and Long term category items:



No	Alternative	Funded	Total	Costs	Time Frame	Sponsor
1	01. Cloud Migration (Vendor selected in separate model)	Yes	0.532	990	Long	Systems Analysi
2	02. Cisco Routers	Yes	0.550	500	Short	Network Adminis
3	03. Desktop Replacements	Yes	0.462	800	Medium	IT Mgmt/Adminis
4	04. EMC VMAX Enterprise Storage		0.546	4,220	Medium	IT Mgmt/Adminis
5	05. Firewall and Antivirus Licenses	Yes	0.477	120	Short	IT Security
6	06. Iron Mountain Cloud Backup Service	Yes	0.475	430	Short	IT Mgmt/Adminis
7	07. Laptop Replacements		0.329	1,340	Medium	IT Mgmt/Adminis
8	08. Mobile Workforce Smartphone App	Yes	0.313	230	Medium	AppDev
9	09. Oracle 12 Upgrade		0.523	1,890	Short	AppMgmt
10	10. PeopleSoft Upgrade		0.406	1,670	Short	AppMgmt
11	11. Salesforce.com Corporate Portal	Yes	0.750	1,345	Medium	User Support / S
12	12. Building access system upgrade		0.490	2,300	Short	IT Security
13	13. Sales Force Laptops	Yes	0.493	150	Medium	IT Mgmt/Adminis
14	14. SRDF Site/Service	Yes	0.403	3,440	Long	IT Mgmt/Adminis
15	15. Multi factor authentication	Yes	0.663	2,100	Short	IT Security
16	16a. Customer Service Call Center - Gold	Yes	0.572	980	Long	User Support / S
17	16b. Customer Service Call Center - Silver		0.510	890	Medium	User Support / S
18	16c. Customer Service Call Center - Bronze		0.498	800	Medium	User Support / S

Click to manage the Strategic Buckets:



Here you see the existing alternative attributes with their categories. You can add, edit, and delete attributes and categories.

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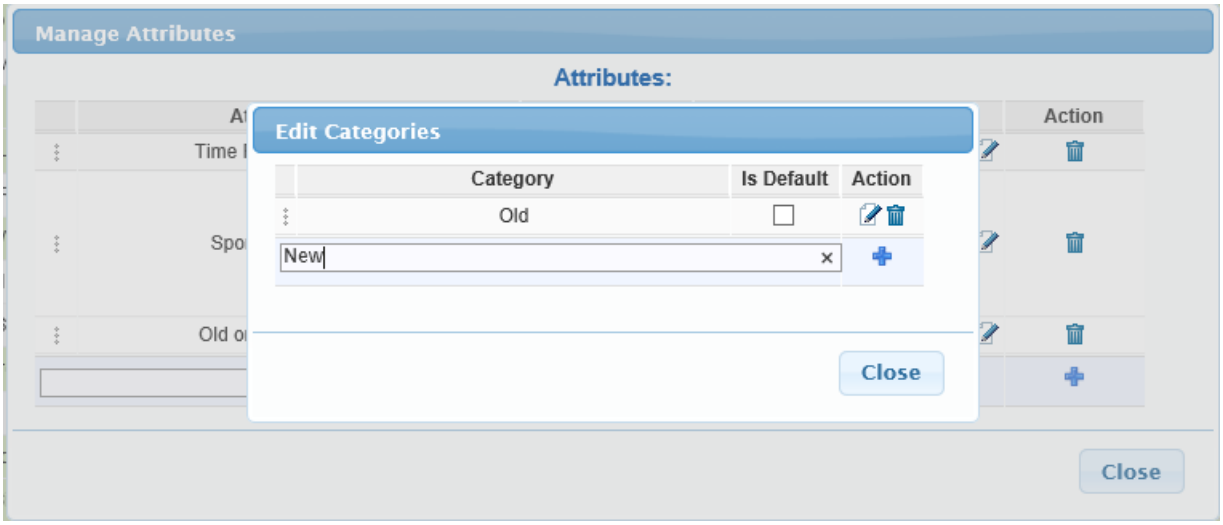
To add a new attribute, simply enter the attribute name on the text field provided.

You can click the icon or press the Enter key to save the attribute.

A new prompt will appear where you can add the categories: Old or New



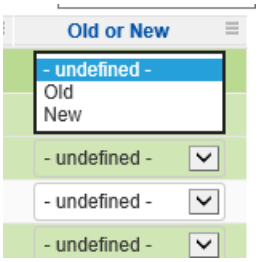
You can specify the default category by checking the Is Default check box.

Click Close.

The default category has **bold** font.

The added category will then be added as a new column.

You can assign the category to an alternative by clicking the drop-down and selecting the category.



Or you can use the Paste option to assign categories to alternatives/projects by pasting data copied from other sources (e.g., notepad, spreadsheet, etc.).

Click to show the copy and paste options:

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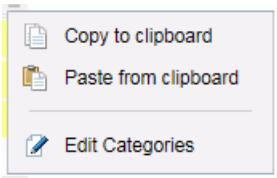

Edit Categories is a shortcut to open the categories dialog box.

You can create Custom Constraints from Strategic buckets (Categorical Alternative Attributes). Custom constraints created from an attribute will create one custom constraint for each category defined (e.g., for the attribute "Time Frame" the categories are Long, Medium, and Short).

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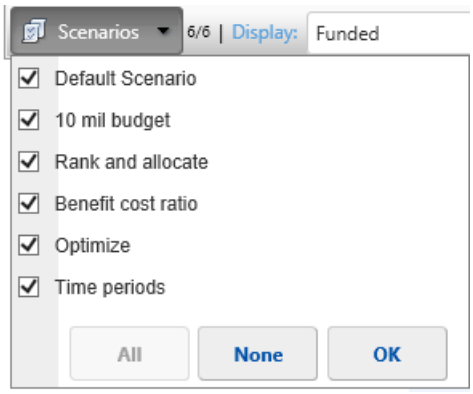
Scenario Comparisons

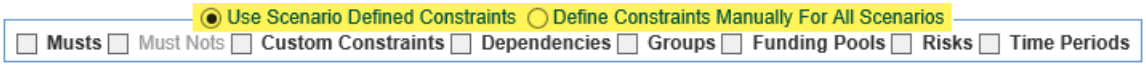
Scenario Comparisons lets you view several scenarios side by side, making it easy to compare the alternatives properties, objective priorities, and constraints side by side.

You can select the scenarios to display using the Scenarios drop-down:



When there is more than one selected scenario, you can use the radio buttons:

- **Use the Scenario defined Constraints** - to use the defined constraints on each scenario, or
- **Define Constraints Manually for All Scenarios** - temporarily apply the ignore and base case settings for all of the selected scenarios defined on the page



By default, the Comparison is the Funded alternatives displayed in Grid View:

	Scenario Name:	Default Scenario	10 mil budget	Rank and allocate	Benefit cost ratio	Optimize	Time periods
	Description:						
	Budget:	12,500	12,500	12,500	12,500	12,500	12,500
	% Effective:	71.27%	78.9%	78.9%	81.2%	81.2%	67.43%
	Funded Cost	11,085	11,835	11,835	12,455	12,455	11,745
No.	Alternative Name ▲	Funded					
1	01. Cloud Migration (Vendor selected in separate model)	Yes	Yes	Yes	Yes	Yes	Yes
2	02. Cisco Routers	Yes	Yes	Yes	Yes	Yes	Yes
3	03. Desktop Replacements	Yes	Yes	Yes	Yes	Yes	
4	04. EMC VMAX Enterprise Storage						
5	05. Firewall and Antivirus Licenses	Yes	Yes	Yes	Yes	Yes	Yes
6	06. Iron Mountain Cloud Backup Service	Yes	Yes	Yes	Yes	Yes	Yes
7	07. Laptop Replacements				Yes	Yes	
8	08. Mobile Workforce Smartphone App	Yes	Yes	Yes	Yes	Yes	Yes
9	09. Oracle 12 Upgrade		Yes	Yes	Yes	Yes	Yes
10	10. PeopleSoft Upgrade				Yes	Yes	Yes

You can select another attribute to compare:

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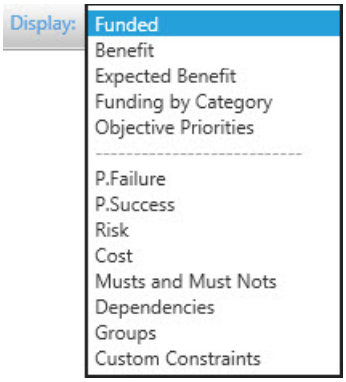
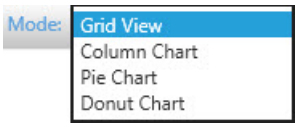


Depending on the attribute being compared, you can display the comparisons in Grid, Column Chart, Pie Chart, or Donut Chart format:



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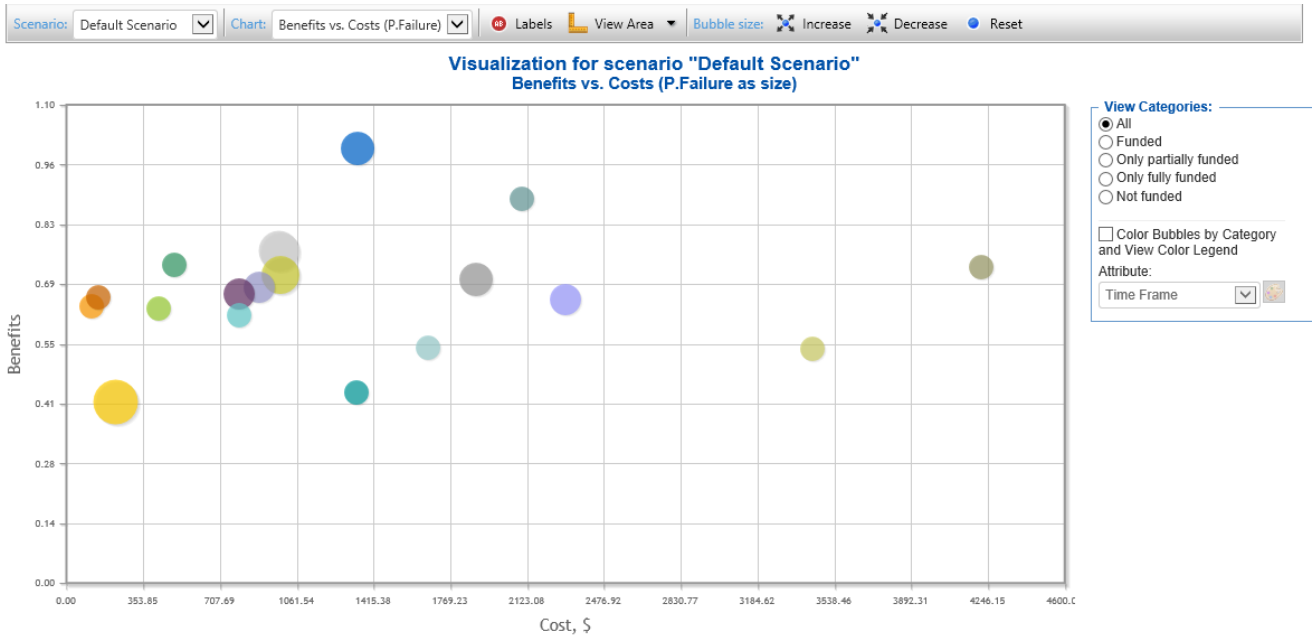
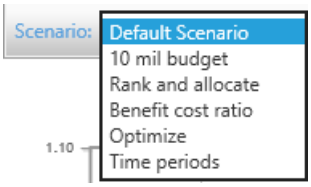
Visualizations

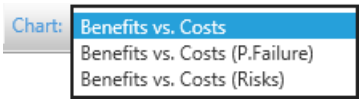
The Visualizations page graphs the alternatives with respect to the covering objectives.



You can plot the alternatives for a specific scenario by selecting the desired scenario in the scenario drop-down:



You have several options on plotting the alternatives:



- **Benefits vs. Costs** – plot alternatives with Cost (x-axis) and Benefits (y-axis)
- **Benefits vs. Costs (P.Failure)** - plot alternatives with Cost (x-axis) and Benefits (y-axis), with the plot size based on the alternative's P.failure
- **Benefit vs. Costs (Risks)** - plot alternatives with Cost (x-axis) and Benefits (y-axis), with the plot size based on the alternative's risk

You can select the alternatives to display in the chart based on the following categories:

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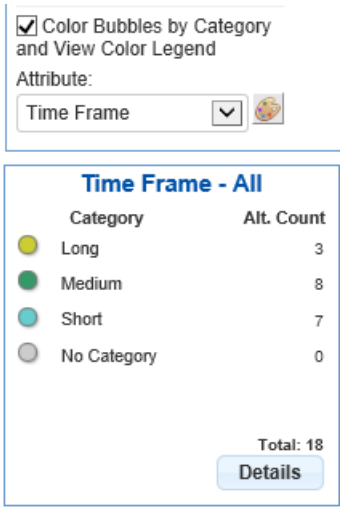
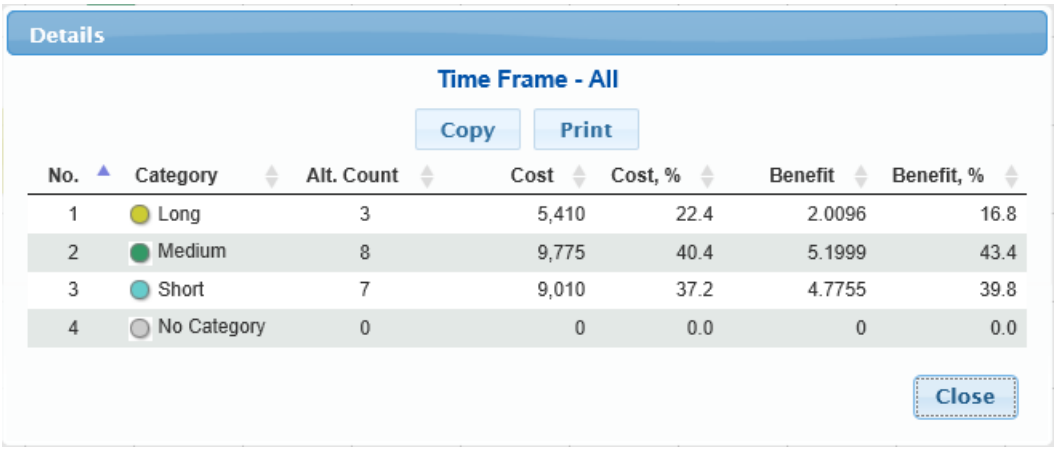
You can color the alternatives based on their category:



The legend will be displayed based on the selected attribute - one color for each category as shown above.

You can also see the number of alternative counts for each category.

Click Details to see more information:



No.	Category	Alt. Count	Cost	Cost, %	Benefit	Benefit, %
1	Long	3	5,410	22.4	2.0096	16.8
2	Medium	8	9,775	40.4	5.1999	43.4
3	Short	7	9,010	37.2	4.7755	39.8
4	No Category	0	0	0.0	0	0.0

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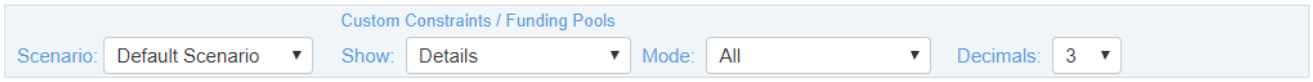
Model Specification

The Model Specification displays all the formulas defined in the optimization.



Model Specification [IT Portfolio Optimizatio…] – Comparion® for scenario "Default Scenario"

Model Specifications

Default Scenario

	Musts	Must Nots	Custom Constraints	Dependencies	Groups	Funding Pools	Risks
Defined:	☐	☐	☑	☑	☑	☑	☑
Ignore:	☐	☐	☐	☐	☐	☑	☑
Base Case Includes:	☐	☐	☐	☐	☑	☐	☐

Maximize Benefits

0.664 * A18 + 0.680 * A17 + 0.763 * A16 + 0.884 * A15 + 0.538 * A14 + 0.657 * A13 + 0.653 * A12 + 1.000 * A11 + 0.542 * A10 + 0.697 * A9 + 0.417 * A8 + 0.438 * A7 + 0.633 * A6 + 0.635 * A5 + 0.727 * A4 + 0.616 * A3 + 0.733 * A2 + 0.709 * A1

Budget Constraint

<= 12,500

Custom Constraints

"PM": 1.000 * A11 + 0.500 * A2 + 1.000 * A4 + 1.000 * A15 + 0.000 * A16 + 1.000 * A6 + 0.000 * A17 + 0.000 * A9 + 0.000 * A18 + 3.000 * A5 + 0.000 * A1 + 1.000 * A12 + 0.500 * A13 + 0.500 * A3 + 0.000 * A10 + 0.000 * A14 + 0.500 * A8 + 0.000 * A7 <= 5.00 - SOFT CONSTRAINT

"Long": 1.000 * A1 + 1.000 * A14 + 1.000 * A16 >= 3.00

"Medium": 1.000 * A3 + 2.000 * A4 + 1.000 * A7 + 1.000 * A8 + 1.000 * A11 + 1.000 * A13 + 1.000 * A17 + 1.000 * A18 >= 3.00

"Short": 1.000 * A2 + 1.000 * A5 + 1.000 * A6 + 1.000 * A9 + 1.000 * A10 + 1.000 * A12 + 1.000 * A15 >= 3.00

Dependencies

A9 Depends On A4

A13 and A7 are Mutually Exclusive

A11 and A12 are Mutually Exclusive

A10 and A4 are Mutually Dependent

Groups

"Customer service call center - activity levels": Exactly 1 of the following: A16, A17, A18

Funding Pools

"Procurement": 1,000 * "A11" + 4,000 * "A15" + 500 * "A2" + 1,400 * "A16" + 300 * "A12" + 430 * "A6" + 4,000 * "A4" + 120 * "A5" + 150 * "A13" + 990 * "A1" + 500 * "A10" + 1,000 * "A14" + 200 * "A3" + 230 * "A8" + 1,000 * "A7" + 1,400 * "A17" + 1,400 * "A18" <= 9,000

"R&D": 500 * "A11" + 1,500 * "A15" + 500 * "A2" + 1,000 * "A9" + 500 * "A16" + 400 * "A12" + 430 * "A6" + 220 * "A4" + 120 * "A5" + 150 * "A13" + 990 * "A1" + 200 * "A10" + 2,000 * "A14" + 500 * "A3" + 230 * "A8" + 1,000 * "A7" + 500 * "A17" + 500 * "A18" <= 6,000

"O&M": 300 * "A11" + 1,400 * "A15" + 500 * "A2" + 1,400 * "A9" + 4,000 * "A16" + 500 * "A12" + 430 * "A6" + 120 * "A5" + 150 * "A13" + 990 * "A1" + 1,000 * "A10" + 2,100 * "A14" + 1,000 * "A3"

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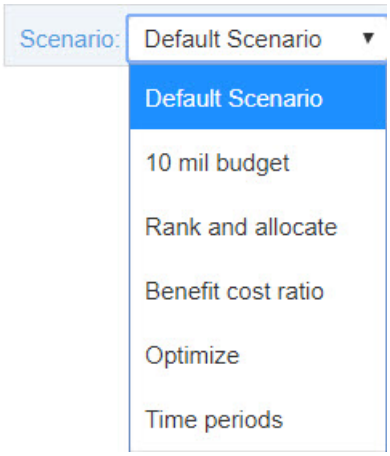
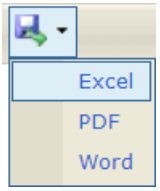
+ 230 * "A8" + 1,000 * "A7" + 4,000 * "A17" + 4,000 * "A18" <= 7,000

Alternatives Legend:	
A1	01. Cloud Migration (Vendor selected in separate model)
A2	02. Cisco Routers
A3	03. Desktop Replacements
A4	04. EMC VMAX Enterprise Storage
A5	05. Firewall and Antivirus Licenses
A6	06. Iron Mountain Cloud Backup Service
A7	07. Laptop Replacements
A8	08. Mobile Workforce Smartphone App
A9	09. Oracle 12 Upgrade
A10	10. PeopleSoft Upgrade
A11	11. Salesforce.com Corporate Portal
A12	12. Building access system upgrade
A13	13. Sales Force Laptops
A14	14. SRDF Site/Service

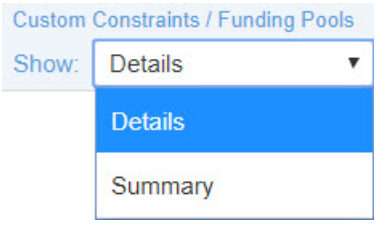
You can select a scenario using the scenario drop-down.



You can download the report in different formats:



For Custom Constraints and Funding Pools, you can select the summary or detailed information:



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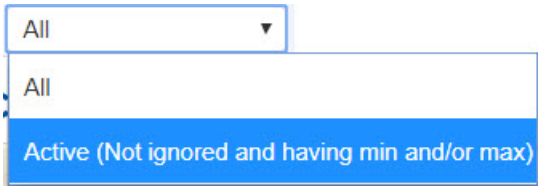
You can also select All or Active.



Active Custom Constraints and Funding Pools are those that are not ignored and have minimum and/or maximum specifications.

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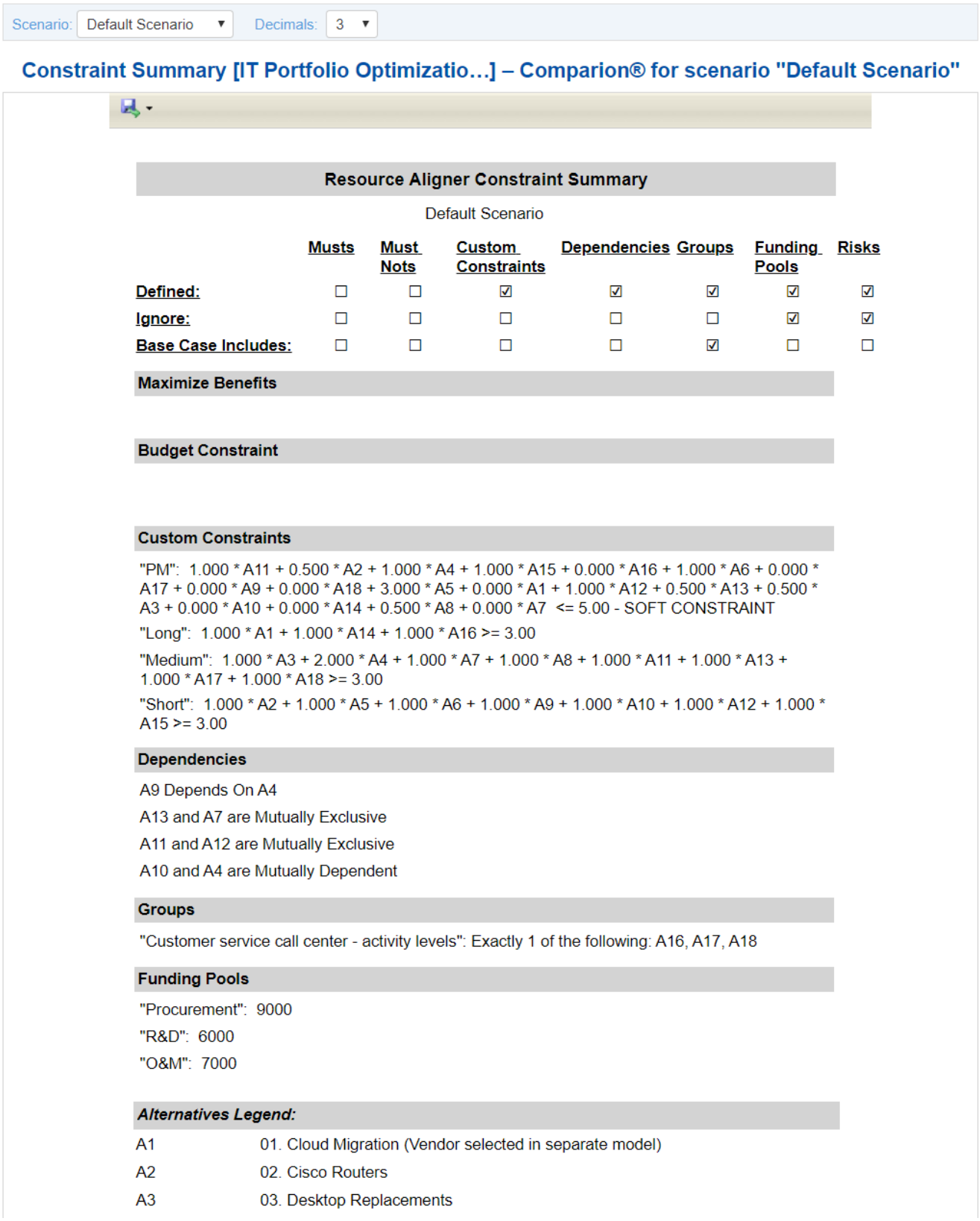
Constraint Summary

This page displays the summary of all the constraints:



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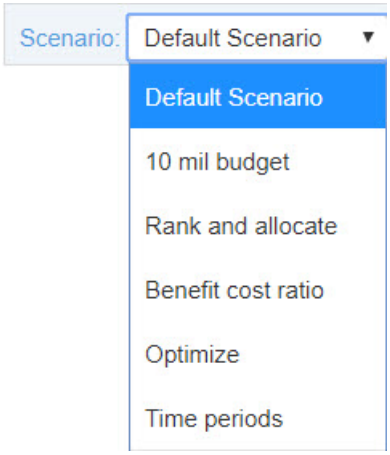
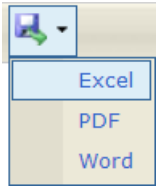
A4	04. EMC VMAX Enterprise Storage
A5	05. Firewall and Antivirus Licenses
A6	06. Iron Mountain Cloud Backup Service
A7	07. Laptop Replacements
A8	08. Mobile Workforce Smartphone App
A9	09. Oracle 12 Upgrade
A10	10. PeopleSoft Upgrade
A11	11. Salesforce.com Corporate Portal
A12	12. Building access system upgrade
A13	13. Sales Force Laptops
A14	14. SRDF Site/Service

You can select a scenario using the scenario drop-down



and download the report in different formats:



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Relevant Constraints

Relevant Constraints are constraints that are used by the optimizer for that scenario. If a relevant constraint is removed or modified, the current solution will change.

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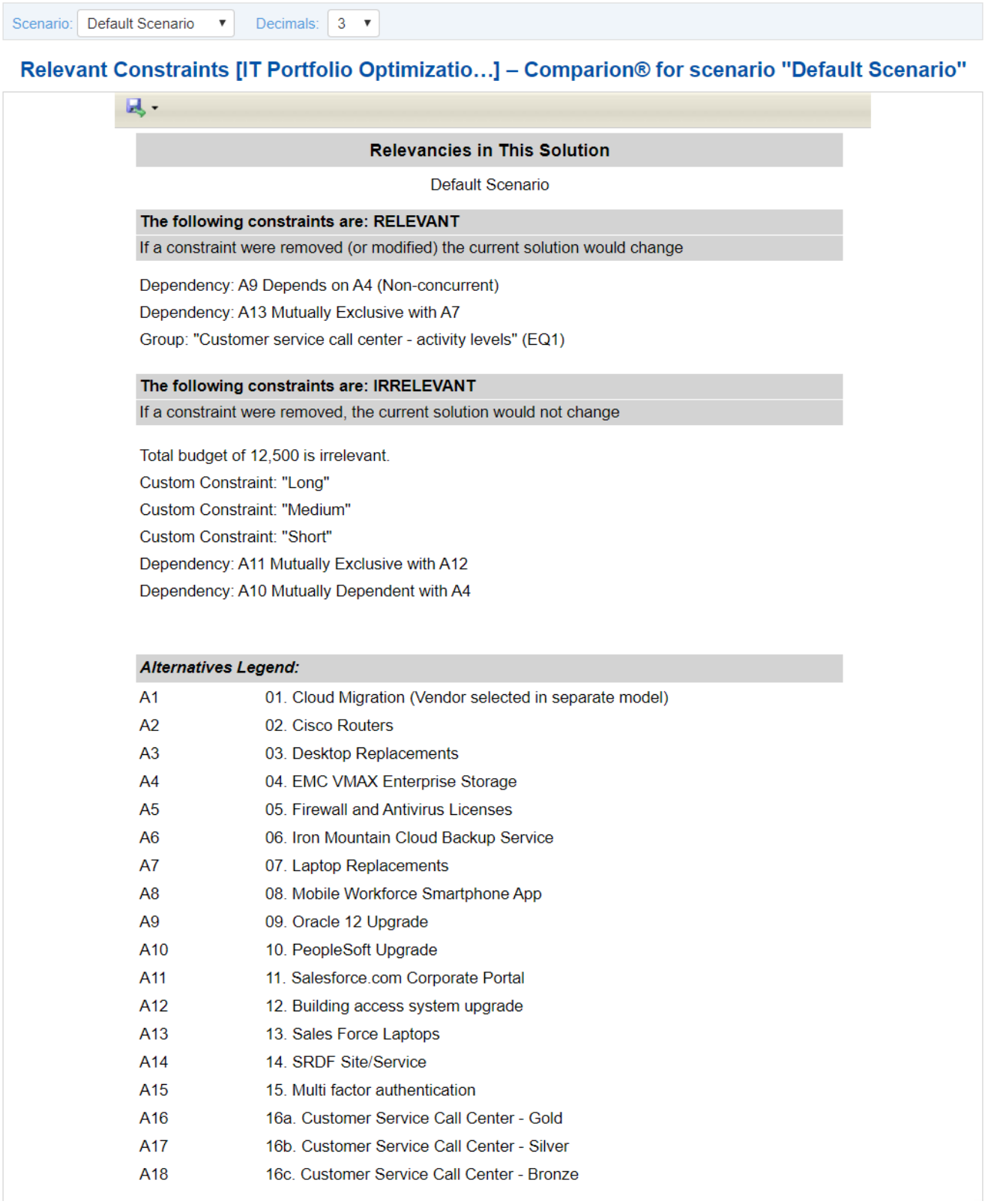

You can select a scenario using the scenario drop-down

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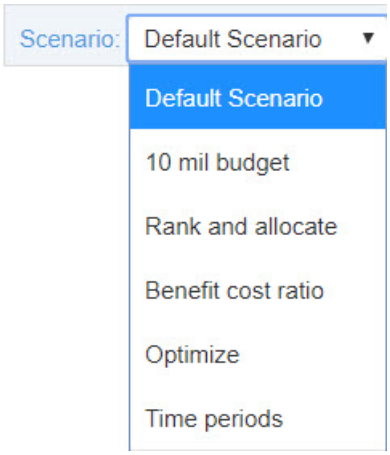
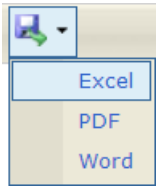


and download the report in different formats:



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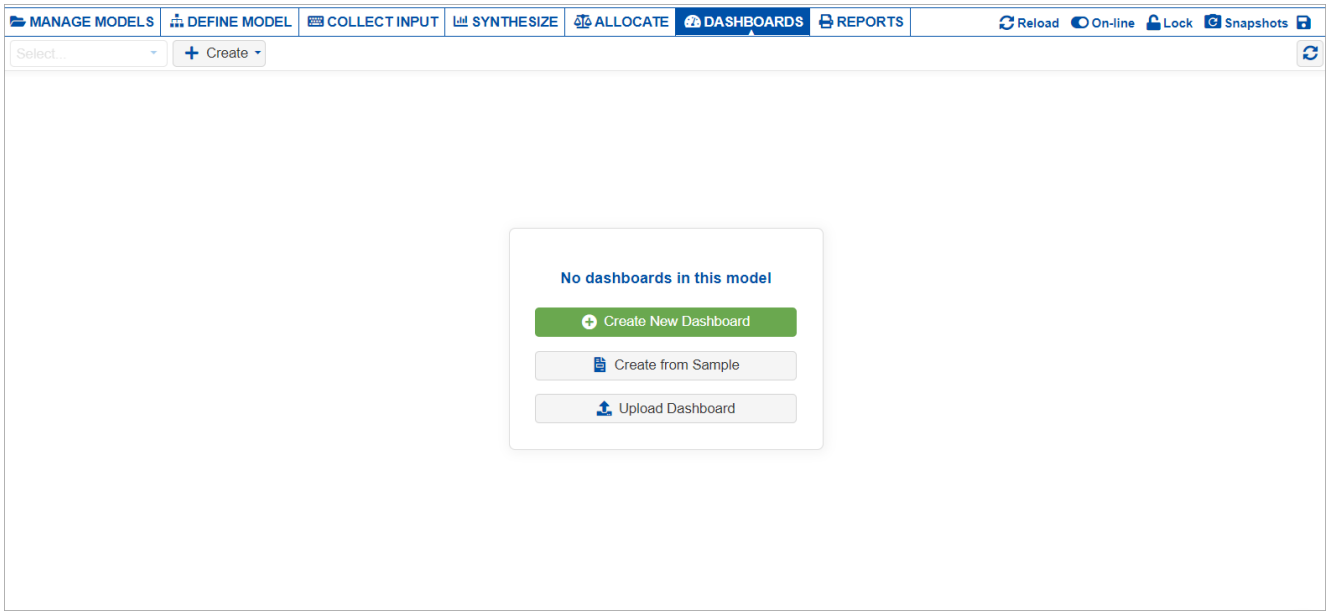
Dashboards

Comparion Dashboard is an information management tool where you can add different Comparion pages and widgets to the Dashboard as panels.

A model without any dashboard is displayed as below:



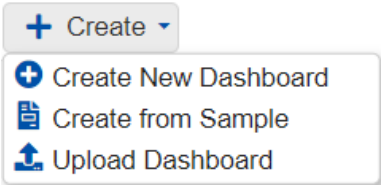
Here we see three options:

(1) **Create New dashboard** - add an empty dashboard or with a predefined layout.

(2) **Create from Sample** - add from sample dashboard.

(3) **Upload Dashboard** - upload a dashboard file. You can upload *.json, *.txt, *.dash, *.rep file with maximum 30MB size.

The same options are also available from the **+ Create** button at the top left:



Create New Dashboard

Click

or from Create > Create New Dashboard.

A dialog box will open as shown below where you will enter the dashboard name, an optional note (or description), and the layout.

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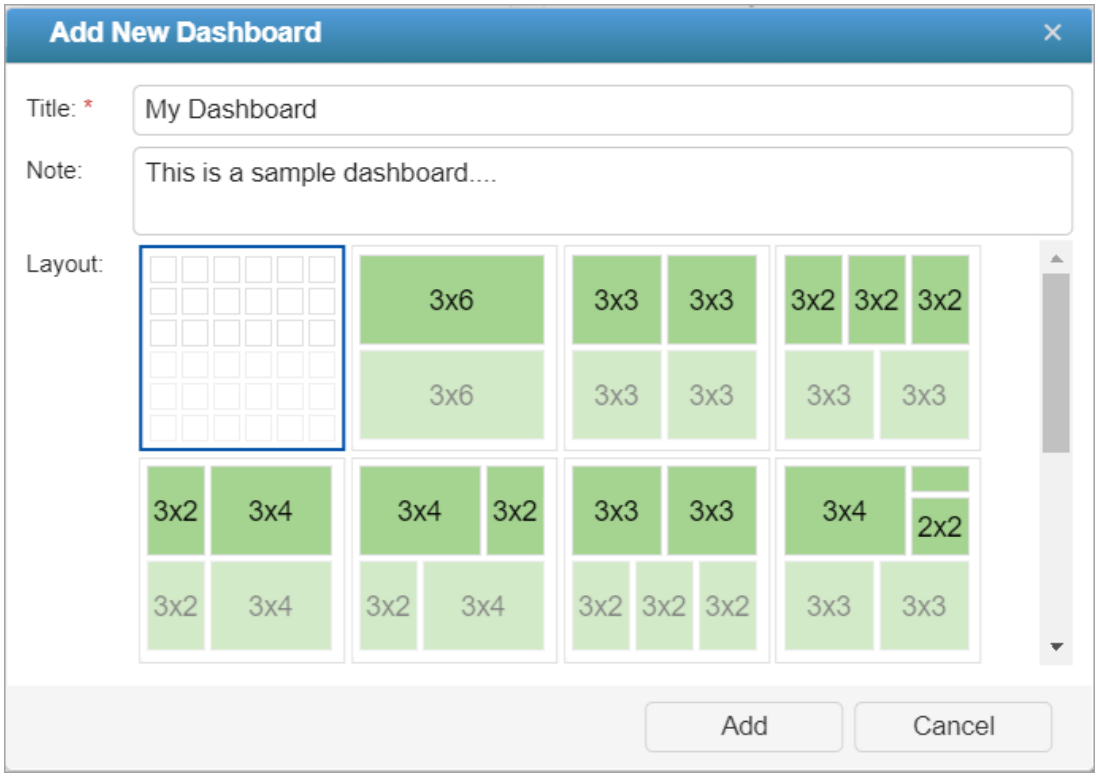

The first layout above is a blank layout (no placeholder). The rest of the layouts have pre-existing placeholders with specific sizes, row x column (e.g 3x6, 3x3, etc.). These placeholders are the container of the panels.

After specifying the dashboard properties, click **Add**.

> **Note**: You don't need to worry about the layout or panel sizes at this point since you can still modify this after specifying the dashboard properties.

The added dashboard will be listed in the dashboard drop-down and new options will appear in the toolbar.

When selecting the blank layout, the added dashboard will show the "Place new panel" button as shown below:

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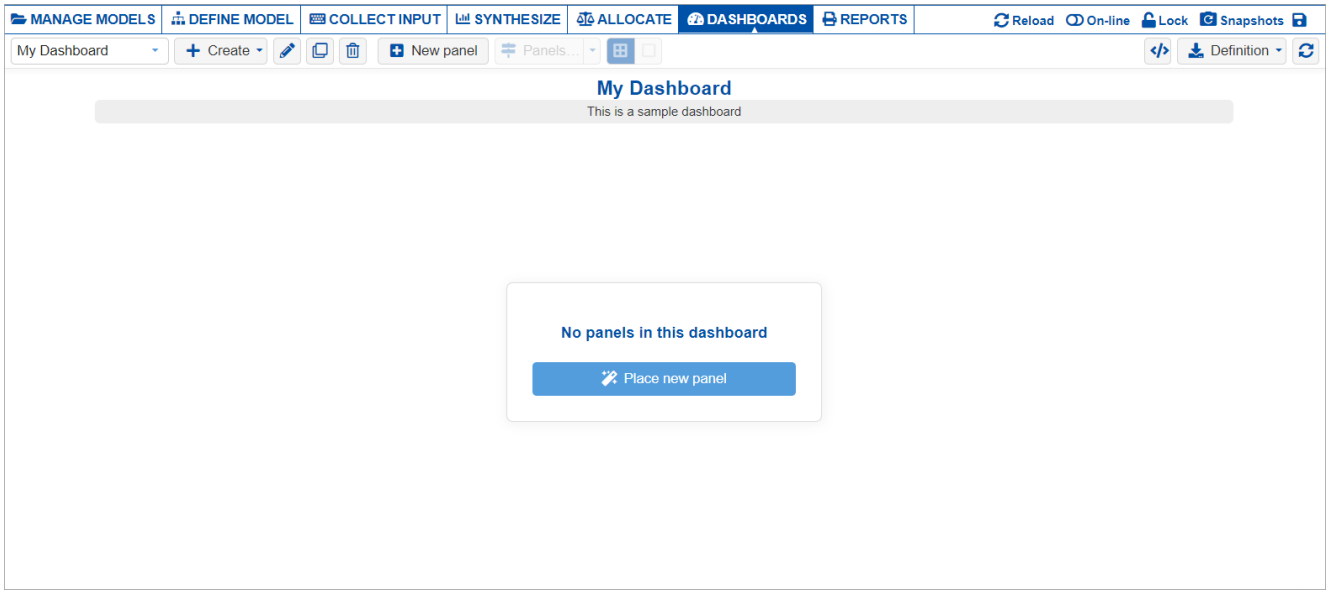
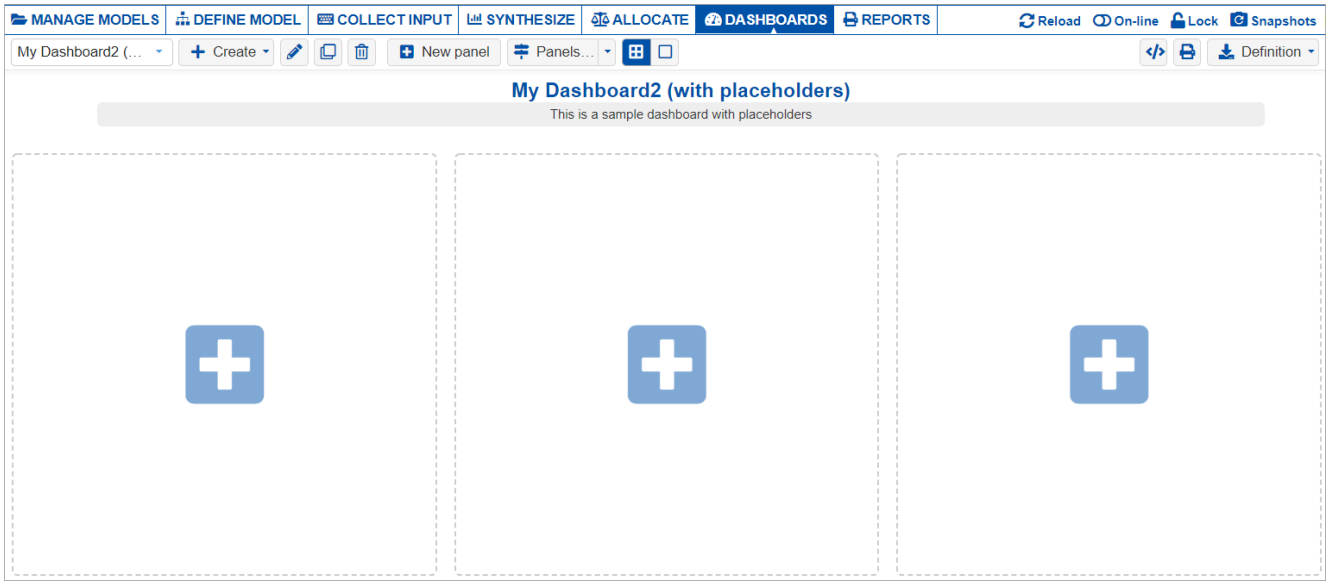


Other dashboard layouts with predefined sizes will show placeholders (boxes with plus icon) as in the example below:



The dashboard name is shown as a header in blue font, and the description is displayed below it.

Clicking on the dashboard name will open the " **Edit Dashboard Properties**" dialog box where you can edit the dashboard name or note. You can also open the same dialog box by clicking the pencil icon from the toolbar:

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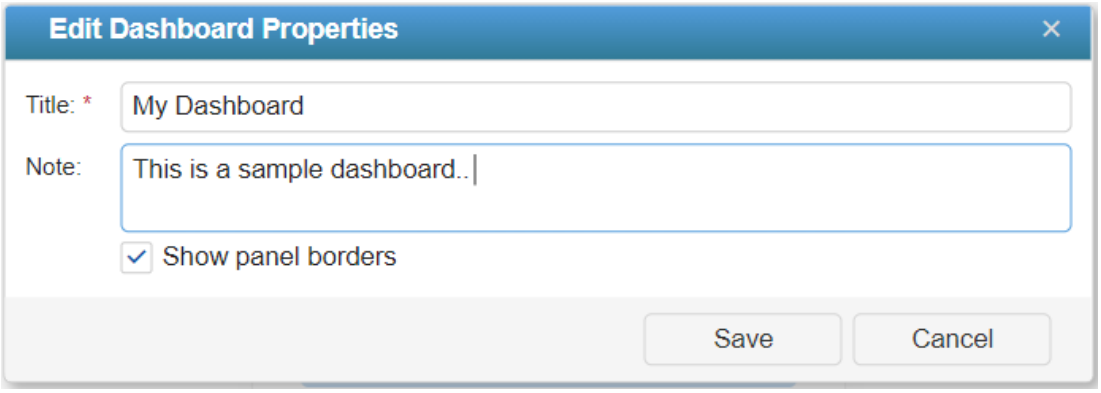
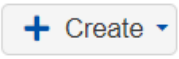


Unchecking "**Show panel borders**" will hide the panel borders and the dashboard will have a gray background.

You can create another dashboard from the  button.

If you have more than one dashboard, you can switch to another dashboard by selecting from the dashboard drop-down.

Click the clone icon to create a copy of the dashboard.

Click to delete the dashboard.

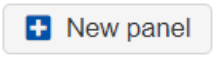
You can also add a new dashboard from any Comparion page that can be added to the dashboard. This will be discussed in the Create Panel from page section below.

Add Panel from Dashboard

Panels are pages or widgets being added to the dashboard.

You can create a new panel in the Dashboard page in different ways:

(a) Click the button (displayed only when the dashboard is empty)

(b) Click the  button on the toolbar at the top

(c) Click the plus icon in the placeholder

Clicking any of the new panel options mentioned above will open the new panel dialog box:

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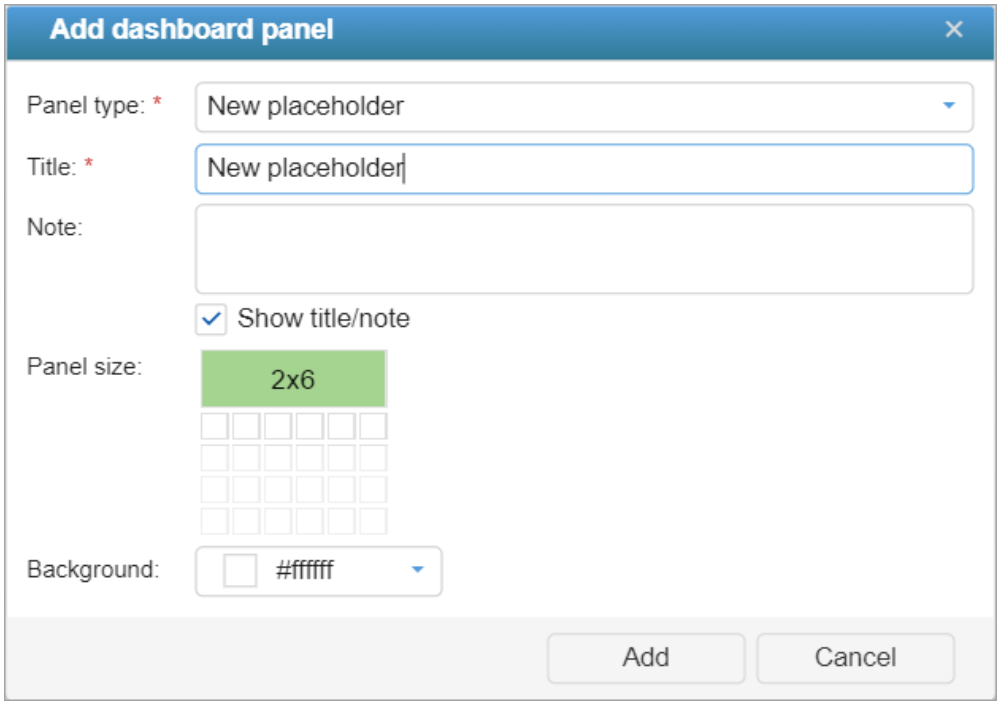
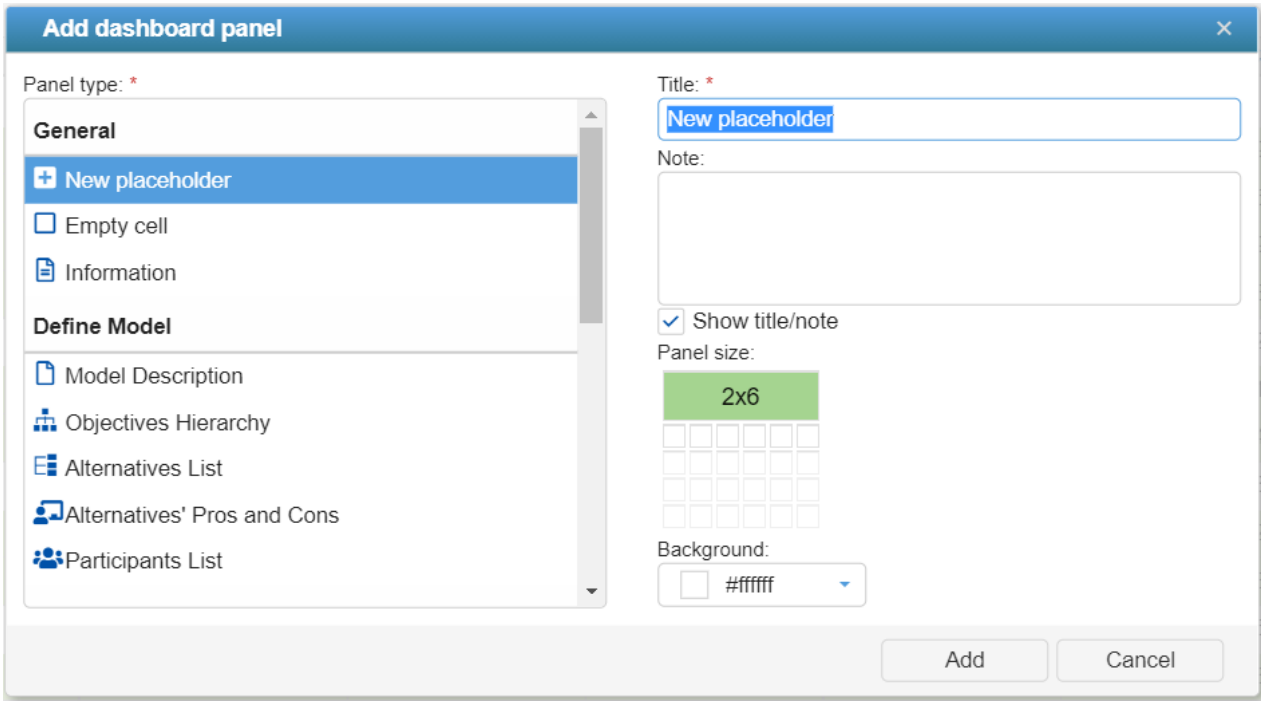


1. **Panel Type** - to select the Comparion page or widget that you want to add to the dashboard.



General panels:

- The "New placeholder" is selected by default; this is an empty panel that displays a placeholder with a plus icon where you can select a page or widget afterward.
- Empty cell - a blank panel you can use to add spaces between the panels; for example, you may want to place the next panel in the next "row."
- Information - add rich text information.

Define Model pages/widgets:

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- Model Description
- Objectives Hierarchy
- Alternatives List
- Alternatives Pros and Cons
- Participant List

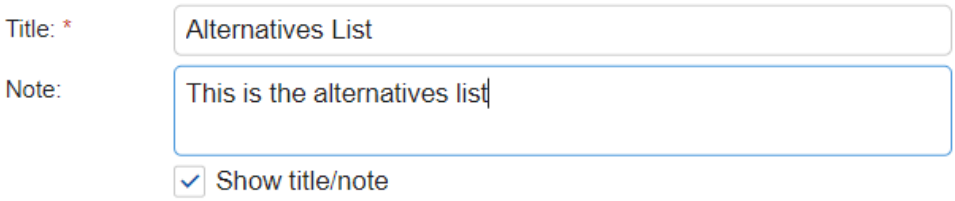
Overall Results pages/widgets:

- Charts (Alternatives and Objectives Charts)
- Grids (Alternatives and Objectives Grids; Portfolio View)
- Sensitivities (Dynamic, Performance, Gradient, 2D, Head to Head, Sensitivities Delta Alternatives)

Allocate:

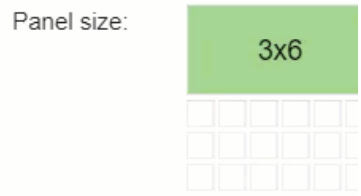
- Portfolio View

2. **Title and Note** -- panel title and the panel description (optional)



You can show or hide the title of note in the dashboard by checking or unchecking the Show title/note checkbox.

3. **Panel size** - is the size of the panel: row x column. You can change the size by clicking on the boxes.



4. **Color** - define the background color of the panel by selecting from the color picker; this is white by default.

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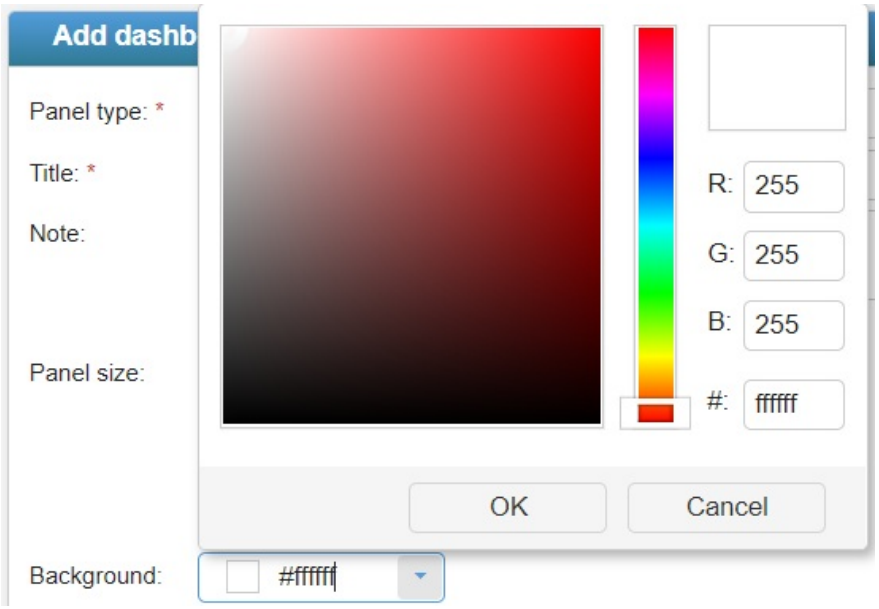
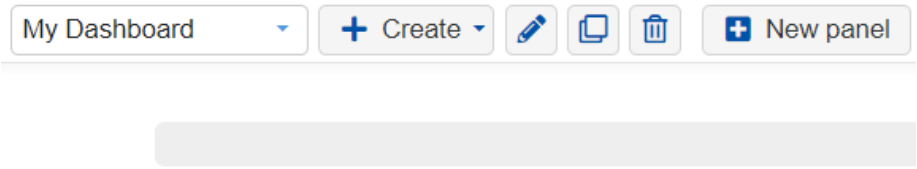
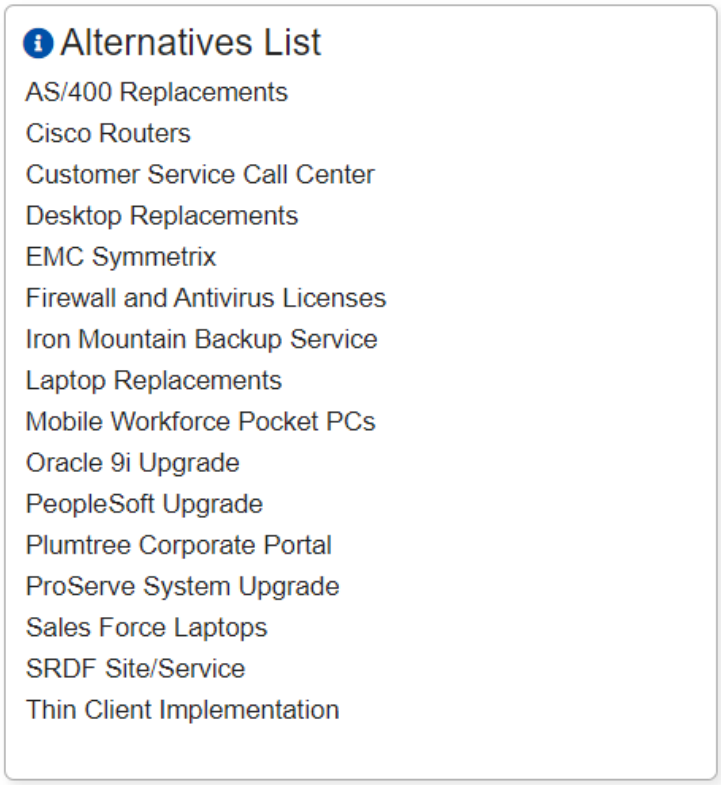


After defining the panel details, click the **Add** button. This will display the added panel into the dashboard:





Hovering on the "i" icon to the left of the panel name will display the panel note that was specified.

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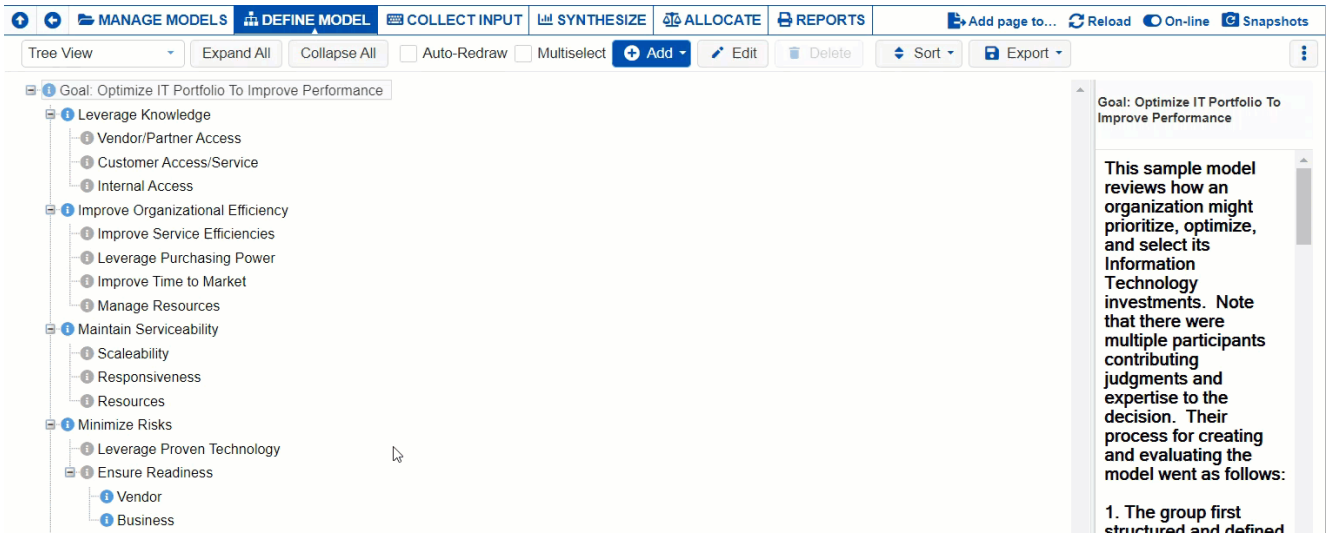
Add Panel from Page

You can also add a panel to a new or existing dashboard from Comparion pages or widgets mentioned above:



In the example above, we added the Objectives hierarchy to a new dashboard.

This was done by clicking the "**Add page to dashboard**" option at the top right of the Objectives page.

This will open a dialog box where you will enter the Panel name and then select to add the panel to an existing dashboard in the model, or create a new one. In our example, we've added the panel to a new dashboard (Dashboard 2 new).

After adding a new panel, a prompt will appear asking to open the recently created panel. Clicking Yes will redirect you to the dashboard page.

Manage Panels (Edit, Clone, Delete, Open original page, etc.)

Double-clicking the panel name will open the **Edit Panel Properties** dialog box.

Hovering on the panel will display the Gear and maximize icons.

Clicking on the Gear icon (or right-click the panel name) will display five icons as shown below:

- **Edit Panel Properties** - open the edit panel dialog box where you can specify the panel title, note, size, and color. You can also double-click the panel name to open the same dialog box. You can also open the same dialog box when double-clicking on the panel name.
- **Clone Panel** - create a copy of the panel.
- **Delete Panel** - delete the panel.
- **Open original page** - open the source page of the panel. For example, for the Alternatives List panel, clicking this

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icon will open the DEFINE MODEL > Alternatives page.

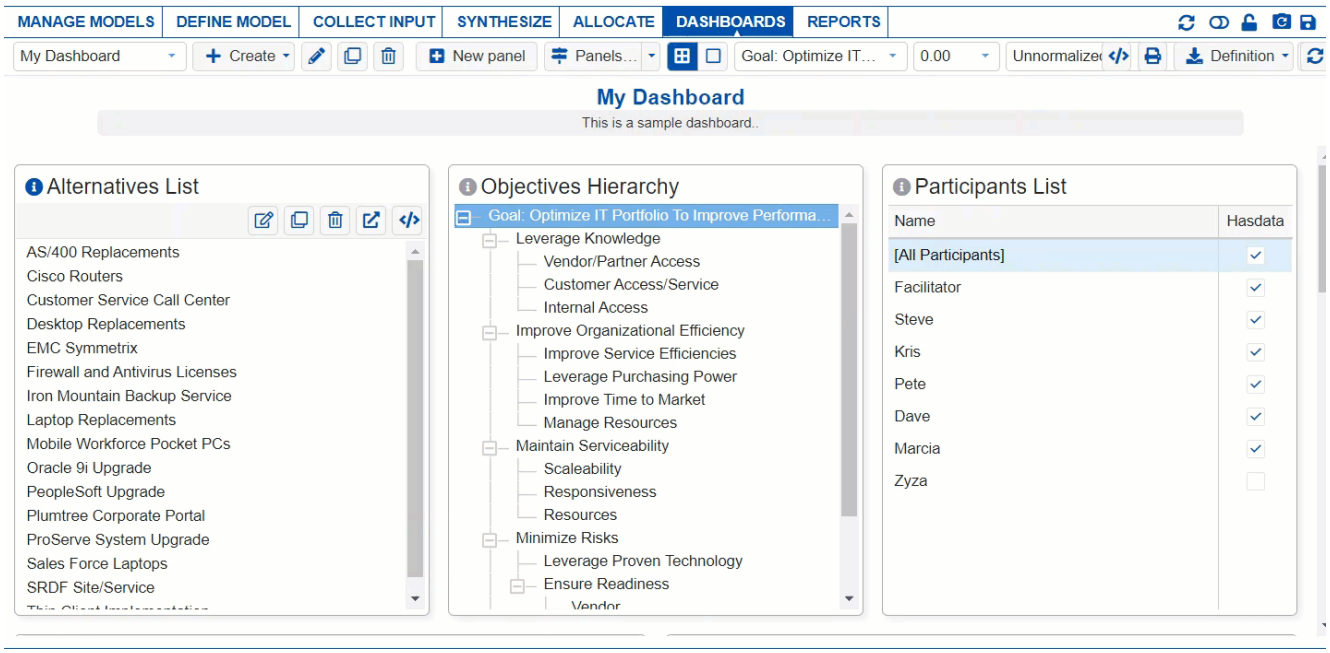
- **Panel JSON data** - open the panel JSON data.

The maximize icon will open a maximized view of the selected panel.

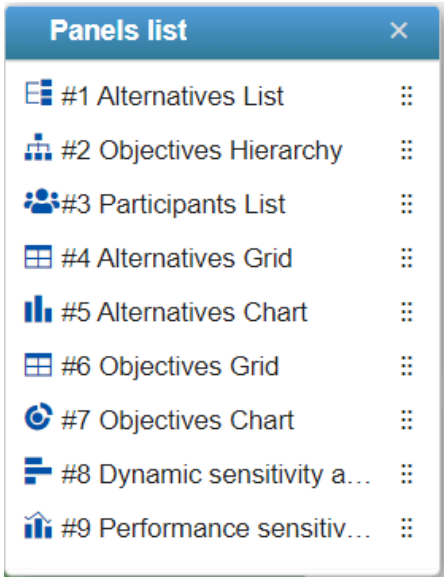
Open Panels List

The Panels List can be opened as a drop-down or a floating list:

(1) **Drop-down Panels List** - clicking the drop-down arrow will open the panels list drop-down. Clicking on a panel name will jump to that panel and flash it for 2 seconds as shown below:



(2) **Floating Panels List** - you can also open a floating panels list by clicking the Panels... button.



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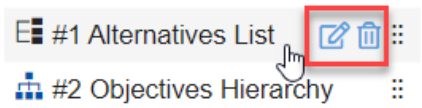
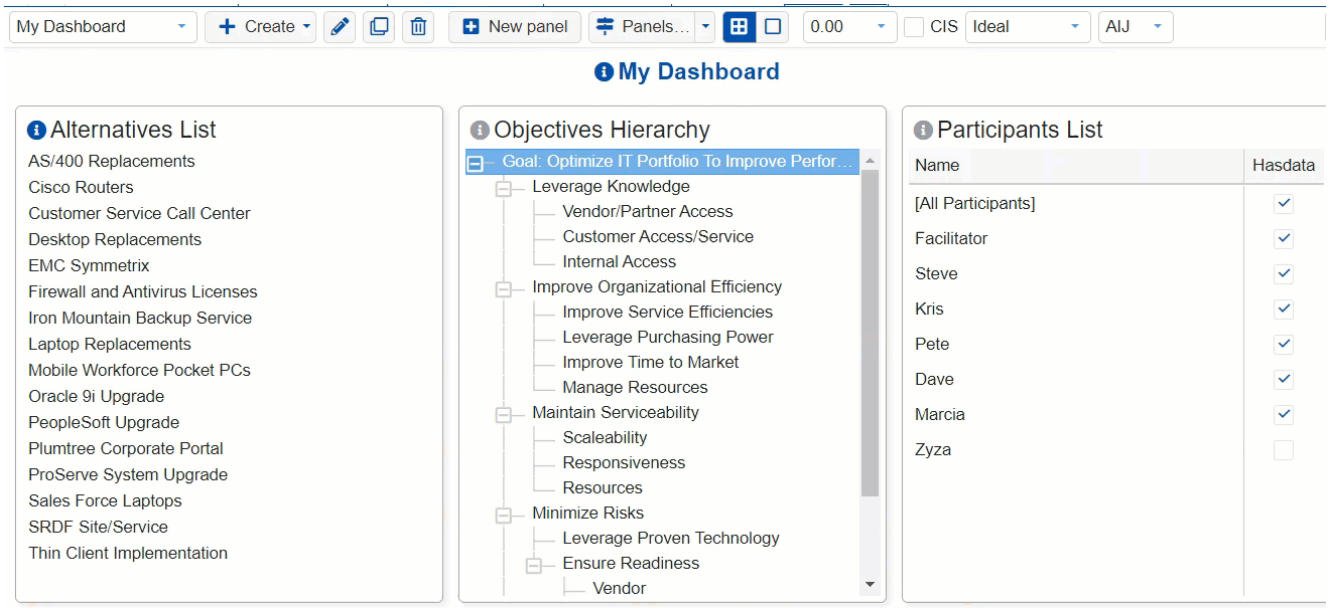
You can also click a panel name from the list above to jump to that panel the same way as with the drop-down panels list.

Hovering on a panel name will show the Edit and Delete Panel button.



You can also rearrange the panels by dragging and dropping the ⠿ icon to the right of the panel names:



Resize Panel

In addition to resizing a panel from " Edit Panel Properties," you can also simply drag the panel border as shown below:

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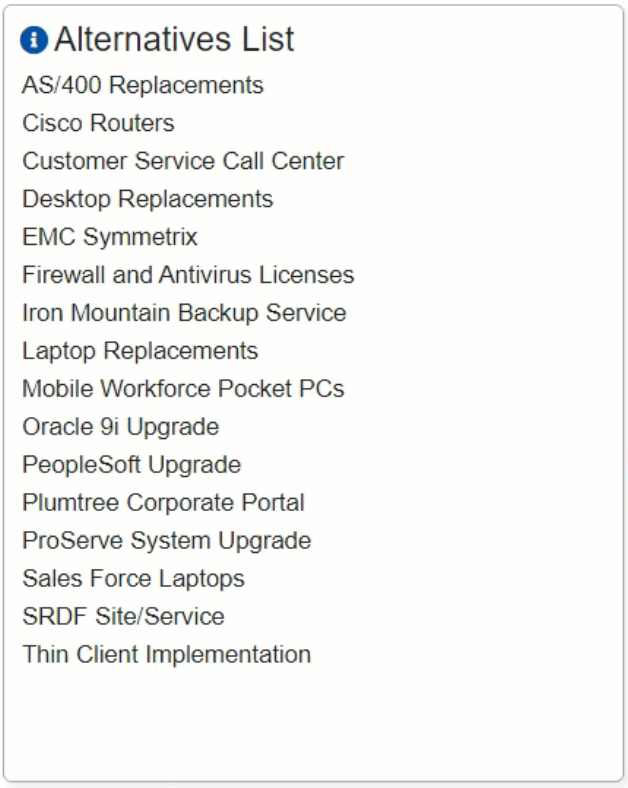
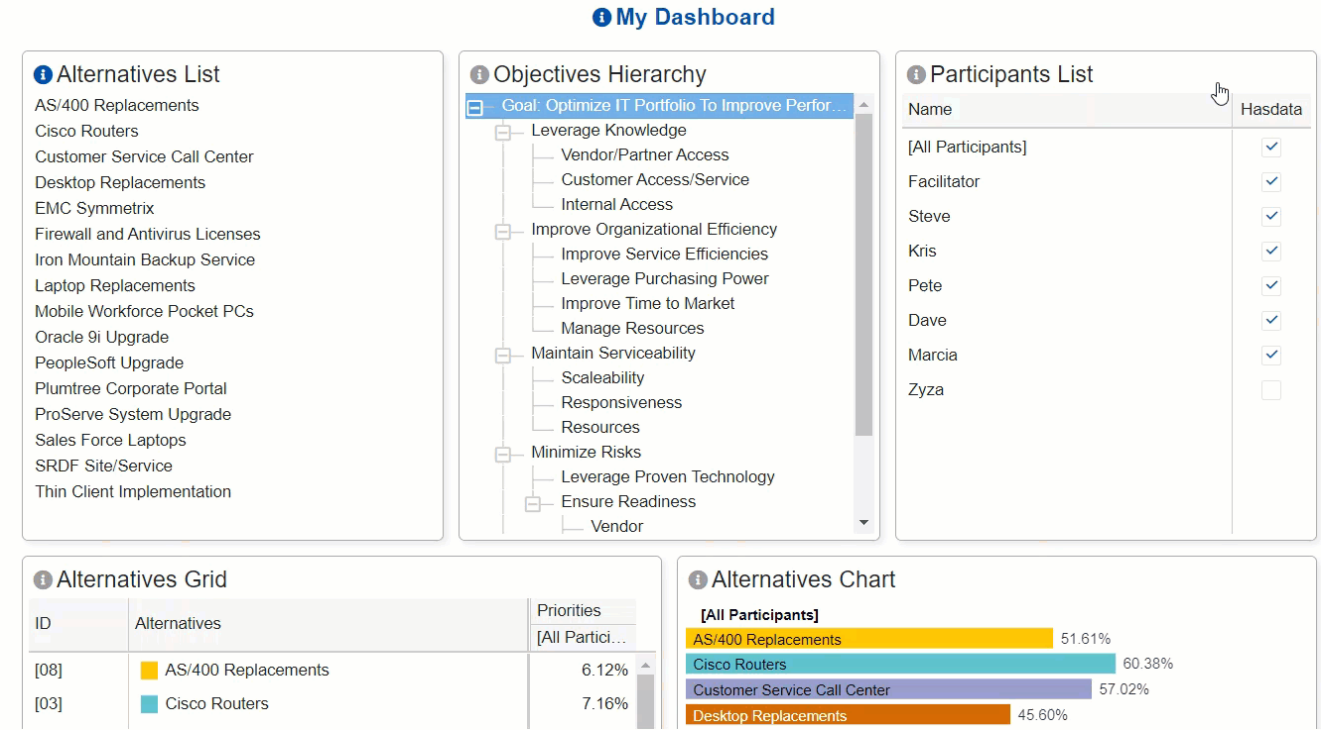


Move or Re-arrange Panel Position

You can move or switch the position of the panels by dragging a panel and dropping it to the desired position as shown below:



Alternatively, you can also rearrange the panels from the "Floating Panels list" by dragging and dropping the ⠿ icon to the

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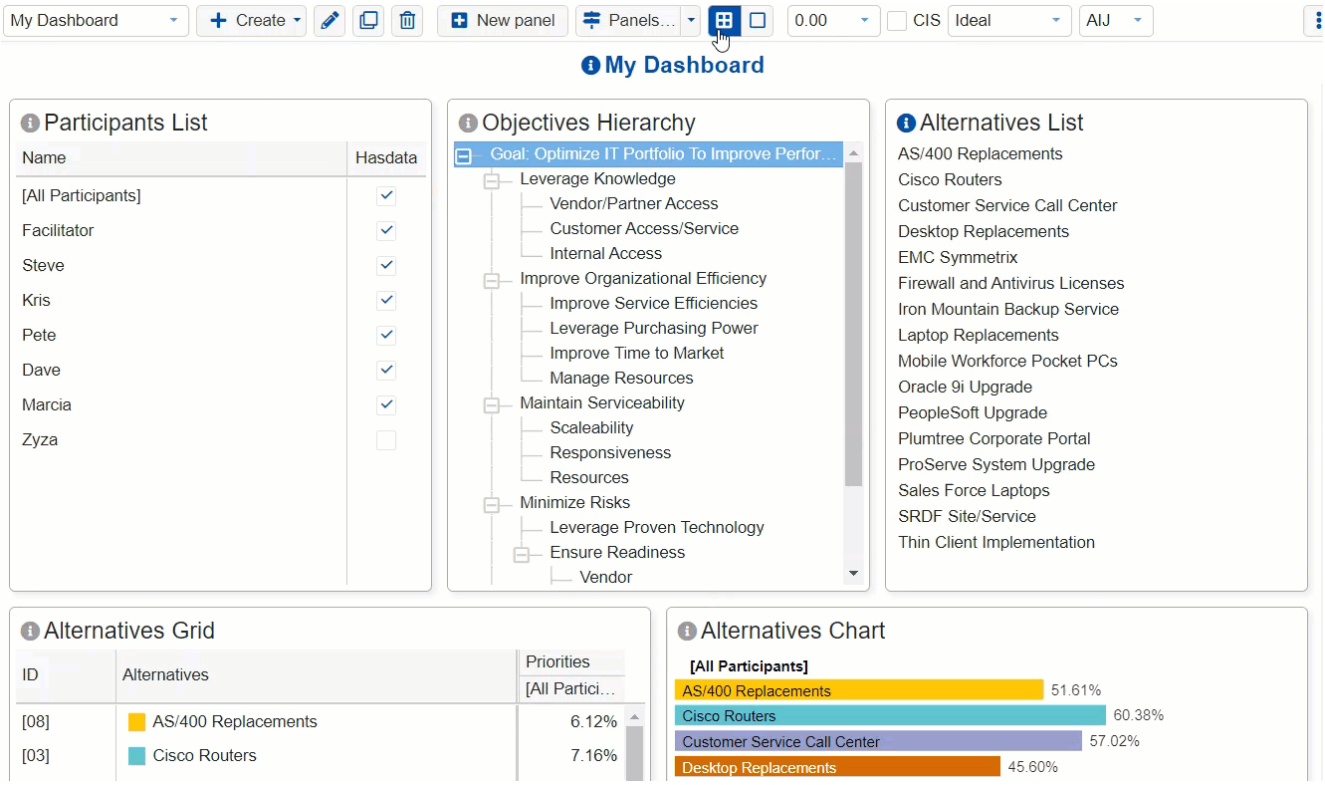
right of the panel name as explained here.

Panel Regular or Flow View

The Regular View displays the panel based on the panel size specified, while the Flow View will have only one panel for each row -- one panel to fit the browser's page width.



Data Settings (for Results Panels)

When the dashboard has results panels (Grids, Charts, and Sensitivities), the **Data Settings** will be available on the toolbar:

Options include the following:

- With respect to - select to display the results with respect to a given objective node
- Decimals - number of decimals to display
- Normalization - select Unnormalized, Normalized, or percentage Maximum

Additional options will be displayed in case there is any Sensitivity Analysis panel:

- SA User (applicable only for Sensitivity Analysis) - clicking this button will open a model where you can select the user or group that you want to display results for in the sensitivity analysis.
- Reset SA (applicable only for Sensitivity Analysis) - reset the sensitivities in case the results are temporarily changed by dragging the objective bars or alternative plots.

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Note: More panel-specific options can be available on the panel toolbar that is accessible when clicking the Gear icon on each panel.

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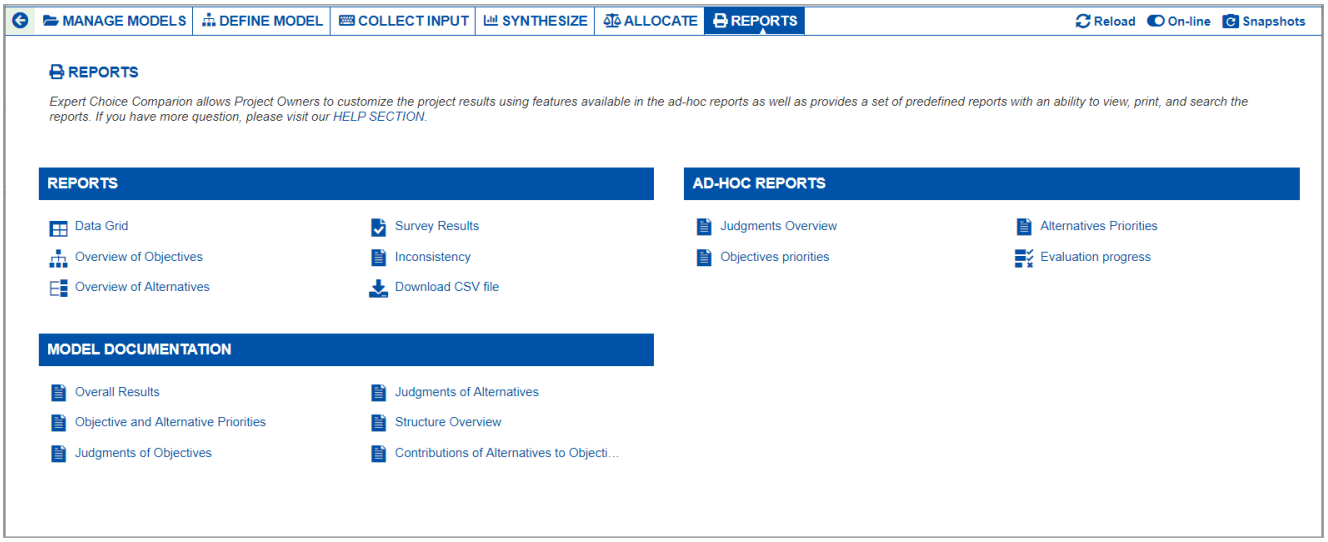
What is Reports?

The Reports page of Expert Choice Comparion contains Pre-defined reports and Ad-hoc reports.

Ad-hoc reports allow the Project Managers to filter model results by specifying filters for one or more columns, either in the grid or by clicking "Create Filter" at the lower left. Ad-hoc reports can be exported to pdf, Excel, or Rich Text File.

Pre-defined reports include a Reports section and a Model Documentation section as shown below. Pre-defined reports can be exported to pdf, Excel, Rich Text File, plain text, or png images.



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Model Documentation

Comparion provides a set of predefined reports and a set of icons to view, print, and download.

- Overall Results
- Objectives and Alternatives Priorities
- Judgments of Objectives
- Judgments of Alternatives
- Structure Overview Report
- Objectives and Alternatives

Icon	Description
	Print - print the entire report
	Print Current Page - print the page displayed
	First page - display the first page of the report
	Previous page - display the page prior to the page currently displayed
	Next page = display the page immediately after the currently displayed page
	Last page - display the last page of the reports

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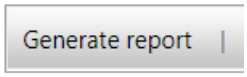
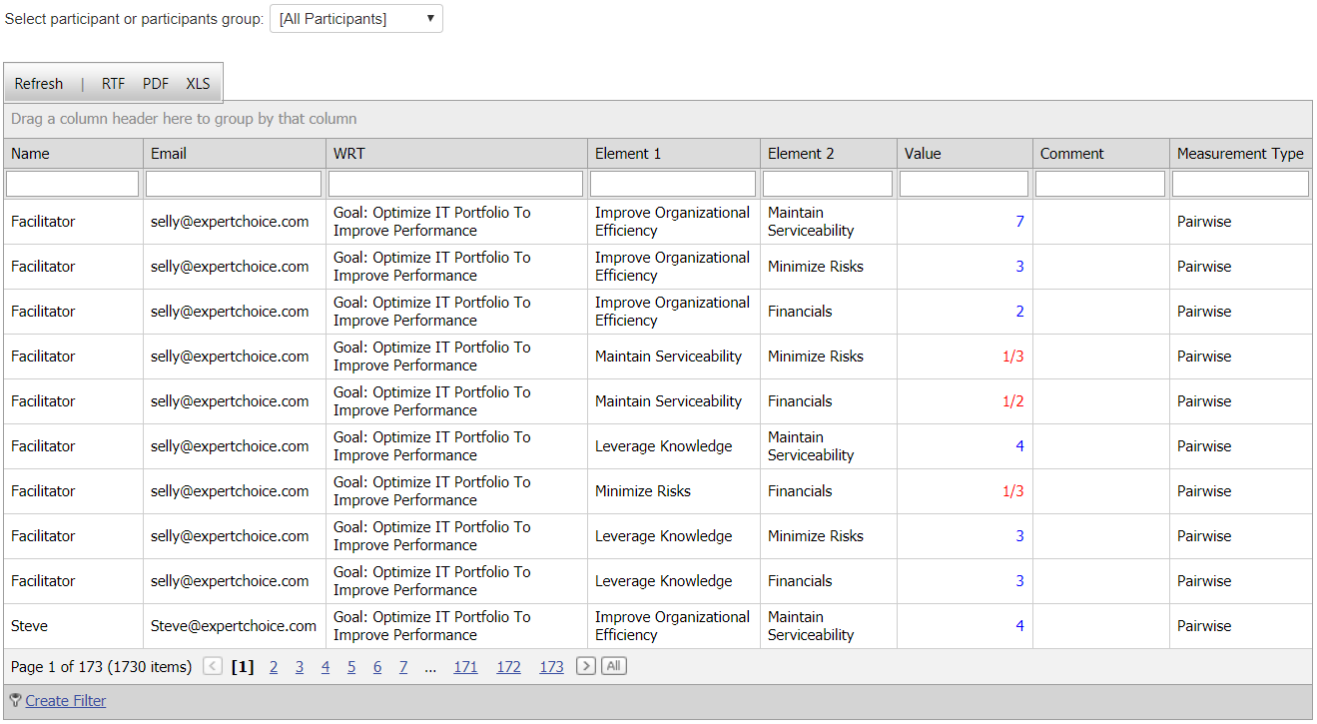
Ad-hoc Reports

Expert Choice Comparion allows Project Owners to filter reports on the Ad-Hoc Reports section of the Reports page. The ability to exclude various results allows you to view the impact that specific users, objectives, alternatives, and judgments submitted have on the local and global priorities for each objective and alternative evaluated.

Click the 

button to create a report:

- Judgments Overview - Reports are available for both Objective judgments and Alternative judgments.



Select participant or participants group: [All Participants]

Refresh | RTF PDF XLS

Drag a column header here to group by that column

Name	Email	WRT	Element 1	Element 2	Value	Comment	Measurement Type
Facilitator	selly@expertchoice.com	Goal: Optimize IT Portfolio To Improve Performance	Improve Organizational Efficiency	Maintain Serviceability	7		Pairwise
Facilitator	selly@expertchoice.com	Goal: Optimize IT Portfolio To Improve Performance	Improve Organizational Efficiency	Minimize Risks	3		Pairwise
Facilitator	selly@expertchoice.com	Goal: Optimize IT Portfolio To Improve Performance	Improve Organizational Efficiency	Financials	2		Pairwise
Facilitator	selly@expertchoice.com	Goal: Optimize IT Portfolio To Improve Performance	Maintain Serviceability	Minimize Risks	1/3		Pairwise
Facilitator	selly@expertchoice.com	Goal: Optimize IT Portfolio To Improve Performance	Maintain Serviceability	Financials	1/2		Pairwise
Facilitator	selly@expertchoice.com	Goal: Optimize IT Portfolio To Improve Performance	Leverage Knowledge	Maintain Serviceability	4		Pairwise
Facilitator	selly@expertchoice.com	Goal: Optimize IT Portfolio To Improve Performance	Minimize Risks	Financials	1/3		Pairwise
Facilitator	selly@expertchoice.com	Goal: Optimize IT Portfolio To Improve Performance	Leverage Knowledge	Minimize Risks	3		Pairwise
Facilitator	selly@expertchoice.com	Goal: Optimize IT Portfolio To Improve Performance	Leverage Knowledge	Financials	3		Pairwise
Steve	Steve@expertchoice.com	Goal: Optimize IT Portfolio To Improve Performance	Improve Organizational Efficiency	Maintain Serviceability	4		Pairwise

Page 1 of 173 (1730 items) [1] 2 3 4 5 6 7 ... 171 172 173 All

Create Filter

- Priorities Overview

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Select participant or participants group: [All Participants]

Refresh | RTF PDF XLS Generate for Individuals as well

Priority / Alternative	Participant / All Participants
AS/400 Replacements	6.08%
Cisco Routers	7.16%
Customer Service Call Center	6.90%
Desktop Replacements	5.12%
EMC Symmetrix	6.08%
Firewall and Antivirus Licenses	5.86%
Iron Mountain Backup Service	6.45%
Laptop Replacements	3.51%
Mobile Workforce Pocket PCs	3.85%
Oracle 9i Upgrade	6.81%
PeopleSoft Upgrade	5.36%
Plumtree Corporate Portal	9.89%
ProServe System Upgrade	6.75%
Sales Force Laptops	6.07%
SRDF Site/Service	5.28%
Thin Client Implementation	8.81%

- Objective Priorities

Select participant or participants group: [All Participants]

Refresh | RTF PDF XLS

Drag a column header here to group by that column

Email	Name	Objective	Path	Local Priority	Global Priority	Inconsistency
selly@expertchoice.com	Facilitator	Goal: Optimize IT Portfolio To Improve Performance	Goal: Optimize IT Portfolio To Improve Performance	100.00%	100.00%	0.06
selly@expertchoice.com	Facilitator	Leverage Knowledge	Goal: Optimize IT Portfolio To Improve Performance | Leverage Knowledge	33.05%	33.05%	0.02
selly@expertchoice.com	Facilitator	Vendor/Partner Access	Goal: Optimize IT Portfolio To Improve Performance | Leverage Knowledge | Vendor/Partner Access	52.80%	17.45%	0.00
selly@expertchoice.com	Facilitator	Customer Access/Service	Goal: Optimize IT Portfolio To Improve Performance | Leverage Knowledge | Customer Access/Service	18.20%	6.02%	0.00
selly@expertchoice.com	Facilitator	Internal Access	Goal: Optimize IT Portfolio To Improve Performance | Leverage Knowledge | Internal Access	29.00%	9.58%	0.00
selly@expertchoice.com	Facilitator	Improve Organizational Efficiency	Goal: Optimize IT Portfolio To Improve Performance | Improve Organizational Efficiency	33.30%	33.30%	0.11
selly@expertchoice.com	Facilitator	Improve Service Efficiencies	Goal: Optimize IT Portfolio To Improve Performance | Improve Organizational Efficiency | Improve Service Efficiencies	31.77%	10.58%	0.00
selly@expertchoice.com	Facilitator	Leverage Purchasing Power	Goal: Optimize IT Portfolio To Improve Performance | Improve Organizational Efficiency | Leverage Purchasing Power	18.71%	6.23%	0.00
selly@expertchoice.com	Facilitator	Improve Time to Market	Goal: Optimize IT Portfolio To Improve Performance | Improve Organizational Efficiency | Improve Time to Market	32.07%	10.68%	0.00
selly@expertchoice.com	Facilitator	Manage Resources	Goal: Optimize IT Portfolio To Improve Performance | Improve Organizational Efficiency | Manage Resources	17.45%	5.81%	0.00

Page 1 of 20 (191 items) [1] 2 3 4 5 6 7 ... 18 19 20 All

Create Filter

- Evaluation Progress

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Select participant or participants group: [All Participants]

Refresh | RTF PDF XLS

Drag a column header here to group by that column

#	Name	Email	Judgments Made	Judgments Total	Percentage	Judgment Time
0	Facilitator	selly@expertchoice.com	261	262	99.62%	4/18/2019 10:41:08 PM
1	Steve	Steve@expertchoice.com	230	262	87.79%	4/18/2019 10:41:08 PM
2	Kris	Kris@expertchoice.com	230	262	87.79%	4/18/2019 10:41:08 PM
3	Pete	Pete@expertchoice.com	208	240	86.67%	4/18/2019 10:41:08 PM
4	Dave	Dave@expertchoice.com	261	262	99.62%	5/31/2019 2:59:18 AM
5	Marcia	Marcia@expertchoice.com	230	262	87.79%	4/18/2019 10:41:08 PM
6	John Doe	j.doe@eci.com	261	262	99.62%	5/31/2019 2:59:18 AM
7	Administrator	admin	4	262	1.53%	6/5/2019 10:58:21 PM
8	Project Manager	z.bayta@eversun.ph	2	262	0.76%	7/11/2019 2:57:12 AM

Create Filter

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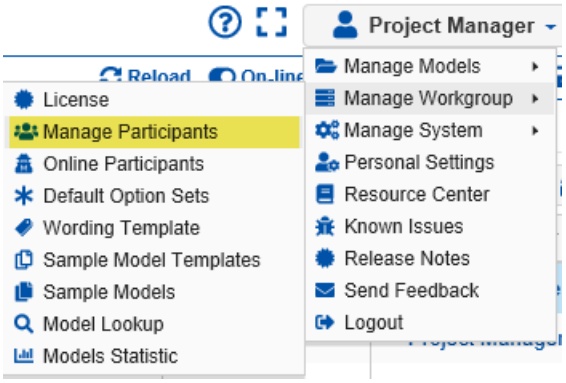
Demote existing Project Organizer/Workgroup Manager

You may want to demote your existing Project Organizer or Workgroup Manager to Workgroup Member. To do this:

1. Go to Workgroup Participants page



2. Check the check box to the left of the participant you want to demote

3. Click Set Permission > Workgroup Member

> After demoting an existing Project Organizer/Workgroup Manager to Workgroup Member, you lose project manager access to all models in the workgroup. If you plan to restore Project Organizer/Workgroup Manager access at a later date, you can make a list of the affected models before demoting.

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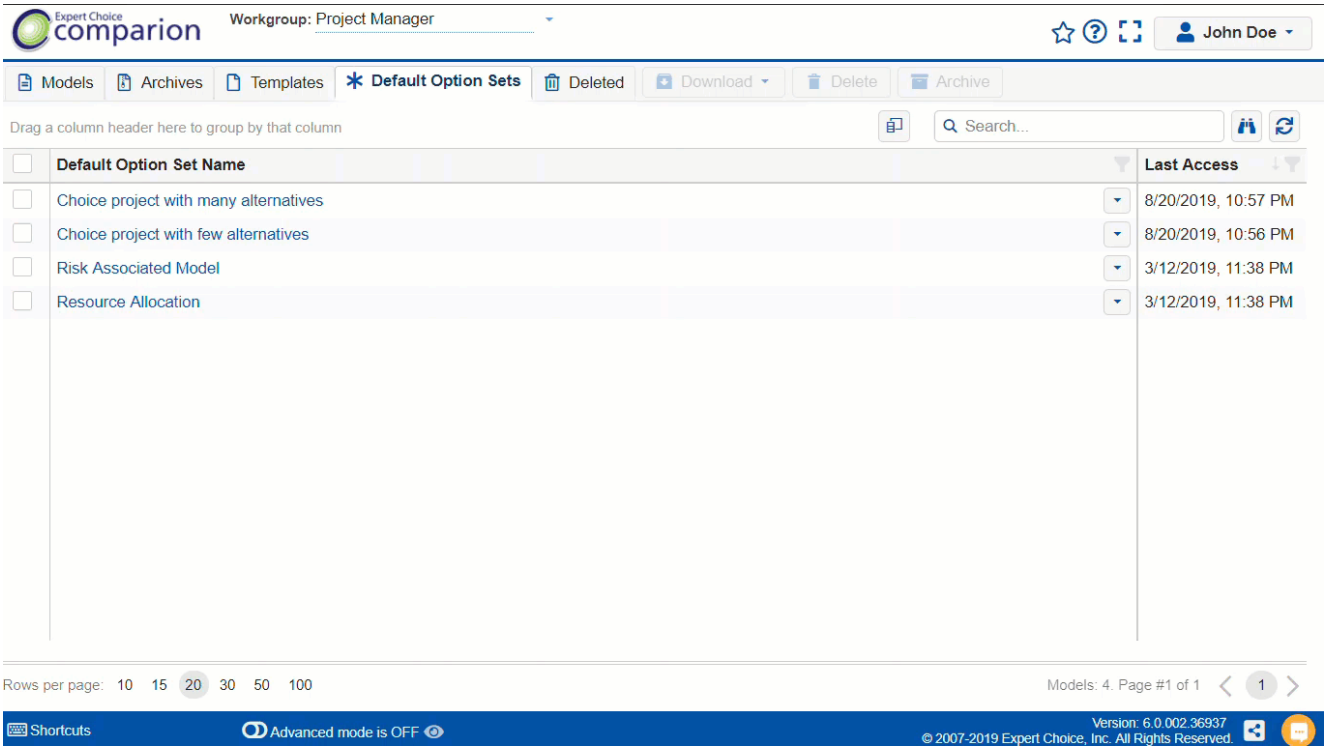
Manage Default Option Sets

Comparion has a large number of options, such as measurement methods for objectives, measurement methods for alternatives, what to display on evaluation pages, alternative wording for "objectives," and "alternatives," etc.

A Project Manager can but need not be concerned with these options. Instead, when creating a new model, four **Default Option Sets** are presented to the Project Manager:

1) **Choice project with few alternatives** - pairwise being used for measuring alternatives as well as objectives.
2) **Choice project with many alternatives** - ratings being used to evaluate the alternatives.
3) **Resource Allocation** - same with (2) above, usually for the purpose of choosing a combination of alternatives for a portfolio or for allocating resources.
4) **Risk Associate Model** - for Resource Aligner's Risk Associated Model - with a Rating scale specific to evaluating alternatives risks.

You can view the existing Default option Sets by clicking on your Account Name at the top right, and then select Manage Workgroup > Default Option Sets:



A Project Manager may desire to change one or more options in a model created from one of the default option sets and subsequently create new models based on the options in the model. This can be done by saving a model as a new Default Option Set in the Workgroup.

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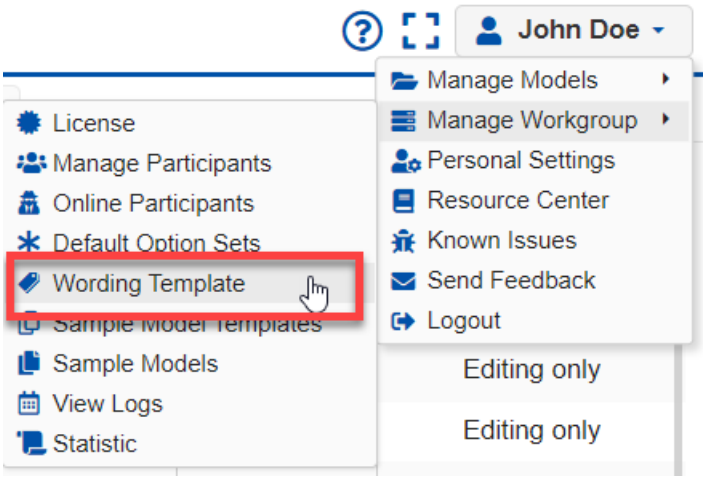
Workgroup Wording Template

When creating a new model, you can select whether to use the Default Options Set Wording or the Workgroup Wording .

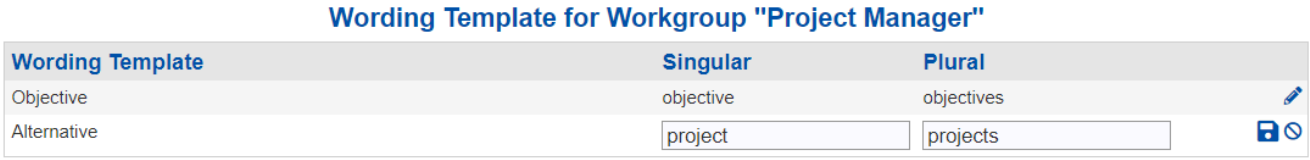
To define your Workgroup Wording, click on your User Name > Manage Workgroup > **Wording Template** page:



Here you can specify the default Objectives and Alternatives terminologies, both in singular and plural forms. By default, Comparion uses alternative(s) and objectives(s):

Click on the pencil icon to edit.

For example, you want to use "project(s)" instead of the default wording "alternative(s)":



Click to accept your changes or to cancel.

Click the **Apply** button to save your changes. This will open a confirmation message:

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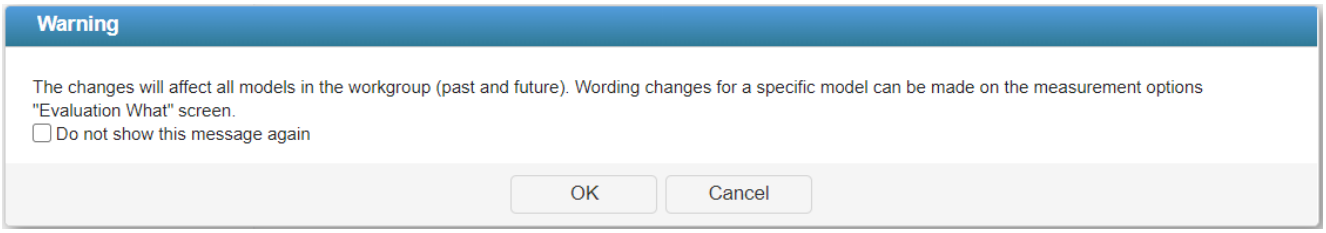

Click **Reset** to clear your recent changes.

Click **Reset to System Default** to reset based on the default Comparion wording.

For existing models, you can modify the wording from the Judgments Options page.

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Basic and Advanced Mode

Basic Mode - A revised, simplified user interface.

Advanced Mode - Advanced mode shows advanced option(s) on each screen. This allows advanced users to go deeper into the application. The left navigation is only displayed when this option is ON.

When you switch to Advanced mode, the advanced options on the page, if any, will flicker for few seconds.

An eye icon also appears as shown above where there are Advanced options on the page, and hovering on the icon will flicker those advanced options.

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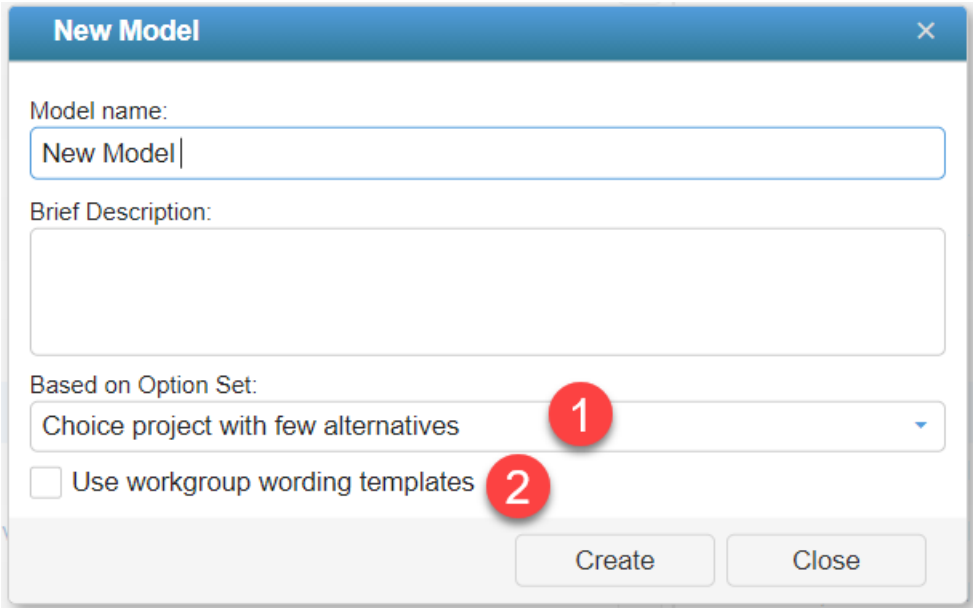
Workgroup, Model and Evaluation Wording

Comparion has a flexible way of defining the wording to be used on your model.

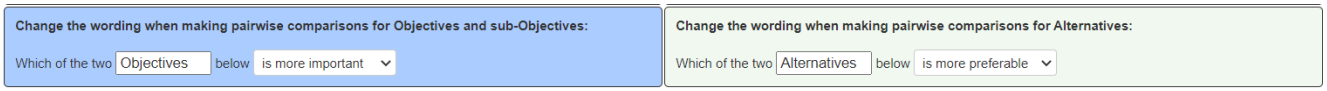
The Model Wording is initially defined for new models from:

1. **Default Options Sets** - use the wording as specified on the default option sets Judgments Options wording.
2. **Workgroup Wording Templates** - check the "**Use workgroup wording templates**" check box to apply the "Workgroup Wording Templates" to the new model's Judgments Options terminologies.



NOTE: When uploading existing models, or creating models from Archive or Templates, the wording will be based on its Judgments Options wording.

Based on the selected option above, the wording will be applied to the created model's JUDGMENTS OPTIONS WORDING which will be used throughout the model.



NOTE: Since the Judgments Options terminologies only have a plural form, few places which use the singular form will use the Workgroup Templates' singular terminologies.

You can also select the evaluation phrase to be used in the evaluation; by default, we show the wording for pairwise comparison both for Objectives (left) and Alternatives (right) as shown above.

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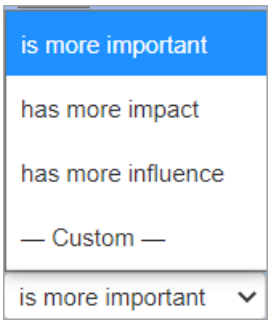
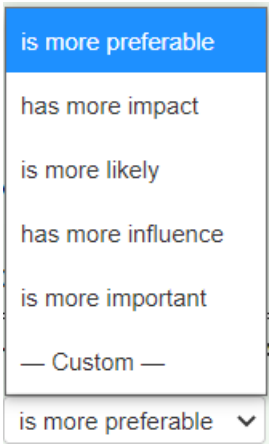
Expand the dropdown to select the phrase.

For Objectives:



For Alternatives:



Alternatively, you can also select **Custom** and type in the desired phrase (e.g., is more influential, has more importance, etc.).

When you select from the predefined phrase on the dropdown, the wording will also be applied to the Rating evaluation.

For example, if you selected "**is more important,**" the Rating wording on the evaluation page will be "**Rate the importance.**" Custom wording is not applicable for Ratings.

If you want to fully customize the evaluation questions, you can edit the question directly on the evaluation page .

A summary of how wording works are shown in the diagram below:

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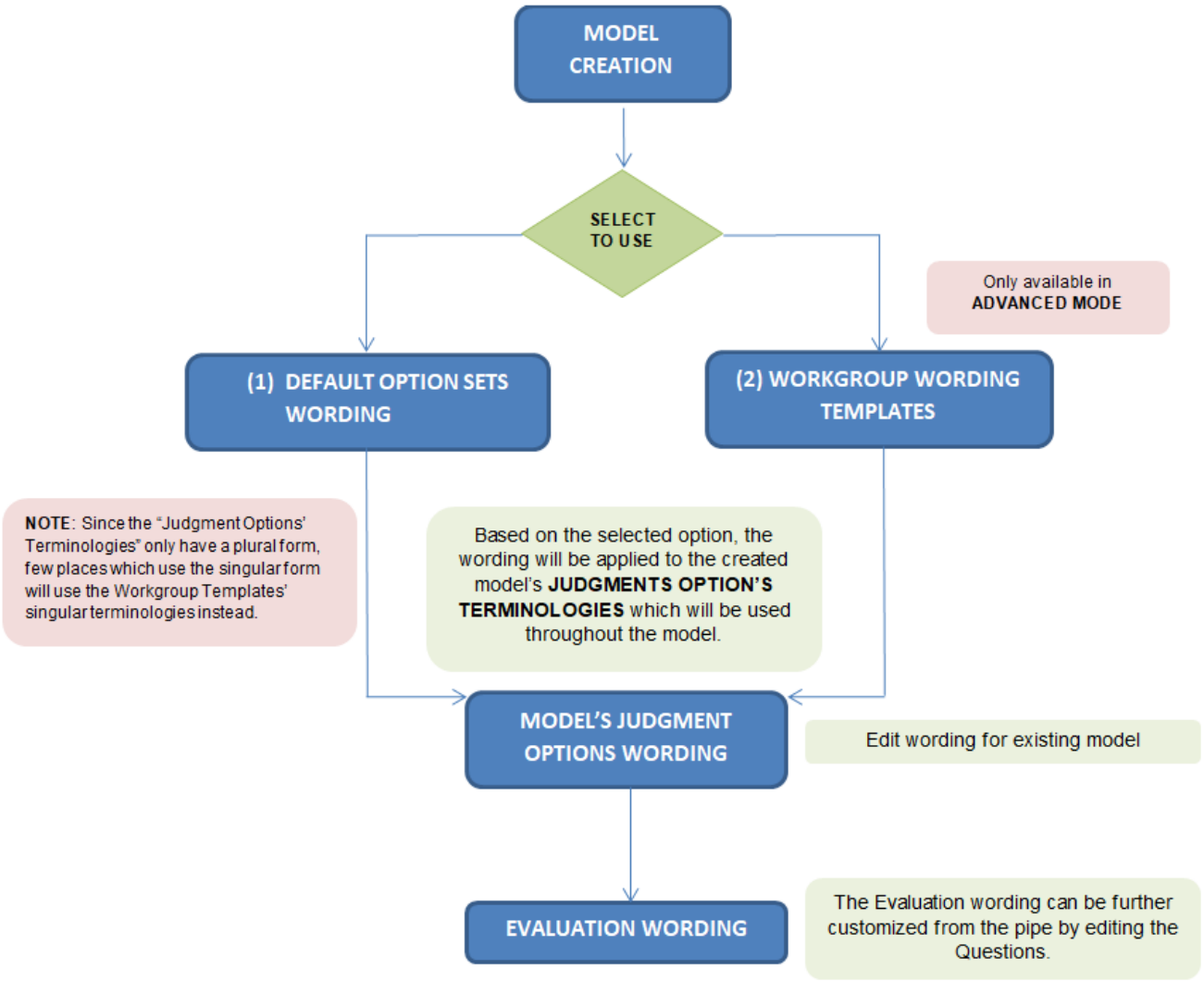

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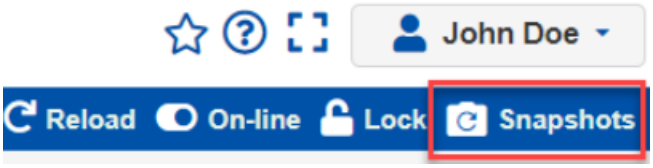
Model Snapshots

Model Snapshots allows you to restore your Comparion model to a specific snapshot or restore point.



You can open Snapshots from the upper right menu as shown above, which is available on every page when the model is open, or in the Model's list command when the model is closed.

View Mode

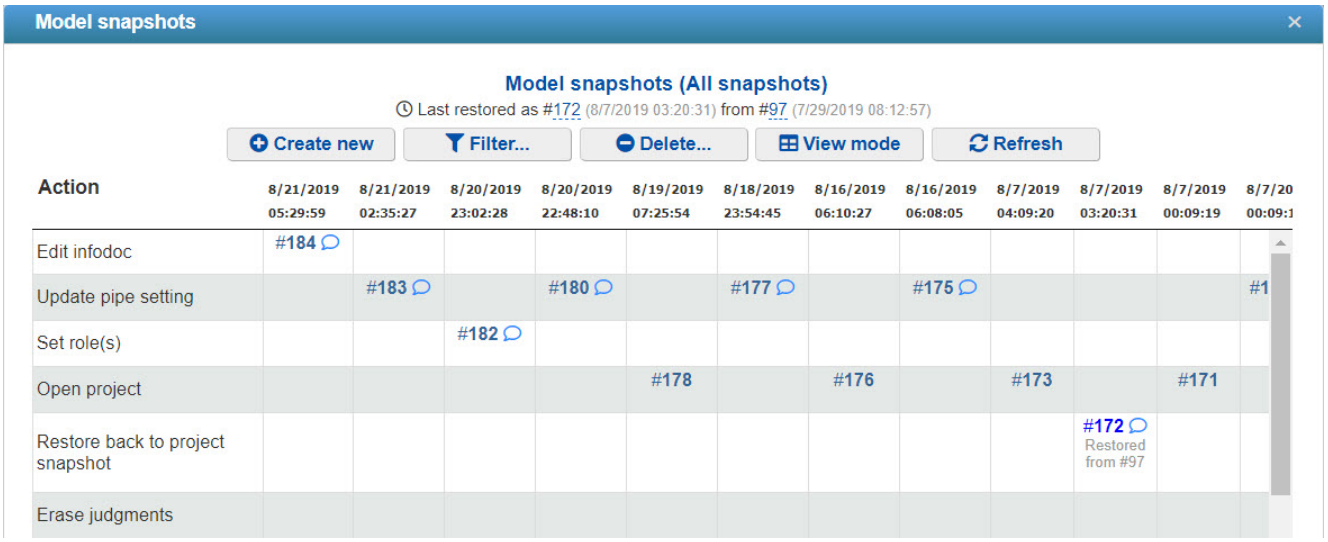
Model Snapshots can be displayed in Grid or List View.

Click View mode to toggle between Grid and List view.

Grid View

The Grid View groups the similar snapshot actions (see 1st column) and shows the corresponding Date/Timestamps on the succeeding columns.

For example below, the "Update pipe setting" action has snapshots with ID #183, #180, #177, and so on for different dates/times.



List View

Simply shows the snapshots' actions in a list view.

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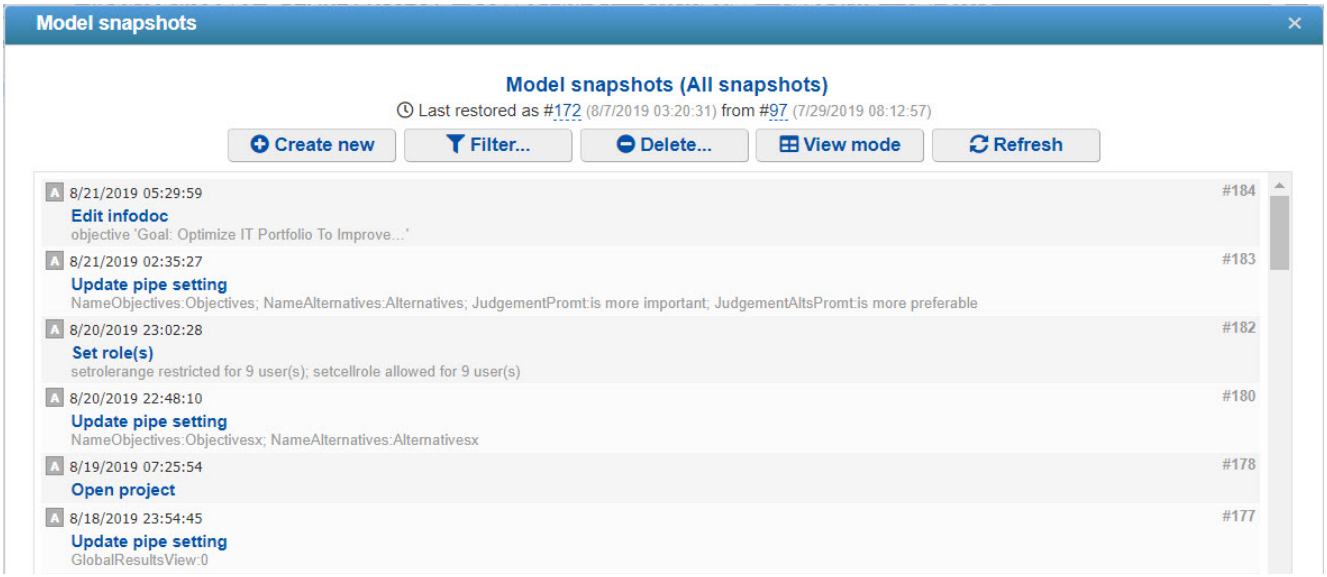


Automatic Snapshots

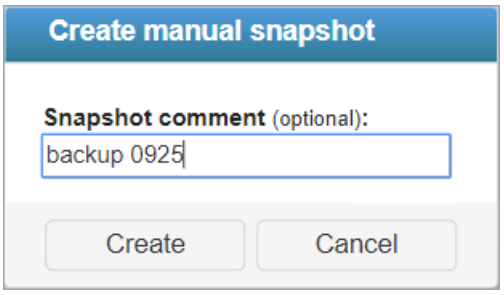
A - (Auto) snapshots created automatically when modifying the model (i.e., add nodes, change contributions, model options, etc.). Automatic snapshots are created **after** the change in the model.

Manual Snapshots

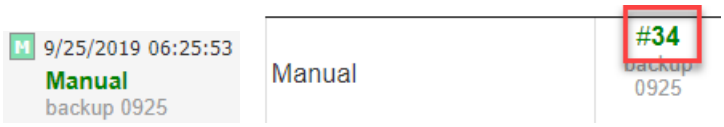
M - (Manual) created by the user at any time for any reason.

You can manually create a restore point by clicking the button.

A dialog box prompt will be displayed where you can add a comment:



Manual snapshots have a **green** font color.



Filter Snapshots

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To filter the grid or list of snapshots, click the

button. You can choose to show all snapshots, only automatic snapshots, or only manual snapshots.

Edit and Delete Snapshots

Hovering on a snapshot name (List View) or Snapshot ID (Grid View) displays the pencil and delete icons.

Clicking the pencil icon will show the edit window where you can edit the snapshot comment.

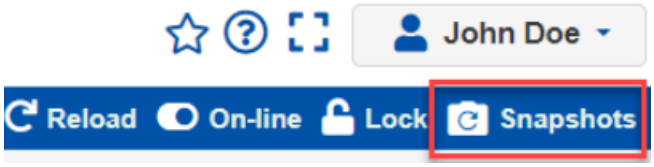
To delete multiple snapshots at the same time, click the

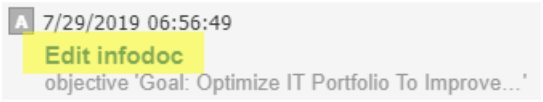
button, then select the snapshot(s) to delete, and then click Delete Selected. You can also empty the list using Delete All.

Restore Snapshots

To restore your model to a specific snapshot (model version):

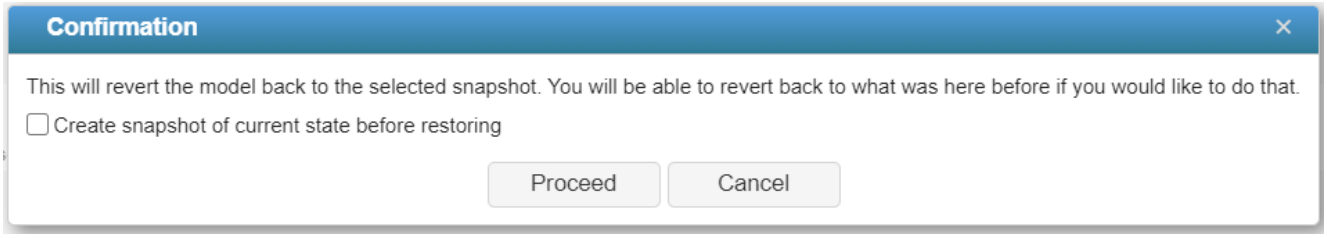
1. Open Snapshots



2. Click on the Snapshot name in the **List View** 

or the Snapshot number in the **Grid view**

of the version you want to revert to.
3. A confirmation prompt will appear:



3. If you wish to create a snapshot of the current state before restoring, click the applicable checkbox, enter the snapshot name, and then click Proceed.

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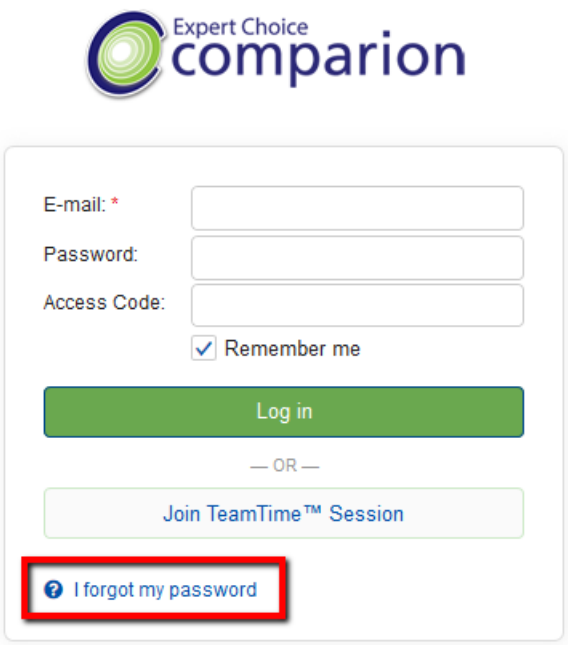
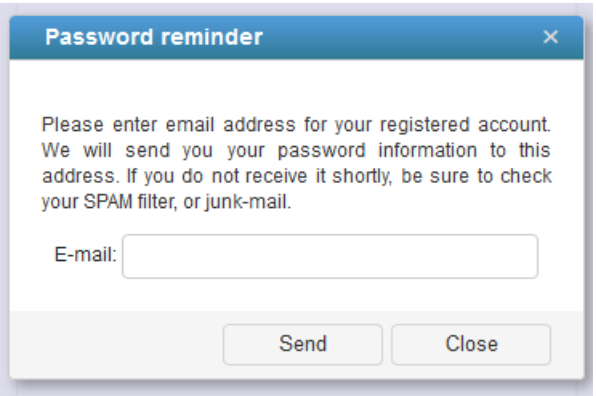
Forgot Password (Reset Password)

Forgot or Reset Password

In case you have forgotten or wanted to reset your password, just click on the " **I forgot my password**" link on the Comparion login page.



A prompt will be displayed where you need to enter the email address of your Comparion account.



Comparion will send you an email with a link (valid for 72 hours) to reset your password.

Simply click the reset link and you will be prompted to create your new password. After doing so, click OK and you will be redirected to the login page where you can type in your email and your new password.

Project Manager Reset Participant's Password

The Project Manager can also change a participant's password.

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1. Go to Workgroup Management/Model's Participants List
2. Search for the Participant that you want to change the password
3. Click the key icon at the right where you can see two options to reset the password:
    - Generate random password
    - Manually set password - by typing in the desired password in the text box provided

Regardless of the option selected, the participant will receive an email with the link to create a new password. The manually set password allows the participant to log in using the temporary password set by the Project Manager; s/he will be asked to create a new password after logging in.

> If you just want to change your password, you can go to the **Personal Settings** page after logging in and then update your password.

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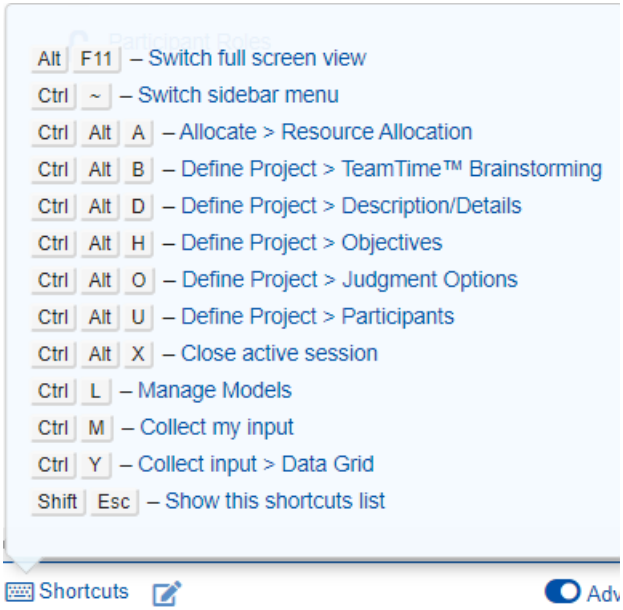
Shortcut Keys

Application Shortcuts

Comparion provides you with shortcuts to easily navigate and perform actions within the application. You can see the list of keyboard shortcuts by clicking the Shortcuts link at the bottom left of every page.

The shortcuts list may vary depending on the user's permission and the current page. For example, the shortcuts below are for the Project Manager.



When the user is in the evaluation, shortcuts for navigating the evaluation and accepting judgments (when applicable) will be included in the list (see highlighted):

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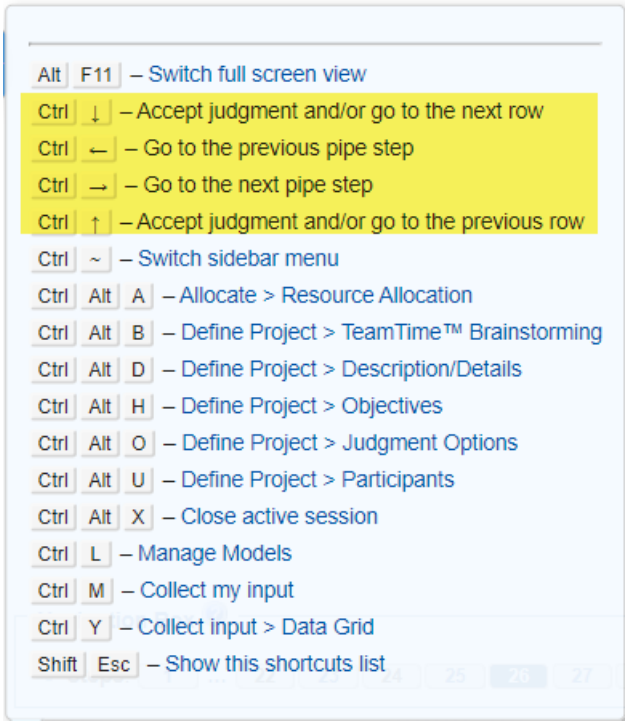
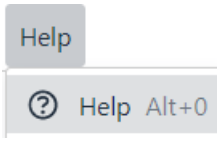


Rich text editor Shortcuts

You can use the rich text editor shortcuts to easily perform formatting options/actions within the editor. You can see the complete list by clicking the Help menu on the editor, or by pressing Alt+0:



Action	Shortcut
Bold	Ctrl + B
Italic	Ctrl + I
Underline	Ctrl + U
Select all	Ctrl + A
Redo	Ctrl + Y or Ctrl + Shift + Z
Undo	Ctrl + Z
Header 1	Shift + Alt + 1
Header 2	Shift + Alt + 2
Header 3	Shift + Alt + 3
Header 4	Shift + Alt + 4
Header 5	Shift + Alt + 5
Header 6	Shift + Alt + 6
Paragraph	Shift + Alt + 7
Div	Shift + Alt + 8
Address	Shift + Alt + 9

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Action	Shortcut
Open help dialog	Alt + 0
Focus to menubar	Alt + F9
Focus to toolbar	Alt + F10
Focus to element path	Alt + F11
Focus to contextual toolbar	Ctrl + F9
Open popup menu for split buttons	Shift + Enter
Insert link (if link plugin activated)	Ctrl + K
Save (if save plugin activated)	Ctrl + S
Find (if searchreplace plugin activated)	Ctrl + F
Switch to or from fullscreen mode	Ctrl + Shift + F

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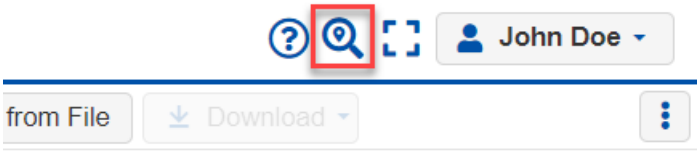
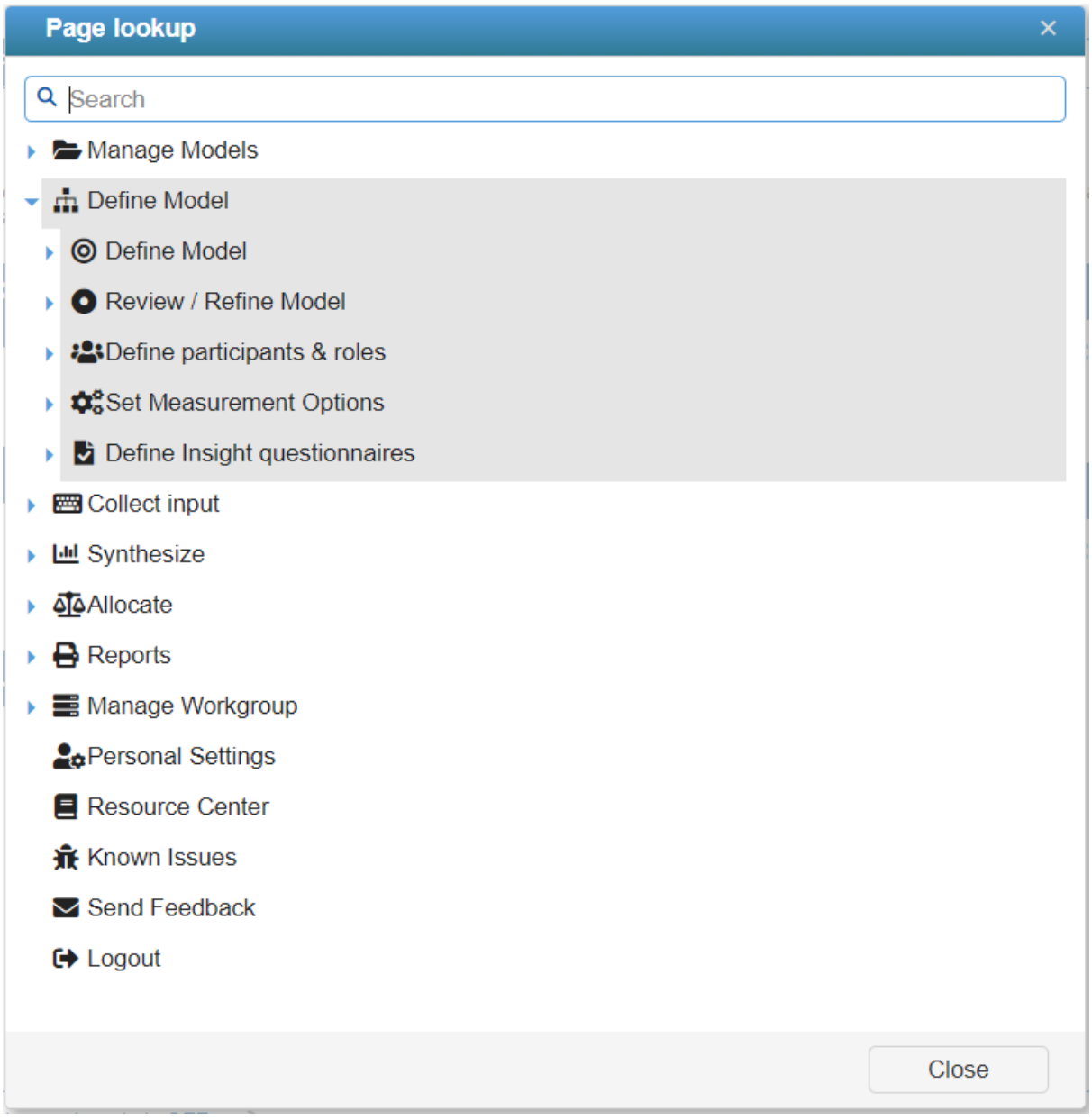
Page Lookup

The Page Lookup allows you to open a dialog box that lists all the Comparion pages.

This can be found by clicking the magnifying glass icon at the top right of the page.





You can expand/collapse the menus. You can search for the page name.

Clicking the page name will redirect you to that page.

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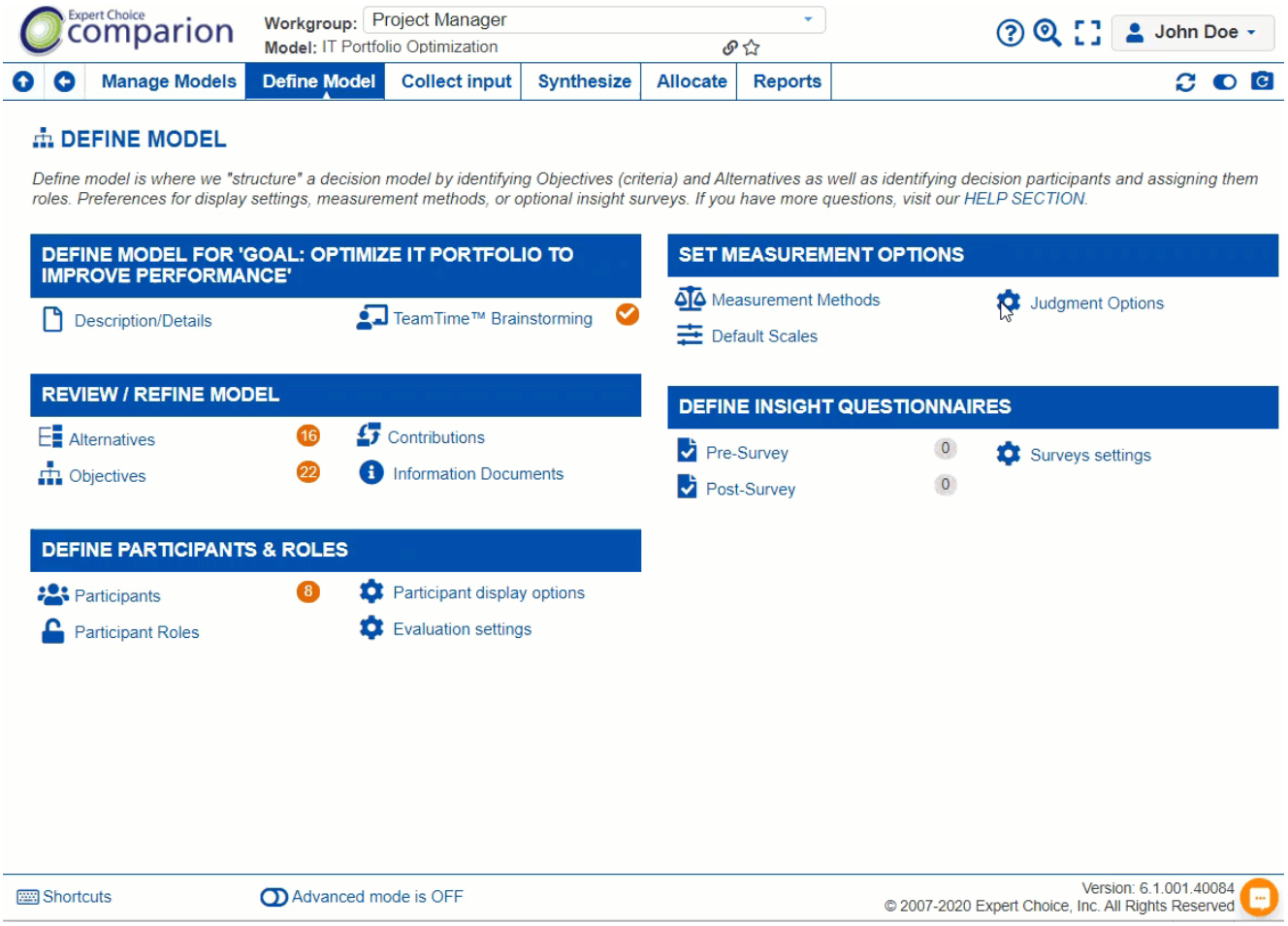

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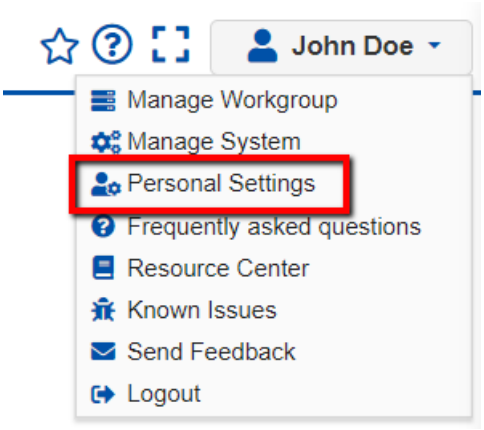
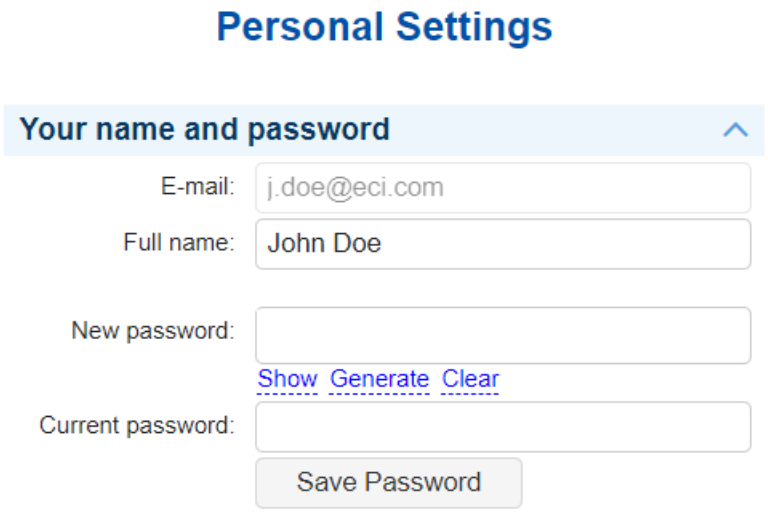
Change name and password

To change your password, click your account name at the upper right and then select Personal Settings:



Enter your new password and your current password, then hit Save Password.



If you forgot your password, you or your Project Manager can reset your password. This is explained here.

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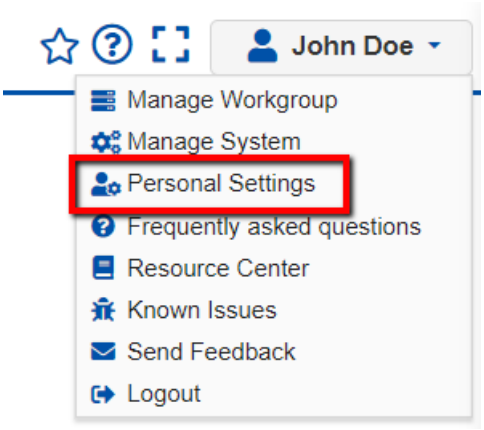
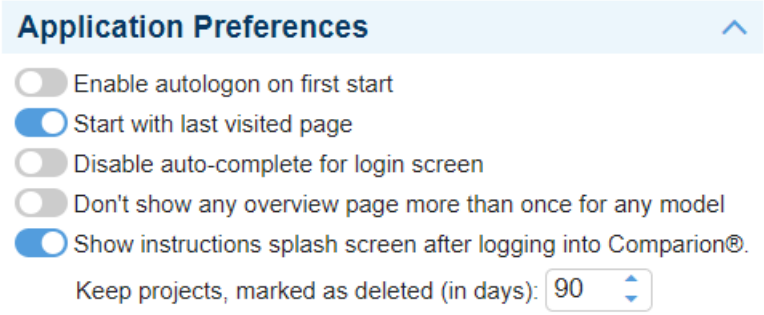
Application Preferences

To access the Application Settings, click your account name at the upper right and then select Personal Settings:





1. **Enable autologon on the first start** - grants or denies users the autologon on Comparion (if email and password are remembered).
2. **Start with the last visited page** - allows the application to remember your last visited model and page. You will be redirected to this page after login.
3. **Disable autocomplete for the login screen** - also referred to as word completion, **autocomplete** suggests finishing what is being typed by comparing the current text with previously-entered text.
4. **Don't show any overview page more than once for any model**
5. **Show instruction splash screen after logging in**
6. **Keep projects marked as deleted in days [90]** , then they will be permanently deleted.

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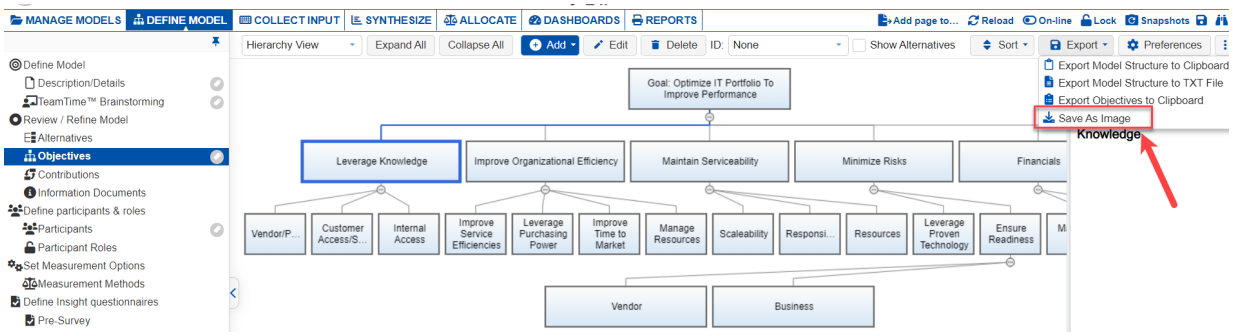
Comparion 6.11

Enhancements

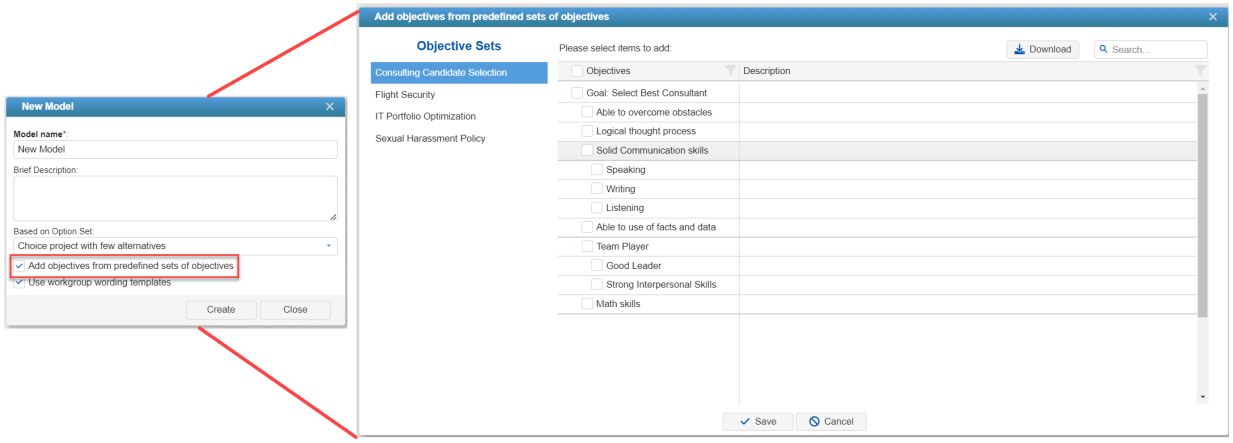
- **Export Objectives Hierarchy View**

  Added a "Save as Image" option on the Objectives hierarchy view. This will export the hierarchy in .png format



- **"Add from predefined sets" when creating a model**

  Added a checkbox "Add from predefined sets" when creating a new model. Checking this will redirect the Project Manager to the Objectives page with the "Add from predefined sets" window open.



- **Charts Font Setting**
  - Change the font settings to a dropdown instead of the decrease/increase A icons
  - Added the "Auto font size" checkbox for column charts (automatically select the best font size for column chart type)

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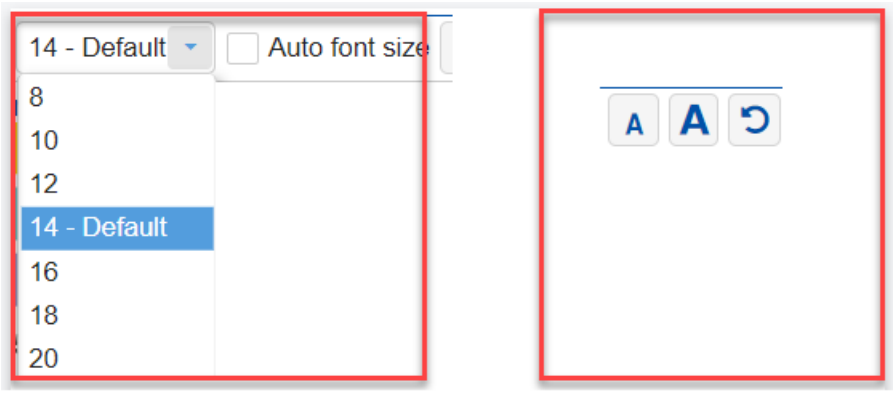
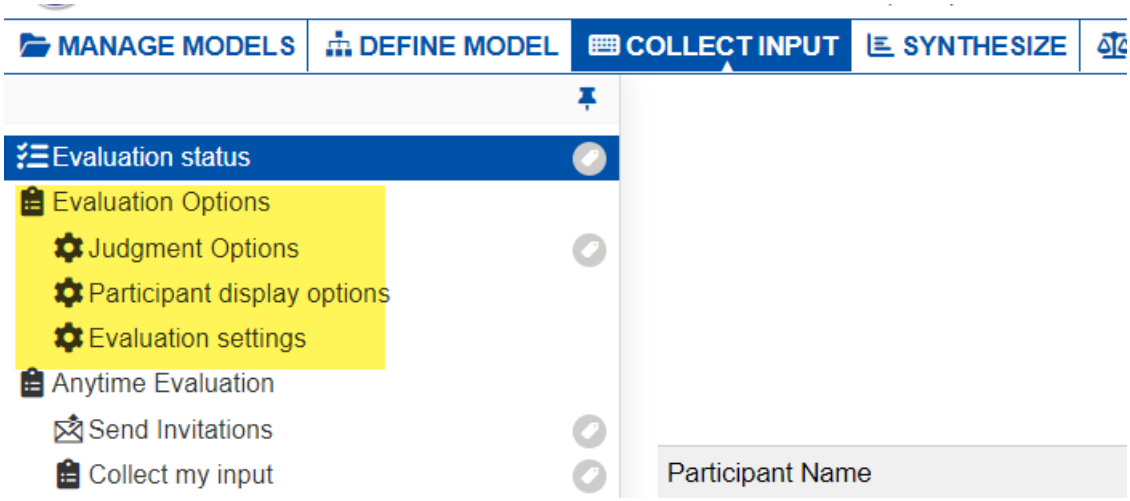


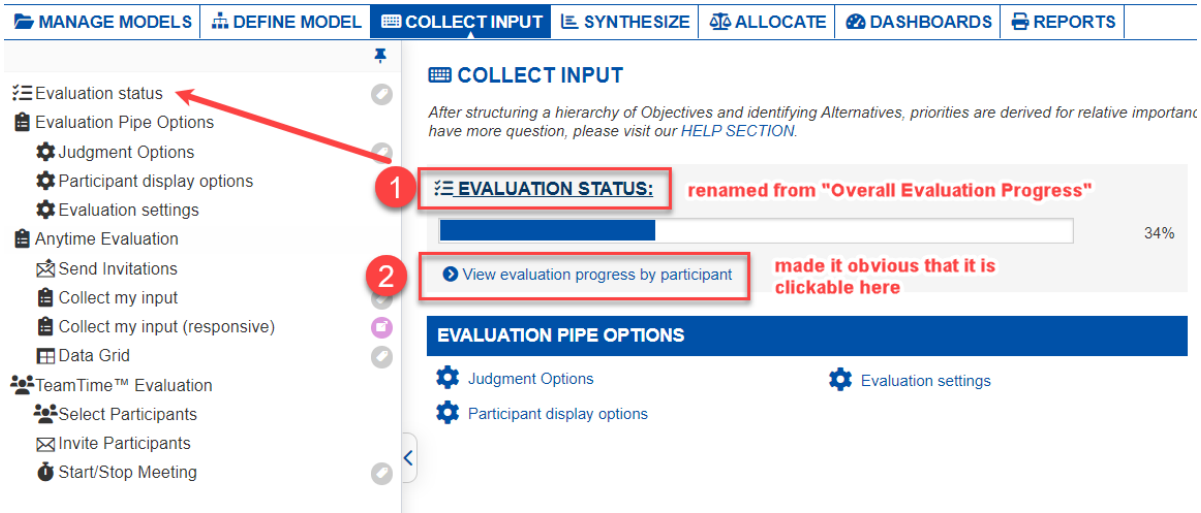
new old

- **Moved the evaluation options pages to the Collect Input tab**

  These pages were moved from the "Define Model" tab to the "Collect Input " tab



- **Consistent naming for Evaluation Status on the landing page and menu**
  - Renamed the "Overall Evaluation Progress" to "Evaluation Status" to match what's on the left menu
  - Added a hotlink to make it obvious that the Project Manager can go to the Evaluation Progress page by clicking



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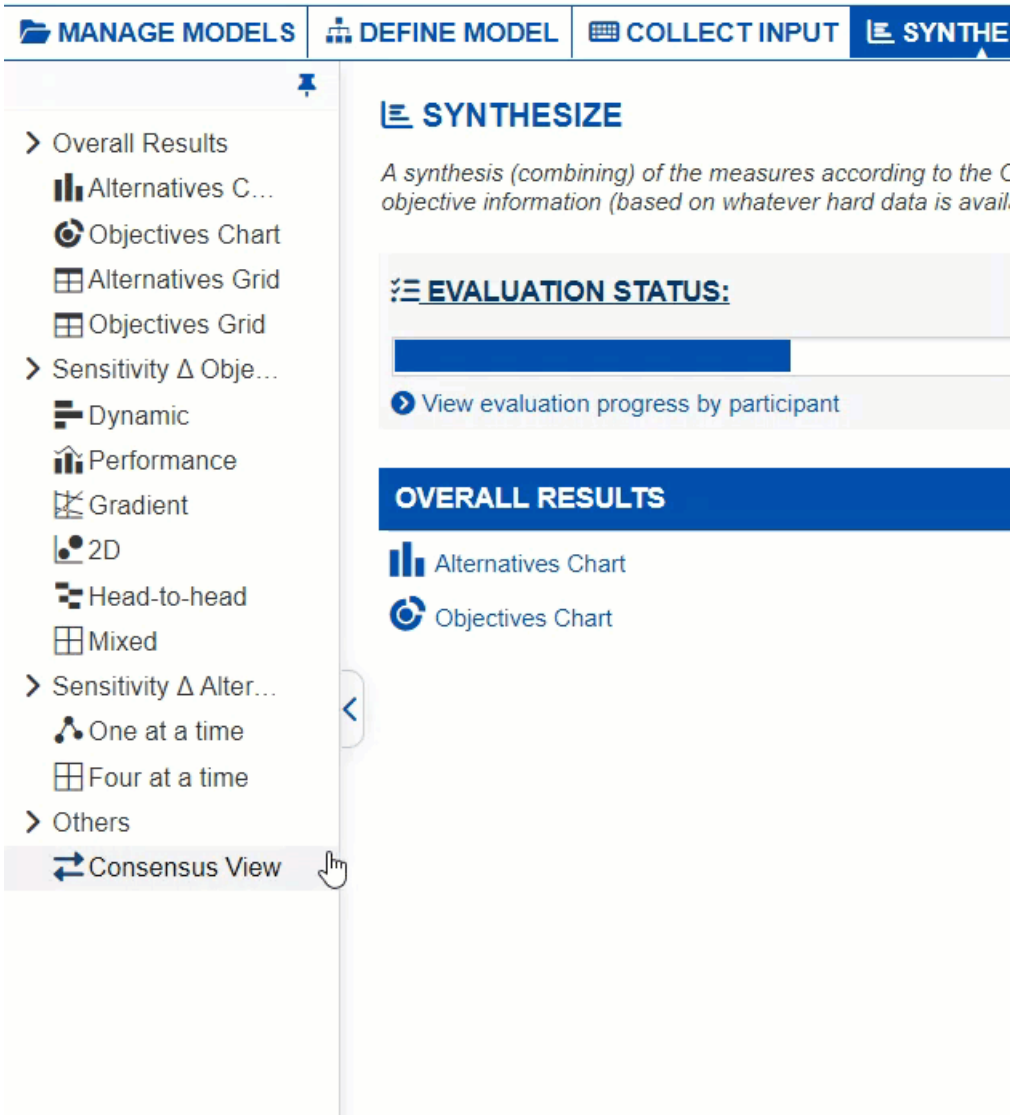
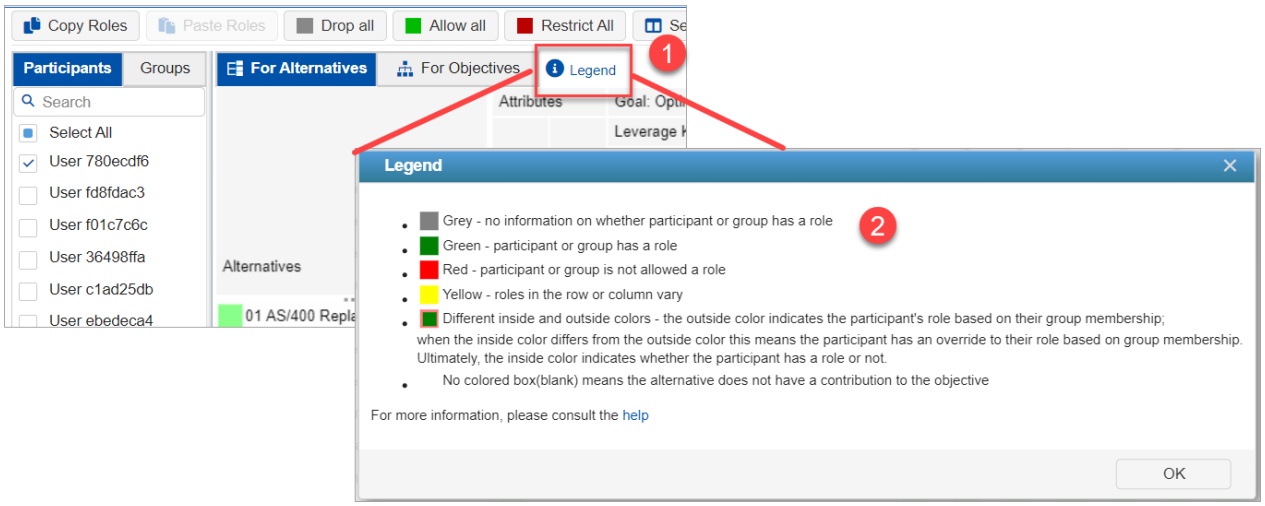
- **Resize the left navigation menu width**



- **Legend on the Participants Roles page**



- **Show Objectives Index on the Define Model > Objectives page**

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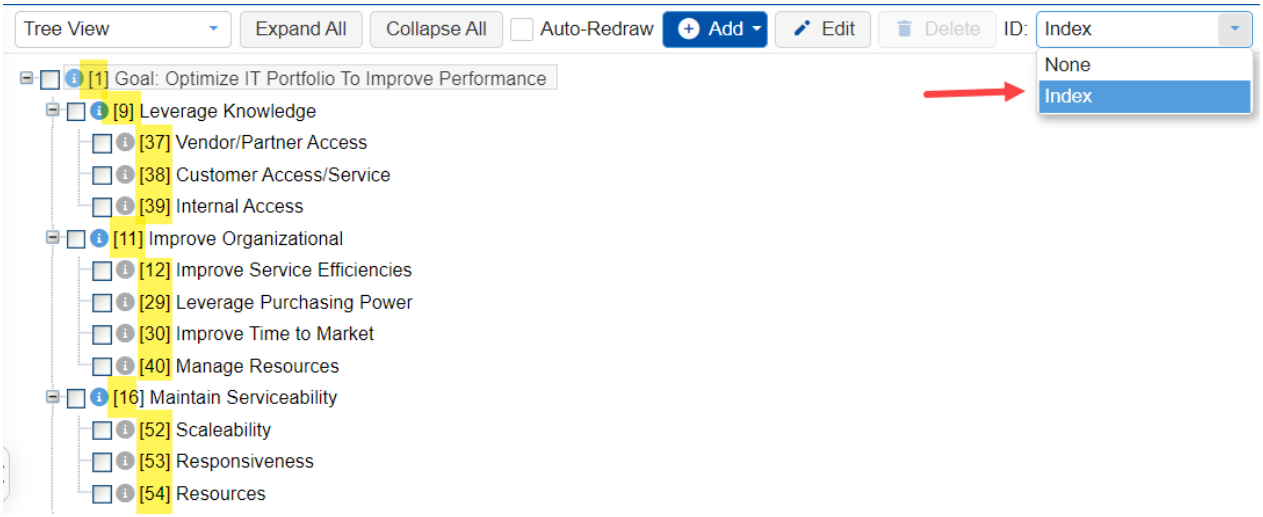
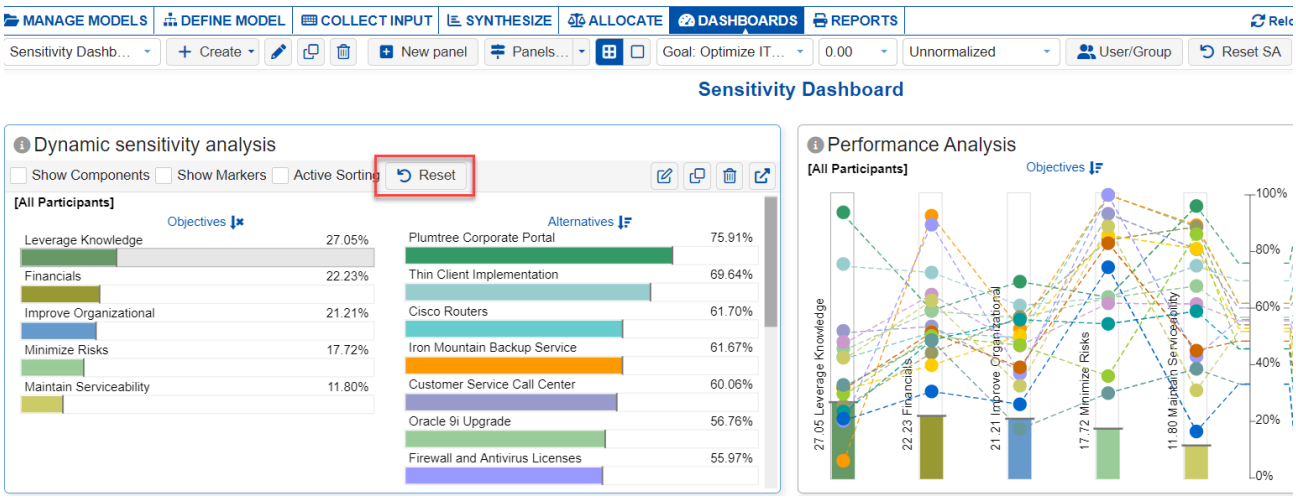


- **Reset option on each Dashboard's Sensitivity Panel**

  We've added a Reset button on each of the sensitive panels, previously the reset button is only available from the main Dashboard toolbar at the top



- **Enhancements on Quick Help**
  - Added text-to-speech option on Quick Help pop-out
  - Changed the pop-out heading background to orange (from blue)
  - Made the pop-out window wider
  - Allowed to display QH more than once when going to a forward step (previously we only display QH once in a session)
- **Made the equal bar for PW Verbal darker**

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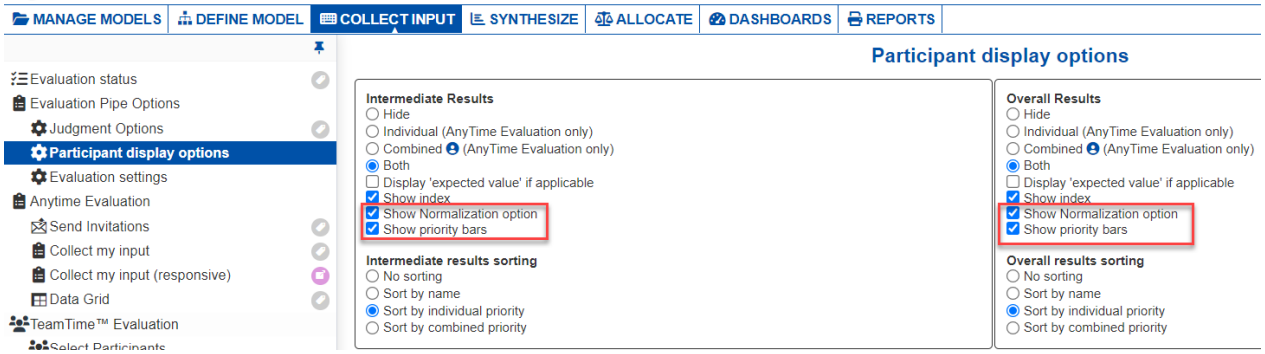
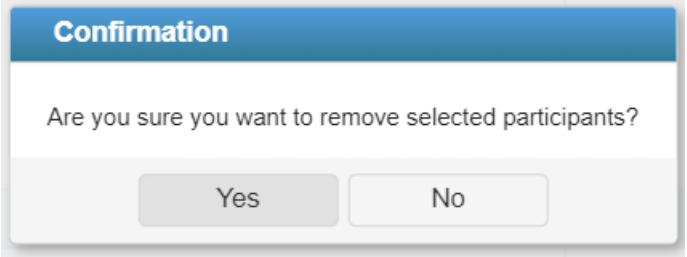
- **Enhancement of Multi-pairwise evaluation**
  - After entering a judgment, auto-select the next unassessed pair (previously we auto-select the next pair regardless if it is evaluated or not)
- **Show/hide the priority bars and normalization dropdown on the evaluation's results steps**



- **Confirmation prompt when deleting participants from the Workgroup Participants page**



- **Use Baron Solver on Resource Aligner**

Bug Fixes

- Fixed the charts labels when they are displayed at the bottom
- Hid the heading on the inconsistency improvement step since it is not applicable

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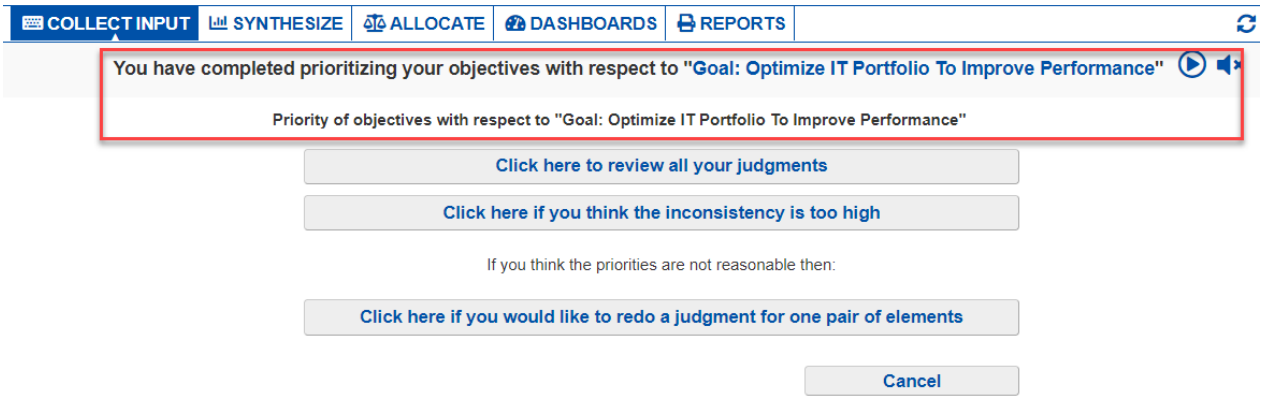

- Fixed issue with not being able to edit participant name when there are < > characters
- Fixed issues on the exported image file of Sensitivity Charts
    - Labels on the exported image file are too small compared to the actual labels displayed on the page
    - Bottom labels are not showing as expected
    - Missing labels for Pie, Donut, and Hierarchical Pie Charts

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March 2, 2022

March 2, 2022 | Version 6.2.9.44670

Enhancements

- Added the "Reset" button on each sensitivity panel on the Dashboard, previously we only have it on the main toolbar.

Fixed Bug

- Fixed issue on Charts and Grid for Chinese Characters

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February 21, 2022

February 21, 2022 | Version 6.2.8.44613

Bug Fixes

- Fixed issue on add/edit rating scale where changes are not saving due to previously closing the editor
- Do not show the priorities when a participant is selected on the Datagrid but instead show the inputted judgments/data
- Fixed the 2D analysis selected node - made the two default nodes the first and second objective nodes instead of the same node

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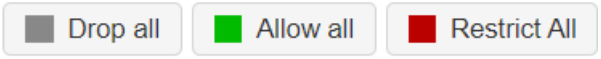
January 24, 2022

January 24, 2022 | Version 6.2.6.44405

Enhancements

- Use colored box icons for the Allow All (green), Restrict All (red), and Drop All (gray) buttons on the Participants Roles page



- Make the groups column shown by default on the Participants page

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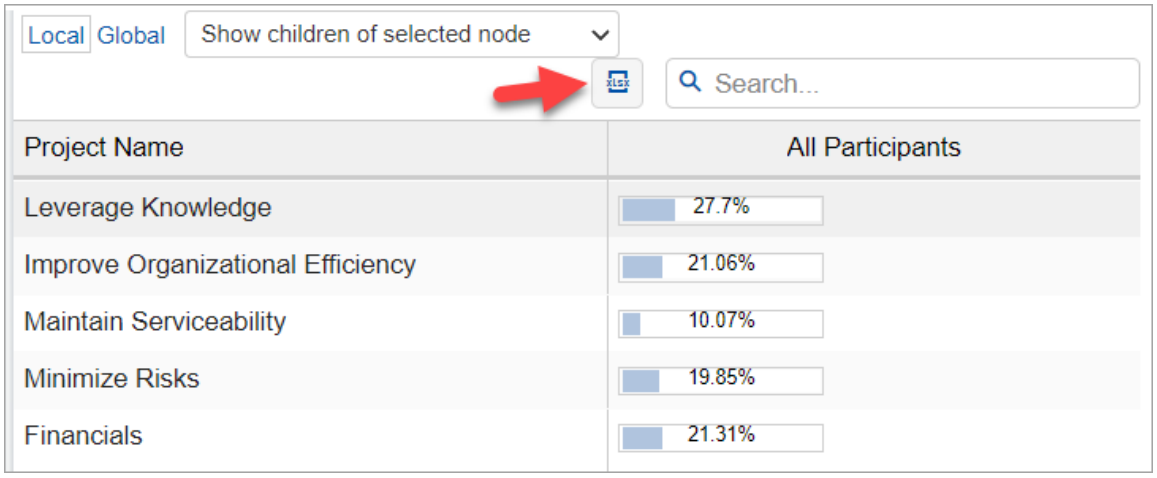
September 27, 2021

September 27, 2021 | Version 6.2.3.43232

Enhancements

- Enhancements on the Synthesize > Objectives Grid
  - Restored the Objectives Grid export to .xlsx file option



  - Allowed pagination on the grid which can be useful for models with many objectives
- Updated the Dashboard Sample "All" for a more compact layout and added a hint text (Your custom text) for Information document panels.
- Enhancements on the Page lookup pop-out
  - Added an Export option (copy to clipboard)
  - Added Expand all / Collapse all, and pick the page the user is currently at
  - Font and icon improvements

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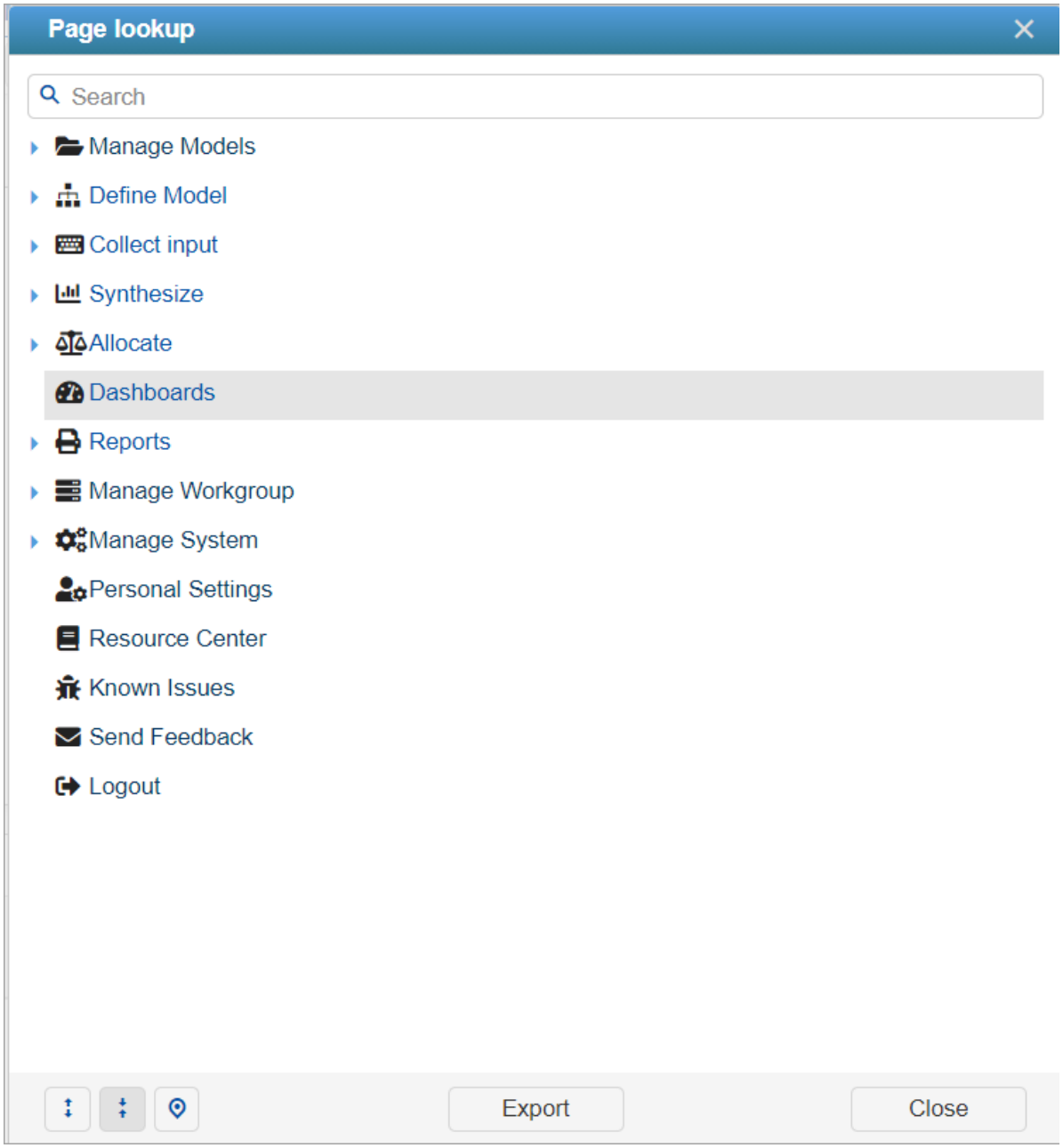
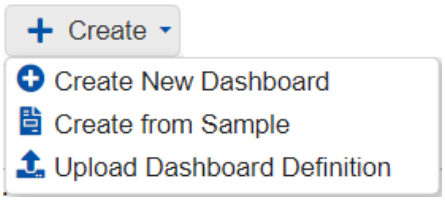


- Moved the Upload Dashboard Definition under the Create button and ungrouped the Download options



Bug Fixes

- Fixed issues on the Participants screen's Evaluation Progress data not getting updated.
    - When making changes to the model such as updating the participant roles, contributions, etc., the evaluation progress of the participants might be affected. Previously, these data are not getting updated without logging out / logging in. After the fix, the evaluation progress is now being updated automatically. We also showed a Refresh

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icon on the column heading to manually reload the data.

- Fixed the "Use Workgroup Wording Templates" option not working for non-advanced mode.
- Fixed the missing help icon on the evaluation's view-only mode that is opened from the Inconsistency report page.
- Fixed the saving problem when changing the Utility Curve from Curve to Linear.
- Fixed the Show Components option on Dynamic Sensitivity when a node other than the Goal node is selected.
- Fixed the refresh issue when copying the evaluation links consecutively when the model is offline. There was a prompt saying that the model is offline even it is already been switched online.
- Fixed the uploading of direct priorities for the Rating measurement method.

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September 2, 2021

September 2, 2021 | Version 6.2.2.43048

Enhancement

- Updates on the Comparion Help widget
  - User Interface improvements (Help Library, Recommended, and Contact us tabs)
  - Entire Help Library accessible from the widget
  - Suggest help articles when submitting a help ticket from the Contact Us tab

Bug Fixes

- Invalidate any session tokens associated with the user when an account password reset is performed.
- Add Participants: Set the focus on the email input box when the dialog box is opened.
- Run Time Error (RTE) when the user session is disconnected on the "License" screen.

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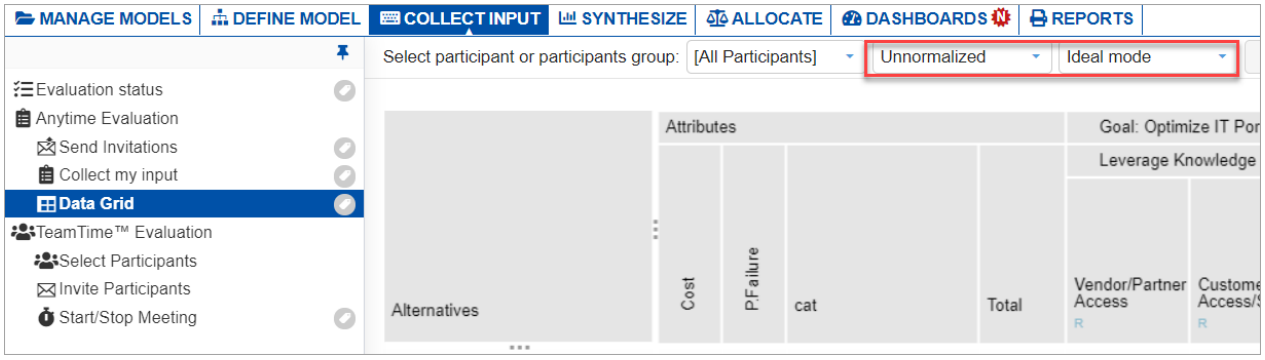
July 21, 2021

July 21, 2021 | Version 6.2.2.42787

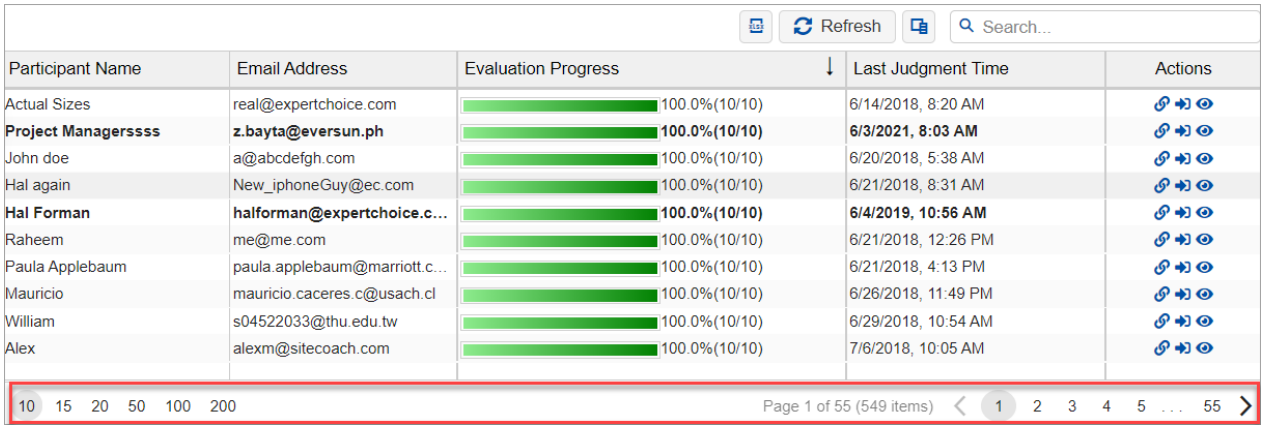
Features and Enhancements

- Added Normalization (Unnormalized and Normalized) and Mode (Ideal/Distributive) options on Datagrid page.



Note: The Distributive mode is only applicable for Normalized, thus Normalized will be automatically selected when Distributive is selected.

- Allowed pagination on the Evaluation Progress page.



- Admin Feature: Be able to specify password for System Managers.

Bug Fixes

- Fixed issues on Dashboard:
  - Participants grid panel has missing columns (Permission, Evaluation Progress).
  - Some Synthesize screens settings are not being applied when a page is added to the dashboard:
    - Selected axis for 2D and Gradient Sensitivities
    - Selected alternatives for Head-to-head Sensitivity
    - Filtered alternatives
  - The leveling of objectives is messed up when editing an objective node from the Objectives panel
- Removed the unnecessary lines on evaluations results steps.
- The last accessed model is being re-opened when returning to some Workgroup Managers pages; even the model has been closed.
- Renamed "Statistic" as "Workgroup Statistics"; Fixed the issue of when selecting an expired workgroup, the user is being

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redirected to the model's list and can no longer return to the Workgroup Statistics page.

- Changing the sorting on Stack Charts is not being reflected until the page is refreshed manually.
- The "Sorting by Name" on Charts and Sensitivities is incorrect when an element name is an acronym.
- Fixed issues on combined calculations (model dependent).
- The "Edit description" button stays disabled when an alternative is checked.
- Very long Rating Scale intensity names are displayed on a single line on the TeamTime meeting screen, which is affecting the layout. We truncated the intensity names so the default elements will still be visible.

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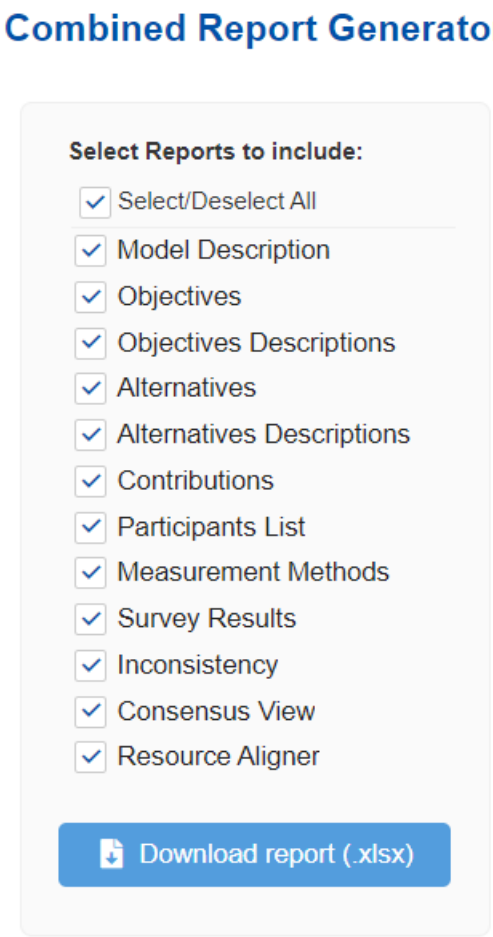
July 2, 2021

July 2, 2021 | Version 6.2.1.42603

Features and Enhancements

1. Combined Reports Generator Enhancements

Added an option to select the reports to include in the combined report file. In the previous version, clicking the "Combined Report Generator" link will immediately download all the reports.



This is found on Reports > Others:

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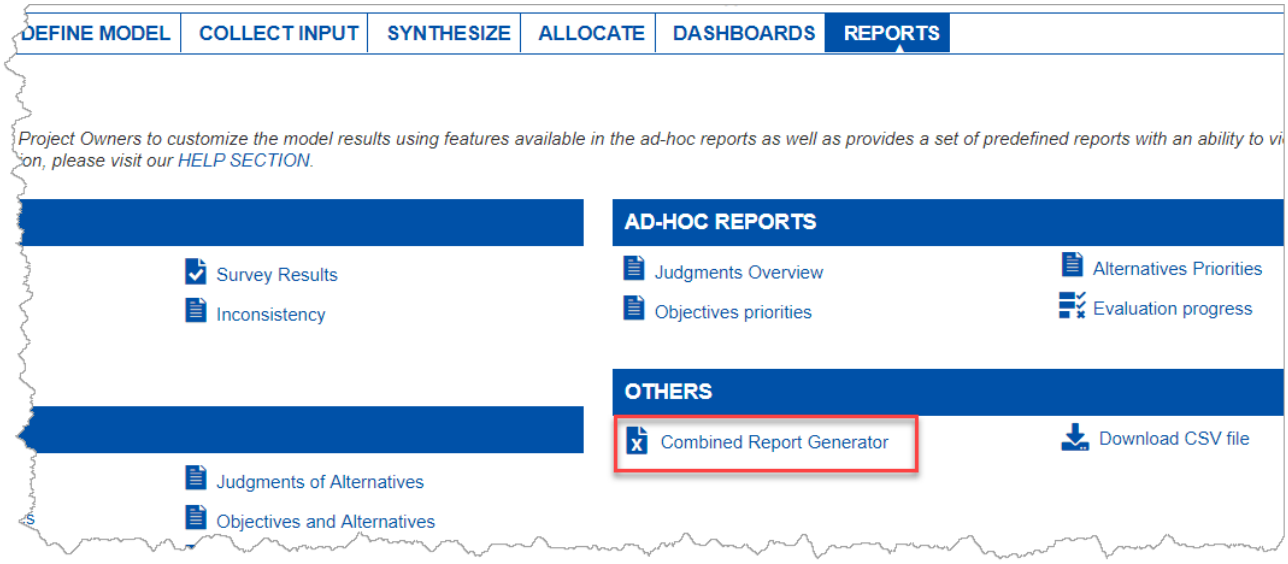

2. Improved Dashboard's Add/Edit interface

Improved the dialog box for adding/editing the dashboard panels. The panel type section is moved to the left and is clickable instead of a drop-down select.

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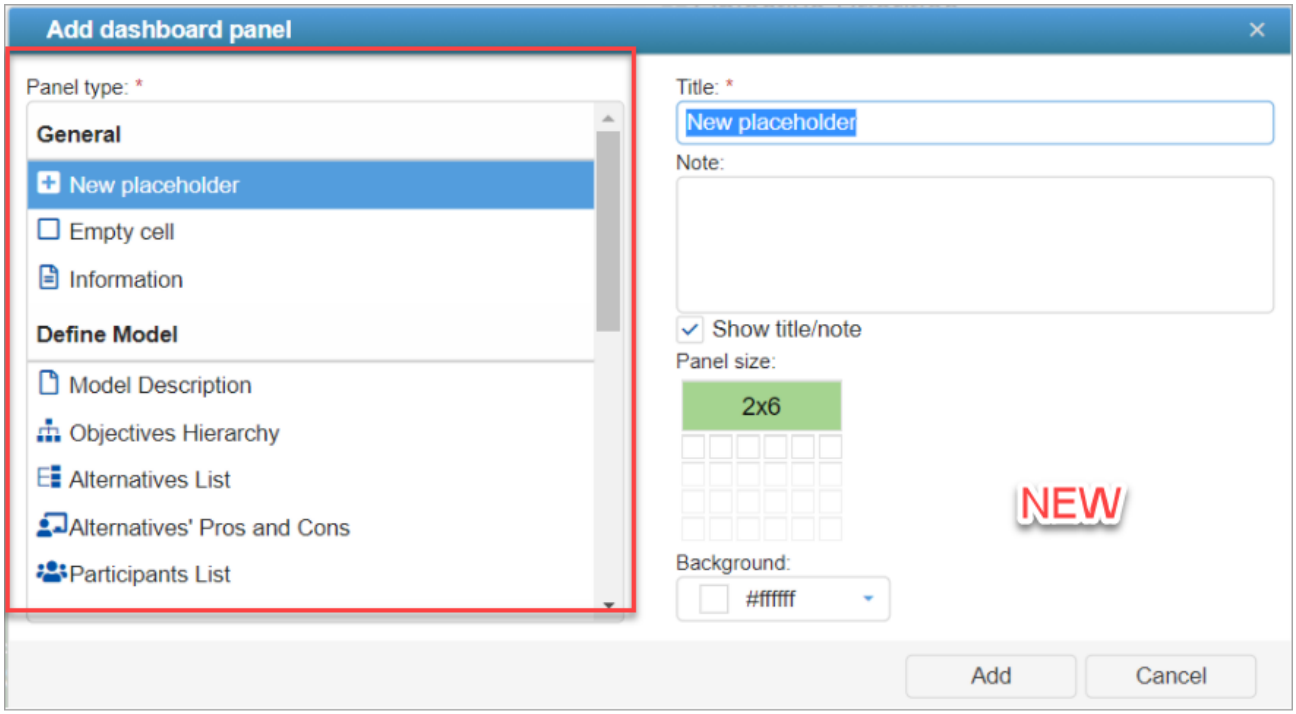

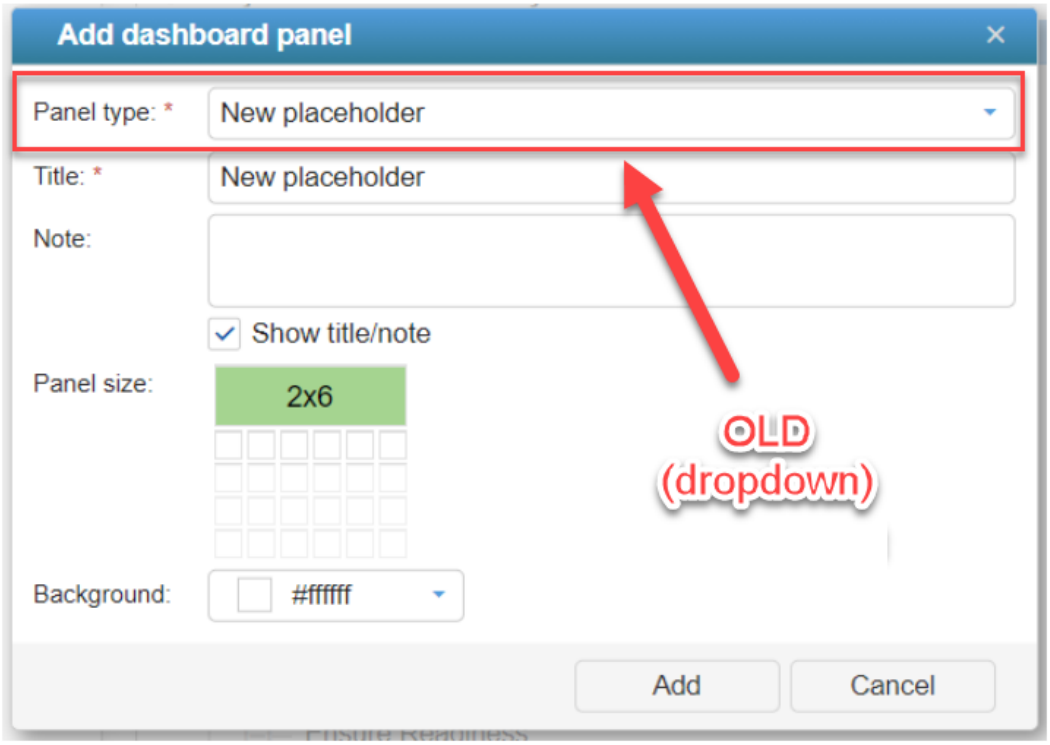

3. Updated controls for Measurement Methods and Default Scales for improved user interface and consistency

The controls on Measurement Methods and Default Scales pages are updated to improve the look and feel of the grid and buttons, etc.

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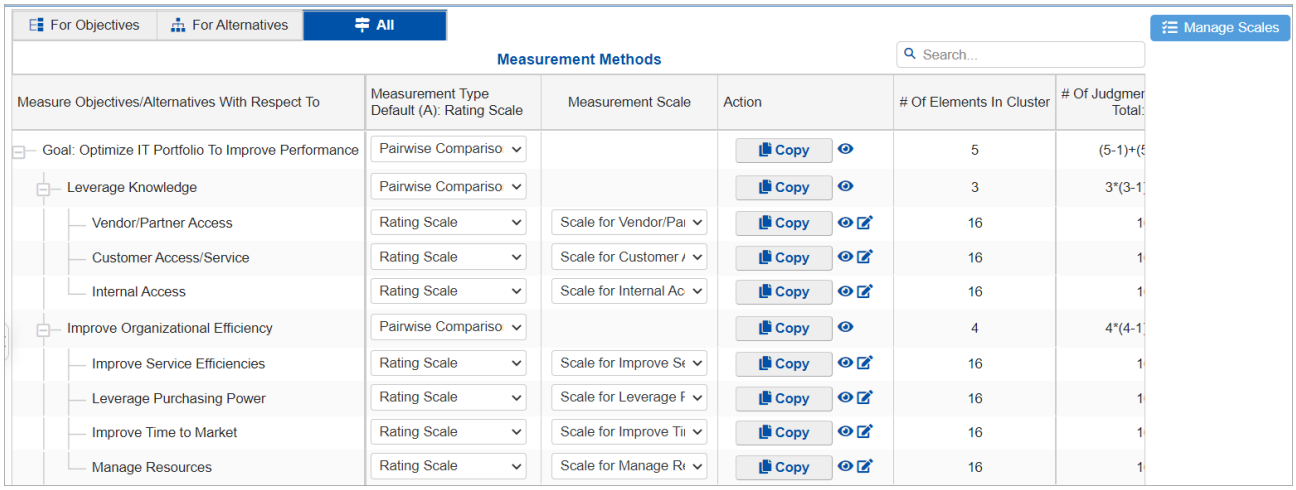
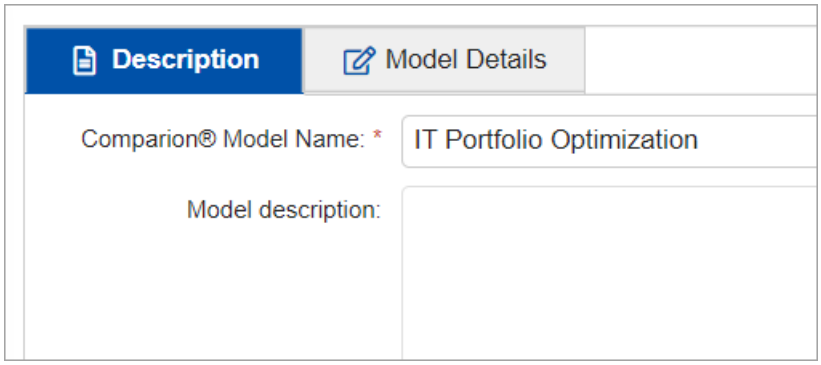


4. Changed the selected tab color to blue

Updated the selected tab background color to blue to make it more obvious.



5. New legend added to Objectives Hierarchy View

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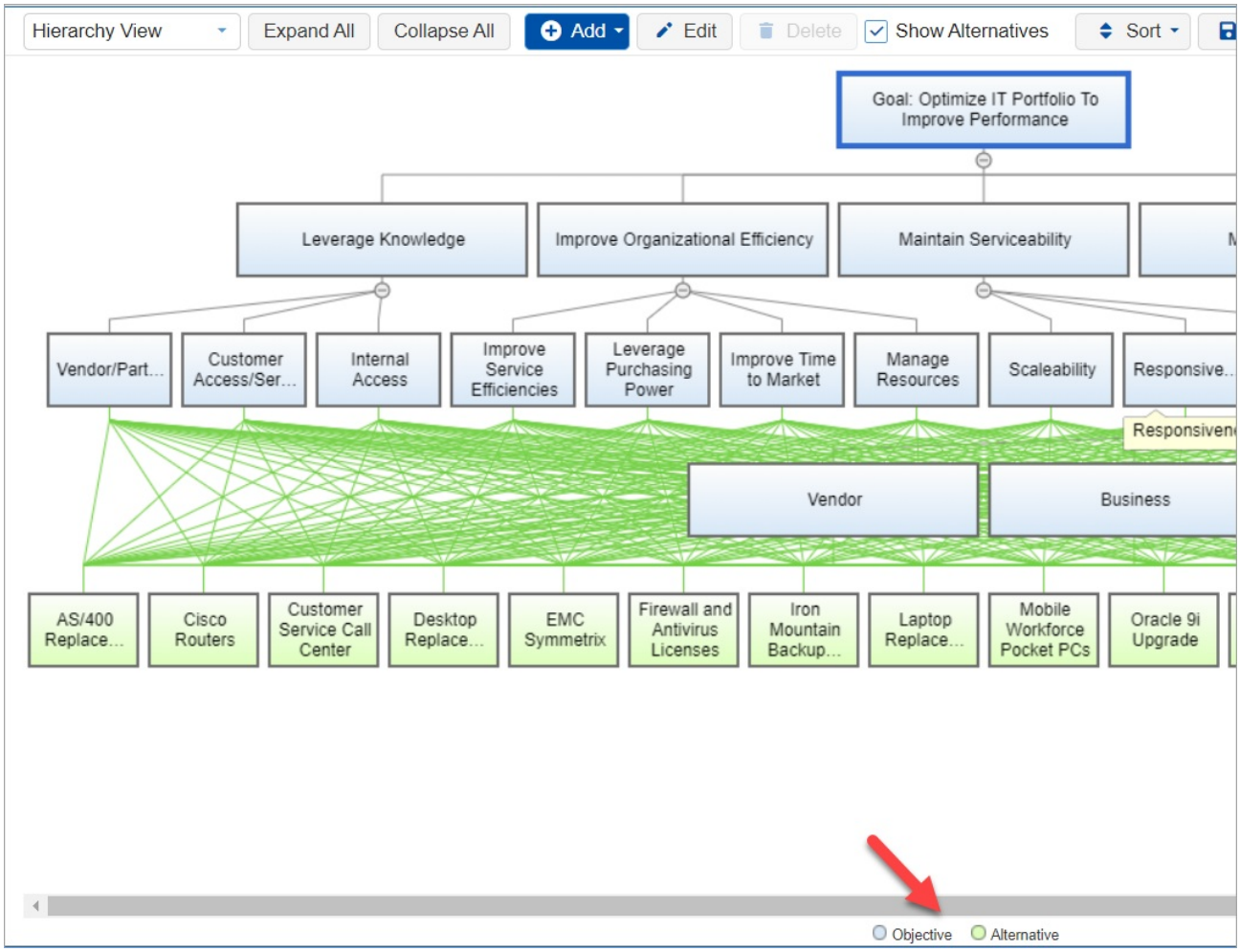

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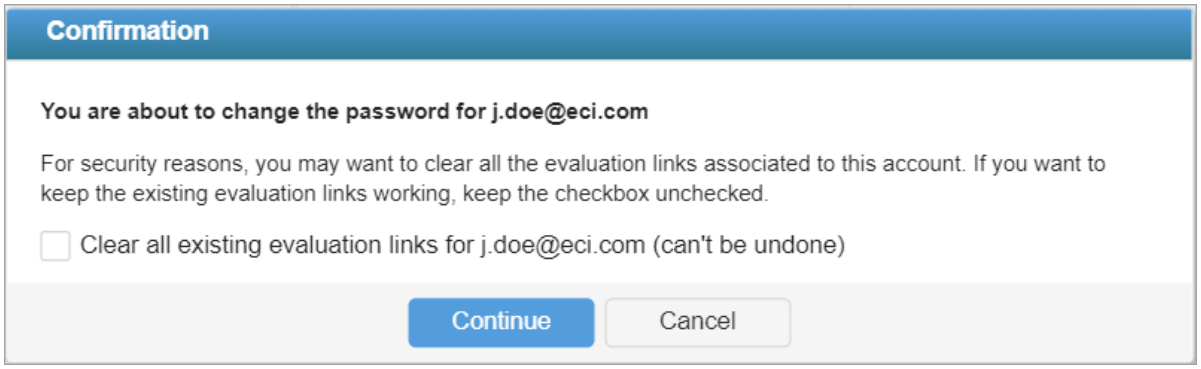
February 24, 2021

February 24, 2021 | Version 6.1.4.42003

Enhancements

- In the previous design, every time a password is created or reset, new evaluation links of a user will automatically be generated, and the old evaluation links will then be invalid for security purposes. On this release, we made the following changes:
  - For new users accessing the site for the first time who will be prompted to create a new password, new evaluation links will be generated, at the same time, their old/existing links will still be working, meaning they can use both.
  - For users resetting the password (from the Personal Settings page) or by his/her Project Manager (from the Participants List key icon), a prompt will appear asking to clear all existing (old) evaluation links or to keep them working.



  - We also added an admin setting to turn on/off the creation of a password for first-time users accessing the system. (This is currently turned ON in Comparion; please contact us at support@expetchoice.com if needed.)

Bug Fixes

- Fixed the auto-playing of YouTube videos on Evaluation's Quick Help. YouTube made an update on video auto-play which caused the issue on Quick Help.
- Fixed the Run Time Error (RTE) that may occur when copying judgments from one user to another.
- Fixed the missing unlock icon on the Participants list to unlock users due to multiple wrong password attempts.
- Fixed the focusing on the first Alternative on the Alternatives page. The first alternative is not being focused correctly and disables the Edit Description button.
- Fixed the missing dialog box prompt to edit the Goal name and its description for newly created models.
- Fixed issue with the enable/disable check box on the Workgroup Participants list. The check box is not updating on the view but is being saved correctly.
- Fixed the copy/paste options that are blocking the right-click context menu on the Objectives Hierarchy View.
- Fixed the issue with the steps list being clickable even when it should not be, since the evaluation is set to not allow users to move forward when there are missing judgments.
- %%Models%% not parsed when creating a copy of a model (Save As) and the number of models is equal to or greater than indicated in the license file for the workgroup.
- Security Fixes

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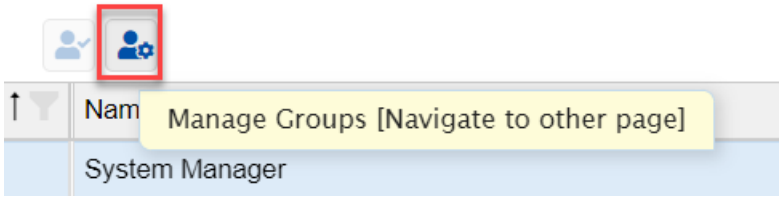
January 21, 2021

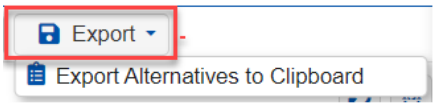
January 21, 2021 | Version 6.1.3.41813

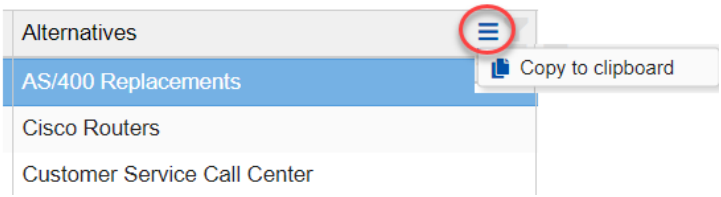
New Features/Enhancements

- Password Complexity. Be able to define the password complexity for the users. When password complexity is enabled, a password requires at least one lowercase letter, an UPPERCASE letter, a number, and a special character. Additional settings can be defined such as the minimum and maximum password length, the number of characters changed, and the number of generations before a password can be reused. These settings are specified by the site admin.
- Added an icon to easily navigate to the Participants page > Manage Groups window from the TeamTime's Select Participants screen. This helps to easily manage the participants' groups while the Project Manager is selecting the participants to join the TeamTime meeting.

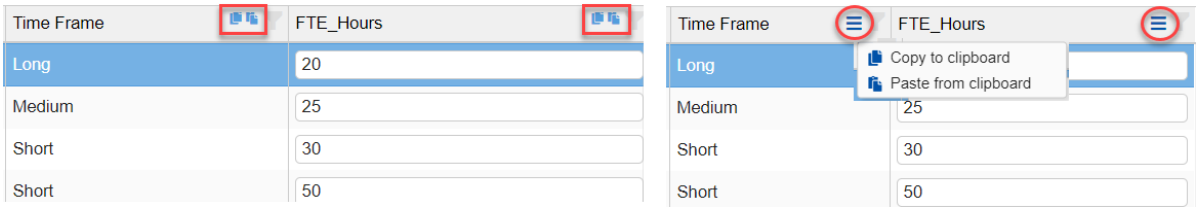


- Alternatives page export icons improvements.
  - Moved the Export > copy Alternatives to the clipboard.

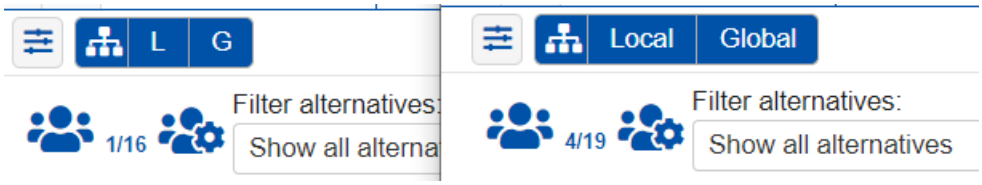




  - Replaced the copy and paste icons to a Hamburger icon with copy/paste sub-options for Alternatives Attributes



- Spelled out Local and Global instead of just L and G



Bug Fixes

- Fixed the issue with expiring participant's evaluation links once a participant creates a password.
  - Previously, existing evaluation links were invalid after creating/resetting a password. We made a fix so that old links will still be working even after creating a new password during the user's first login. Additionally, when a

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participant resets his own password, or a Project Manager resets another user's password, they will have an option to clear all the existing links or keep them working.

- Fixed the Run Time Error on Sensitivity Analysis for some models with not enough data to calculate results.
- Fixed the issue with the truncated labels on Hierarchical Pie Chart.
- Disabled the curvature input box when linear is selected for Utility Curve Scale.
- Fixed the blank local/global priorities. This used to happen on Synthesize screens:
  - after creating a dynamic group in Synthesize screens
  - selecting another user/group
- Fixed issue on allowing to input P. Failure greater than one on Alternatives page (P. Failure should be 0-1).
- Fixed issue with not being allowed to save a non-complex password from the Personal Settings page, even though there should be no restriction.
- Fixed issue with password icon color not being refreshed automatically on the Participant's screen. The password (key) icon is blue when the user does not have a password, and gold when the password exists.
- Fixed the alternative priorities being displayed on the Strategic Buckets page. It used to not show the priorities based on the selected scenario.
- Fixed the refresh issue on the insight survey list from "Add Attributes from insight question." After deleting a participant attribute, you can't add the attribute again since it is still considered the attributes as already added.

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Comparion Dashboard Release

June 12, 2020 | Version 6.0.15.39790

We are excited to announce the **Comparion Dashboard Release.**

- Dashboard
- *Other Enhancements:*
  - Page Lookup
  - Combined Reports Generator
  - Responsive or Non-Responsive AnyTime Evaluation
  - Question Text to Speech
  - TeamTime Brainstorming Enhancements
  - Multi-categorical Alternatives Attributes
  - Participants Groups
  - Export Efficient Frontier Grid
  - Show Evaluation Progress on Participants screen
  - Four at a Time Sensitivity: Objectives Pagination
  - Charts Enhancements
  - Alternatives Colors from Define Model
  - Download and Get Links shortcuts

Dashboard

Comparion Dashboard is a powerful tool where you can add different Comparion pages or widgets to a dashboard as panels.

The pages/widgets you can add are the following:

- Model Description
- Alternatives list
- Objectives Hierarchy
- Alternatives Pros and Cons
- Participants List
- Grids (Alternatives, Objectives, Portfolio View)
- Charts (Alternatives, Objectives)
- Sensitivities
  - Dynamic, Performance, Gradient, 2D, Head-to-head, Alternatives Performance

Panels can be moved around, maximized, resized, and more. You can create one or more dashboards as you need.

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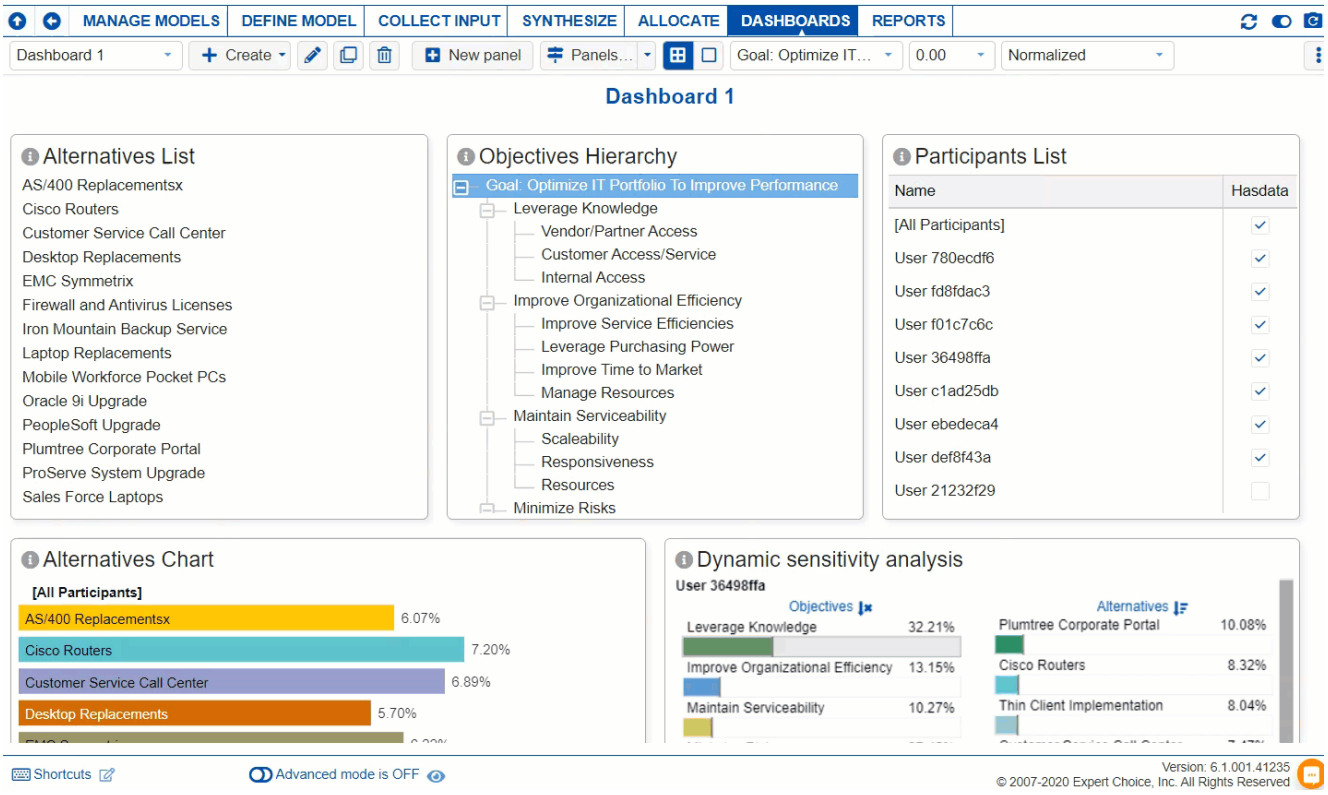

Click for more details..

Combined Report Generator

Be able to generate a report in .xlsx format which comprises the following model data:

- Model Overview (Model Description)
- Alternatives and Objectives Priorities
- Information Documents
- Contributions Matrix
- Participants List
- Measurement Methods
- Inconsistency
- Consensus
- Resource Aligners Data (Scenarios, Dependencies, Constraints, Groups, Funding Pools, Time Periods, etc.)

This can be found on Reports page < Combined Report Generator.

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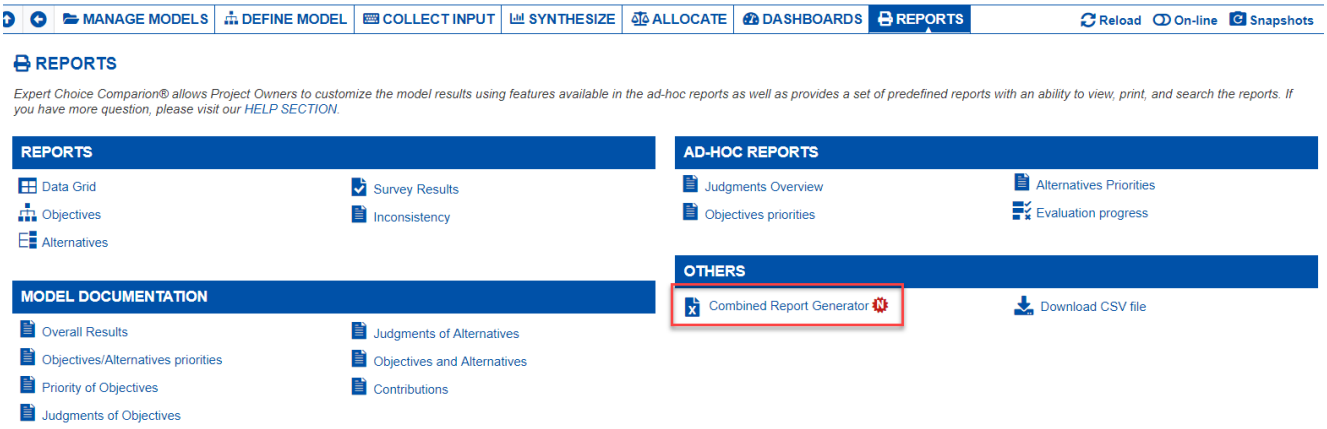
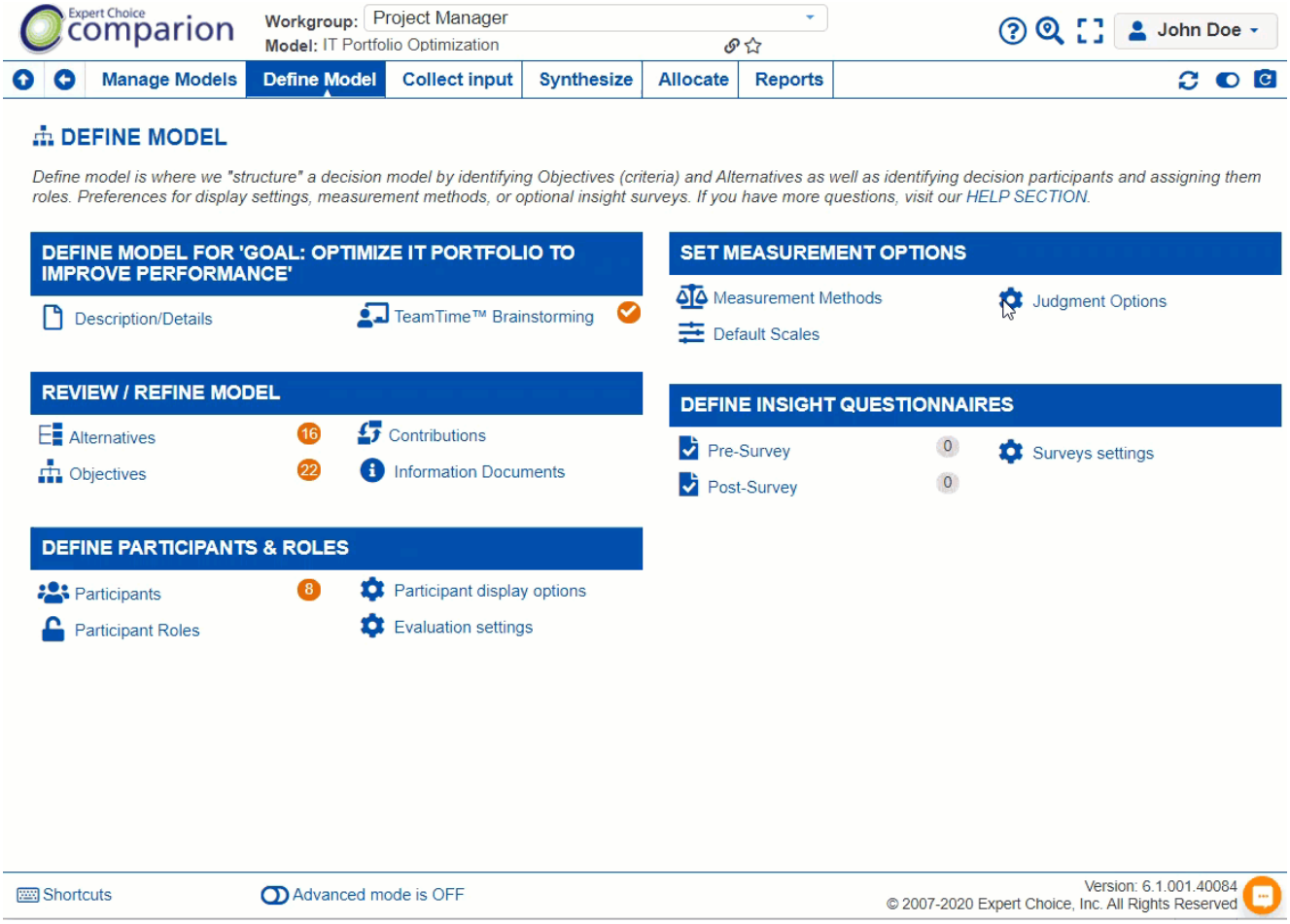


Page Lookup

The Page Lookup allows you to open the list of Comparion pages. You can search and jump to a specific page at ease.



Click for more details..

Responsive or Non-Responsive AnyTime Evaluation

AnyTime Evaluation pages can now be **Responsive** or **Non-responsive**.

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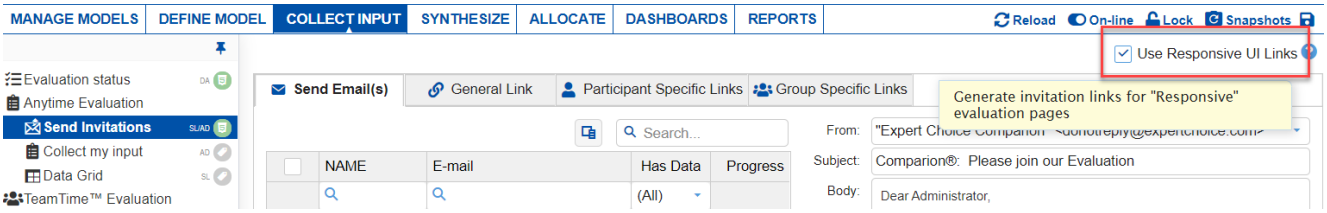
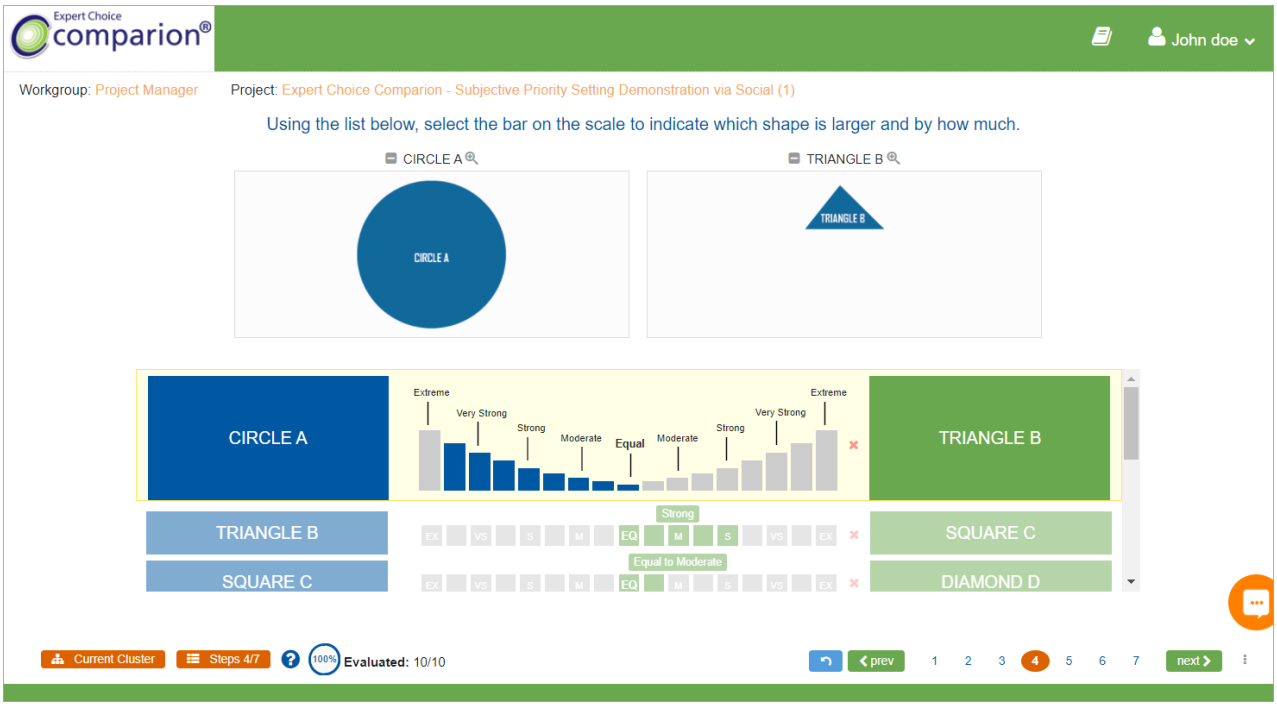
In general, Responsive pages adapt content to fit different screen sizes, such as smartphones and tablets. On the other hand, Non-responsive pages have some features not yet available on Responsive Evaluation. See more details **here**.

The Project Manager can invite the participants to either Responsive or Non-Responsive Evaluation by checking/unchecking the "Use Responsive UI Links."



Responsive Page:

Desktop



Mobile

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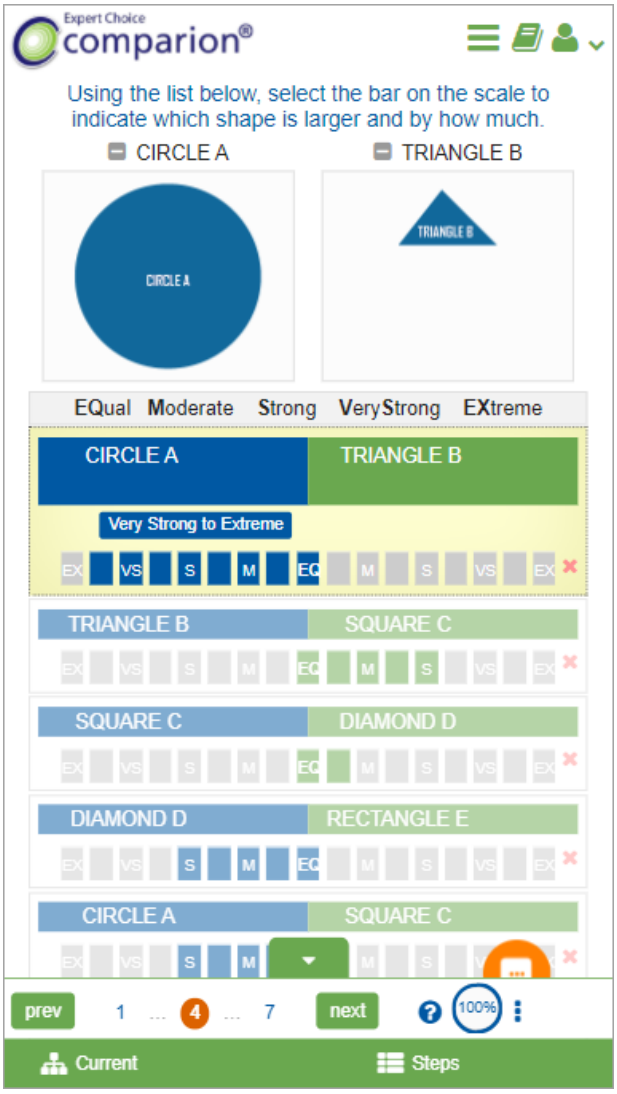

Non-Responsive Page:

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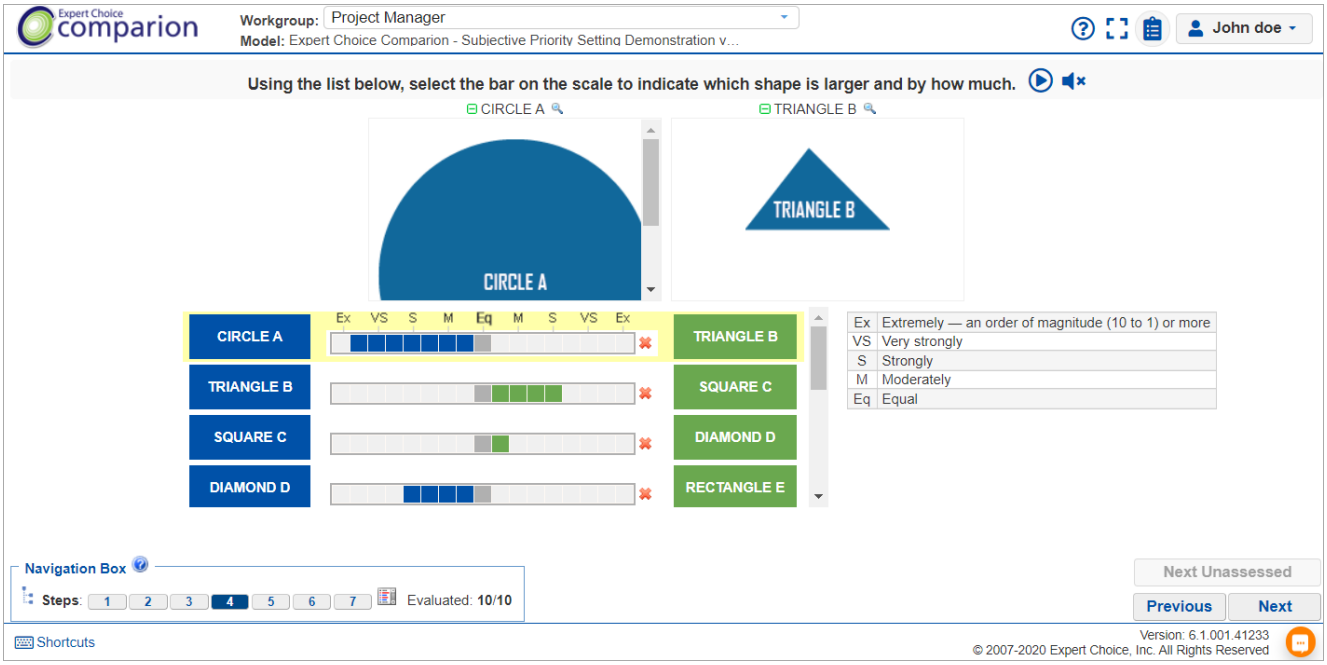
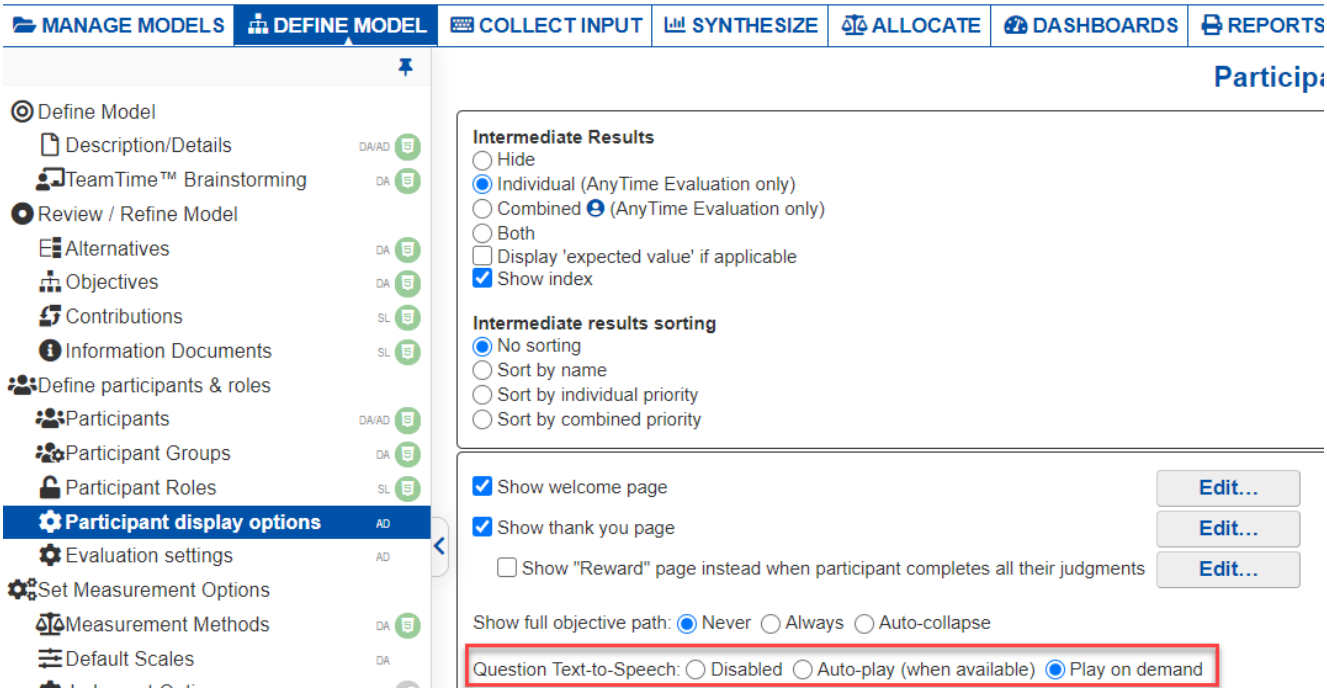


Question Text-to-speech

We've added a text-to-speech option on the Non-responsive evaluation.

Text to speech can be disabled, auto-played, or played on demand. This can be set-up on **DEFINE MODEL > Define Particpants & Roles > Participants Display Options:**



See example below:

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Your browser does not support HTML5 video.

Enhanced Resource Aligner's Infeasibility Analysis

Optimization can be infeasible when it may not be possible to satisfy all of the constraints specified. Expert Choice will, of course, report that there is no feasible solution when this condition arises.

With the Infeasibility Analysis, the Optimizer will analyze the constraints and suggest a possible combination of changes that can result in a feasible solution. In this enhanced version, you can now select whether to suggest only one (the best solution) or multiple possible solutions.

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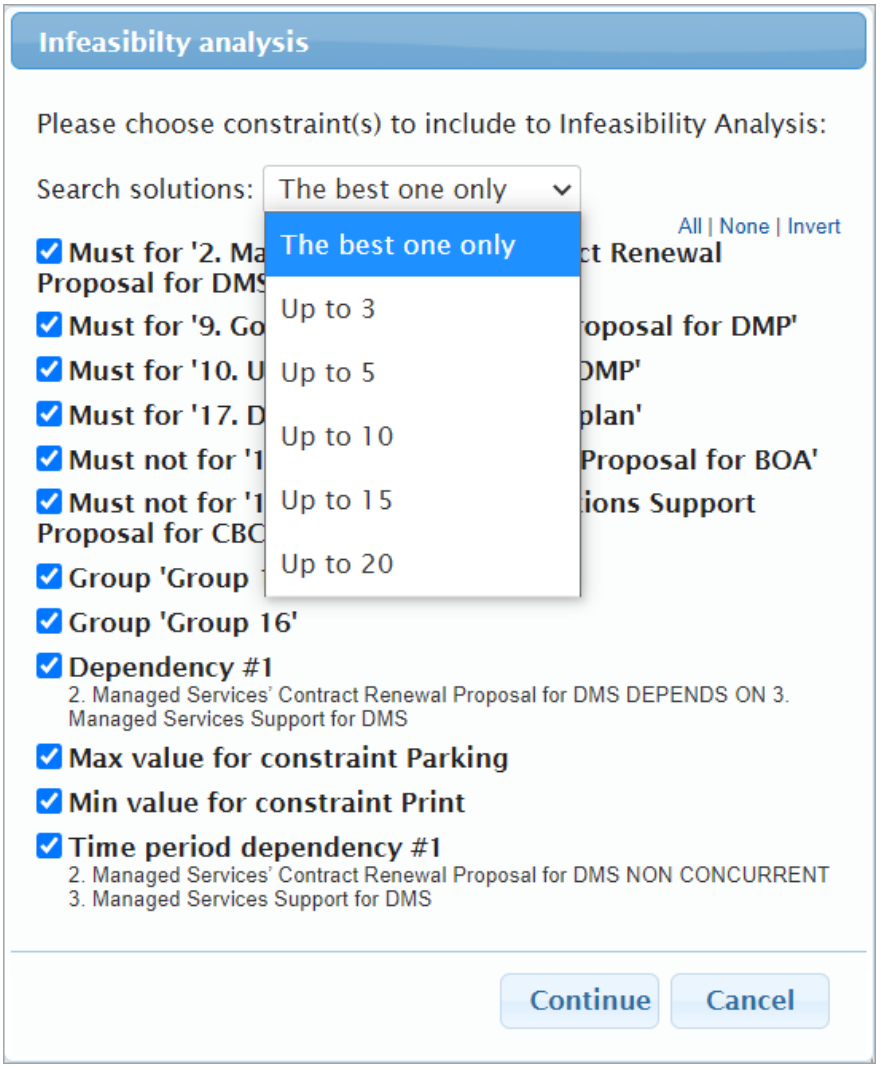
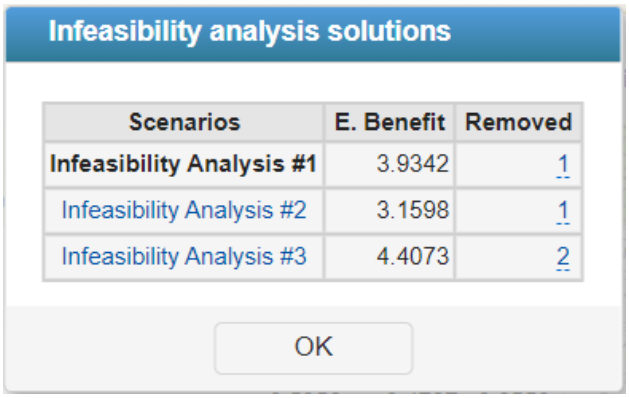


You can view the removed constraint(s) on each of the suggested solutions:



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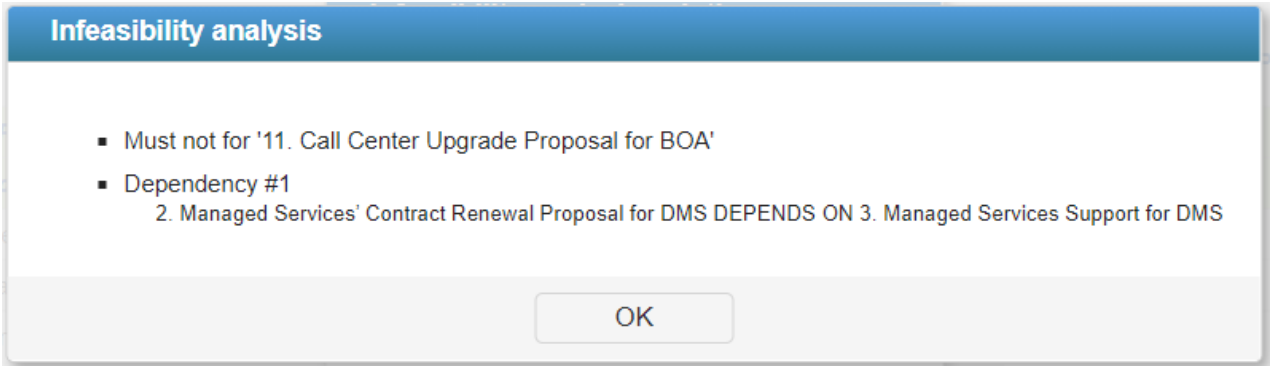
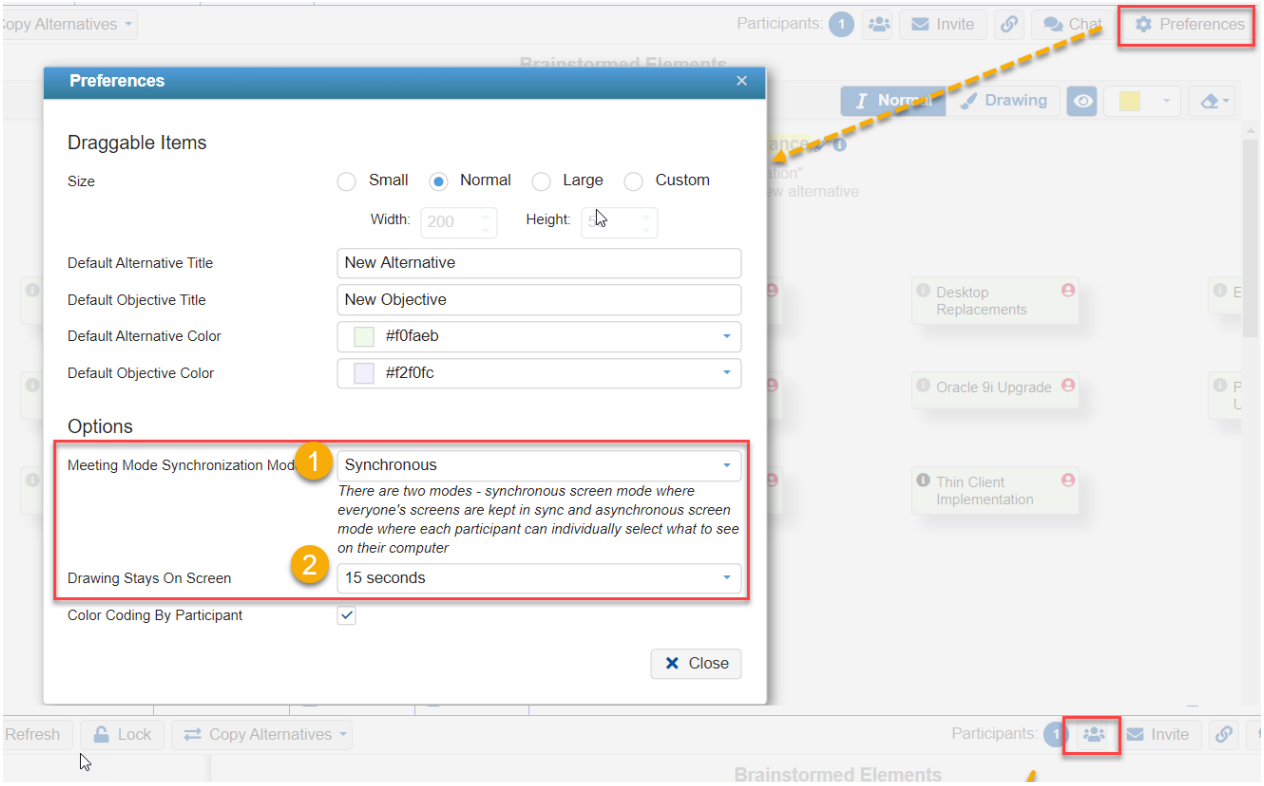


You can then modify the existing scenario based on the suggested changes or create a new scenario, as desired.

TeamTime Brainstorming Enhancements

We've done multiple enhancements for Comparion's TeamTime Brainstorming:

1. Added **Synchronous / Asynchronous** options - on the previous version, the Teamtime brainstorming is only **Synchronous** meaning the active tab both for the Model Elements and the Whiteboard are controlled by the Project Manager and it will be reflected on the meeting attendees' pages. The **Asynchronous** mode allows the meeting attendees to control the tab that they will access during the meeting.
2. Option to **auto-clear drawing** by 15 seconds
3. Ability to **manage model's existing participants** during the meeting (Add, Remove, Set Permission, Delete, Send Mail)
4. Be able to a **dd/edit the Goal node description**
5. Other UI enhancements...



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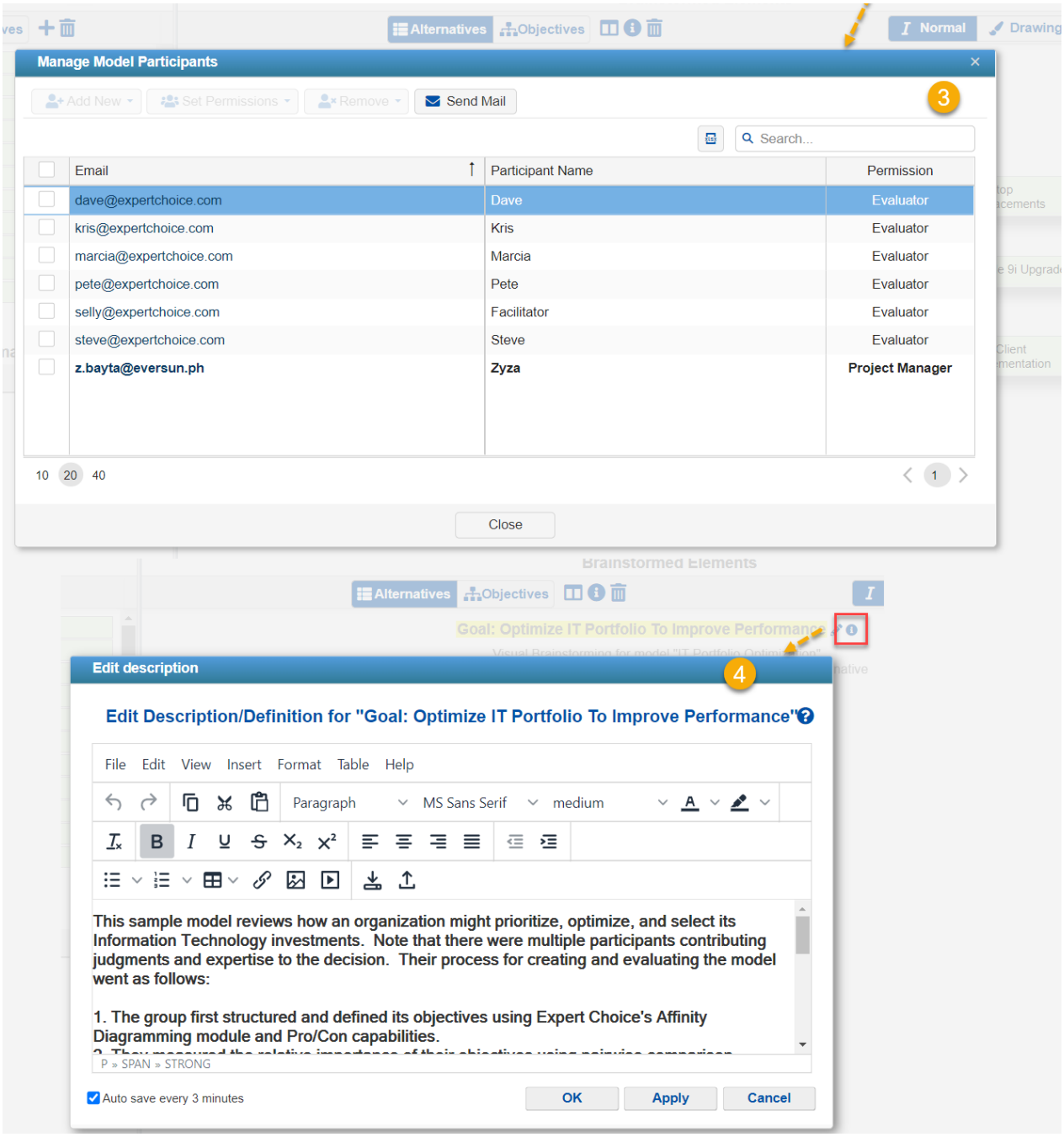

Multi-categorical Alternatives Attributes

The multi-categorical attribute is a new type of alternative attribute which allows the Project Manager to assign multiple categories to the alternatives. Previously, we could only assign one attribute for each alternative.

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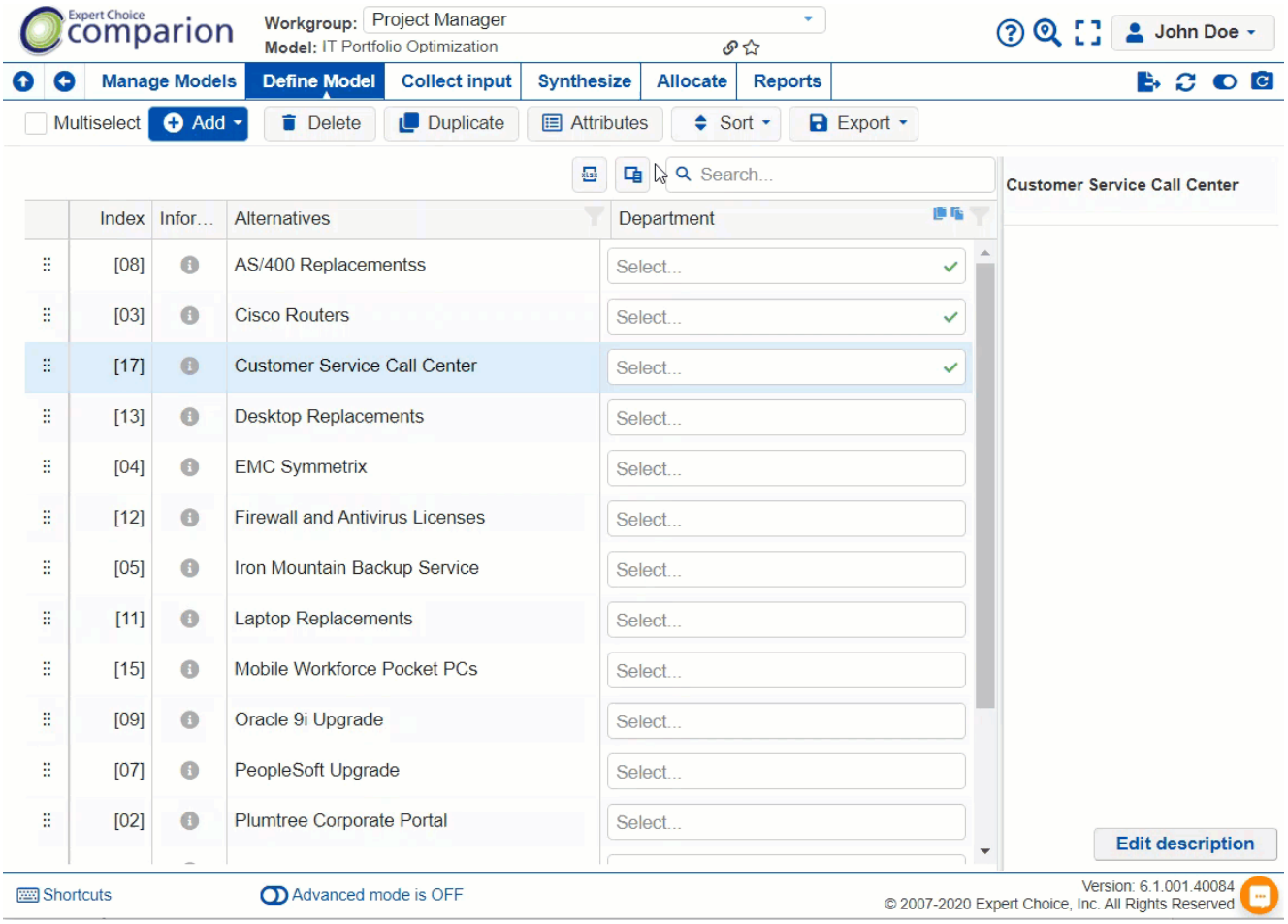
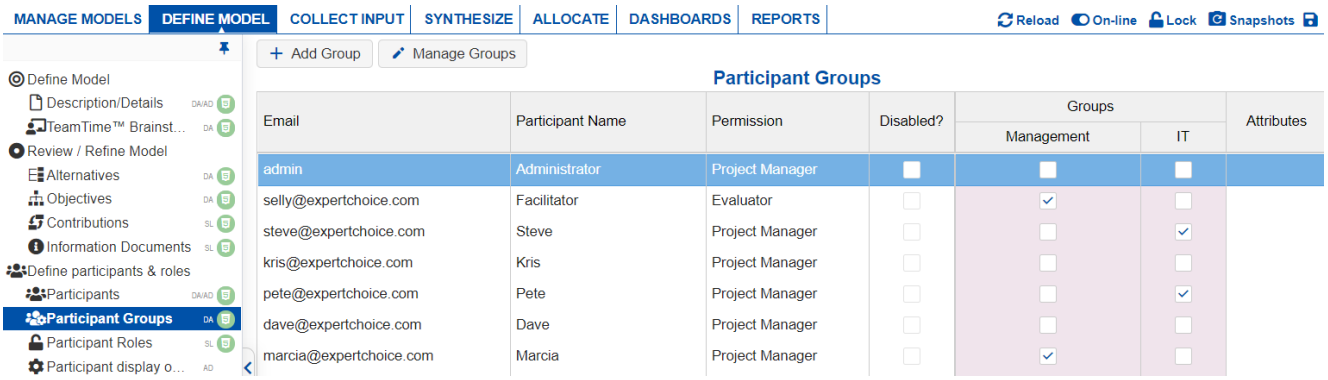


Note: Multi-categorical attributes is not yet supported on datagrid, so it is "read only" on the exported .xlsx file.

Participants Groups

Added a separate page where you can manage the Participants Groups.



Export Efficient Frontier Grid

In addition to exporting the Efficient Frontier grid, we've added export options for the chart:

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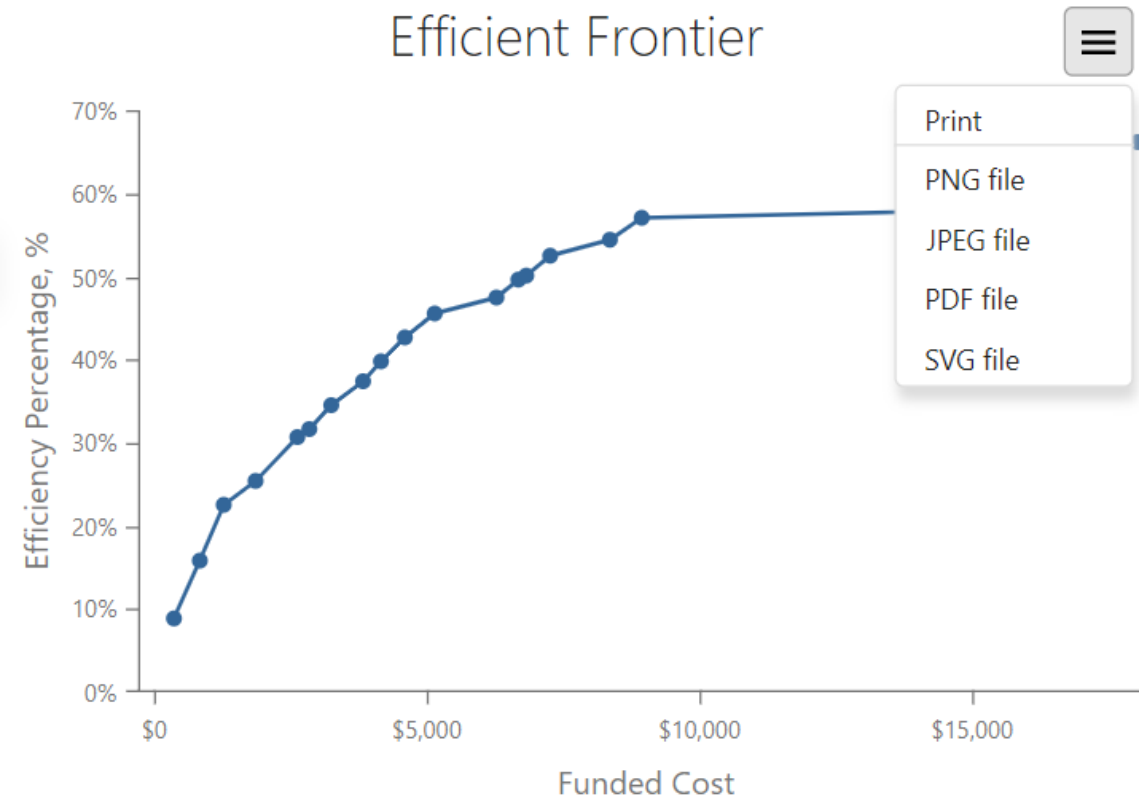
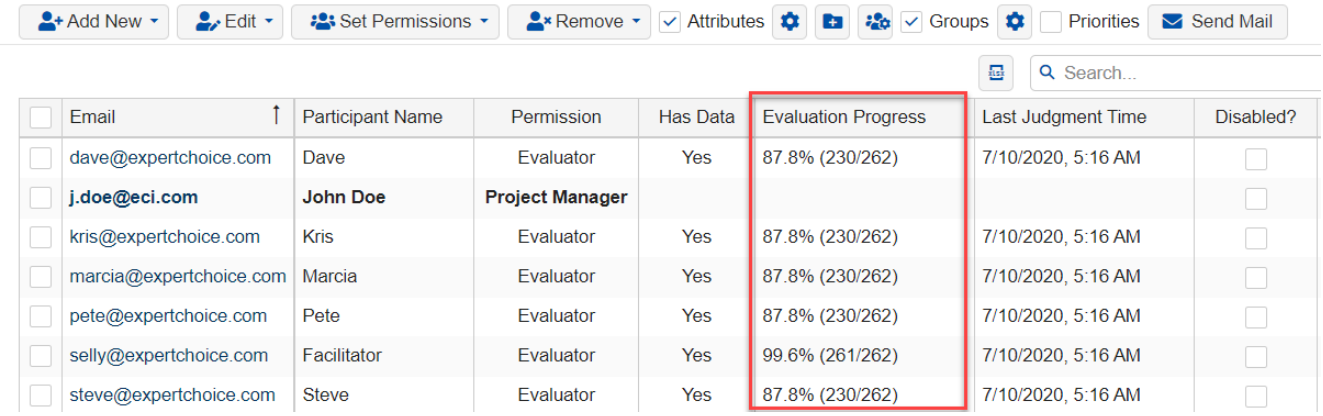


Show Evaluation Progress on Participants screen

Added a column to show the Evaluation Progress in the Participants page.



Email	Participant Name	Permission	Has Data	Evaluation Progress	Last Judgment Time	Disabled?
dave@expertchoice.com	Dave	Evaluator	Yes	87.8% (230/262)	7/10/2020, 5:16 AM	
j.doe@eci.com	**John Doe**	**Project Manager**				
kris@expertchoice.com	Kris	Evaluator	Yes	87.8% (230/262)	7/10/2020, 5:16 AM	
marcia@expertchoice.com	Marcia	Evaluator	Yes	87.8% (230/262)	7/10/2020, 5:16 AM	
pete@expertchoice.com	Pete	Evaluator	Yes	87.8% (230/262)	7/10/2020, 5:16 AM	
selly@expertchoice.com	Facilitator	Evaluator	Yes	99.6% (261/262)	7/10/2020, 5:16 AM	
steve@expertchoice.com	Steve	Evaluator	Yes	87.8% (230/262)	7/10/2020, 5:16 AM	

Four At a Time Sensitivity: Objectives Pagination

Added an option to select the number of objectives per page. This is helpful when there are many objectives in the model to make the sensitivity less busy.

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Charts Enhancements

1. Added options to show the Local and Global Objectives priorities on the Hierarchy tree
2. Added connecting lines on the hierarchy tree to make the objectives leveling more obvious
3. Ability to Sort the Hierarchy Tree

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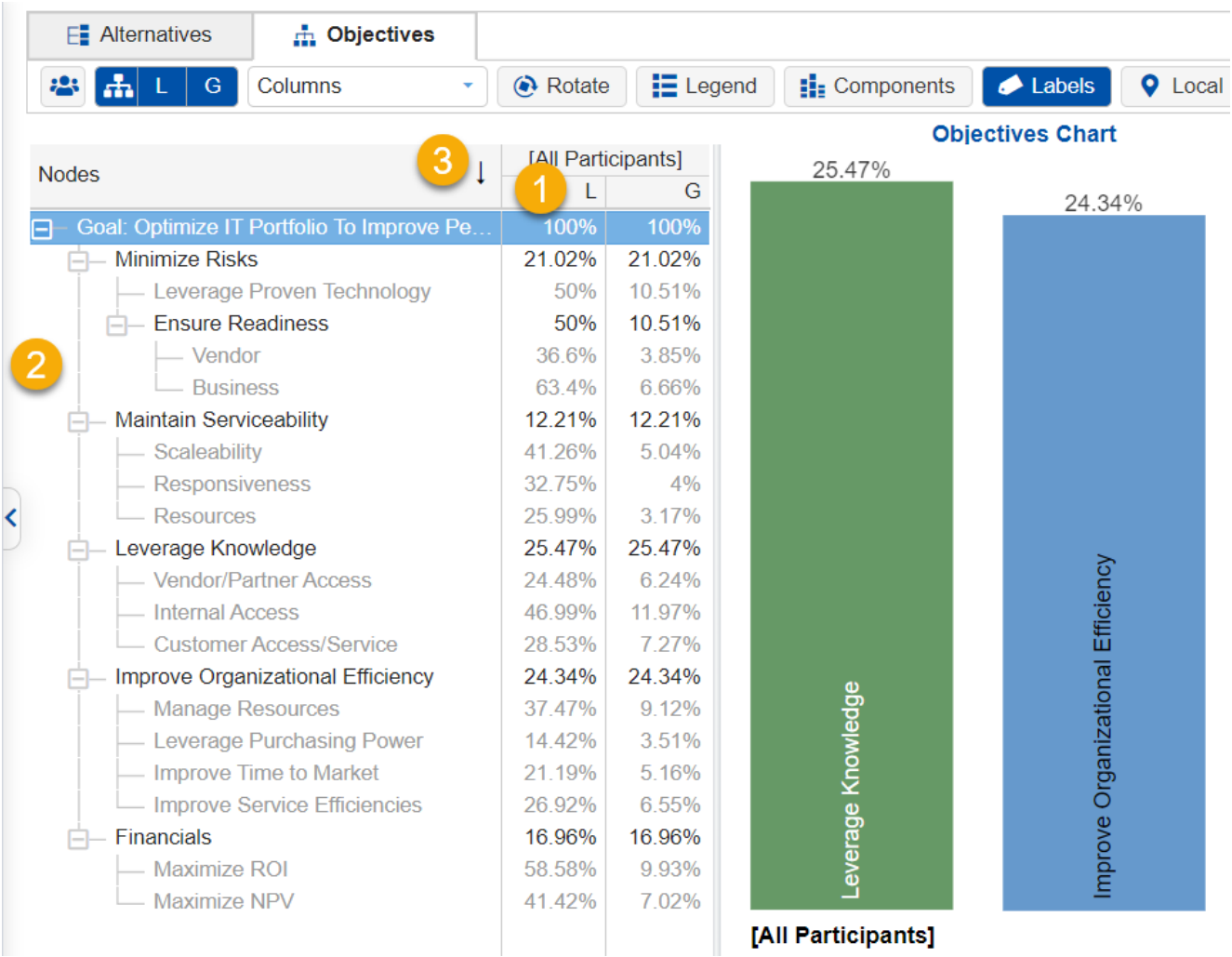

4. Added clockwise and counter-clockwise rotate; zoom in and zoom out options on Hierarchical Pie Chart

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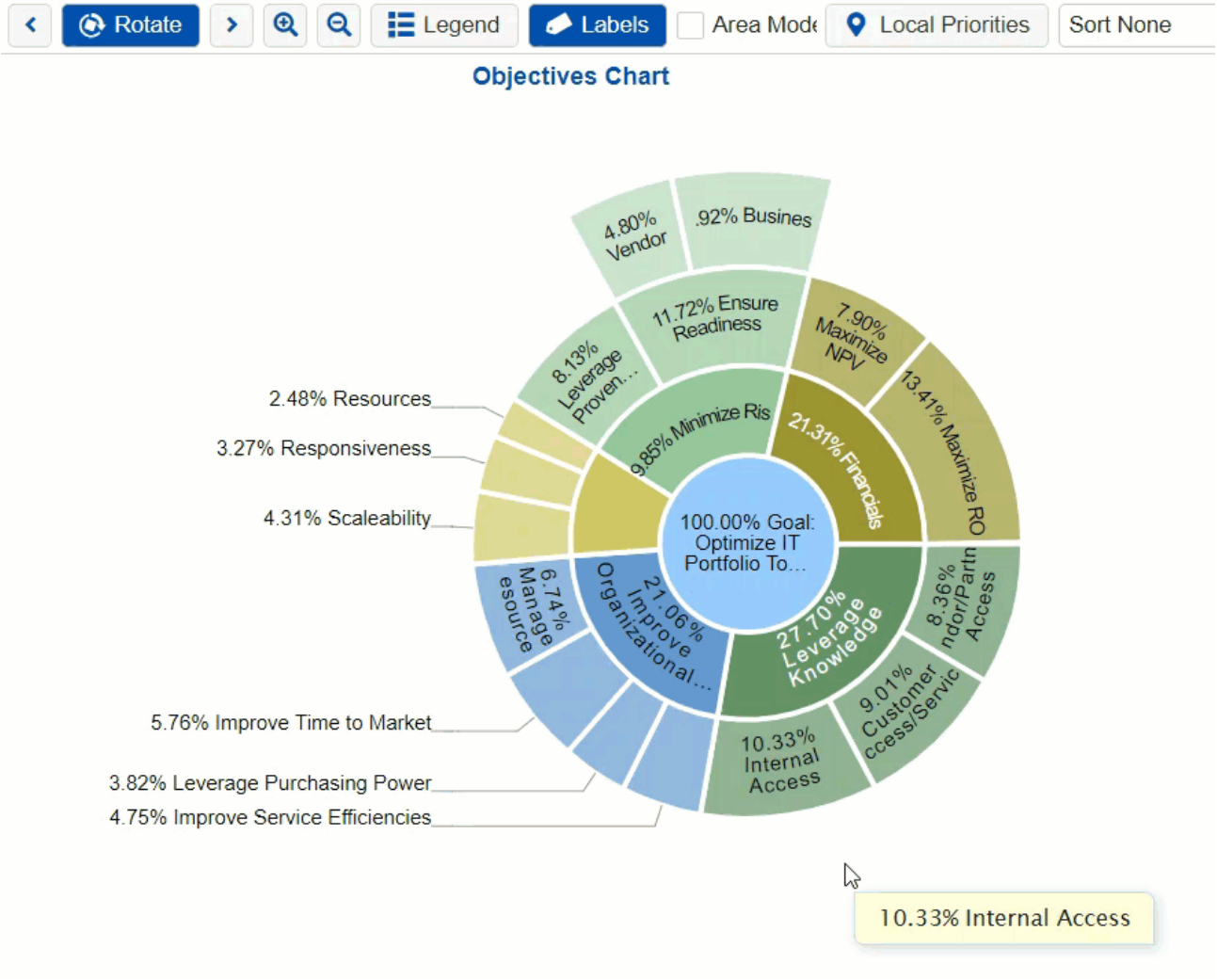

Alternatives Colors from Define Model

Be able to define the Alternatives colors in the DEFINE MODEL workflow, in addition to the Synthesize pages.

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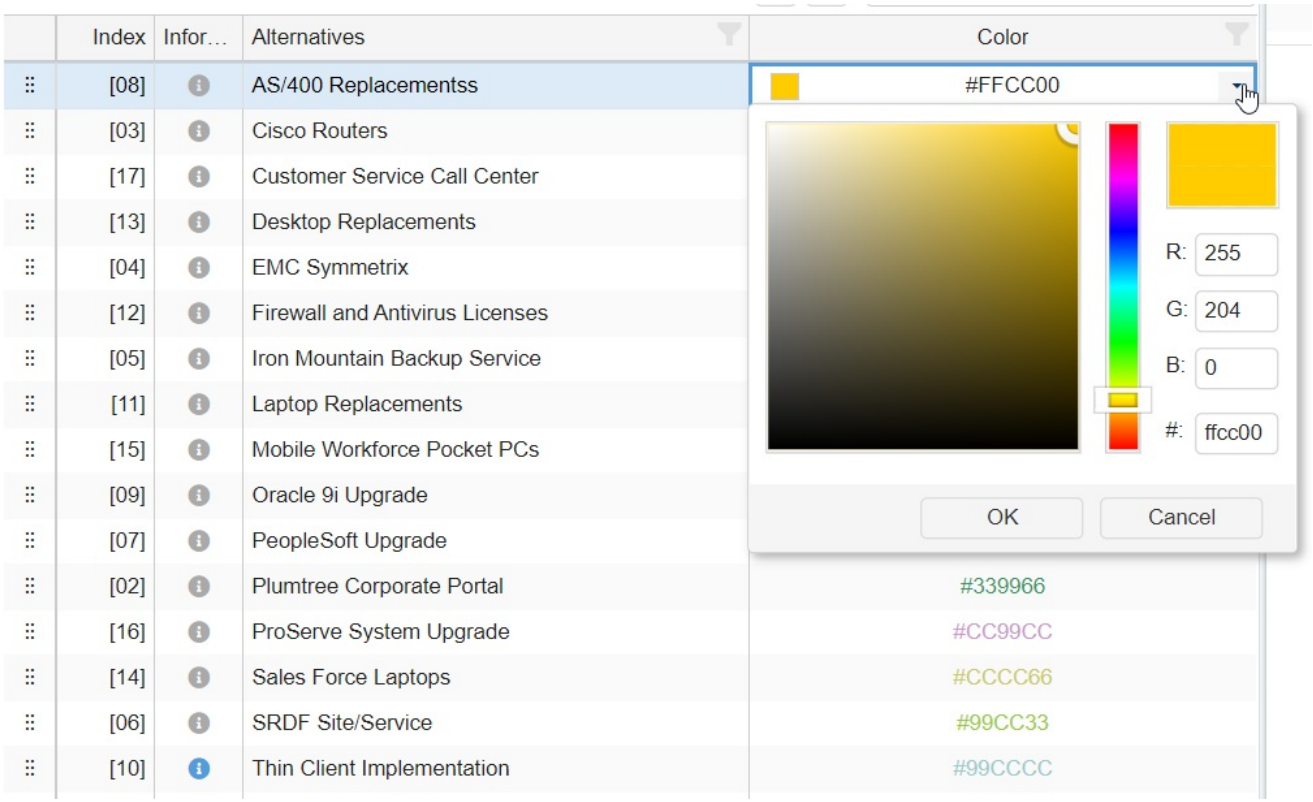
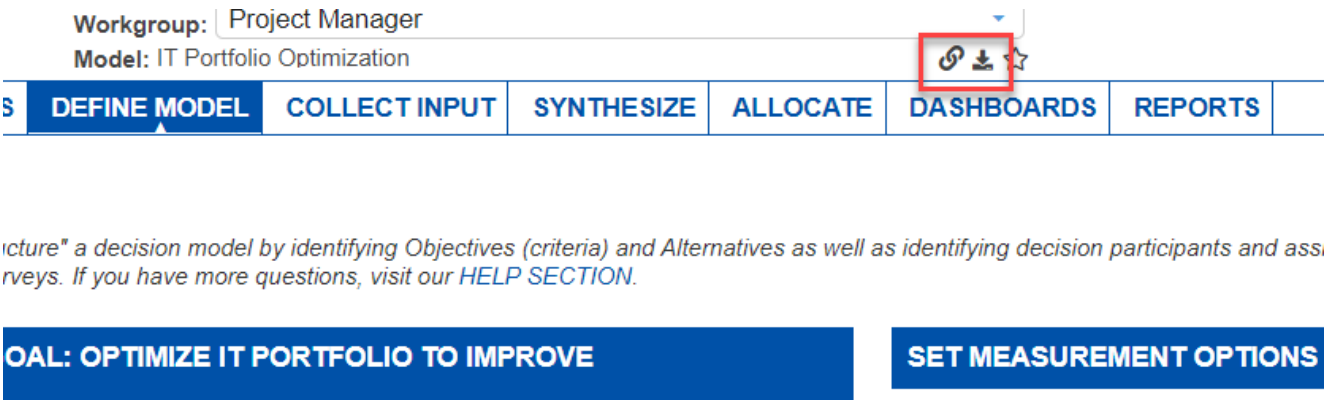


Download and Get Links Shortcuts

We've added the download and get link icons available at the right of the model name.

The download icon will open a dialog box asking whether to include the snapshot's data.

The get link icon will open a dialog box where you can copy the model link, anytime and Teamtime links, and brainstorming link.



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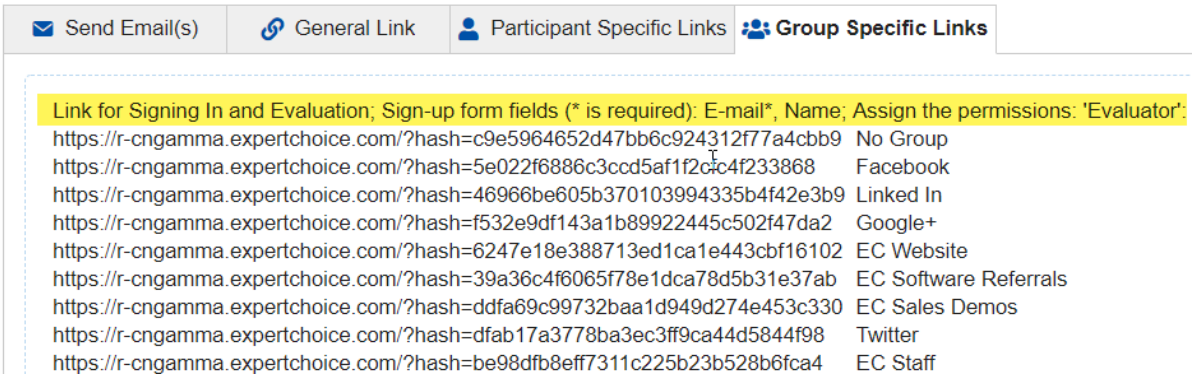
May 4, 2020

May 4, 2020 | Version 6.0.014.39358

Enhancement

- Added Invitation details on Send Invitations > **Groups Specific Links** tab:
  - The generated Group links in this tab are based on what invitation link type is selected from the General links tab. We've added the invitation link type (Anonymous or Signing in and Evaluation, if Signing in link, include the fields), and the assigned permission (see highlighted).



Bug Fixes

- Normalization is not being remembered in Synthesize screens.
- The email and password are incorrect in the View Only Evaluation opened by the Project Manager from the Participants screen.
- Filtering and Sorting of Alternatives in 2D Sensitivities are not working correctly.
- The P. Failure (Probability of Failure) column is incorrectly named as Risk on the Alternatives page.

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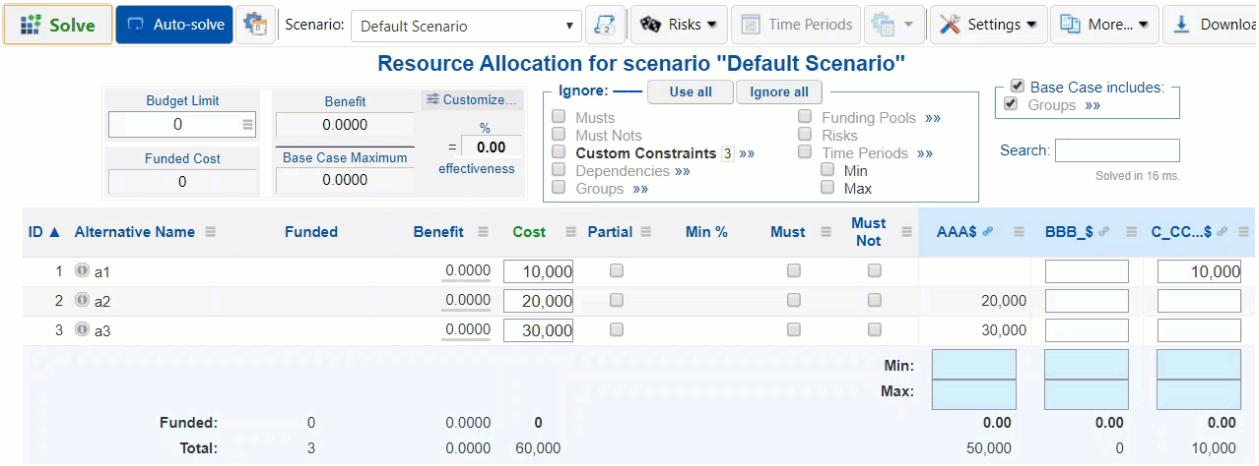
April 23, 2020

April 23, 2020 | Version 6.0.014.39278

New Feature

- Update/Sync the Custom Constraints from Costs when the Custom Constraint name ends with a dollar $ sign



Bug Fixes

- Search model in the Models Look-up page using the access code with a dash sign wasn't working
- Missing participant name when uploading or opening a model where the logged-in user is not previously included
- Improved performance on the Models List page when the Workgroup has many models (Chrome browser)
- Responsive Anytime pipe does not load when a participant has an apostrophe in their name
- Browser is freezing when deselecting all participants/groups in Charts screen
- The download button is not aligned in Chrome
- RA Time Periods - funds are allocated for a time period that does not exist
- Performance sensitivity issues when resizing the browser
- Information documents overflow boundaries in Teamtime in Edge browser - also has unnecessary scrollbars
- Alternative categorical attribute editing bug
- Double scroll in Evaluation Progress screen when there are many participants
- Error trying to open anytime pipe when TeamTime is ongoing
- Opening the view-only pipe of the admin opens the logged in PM's pipe instead
- Run Time Error when adding alternatives and edit cost/risk
- Infeasibility Analysis: Modify the original scenario is not working
- Performance sensitivity - Can't select users with no roles in Charts screen when CIS is ON

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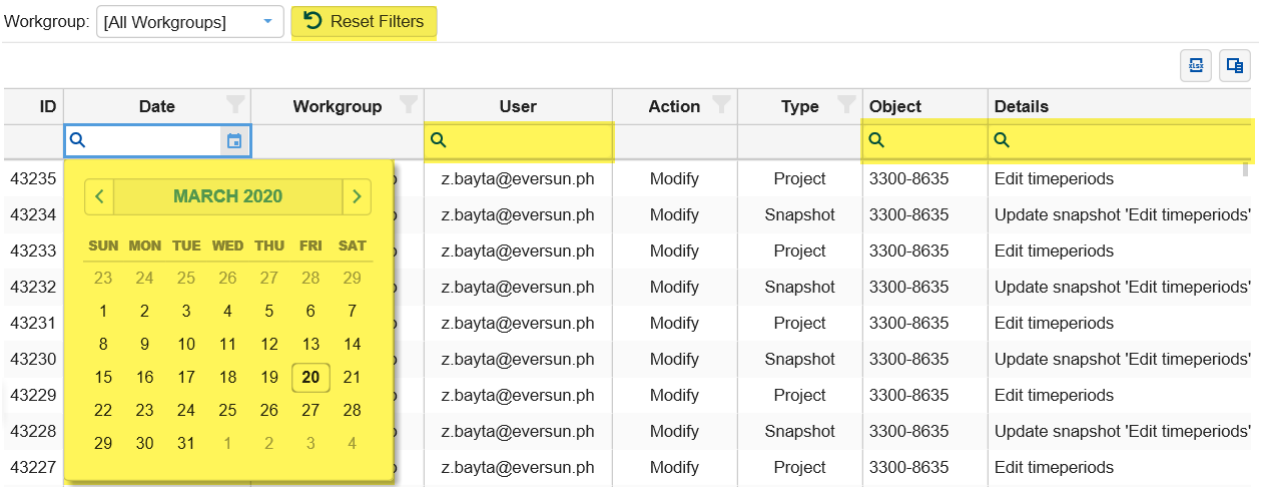
March 20, 2020

March 20, 2020 | Version 6.0.13.38923

New Features/Enhancements

- Resource Aligner's Time Periods: Option to synchronize the Min and Max entered on the first period to all the subsequent periods. This is available from Portfolio View > Time Periods mode.

- Enhanced the View Logs page released last March 16.



  - Added a search/filter row for applicable columns.
  - Added a date picker on the Date column.
  - Added a Reset Filters button.

Bug Fixes

- Fixed the slight difference in the priority displayed on Step Function and Utility Curve evaluation graph for some judgments. The saved priority is correct, only the display has around 0.01 difference.
- Fixed the Snapshot name when editing Cost and Risk.
- Removed the required Time when using the date picker from the Model's list.
- Fixed issues when switching from Advanced mode to non-advanced mode in the Models List.
  - The Filter row is still displayed even when the user already switched back to non-advanced mode. This should be reset.
  - The Favorites column is flashing as an Advanced option.

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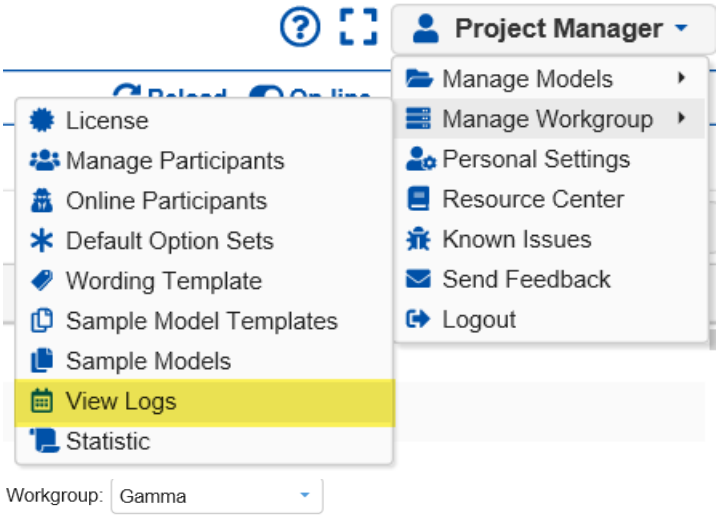
March 16, 2020

March 16, 2020 | Version 6.0.12.38884

New Feature

Added a "View Logs" page for Workgroup Managers which shows the user logs on the workgroup(s) that the Workgroup Manager belongs to. This is accessible from the user name at the top right, by clicking Manage Workgroups > View logs.



Workgroup: Gamma

ID	Date	User	Action	Object	Details	Result
42599	3/16/2020 3:55 AM	Project Manager	Create	7703-3062	Create snapshot 0163fec2d3	Open model [vzap4x
42598	3/16/2020 3:55 AM	Project Manager	Modify	7703-3062	Update snapshot 'Open model'	[vzap4x#2bl1]
42597	3/16/2020 3:55 AM	Project Manager	Open	7703-3062		[vzap4x#2bl1]
42596	3/16/2020 3:55 AM	Project Manager	Close	7703-3062		[vzap4x#2bl1]
42595	3/16/2020 3:55 AM	Project Manager	Logout	z.bayta@ev…		[vzap4x#2bl1]
42594	3/16/2020 3:54 AM	Project Manager	Open	7703-3062		[vzap4x#2bl1]
42593	3/16/2020 3:54 AM	Project Manager	Close	7703-3062		[vzap4x#2bl1]
42592	3/16/2020 3:54 AM	Project Manager	Create	7703-3062	Create snapshot 0163fecc1e	Open model [vzap4x
42591	3/16/2020 3:54 AM	Project Manager	Modify	7703-3062	Update snapshot 'Open model'	[vzap4x#2bl1]

Bug Fixes

- Fixed the Evaluation Overall Results page > "Hide Objectives Hierarchy" icon was not visible for small devices/resolutions.
- Fixed the issue with deleting judgments from the Evaluation Judgments Table.
- Fixed the RTE (Run Time Error) that sometimes occurred when the user was disconnected.
- Fixed the unnecessary decimals showing on Rating Evaluation pages.
- Fixed rounding on percent complete on the evaluation progress page.
- Fixed the issue with the priority displayed for the Data steps evaluation graph (Step Function and Utility Curve)

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March 6, 2020

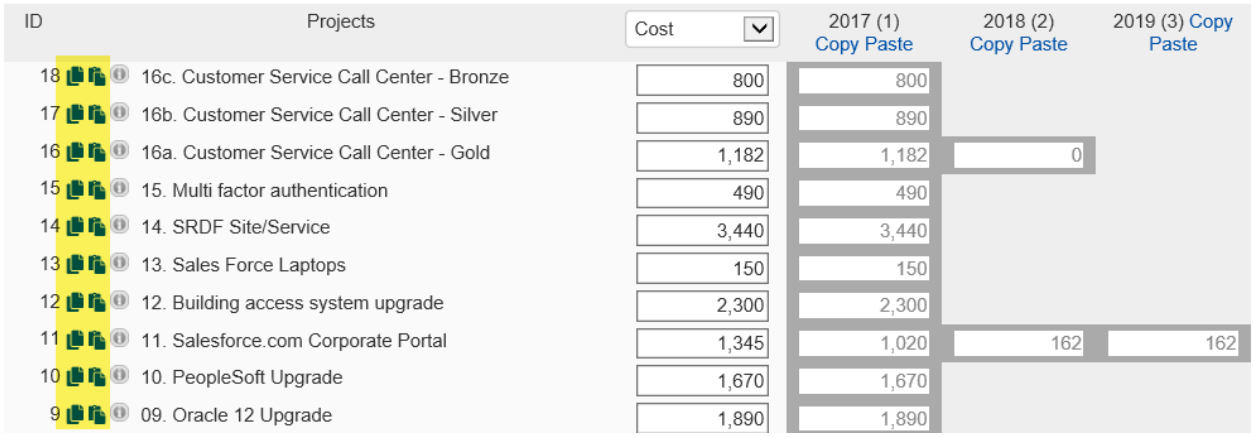
March 6, 2020 | Version 6.0.011.38825

Enhancements

- Improvements in Synthesize Charts Toolbar:

  - Made the chart types a drop-down option
  - Added chart option labels for better understanding
- Rearranged the buttons on the Invite Participants page to group related actions

- In addition to being able to copy and paste the Time Periods columns, Time periods rows can now be copied and pasted from one row to another.



Bug Fixes

- Fixed the issue when importing Custom Constraints from Categorical Alternative Attributes.
- Fixed the default pairwise wording when uploading Comparion desktop (.ahpz) file. The default wording is now "is more important" for Objectives and "is more preferable" for Alternatives.
- Fixed the syncing issue in the Alternatives and Resource Allocation pages.
- Fixed issues in TeamTime Brainstorming:
  - Difficulty adding/dragging elements that have names with non-English characters.
  - Can't detect disconnected users, thus the total number of Online Participants was incorrect
  - Inconsistent hint when adding Pros and Cons.
- Fixed issue when resizing information document frames when the mode is switched from Tooltip to Frame View.
- Fixed the missing upload image button when editing the Quick Help for small devices.
- Fixed the saving of zero data for Step Function and Utility Curve measurement methods.

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March 2, 2020

March 2, 2020 | Version 6.0.010.38763

New Feature / Enhancement

- Added Export functionality on Synthesize Sensitivity screens (Dynamic, Performance, Gradient, 2D, Head to Head, Mixed, Alternatives Sensitivity). Use the Export button available at the right of the toolbar. The image exported is a screenshot of the chart currently displayed.

- Improved Charts Toolbar: Added labels on charts icons.

Bug Fixes

- Fixed the Losing Resource Aligner Data during download/upload for some models.
- Fixed the pop-up message when uploading a Riskion model to a Comparion workgroup
- Fixed Alternative Names issue with plus "+" sign.
- Fixed issue with TeamTime Collaborative Structuring for anonymous users joining the meeting.
- Fixed the inconsistent color on the Hierarchy Tree in Consensus View and Sensitivity delta Alternatives pages.
- Fixed issue with the list of categories not showing up on Resource Aligner's custom constraints (Chrome Browser).

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February 19, 2020

February 19, 2020 | Version 6.009.38661

Enhancements

- Made the "Signing in/logging in" evaluation link selected by default in the Collect Input > Invite Participants > General link page
- Applied the "Active Sorting" option, which was recently implemented in Dynamic Sensitivity, to the Mixed View
- Replaced the copy icon on the Measurement Methods screen to a button with a "Copy" text to make it more obvious.

Bug Fixes

- Fixed custom wording for Objectives and Alternatives not being applied on the "Add nodes" modal and preview (landing) pages.
- Fixed the Preview Evaluation (View only) on the Participants and Evaluation Progress screens as they open the old evaluation page. There was also an un-ending "Please Wait" in Measurement Methods when opening the preview.
- Fixed the slowness/freezing when adding new Alternative(s) and the model already has many Alternatives.
- Fixed the slowness of structuring and editing alternatives. Fixed issue: Modifications to Alternative name not carrying through to Resource Aligner unless the model is closed/reopened. We are looking for a better approach to fix the issue without affecting performance.
- Fixed the issue with the Objectives hierarchy auto-expanding when editing an Objective Name.
- Fixed the right-clicking on a sub-objective in the Objectives screen with a hierarchy with many nodes.
- Fixed the Contributions page showing only the Alternative Names column when the alternative names are very long.
- Fixed the inconsistent toolbar look on Resource Aligner pages.

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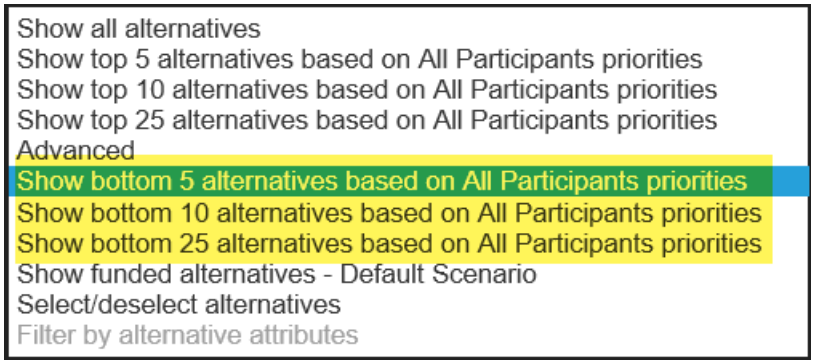
February 11, 2020

February 11, 2020 | Version: 6.0.008.38585

New Feature

- Added ability to Filter the bottom 5, bottom 10, or bottom 25 alternatives on the Synthesize pages. This will filter the alternatives list based on the bottom "N" (5, 10, 25) Combined group priorities.



Bugs Fixes

- **Fixed the Incorrect evaluation progress percentage.** The Overall Evaluation Progress percentage displayed on the Evaluation Progress page was incorrect.
- **Fixed the Charts bars length**. Previously, chart bars were proportioned incorrectly.
- **Fixed the Sub-menus from User Name**.
- **Fixed the RTE (Run time error) in the Measurement Methods screen** .
- **Set the default normalization to normalized.**
- **Decreased the frequency at which the Help hint pop-up occurs during evaluation** .
- **Fixed the character encoding for the model name**. Some models that use non-English alphabets and symbols were not being encoded properly.
- **Remove unnecessary scrollbars when using the Edge browser.**
- **Fixed display bug when using multi-direct ratings.**
- **Fixed the button labels cut off.** Button labels in Participants' screen are cut-off unnecessarily even though there is enough space.
- **Fixed the duplicate % sign** in Charts tooltip.

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January 31, 2020

January 31, 2020 | Version: 6.0.007.38490

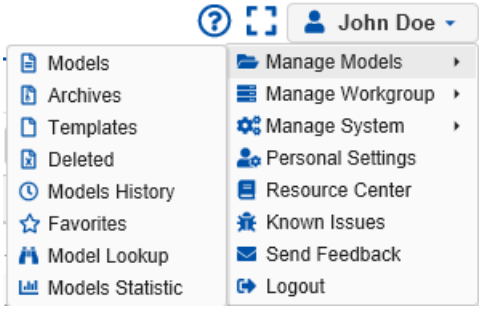
Enhancements

- **Enhancements of Resource Aligner's Funding Pools**
  - Added a running total at the bottom that updates dynamically when amounts in the text boxes change;
  - Displayed a row for percentage filled, which is the running total divided by the total for the funding pool.

Funding Pools for model "IT Portfolio Optimization"

ID	Alternative Name	Cost	Procurement		R&D		O&M	
			Limit	Allocated	Limit	Allocated	Limit	Allocated
			9,000	4,430	6,000	4,385	7,000	7,000
1	AS/400 Replacements	990	990	0	990	990	990	0
2	Cisco Routers	500	500	0	500	0	500	500
3	Customer Service Call Center	980	1,400	0	500	500	4,000	480
4	Desktop Replacements	800	200	0	500	0	1,000	0
5	EMC Symmetrix	4,220	4,000	1,070	220	220		2,930
6	Firewall and Antivirus Licenses	120	120	0	120	0	120	120
7	Iron Mountain Backup Service	430	430	0	430	430	430	0
8	Laptop Replacements	1,340	1,000	0	1,000	0	1,000	0
9	Mobile Workforce Pocket PCs	230	230	0	230	0	230	230
10	Oracle 9i Upgrade	1,890		1,890	1,000	0	1,400	0
11	PeopleSoft Upgrade	1,670	500	470	200	200	1,000	1,000
12	Plumtree Corporate Portal	1,345	1,000	1,000	500	45	300	300
13	ProServe System Upgrade	2,300	300	0	400	0	500	0
14	Sales Force Laptops	150	150	0	150	0	150	0
15	SRDF Site/Service	3,440	1,000	0	2,000	2,000	2,100	1,440
16	Thin Client Implementation	2,100	4,000	0	1,500	0	1,400	0
	Total:	22,505	15,820	4,430	10,240	4,385	15,120	7,000
				49.2%		73.1%		100.0%

  - Widen the amount text boxes
- **Resource Aligner's Alternatives Attributes column** : Fixed alignment, auto-parse hyperlinks.
- Added a context menu when clicking the User Name at the top right to easily navigate to Workgroup and Model pages.



Bug Fixes

- Fixed the scrolling issue on the Contributions page for models with special characters, and for models with a very large objectives hierarchy.

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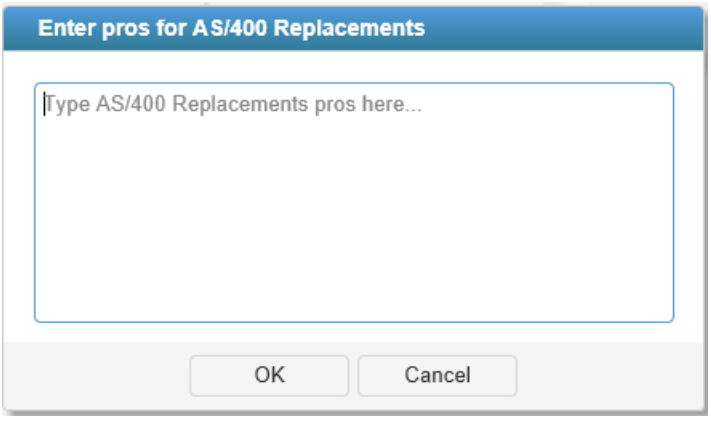
January 29, 2020

January 29, 2020 | Version: 6.0.006.38452

Enhancements and Updates:

- Print Alternative name when adding pro(s) or con(s) on TeamTime Collaborative Brainstorming.



- Automatically collapse (Advanced Mode is OFF) and expand (Advanced Mode is ON) the Toolbar on Synthesize pages.
- Ability to reset the password (set as blank) of multiple selected users from the Workgroup Participants screen (in addition to Project Participants list).
- Updated the EULA (End User License Agreement).

Bug Fixes

- Fixed unnecessary scroll bars showing in Chrome browsers which are blocking some of the elements.

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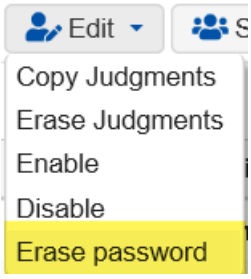
January 22, 2020

January 22, 2020 | Version: 6.0.005.38387

New Features

- Ability to reset the password to blank for multiple selected users. Erase password is under the Edit option in the Project Participants screen.



- Ability to select multiple adjacent rows on the Participants Roles screen using the SHIFT key. To do this, click the first row, then press the SHIFT key and hold it. Click the last row and release the SHIFT key.

Bug Fixes

- ~~Fixed issue: Modifications to Alternative name not carrying through to Resource Aligner unless the model is closed/reopened~~ This was rolled back on February 19, 2020 Release due to the slowness it caused. We are finding a better approach to resolve the issue.
- Fixed issue: Password being generated when adding new users even though the "Generate Random Password" option is unchecked.

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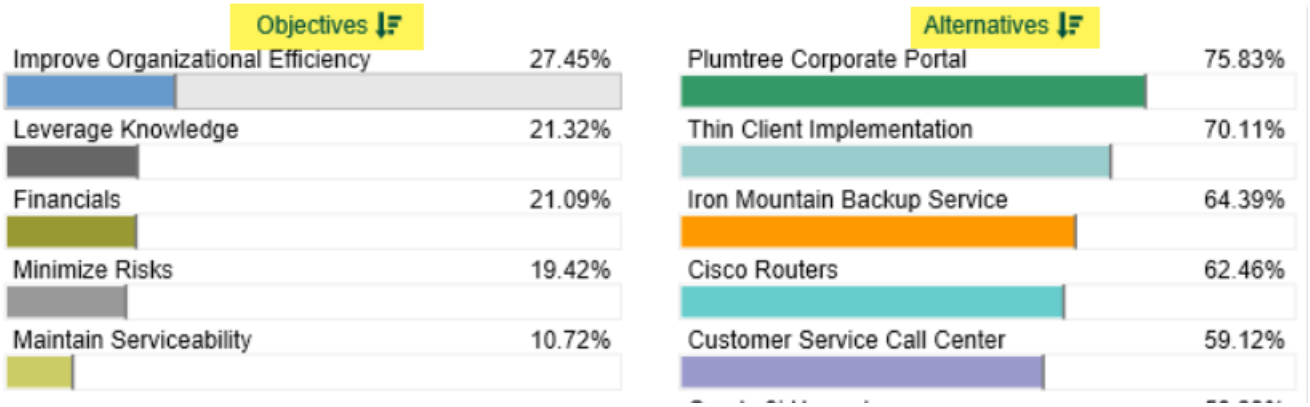
January 20, 2020

January 20, 2020 | Version 6.0.005.38360

New Feature

- Ability to sort Objectives and Alternatives without opening the toolbar in the Dynamic and Performance Sensitivities. Made the Objectives and Alternatives headings clickable to sort by None, by Priority (decreasing), or by Name (increasing). These options are synced with the Sort drop-down on the toolbar.



Bug Fixes

- Fixed syncing in Mixed Sensitivities
- Fixed the canceling of the solver in the Efficient Frontier screen. Also, disabled other options except for the Cancel button when the solver is working.

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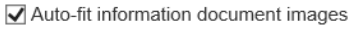
January 17, 2020

January 17, 2020 | Version: 6.0.005.38345

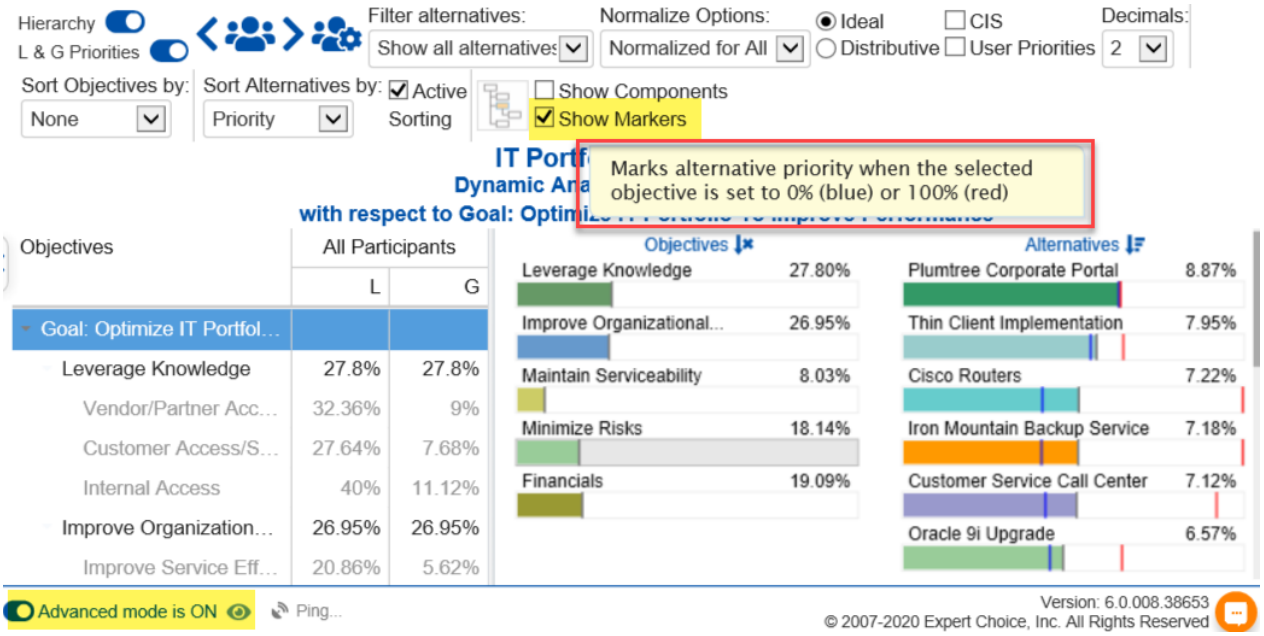
New Features and Enhancements

- Enhancements for Auto-fit image feature in Evaluation Information Documents (frame view)

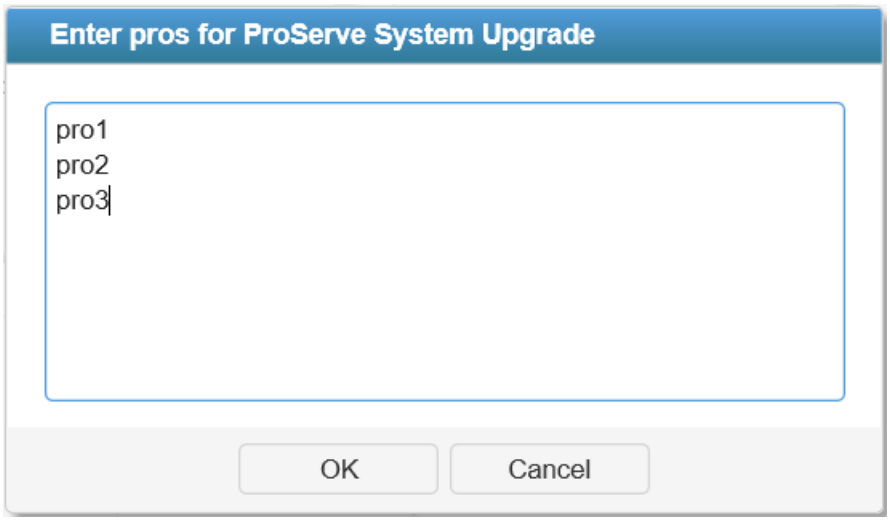
  

  - Made the auto-fit image feature OFF by default
  - Added this option as a model setting, found in Define Model > Participants Display Options page

- Made "Show Markers" an Advanced option and added an explanatory tooltip.



- Sort Dynamic Sensitivity descending by default. Remember the last custom sort.
- Collaborative Brainstorming Enhancements
  - Be able to add multiple pros and cons at a time



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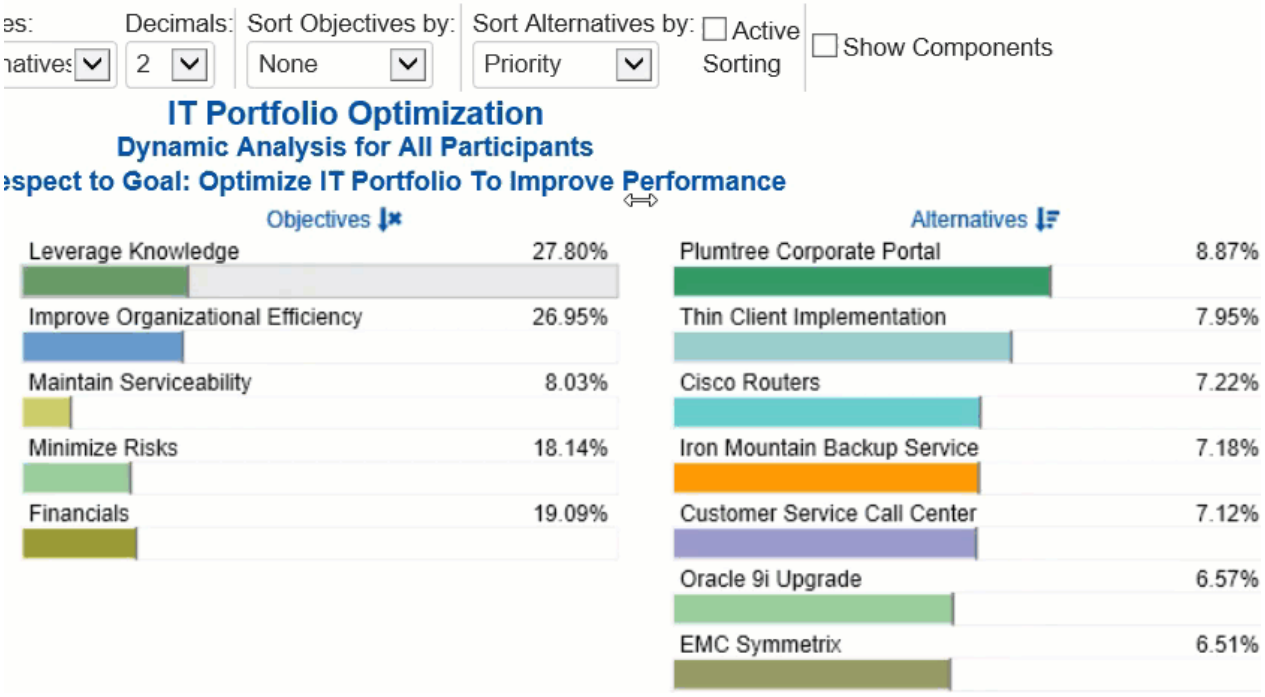
- Added the Unnormalized option for Sensitivity Δ (delta) Alternatives screen - previously the results were always Normalized.
- Added the "Active Sorting" option in Dynamic Sensitivity to re-sort alternatives by priority high to low as the user drags the Objectives bars.



Bug Fixes

- Fixed the issue with remembering the last page visited when the model visited was deleted or inactive. The user will be redirected to the Model List list.
- Removed participants/groups details in Consensus View.
- Fixed bug when setting evaluation question text to italics.
- Fixed the error when a user is disconnected (e.g., the site was updated) during an evaluation.
- Restored the Missing "Objectives Priorities" Predefined report.
- Fixed the auto-scrolling on the evaluation page for Multi ratings on small devices.
- Fixed the unnecessary blue background on the evaluation page for rating legend/intensity and infodocs.
- Removed extra spaces upon the first load of multi-pairwise.
- Fixed inconsistent normal and hover colors on Judgments Table buttons on the Evaluation page (Inconsistency Improvement).
- Fixed issues with TeamTime Brainstorming:
  - Information documents -- refresh issue, the infodocs are not updating properly.
  - Pros/Cons Clear All not working.
  - Users' default colors are too light and not obvious.
- Fixed inconsistent tabs, grid, and buttons.
- Fixed the Teamtime meeting timeout.

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Introducing Comparion® Release 2020

October 23, 2019 | HTML5 (No Silverlight version)

We are excited to introduce you to Expert Choice Comparion® 2020.

Key improvements:

- Expanded browser support. Comparion 2020 allows you to use any HTML5 supported browsers, which means ALL modern browsers. You no longer need to install any plug-ins or add-ons.
- A revised, simplified user interface, but with an Advanced Mode option for those who need to go deeper into the application.
- Introducing a modern and enhanced Charts display and interface updates.
- New help system. An in-app help widget displays context-sensitive help articles. The help system is fully indexed, searchable, and the entire knowledge base can be opened in a separate window. You can leave help feedback, rate help topics, download a pdf, and more.

*We are providing a **Legacy Comparion site** for you to use in case you need more time to become familiar with the new Comparion interface.*

Watch the Comparion® 2020 Release Webinar!

Your browser does not support HTML5 video.

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What is Comparion?

Expert Choice Comparion® Collaborative Decision Making Solution

Expert Choice Comparion® is a collaborative decision making solution focused on the achievement of objectives and choosing one or a combination of *alternatives.* Comparion is typically used by professionals responsible for strategic or tactical decision-making activities involving the choice of one or a combination of alternatives.

Comparion helps you:

- structure complex problems in a clear, understandable fashion
- accurately measure the importance of competing objectives and alternatives
- synthesize information, expertise, and judgments
- conduct what-if and sensitivity analyses
- clearly communicate to share results and iterate parts of the decision process when necessary
- allocate resources

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Comparion Sample Models

Comparion Sample Models can be added to your workgroup (some may already be in your workgroup).

1. Click on the link to download a sample model file and save it somewhere on your computer.
2. From the Manage Models page, click the "New from File" button and select the file to upload the model you just downloaded.

Application (Purpose)	Sample Models	Industry
Sample Simple Model	Sample_01_CarPurchaseSimpleExample	Example
Sample Measurement	Sample_01B_CarPurchaseSimpleExampleMeasurement	Example
Sample Pros and Cons	Sample_02_CarPurchaseSimpleExampleProsAndCons	Example
Sample More elaborate model	Sample_03_FlightSecurity	Example
Sample HBR Case	Sample_04_AllstarSportsCase	Example
Sample Consulting Candidate Selection	Sample_Consulting Candidate Selection	Example
Sample Employee Selection	Sample_Research Assistant Personnel Selection	Example
Sample Equipment Selection	Sample_HVAC project for a Classic Building	Example
Sample Homeland Security Priorities	Sample_Department of Homeland Security Prioritization	Example
Sample IT Portfolio / Optimization	Sample_IT Portfolio Optimization	Example
Sample Oil Pipeline Selection	Sample_Oil Pipeline Route Selection	Example
Sample Policy Decision	Sample_SexualHarassment Policy	Example
Sample Export Decision	Sample_StrategicPrioritiesForExportDevemopmentCanada	Example
Sample Trade Study	Sample_Trade Study	Example
Human Resource Management	Consulting Candidate Selection	Example
Strategic Planning & Budgeting	IT Portfolio Optimization	Information Technology
Federal Government Management	DHS Transformation and Systems Consolidation	Federal Government

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Comparion Sample Templates

The currently available Comparion model templates are listed below. Templates contain the structure of the model but do not contain participant information, data, or results. You can use these templates to create new models.

You can also create your own templates from the workgroup models list from the drop-down next to each model.

Please follow these steps to download templates, add them to your account, and create models based on them.
1. Click on the link to download the model template (.ahps file).
2. From the Manage Models page, click the "New from File" button and select the file to upload the template you just downloaded.

Application (Purpose)	Model Templates	Industry
General	Project Selection	
General	Market Strategy Sample	
General	Corporate Performance According to the Balanced Scorecard	
General	Corporate Relocation Decision	
Risk Assessment	IT Portfolio Project Risk	Information Technology
Risk Assessment	Bio-Threat Risk Assessment	
Human Resource Management	Human Capital Portfolio Appraisal	
Human Resource Management	Project Manager Selection	
Procurement	Change Management System Selection	
Strategic Planning & Budgeting	Chemical Plant Capital Portfolio Management	Manufacturing
Strategic Planning & Budgeting	DOE Stimulus Allocation Plan	Government
Strategic Planning & Budgeting	Hospital Capital Portfolio Management	Health care
Strategic Planning & Budgeting	IR&D Portfolio Management	
Strategic Planning & Budgeting	IT Portfolio Optimization	Information Technology
Strategic Planning & Budgeting	Supermarket Chain Portfolio Management	Retail
Vendor Selection	Docking and Berthing Solution Selection	
Vendor Selection	Human Resources Technology Selection	
Information Technology	IT Technology Program Acquisition Portfolio	
Market Research	Voice Of Customer Part I Market Segments Prioritization	
Market Research	Voice Of Customer Part 2_Market Segments Prioritization	

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Why All Important Decisions are Subjective

AHP (along with other multiple objective methods --discussed below) differs in a significant way from most/all other Management Science/Operations Research methods which focus on an "objective" function – singular. Taking the "best" course of action, with very few exceptions, entails multiple objectives. The choice of the 'best' course of action involves trade-offs among the multiple objectives. However, the relative importance of the objectives is *subjective*. Therefore, all important decisions are subjective.

As a simple word proof of why all important decisions are subjective, consider the following. Time and money (or more elaborate manifestations of time and money) are objectives in every important decision. To a young, poor person, money is likely to be more important than time. To an old, wealthy person, time is likely to be more important than money. Therefore, the relative importance of time and money is dependent on the person (subject) making the decision. There can be no data, "formula" or objective way of ascertaining the relative importance of these two objectives. It depends on the subject. AHP is unique in its ability to elicit and accurately measure (see below) the relative importance of objectives to individual decision makers, or groups of decision makers.

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Math of AHP

The Math of AHP -- Computing priorities from pairwise comparisons

Eigenvector computation

Priorities for the elements in a cluster are derived from the relative pairwise comparisons by normalizing the principle right eigenvector of the matrix consisting of the pairwise comparisons. An insight into why this is so "natural" a computation can be obtained by considering *n* rocks of known weights $w_1, w_2, .. w_n$. We form a matrix of the ratio of the known weights of the rocks as follows:

$$\underline{A} = \begin{bmatrix} w_1/w_1 & w_1/w_2 & w_1/w_3 & \cdots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & w_2/w_3 & \cdots & w_2/w_n \\ w_3/w_1 & w_3/w_2 & w_3/w_3 & \cdots & w_3/w_n \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ w_n/w_1 & w_n/w_2 & w_n/w_3 & \cdots & w_n/w_n \end{bmatrix}$$

If we wanted to "recover" or find the vector of weights [$w_1, w_2, w_3, \ldots w_n$] given these ratios, we can take the matrix product of the matrix A with the vector *w* to obtain [1]:

$$\begin{bmatrix} w_1/w_1 & w_1/w_2 & w_1/w_3 & \cdots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & w_2/w_3 & \cdots & w_2/w_n \\ w_3/w_1 & w_3/w_2 & w_3/w_3 & \cdots & w_3/w_n \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ w_n/w_1 & w_n/w_2 & w_n/w_3 & \cdots & w_n/w_n \end{bmatrix} * \begin{bmatrix} w_1 \\ w_2 \\ w_3 \\ \cdots \\ \cdots \\ \cdots \\ w_n \end{bmatrix} = \begin{bmatrix} nw_1 \\ nw_2 \\ nw_3 \\ \cdots \\ \cdots \\ \cdots \\ nw_n \end{bmatrix}$$

$$\underline{A} \quad * \underline{w} = n \underline{w}$$

If we knew A, but not *w*, we could solve the above for *w*. The problem of solving for a nonzero solution to this set of equations is very common in engineering and physics and is known as an eigenvalue equation:

$$\underline{A}w = \lambda \underline{w}$$

The solution to this set of equations is, in general, found by solving an *n*th order equation for l. Thus, in general, there can be up to *n* unique values for l, with an associated *w* vector for each of the *n* values.

In this case, however, the matrix A has a special form since each row is a constant multiple of the first row. For such a matrix, the rank of the matrix is one, and all the eigenvalues of A are zero, except one. Since the sum of the eigenvalues of a positive matrix is equal to the trace of the matrix (the sum of the diagonal elements), the non-zero eigenvalue has a value of *n*, the size of the matrix. This eigenvalue is referred to as λ_{max}.

Notice that each column of A is a constant multiple of *w*. Thus, *w* can be found by normalizing any column of A.

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The matrix A is said to be strongly consistent in that

$a_{ik}a_{kj} = a_{ij}$ for all i,j.

Now let us consider the case where we do *not* know $\underline{w}$, and where we have only estimates of the $a_{ij's}$ in the matrix A and the strong consistency property most likely does not hold. (This allows for small errors and inconsistencies in judgments.) It has been shown that for any matrix, small perturbations in the entries imply similar perturbations in the eigenvalues, thus the eigenvalue problem for the inconsistent case is:

$$\underline{\mathbf{A}w} = \lambda_{max}\underline{w},$$

where λ_{max} will be close to n (actually greater than or equal to n) and the other l's will be close to zero. The estimates of the weights for the activities can be found by normalizing the eigenvector corresponding to the largest eigenvalue in the above matrix equation.

Aside: The eigenvalue equation, when solved, produces one or more eigenvalues with associated eigenvectors. The word eigen, in German, means characteristic, or one's own. This is appropriate because eigenvalue equations arise naturally in many instances of mathematics and science -- on their own -- as a characteristic of the system itself. Eigenvalue equations are among the most frequent and universally occurring concepts in math and science; others include *pi*, the natural number *e*, fibonacci numbers, and the golden ratio. Even the Google search algorithm uses eigenvectors. (See 25 billion dollar eigenvector)

[1] The matrix product is formed by multiplying, element by element, each row of the first factor, A, by corresponding element of the second factor, $\underline{w}$, and adding. Thus, the first element of the product would be: $(w_1/w_1)*w_1 + (w_1/w_2)*w_2 + ...+ (w_1/w_n)*w_n = nw_1$. Similarly, the second element would be $(w_2/w_1)*w_1 + (w_2/w_2)*w_2 + ...+ (w_2/w_n)*$

$_n = nw_2$. The nth element would be nw_n. Thus, the resulting vector would be $n\underline{w}$.

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Structuring

In conformity with the second of the three AHP axioms originally proposed by Saaty, the elements of any cluster should be "homogeneous," meaning that they should differ in importance from one another by no more than an order of magnitude. This requirement is not absolute, but rather a guideline in the structuring of an AHP model.

It is commonly accepted that each cluster possess no more than seven, plus or two elements, so that (a) the thinking during the pairwise comparison process does not exceed human cognitive limitations – in particular short term memory, and (b) the number of pairwise comparisons does not grow beyond reason.

The terminology used to refer to the elements in clusters in AHP models varies, depending on both the purpose of the model as well as the preference of the modeler. For typical AHP models to choose a "best" alternative, the elements in the clusters below the goal can be referred to as objectives or criteria. The lowest level in a hierarchy, sometimes referred to as covering objectives (since they "recover" the alternatives to be evaluated) or terminal objectives, may represent attributes of the alternatives.

We strongly recommend that the higher level elements be referred to as objectives rather than criteria or attributes. For other types of AHP models, such as forecasting models, cluster elements can be referred to with other terms, such as influencing factors and scenarios.

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Importance of Hierarchical Structuring

Humans have difficulty dealing with more than seven - plus or minus two - factors at a time. To overcome this cognitive limitation, objectives can be structured into a hierarchy of clusters of elements. One of the axioms of AHP is that the elements in a cluster should be within an order of magnitude of importance with one another.

Plex: A Plex is defined as an element and all elements below. The plex of the goal is the entire hierarchy.

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Axioms of the Analytic Hierarchy Process

Originally, AHP was based on three relatively simple axioms.

The first axiom, the **reciprocal axiom**, requires that, if PC(EA,EB) is a paired comparison of elements A and B with respect to their parent, element C, representing how many times more the element A possesses a property than does element B, then PC(EB,EA) = 1/ PC(EA,EB). For example, if A is 5 times larger than B, then B is one fifth as large as A.

Homogeneity, the second axiom, states that complexity should be structured in a hierarchy of homogenous clusters. The elements to be compared within each cluster should be relatively homogenous, otherwise there would tend to be larger errors in judgment. When constructing a hierarchy of objectives, one should attempt to arrange elements in clusters so that with each cluster, they do not differ by more than an order of magnitude. (The AHP verbal scale ranges from 1 to 9, or about an order of magnitude. The numerical and graphical modes of AHP software implementations permit more than one order of magnitude, allowing a relaxation of this axiom, with the understanding that judgments beyond an order of magnitude generally result in a decrease in accuracy and increase in inconsistency.)

The third axiom, **hierarchic composition**, states that judgments about, or the priorities of, the elements in a hierarchy do not depend on lower level elements. This axiom is required for the principle of hierarchic composition to apply.

While the first two axioms are always consonant with real world applications, the hierarchic composition axiom requires careful examination, as it is not uncommon for it to be violated. While the preference for alternatives is almost always dependent on higher level elements - the objectives, the importance of the objectives might or might not be dependent on lower level elements - the alternatives. For example, in choosing a laptop computer, the relative importance of speed vs. weight might depend on the specific alternatives being considered—if the alternatives were about the same weight but differed greatly in speed, then speed might be considered to be more important. If this is the case, we say there is "feedback" from the alternatives to the objectives.

There are two basic ways to proceed in those situations where this axiom does not apply -- that is, when there is feedback. The first involves a formal application of feedback and a super matrix calculation for synthesis rather than hierarchic composition. This approach is called the Analytic Network Process. For simple feedback (between adjacent levels only), this is equivalent to deriving priorities for the objectives with respect to each alternative, in addition to deriving priorities for the alternatives with respect to each objective. The resulting priorities are processed in a super matrix, which is equivalent to the convergence of iterative hierarchical compositions.

While this approach is extremely powerful and flexible (feedback within levels and between nonadjacent levels can also be accommodated), a simpler approach that usually works well is to make judgments for lower levels of the hierarchy first (or to reconsider judgments at the upper levels after making judgments at the lower level). In so doing, the brain performs the feedback function by considering what was learned at lower levels of the hierarchy when making judgments for upper levels. Thus, an important rule of thumb is to make judgments in a hierarchy from the bottom up, unless one is sure that there is no feedback, or one already has a good understanding of the alternatives and their trade-offs. Even if this is not done, adherence to AHP's fourth axiom (below) as well as the process notion of AHP, can usually lead to appropriate judgments, since an examination of the priorities after a first iteration of the model will highlight those areas where judgments should be revised based on what has been learned.

A fourth axiom, introduced later by Saaty, says that individuals who have reasons for their beliefs should make sure that their ideas are adequately represented for the outcome to match these expectations. While this axiom might sound a bit vague, it is very important because the generality of AHP makes it possible to apply AHP in a variety of ways and adherence to this

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axiom prevents applying AHP in inappropriate ways. We will illustrate this a bit later.

The simplicity and generality of AHP fit nicely with Ockham's razor which contends that the simplest of two or more competing theories is preferable. Not only are AHP's axioms simpler and more realistic than other decision theories, but the ratio scale measures that it produces makes AHP more powerful as well.

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Musts vs. Wants

Compensatory decision methodologies, such as AHP are the most effective way to prioritize alternatives. A rational decision is one that best achieves an individual's or group's objectives -- their wants. However, there are sometimes constraints, perhaps legal, that rule out certain alternatives. We say that these alternatives are infeasible and use "musts" to eliminate them from consideration before doing a prioritization or making a choice.

Musts can also be used to narrow down the number of alternatives being considered in order to shorten the evaluation process. For example, we might restrict our evaluation of stocks to those that are on a major exchange, have a price to earnings ratio below a specified number, and are recommended by a favored source of information. However, musts should be used somewhat sparingly because once an alternative is eliminated because it does not satisfy one or more musts, it cannot be selected no matter how desirable it is with respect to other objectives.

In addition, the specification of musts is often somewhat arbitrary. When selecting a car for example, we might say that we will consider only alternatives that cost less than $50K. This would rule out a car that costs $50,001 and might be more preferable than a car that costs $49,000 on all other objectives.

Musts can sometimes be wants in disguise, or can be both a must and a want. Musts are often useful in doing source selection, where a list of mandatory requirements is often given. After eliminating alternatives that do not meet one or more musts, some of the musts might also be considered as "wants." For example, there might be a must that each alternative must provide a specific function, because that criteria might advantage or disadvantage an alternative.

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Focus on Objectives

Criteria, Objectives, and Attributes are terms that are often used interchangeably when making decisions.

Traditionally, people speak of criteria.

We recommend focusing on "objectives" instead of criteria. This helps clarify what should and should not be in the hierarchy -- which we refer to as an "objectives" hierarchy.

A criterion (singular) or criteria (plural) are often thought of in "ordinal" terms, i.e., meeting a criterion.

Consider thinking of criteria as measures for the achievement objectives.

Avoid using attributes in the hierarchy itself. Attributes, such as the size of a car, are useful in helping to identify objectives, but are not in and of themselves objectives. The size of a car is, for example, an attribute. But size is in and of itself not an objective. What objectives related to size might be included in the hierarchy? A large car can carry more people, so capacity of people is an objective. A large car is generally safer, so safety is an objective. A large car is usually less fuel efficient, so fuel efficiency is an objective. A large car is more difficult to park, so ease of parking might be an objective. Focusing on objectives rather than attributes will help in identifying all relevant "wants" and also avoid double counting a "want" that might be related to more than one attribute.

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Roles

A major challenge of almost all organizations today is to find a way to integrate the knowledge and expertise of their personnel in decision making and forecasting. In *The Wisdom of Crowds*, James Surowiecki shows that under certain conditions -- diversity, independence, and a particular kind of decentralization, the aggregation of judgments of a group will produce better decisions and forecasts than even the most skilled decision maker. Expert Choice provides a process for such aggregation of judgments based on data, knowledge, and experience from people throughout an organization or population. By assigning roles for providing data and judgments, the conditions for creating the *wisdom of crowds*, rather than *delusions of crowds* (Extra Ordinary Popular Delusions and the Madness of Crowds), can be achieved. Assigning roles to decision makers is also important in terms of higher level management maintaining control where they feel it is necessary (usually by limiting roles for prioritizing the high level objectives). Finally, assigning roles helps distribute some of the workload in gathering judgments.

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Politics, Governance and Control

The ability for AHP to aggregate (synthesize) and filter (assign roles) is important for several reasons.

Governance and Roles

Power and control are distributed in organizations in a wide variety of ways. An effective decision process must recognize and accommodate the existing governance structure or it will not be embraced.

Control

Because AHP is typically applied to important complex decisions and prioritizations, then politics, governance, and control are important considerations. High level decision makers are often wary of what they might feel is dilution of their control and, to some extent, this is a reasonable concern.

Most if not all other types of models are useful in providing information and insight to decision makers – rather than suggesting the best course of action. However, because AHP and Expert Choice models and evaluations can include *any* qualitative, subjective, intuitive, or emotional factor as well as objective information and hard data, the results of AHP models can, with suitable examination and iteration, be *put into action*. Before this is done, however, decision makers need to be convinced that the computer or model is not making the decision, but that the decision makers remain in control. Not only is this possible but, if applied properly, decision-makers should have even more control than they had when making decisions without using AHP.

This is not difficult to achieve. The hierarchy is a natural way of organizing complexity that most decision makers are comfortable with. The pairwise judgment process is also very natural, and the decision makers can verify that derived priorities for each cluster are true reflections of what they have in mind. Sensitivity analysis (discussed below) provides additional insight and control. The impact of "what ifs" can be easily examined and insights incorporated into the model in the form of additional objectives, restructuring of the hierarchy, some changes in judgments, or a combination of such modifications.

The key, however, is that the decision maker(s) must remain in control and feel confident that they are in control.

In situations where there is one decision maker with ultimate responsibility for a decision, he/she has the option of choosing whether to decide alone, or with some combination of people throughout the organization. Some options include:

1. Making the decision totally alone without consulting anyone
2. Collecting information from subordinates without telling them about the issue, then deciding alone
3. Consulting with subordinates on an individual basis about an issue, then deciding alone
4. Consulting with a group about an issue, then deciding alone
5. Meeting with a group, sharing information, and having the group decide

The quality of the decision as well as decision commitment will vary, depending on the option chosen.

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In other situations, decision making authority is distributed among a group of people and option 5 above is the only alternative.

Regardless of the situation, however, AHP provides the ability for a top-level decision maker or decision makers to remain "in control" by reserving the right (role) to make the judgments about the top-level objectives – the ones that drive the decision -- while assigning the roles for evaluating lower-level objectives and alternatives to those throughout the organization who have the most experience and up-to-date, detailed information.

Commitment and Process Buy-In

While it is rare that every participant in a group decision will be happy with the resulting choice or allocation of resources, it is almost always the case that every participant will be satisfied with the process. This is important in getting people to understand and commit to implementing the decision as well as limiting second guessing and endless debate.

The Wisdom of Crowds

In The Wisdom of Crowds, James Surowiecki makes a compelling argument and presents numerous examples that, given certain conditions (diversity, independence, and a particular kind of decentralization), the aggregation of judgments of a group will produce better decisions and forecasts than even the most skilled decision maker. Expert Choice provides a process for such aggregation of judgments based on data, knowledge, and experience from people throughout an organization or population.

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Levels Of Measurement

Not all numbers have the same meaning in terms of what operations can be legitimately performed on them. In order for operations like addition and multiplication with numbers to be mathematically meaningful, the numbers must possess certain properties.

Nominal, ordinal, interval, and ratio

A widely used categorization for levels of measurement is due to S. S Stevens, in which four levels of measurement are defined:

- nominal,
- ordinal,
- interval, and
- ratio.

The meaning of information contained in each level increases, or we might say that each level contains the information in all lower level plus additional information.

Nominal means in name only; e.g., the number of a horse in a horse race designates the horse, not the position at the finish. (Although, as Stevens points out, the level of measurement is sometimes not clear from the number itself. The number on the horse does designate the starting gate position – but this information is not important for most people.)

Ordinal numbers add information about order or ranks – either high-to-low, or low-to-high. For example, horse number 3 finished in 1st place.

Interval numbers add information about the "intervals" between measures. For example, Horse number 3 finished in first place, 3 lengths or 12 meters ahead of the second place horse.

Ratio numbers have the highest level of measurement where the ratios of the measures are meaningful in terms of ratios or proportions. For example, the finish time for the winning horse was .973 times that of the second-place horse.

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The "appropriate" measure for a specific application depends on the application; and a decision maker has, in some circumstances, the discretion to use whatever is most meaningful to him/her. For example, the intervals in time between the first- and second-place horses in a previous race might be more informative of a horse than the ratios of the finishing times. However, there are circumstances where the choice of level of measurement is not discretionary – that is, if results that are deemed to be mathematically meaningful are desired.

Mathematical definitions vs. practical understanding

Mathematicians define an interval scale as being invariant under the transformation y = ax + b, and a ratio transformation as being invariant under the transformation y = ax. While this is precise, it doesn't convey an understanding of the practical meanings of interval and ratios scales, which are:

Corresponding intervals anywhere on an interval scale have the same meaning. For example, the interval between 1 and 2 has the same meaning (significance) as the interval between 98 and 99. That is, intervals on an interval scale are meaningful.

Corresponding ratios anywhere on a ratio scale have the same meaning. For example, the ratio of 6 to 3 has the same meaning as the ratio of 100 to 50. That is, ratios on a ratio scale are meaningful.

Distance, for example, is a ratio scale. The ratio of two miles to one mile has the same meaning as the ratio of 100 miles to 50 miles – the first is twice the distance of the second. If we multiply miles by some constant (e.g., to convert to meters or feet), the ratios will still be two to one. However, if we add a constant (say 5), then the ratios will no longer be the same, as the ratio of 7 miles to 5 miles is not the same as the ratio of 105 miles to 55 miles.

There is a misconception that a ratio scale has to possess a true zero. This is not the case. A ratio scale has an implied zero, but not necessarily a true zero. For example, while the measures of areas of geometric shapes are a ratio scale measure, an actual shape with zero area does not exist.

Why are levels of measure important

Quite simply, in order for mathematical operations with numbers to be "meaningful," the numbers must possess certain levels

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of measurement. For example, care must be taken not to multiply or add ordinal measures. It is meaningful to multiply ratio scale numbers, or a ratio scale number by an interval scale number, but it is mathematically incorrect to multiply two interval level numbers.

Why ratio scale measures are important

There are several reasons why ratio scale measures, as derived by using AHP, are important. When structuring a complex decision (or forecasting model) as a hierarchy of objectives, with sub-objectives, and sub-sub objectives, we derive priorities for the elements in the top cluster, clusters below this cluster, and so on. If we were to multiply the priorities of the elements in each cluster by the priorities of the cluster above (we call the priorities of the elements in each cluster "local" priorities) to derive what we refer to as "global" priorities of the elements themselves, then the results would be mathematically meaningless unless the priorities possessed the ratio scale property.

As far as the level of measure of the alternative priorities, these too would be ratio scale measures provided the alternative priorities with respect to the lowest level objectives in the hierarchy are ratio scale priorities. However, using only interval measures as with other methods such as Multi Attribute Utility Theory (MAUT), we could still multiply by the ratio scale priorities of the lowest level sub-objectives and derive mathematically meaningful results. The results would, however, possess only the interval and not ratio level measure property. This is adequate for ascertaining which alternative has the highest overall priority, but is not adequate if we want to use the derived priorities in places where ratio scale priorities (i.e., proportion) are required for making optimal decisions, such as allocating resources to a portfolio of projects/alternatives.

There are some applications where the priorities of one evaluation are multiplied by priorities of another evaluation. For example, the relative risks of possible occurrences can be determined by deriving the relative impacts of the occurrences, and multiplying by the relative likelihoods of the occurrences. Risks derived in this manner are mathematically meaningful only if the measures of relative impact and relative likelihood are both ratio scale measures.

Ratio scale priorities are required in any application where meaningful measures of proportionality are assumed - for example, when allocating resources to a set of alternatives where the anticipated benefits are assumed to be proportional to the measured priorities of the alternatives.

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Absolute Measurement

Relative measurement in AHP is performed by comparing two elements, e.g., objectives or alternatives, one to another; whereas absolute measurement is performed on each element, e.g., alternatives, one at a time. There are several ways this is done in Expert Choice.

"Mappings" or formulas convert either a decision maker's judgment (about the preference for an alternative with respect to an objective) OR hard data, to ratio scale priorities. This is done for each alternative, one at a time.

The three types of "mappings" or formulas in Expert Choice include rating scales, utility curves, and step functions.

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Relative Measurement

Relative measurement consists of pairwise comparisons of two elements with respect to some higher level element in the hierarchy.

For example, a judgment can be made about the relative importance of two objectives with respect to the goal, or the relative importance of two sub-objectives with respect to their parent objective. Each element in a cluster is compared to every other element in the cluster. (In some cases, not all of the possible pairwise comparisons need be made -- saving time at the expense of accuracy.)

If there are *n* elements in a cluster, there will be (*n**(*n*-1))/2 comparisons or judgments since each element is assumed to be equal to itself, and the judgment of elements *b* to *a* is assumed to be the inverse of the judgment of *a* to *b*.

Since AHP hierarchies are generally structured with at most 7 plus or minus 2 elements in any cluster, there would, for example, be 10 pairwise comparisons or judgments for a cluster with 5 elements, 21 for a cluster with 7 elements, 28 for a cluster of 8 elements, and 36 for a cluster of 9 elements.

The nonlinear increase in the number of judgments as a function of cluster size is one reason for avoiding clusters with too many elements. However, since some of the (*n**(*n*-1))/2 judgments are "redundant," in the sense that priorities can be computed with a minimum of just (*n*-1) judgments, it is not a paramount consideration.

The "redundant" judgments serve an important purpose in that, in general, the more pairwise comparisons, the more accurate the derived priorities will be. In fact, the computed priorities can be fairly accurate even when some or many of the judgments are themselves not very accurate (for example with verbal judgments translated to ordinal numbers, as explained below). This is analogous to computing the average of a sample – the larger the sample, the closer the average is likely to be to the population mean.

One interpretation of the eigenvector computation is that it is equivalent to taking the average of an infinite number of paths of lengths 1, 2, 3, … involving the pairwise comparisons between the elements in a cluster. For example, the ratio of two elements *a* to *b* can be computed as the average of the direct comparison of *a* to *b*, and the comparisons of *a* to *c* to *b*, and a to *c* to *d* to and *a* to *d* to *c* to *b*, and so on.

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Redundant Judgments

A minimum spanning set of judgments for a cluster of *n* elements consists of a set of *n*-1 judgments, in that every element can be "reached" from every other element. It is necessary to have a spanning set of judgments in order to compute the priorities for the elements within a cluster.

Any judgments beyond the minimum number for a spanning set are called "redundant" because they are not needed to compute priorities. They are necessary, however, to improve the accuracy of the priorities, especially in the case of verbal judgments.

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Missing Judgments

The number of judgments in a cluster, $n(n-1)$ divided by 2, refers to the maximum number of pairwise comparisons in a cluster. However, Expert Choice can compute priorities from an eigenvector equation when there are missing judgments. At a minimum, there needs to be at least $n-1$ judgments. In order for this to work, there must also be a spanning set of judgments with a path from any element to any other element in the cluster.

There is a trade-off between time to make judgments and accuracy. If each of the $n-1$ judgments in a spanning set were perfectly accurate, there would be no need for any more (redundant) judgments. However, this is not the case – particularly when pairwise verbal judgments are made. One method to employ with Expert Choice is to elicit the $n-1$ judgments on the diagonal of the matrix, representing the elements in a cluster as a minimum spanning set, and perhaps the diagonal above consisting of an additional $n-2$ judgments.

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Accuracy of Derived Priorities

The accuracy of the priorities computed from pairwise relative comparisons has been validated over the years in numerous studies.

First, it has been shown that for a pairwise comparison matrix A = [*a ij*] that is consistent (sometimes called super-transitivity), where *aij = a ik a kj*, then the ratio-scale components of the right-eigenvector give the true, actual priorities (weights) of the items being compared (Mirkin 1979 -- Mirkin, B. G. 1979. Group Choice, John Wiley & Sons, NY).

If consistency does not hold, and in general it does *not*, error analysis has shown that the eigenvector still produces a set of priorities that are good approximations of the true (unknown in most cases) values. This happens because, as Saaty (1980 --- Saaty, T. L. 1980. The Analytic Hierarchy Process, McGraw-Hill Book Co., N.Y.) has shown mathematically, the eigenvector calculation has an averaging effect – it corresponds to finding the dominance of each alternative along all walks of length k, as k goes to infinity. Because of this, and provided there is adequate variety and redundancy, the impact of errors in judgments, such as those introduced by using an ordinal verbal scale, can be greatly reduced.

Empirical research and numerous validation studies involving brightness of light, distance, and areas of geometric shapes have shown that it is also true for judgments from the fundamental verbal scale (ordinal measures), provided there is adequate variety in the elements being compared and adequate redundancy in the judgments (that is, *n**(*n*-1) sufficiently larger than *n*-1).

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Spanning Set

Expert Choice employs an algorithm to determine when a spanning set of judgments has been entered for a cluster of elements, at which point priorities can be derived. A spanning set of judgments is such that every element can be "reached" from every other element. In the example below:

ID	Alternative Name	All Participants 7 with judgments
[08]	AS/400 Replacements	52.74%
[03]	Cisco Routers	61.76%
[17]	Customer Service Call Center	60.38%
[13]	Desktop Replacements	49.19%
[04]	EMC Symmetrix	52.77%
[12]	Firewall and Antivirus Licenses	56.75%
[05]	Iron Mountain Backup Service	59.98%
[11]	Laptop Replacements	32.78%
[15]	Mobile Workforce Pocket PCs	32.71%
[09]	Oracle 9i Upgrade	57.69%

Relative judgments have been made for:

- A to B
- A to C
- B to D and
- D to E

And form a spanning set.

Some spanning sets are obvious -- for example, the top row of judgments would be a spanning set as would the main diagonal.

A cluster of *n* elements would require *n*-1 elements in a minimum spanning set.

Any judgments beyond the minimum number for a spanning set are called " redundant" because they are not needed to compute priorities. They are necessary, however, to improve the accuracy of the priorities, especially in the case of verbal judgments.

Since the *n* - 1 judgment in a minimum spanning set contains no "redundancy," the inconsistency ratio will be zero. This is a

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good reminder that a low inconsistency does not imply accurate results. A relative low inconsistency is necessary but not sufficient for accurate results. Making one more judgment than the minimum number in a spanning set will generally increase the accuracy of the resulting priorities while also increasing the inconsistency above 0.

See also: Missing judgments

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Validation exercises

Brightness of Light Experiment

In one experiment Saaty placed chairs at various distances (9, 15, 21, and 28 yards) from a light source in his back yard to see if his wife and young children, standing at the light source, could judge the relative brightness of the chairs.
The results achieved with pairwise verbal judgments (see Table 2) were in very close agreement with the inverse square law of optics, which says that relative brightness is inversely proportional to the square of the distance of the object from the light source.

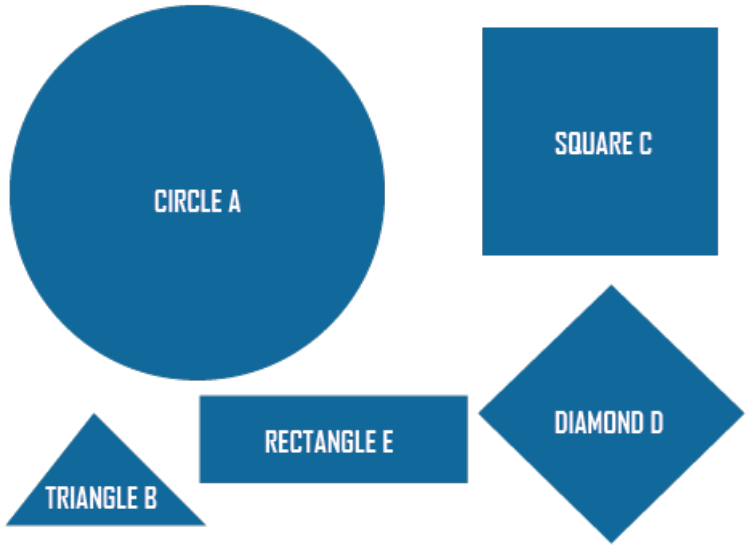
Table 2 – Results of Brightness of light on Chairs Experiment

Chair	Estimates from Wife's Judgments	Estimates from Sons' Judgments	Results from applying Inverse Square Law of Physics
1	0.61	0.62	0.61
2	0.24	0.22	0.22
3	0.10	0.10	0.11
4	0.05	0.06	0.06

Saaty *The Analytic Hierarchy Process*, p. 39.

Area Validation Experiment

The relative areas of different geometric shapes (each within an order of magnitude) were derived from pairwise verbal judgments for shapes such as the following:



This experiment has been performed thousands of times and you can easily do this individually or with a group. The actual relative areas and estimates derived from pairwise verbal judgments with a group of executives at the Ford Motor company is shown below:

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Shape	Rank	Reverse	Proportion	Pairwise Verbal	Actual
Circle	1	5	33.3%	49.6%	47.5%
Triangle	5	1	6.7%	4.8%	4.9%
Square	2	4	26.7%	23.6%	23.2%
Rectangle	4	2	13.3%	14.5%	15.1%
Diamond	3	3	20.0%	7.5%	9.3%

Note how close the estimates are in the pairwise verbal column (column 5) to the actual column (column 6). Note also how deficient the estimates are if one were to simply derive the estimates based on the ranking (ordinal measures) of the shapes (column 4 above).

The accuracy of the derived ratio scale priorities are truly amazing considering that the inputs were ordinal measures (words on the fundamental verbal scale). Deriving ratio scale measures from ordinal inputs is somewhat magical since ratio measures have all of the information of ordinal measures, plus interval and ratio meaning as well. In a sense, it gives new meaning to GIGO -- garbage in, genius out! Do not, however, take this for granted. There may be cases where intervals or ratios of the priorities resulting from verbal judgments do not adequately represent the decision maker's feelings. It is incumbent upon the decision maker(s) to examine the resulting priorities and, if they do not adequately represent the decision maker's feelings, to revise the judgments in either the graphical or numerical mode.

If graphical or numerical judgments had been made, we would expect the results to be even better, since this is an "objective" problem with known scores. So why use verbal judgments at all?

Verbal judgments are often more appropriate when judging qualitative factors, and all crucial decisions have qualitative factors that must be evaluated. Numerical comparisons can convey the wrong sense of accuracy of input. If one were to say that clean air is 4.3 times more important than clean water, rather than between moderate and strongly more important, how does one defend the 4.3 rather than 4.2 or 4.6 or 5?

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Problems with traditional rating scales

A Standard Rating Scale

Intensity Name	Priority
High	1.000
Moderate	.660
Low	.330
None	.000

Pros

Familiar

Simple

Cons

Can't adequately distinguish between the quality of investments – you don't get a "good fit" & here's proof

Do not support effective cost/benefit analysis or optimization – you'll be "skateboarding to work"

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Ratings Scales

A Pair of Jeans

What if you went to buy a pair of jeans and they were only available in three sizes....

Size

20" Waist

30" Waist

40" Waist

...and you have a size 34" waist?

30

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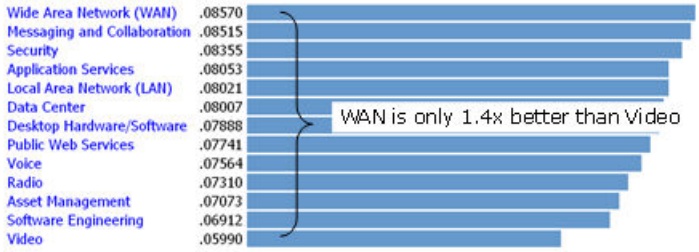
Example Results Using a High, Med, Low Rating Scale

Evaluation Using a *Ratings* Approach

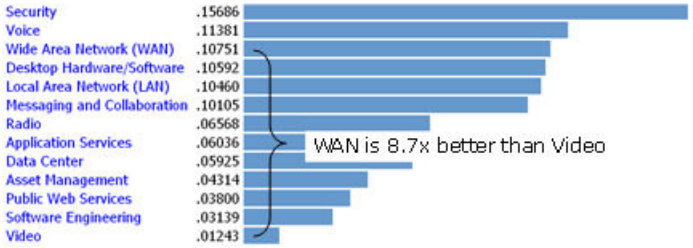


High = 1.0
Med = 0.66
Low = 0.33
None = 0

31

Example Results Using Pairwise Comparison

Evaluation Using a *Pairwise* Comparison Approach



32

Ratings Scales

Skateboarding to Work

Let's say you live 30 miles from work, have a choice of 3 modes of transportation for your commute and want to select the mode with the highest benefit/cost...

Effectiveness Rating	Cost	Benefit/Cost * 10^5
High (1.0)	$30,000	3.333
Med. (.66)	$ 1,000	66
Low (.33)	$ 100	330

...you'll be skateboarding to work!

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Ideal and Distributive Synthesis: Closed and Open Systems

Originally, AHP had only one synthesis mode – later called the "distributive" synthesis mode. A distributive synthesis distributes priorities from the goal down through the alternatives and is analogous to dividing priorities in a pie chart, which is intuitive for decision makers to comprehend. The sum of the global priorities for each alternative with respect to each covering objective represents the overall priority of that alternative. The priorities have ratio scale properties (as well as, of course, interval and ordinal properties), which means that they can be used in making a choice or in allocating resources. This synthesis operation can be thought of as distributing the goals priority of 1.0 to the alternatives under consideration, and is today called the distributive synthesis mode. Originally, this was the only synthesis mode of AHP. Critics of AHP pointed out situations where a different synthesis mode is more appropriate.

Ideal Synthesis

The ideal synthesis mode of AHP was introduced by Forman in 1993 [Forman, E. H., 1993. "Ideal and Distributed Synthesis Modes for the Analytic Hierarchy Process," *George* Washington University Working Paper] and was incorporated into Expert Choice software, for situations where the introduction of new alternatives to a decision might - using the distributive synthesis mode - cause the ranks of existing alternatives to change, even when none of the judgments with respect to the original alternatives are changed. There are some situations where it is reasonable for the ranks of existing alternatives to change, and others where it is not.

Forman and Gass defined these as *closed* and *open* systems which exhibit the properties of scarcity and abundance. The distribution of a country's gold is an example of a *closed system*, where the distributive mode (described above) makes sense. Consider the situation where a newly formed country has decided to distribute its gold reserve to identified segments of the society based on criteria that includes population and economic potential. After distributing the gold, a previously overlooked segment of the society with a small population but great potential is added to the allocation. To make a distribution to this new segment, gold would have to be taken back from the old segments and redistributed. Depending on the weights for the criteria, sectors that were highly populated but with relatively low economic potential could lose less than those with relatively low population and a high economic potential causing a reversal in ranks of these pre-existing segments to take place – a reasonable consequence. Similarly, an AHP model might be used to forecast that the Democratic candidate in a U.S. Presidential race is slightly ahead of the Republican candidate. Now suppose an Independent candidate enters the race. It is conceivable (and in fact has happened in more than one recent Presidential race) that the ranks of the Democratic and Republican candidates would change since the Independent candidate might take more votes from the Democratic candidate than the Republication candidate.

Now suppose that you were considering the purchase of a new computer and have already identified 5 alternatives to choose from. Further assume that alternative "A" was, according to a multi-objective decision model such as AHP, the most preferred, with alternative "B" a very close second, in large part, due to the fact that alternative "A" was preferred on cost. Now suppose that someone suggest that you consider a 6th alternative, alternative "F" that is relatively inexpensive, but not as inexpensive as alternative "A." Furthermore, alternative "F" is not as preferable as "A" or any other alternative on any of the objectives. If one were to use the AHP distributive mode, it is possible (although not common) for the ranks of alternatives "A" and "B" to change when alternative "F" is introduced – simply because the alternative "F" would take more priority from "A" on cost than it would from alternative "B" – and this is enough to cause the ranks of alternatives "A" and "B" to reverse. Proponents of MAUT had criticized AHP because of this phenomenon. On one hand, this criticism was justified because in situations like this, one would not want to have their chosen alternative susceptible to a change when an "irrelevant" alternative was introduced into consideration. On the other hand, there is a need for a prioritization methodology like AHP to allow for such rank

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reversals in situations where they do make sense -- as described in the closed system above.

Rank reversal

To address the need for a prioritization method to be applicable to both situations, a second synthesis mode, called the Ideal synthesis, was added to AHP and Expert Choice. Rather than distributing the priority of each covering objective to the alternatives based on the local priorities of the alternatives, the AHP ideal synthesis mode assigns all of each covering objectives priority to the alternative that is most preferred under that objective, and assigns priorities to the other alternatives under each covering objective in proportion to their priority, relative to the most preferred alternative under that covering objective. The sum of the priorities is then normalized, so they add to one. This approach is called the "open system" approach since the introduction of new alternatives will require more priority to be assigned under each covering objective but will not change the proportionality (or ranks) of existing alternatives. The result then, is that there can be no rank reversals when new alternatives are added (or existing alternatives removed) from an evaluation. We will say more about this in a later section of the article.

To summarize, AHP has two synthesis modes: distributive synthesis, appropriate to "closed systems'"where there is a fixed resource to be considered – such as votes in an election or market for a product, or estimating forecast probabilities; and ideal synthesis, appropriate to "open systems" where introduction of new alternatives can be modeled by adding an additional "priority," and then normalizing – thus maintaining the ratios and ranks of existing alternatives when new alternatives are added for consideration (or existing alternatives removed from consideration).

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Inconsistency Ratio

Overview

The theory of AHP does not demand perfect consistency. AHP allows inconsistency but provides a measure of the inconsistency in each set of judgments. This measure is an important by-product of the process of deriving priorities based on pairwise comparisons. It is natural for people to want to be consistent. Being consistent is often thought of as a prerequisite to clear thinking. However, the real world is hardly ever perfectly consistent, and we can learn new things only by allowing for some inconsistency with what we already know.

A measure of inconsistency is computed for each set of judgments when making paired comparisons. Inconsistency follows the transitive property; for example, if you were to say that A > B, and B > C, then say that C > A, you would have been inconsistent. However, as described below, the AHP and Expert Choice "inconsistency ratio" measures more than just transitive consistency.

It is more important to be *accurate* when deriving priorities than to be *consistent*. There are some people who are perfectly consistent but consistently wrong. If we are perfectly consistent (as measured with an AHP inconsistency ratio of zero), we cann*ot* say that our judgments are good, just as we cannot say that there is nothing wrong with us physically if our body temperature is 98.6 degrees. On the other hand, if our inconsistency is, say, 40% or 50% (an inconsistency ratio of 100% is equivalent to random judgments), we can say there is something wrong, just as we can say that there is something wrong if our body temperature is 104 degrees.

Tom Saaty, the creator of AHP and cofounder of Expert Choice, reasoned that consistency is important in our everyday lives, but we must allow for some inconsistencies to learn new things. As a "rule of thumb," he proposed that we should be consistent about an order of magnitude (10 times) more than we are inconsistent. From this, he reasoned that an inconsistency ratio of about 10% or less is reasonable. However, particular circumstances may warrant the acceptance of a higher value, even as much as 20% or 30%. A set of judgments that results in priorities that are more accurate is better than a set of judgments that are more consistent but results in less accurate priorities. But since we are *deriving* priorities and don't usually know what the *real* priorities are, we should ask whether the derived priorities are reasonable or not, at the same time that we examine the inconsistency ratio.

Causes of Inconsistency

Let us look at some of the reasons why inconsistency occurs, as well as the useful information that the inconsistency ratio conveys, and ways to address it.

The most common cause of inconsistency is clerical error. When entering one or more judgments into a computer, the wrong value, or perhaps the inverse of what was intended, is sometimes entered. Clerical errors can be very detrimental and often go undetected in many computer analyses. When using Expert Choice Comparion, one can easily find and correct such errors.

A second cause of inconsistency relates to model structure. Ideally, one would structure a complex decision in a hierarchical fashion where factors at any level are comparable, within an order of magnitude or so of other factors at that level. Practical considerations (number of judgments that would be required) frequently preclude such a structuring, but it is still possible to get accurate results. Suppose, for example, we compared several items whose ratios differed by as much as two or three orders of magnitude. One might erroneously conclude that the AHP verbal scale is incapable of capturing such ratio differences since the verbal scale ranges from 1 to 9. (This is not an issue with the Graphical/Numerical pairwise scale.) However, because the resulting priorities are based on second, third, and higher order dominances, priorities derived with the

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AHP verbal scale can produce ratios that differ far beyond an order of magnitude. A higher than usual inconsistency ratio will result because of the number of extreme judgments, but the priorities will be reasonably accurate. If one recognizes this as the cause (rather than a clerical error, for example), one can accept the inconsistency ratio even though it is considerably greater than 10%.

A third cause of high inconsistency is the inappropriate use of "extreme" judgments. This can occur if an evaluator chooses "extreme" for every or most every judgment rather than using the verbal scale to connote intensity as well as direction. To help reduce the possibility of this occurring, Expert Choice Comparion will inform an evaluator of the meaning of an "extreme" judgment the first time or two that a judgment is made. However, the Project Manager might examine the judgments of evaluators with high inconsistencies to see if this is the case and, if so, ask the evaluator to reconsider their judgments. Asking evaluators to provide comments for their judgments beforehand is a good way ascertain this.

A fourth cause of inconsistency is lack of information. If an evaluator has little or no information about the factors being compared, then judgments will appear to be somewhat random, and a high inconsistency ratio will result. Sometimes we fool ourselves into thinking that we know more than we really do. It is useful to find out that a lack of information exists, although sometimes we might be willing to proceed without immediately spending time and money gathering additional information in order to ascertain if the additional information is likely to have a significant impact on the decision.

A fifth cause of inconsistency is lack of concentration during the judgment process. This can happen if the people making judgments become fatigued or are not really interested in the decision.

A sixth cause of a high inconsistency ratio is an actual lack of consistency in whatever is being modeled, or what we might refer to as real world inconsistencies. The real world is rarely perfectly consistent and is sometimes fairly inconsistent. Professional sports is a good example. It is not too uncommon for Team A to defeat Team B, after which Team B defeats Team C, after which Team C defeats Team A. Inconsistencies such as this may be explained as being due to random fluctuations, or to underlying causes (such as match ups of personnel), or to a combination. Regardless of the reasons, real world inconsistencies do exist and thus will appear in our judgments.

Consistency is Necessary but Not Sufficient

It is important that achieving a low inconsistency does not become the goal of the decision making process. Reasonable consistency is necessary but not sufficient for a good decision. It is possible to be perfectly consistent but consistently wrong. It is worth saying again: It is more important to be accurate than to be consistent. You should NOT change judgments just because of inconsistencies. You *should* reexamine judgments because of high inconsistency and change only those judgments that you feel were incorrectly recorded or for which you have a change of opinion - regardless of inconsistency.

Background and Theoretical Concepts related to Inconsistency

Inconsistency– measurement and significance

The priorities derived from relative pairwise comparisons are computed as the normalized values of the right hand eigenvector associated with the largest eigenvalue of the reciprocal matrix formed from the pairwise comparisons. (For those non-mathematicians reading this, all you need to know is that the eigenvector computation - which Expert Choice Comparion will do for you - is one of the most powerful and widely applicable concepts in mathematics and physics. If you Google "Eigenvector and billion and Google" you will find several explanations of how Google made billions using Eigenvectors.)

The largest eigenvalue (there are multiple solutions or values just as there are two for the quadratic formula) is referred to as

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l_{max}. The closer l_{max} is to *n*, the number of elements being compared, the more consistent are the judgments. If judgments are perfectly consistent, l_{max} will equal *n*. Thus, the difference between l_{max} and *n*, can be used as a measure of inconsistency. Instead of using this difference directly, Saaty defined a consistency index as:

$(l_{max} - n)/(n-1)$

since it represents the average of the remaining eigenvalues.

In order to derive a meaningful interpretation of either the difference or the consistency index, Saaty simulated random pairwise comparisons for different size matrices, calculating the consistency indices, and arriving at an average consistency index for random judgments for each size matrix. He then defined the consistency ratio as the ratio of the consistency index for a particular set of judgments, to the average consistency index for random comparisons for a matrix of the same size. Forman performed additional simulations and calculated indices for cases with missing judgments.

Since a set of perfectly consistent judgments produces a consistency index of 0, the consistency ratio will also be zero. A consistency ratio of 1 indicates consistency akin to that which would be achieved if judgments were not made intelligently, but rather at random. This ratio is often called the inconsistency ratio since the larger the value, the more inconsistent the judgments.

E. H. Forman, "Random Indices for Incomplete Pairwise Comparison Matrices" *European Journal of Operations Research* Vol. 48, #1, 1990, pp. 153-155

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Hard Data and Judgment

Important decisions and resource allocations involve some combination of hard data and judgment. Expert Choice has effective ways for you to synthesize hard data and judgment into rational, defensible, convincing decisions. This is accomplished by structuring complexity into a hierarchy of objectives, identifying alternatives, measuring the relative importance of the objectives towards the organization's goal(s), synthesizing, allocating resources, and iterating.

The amount of data that is available in making a decision or allocating resources can vary widely. In some cases, such as establishing a new venture, there may be little or no hard data in a preliminary evaluation of alternatives. The entire process can be conducted based solely on the knowledge and experience of those making the decision. In other cases, there may be some hard data available, and in other cases a great deal of hard data, some of which is stored in large computerized data bases. The basic approach using Expert Choice is the same in each of these cases, with slight variations.

For those cases where a decision is to be made based only on the decision maker's knowledge and experience -- with no hard data -- pairwise comparisons can be used to derive the relative importance of the objectives as well as the relative preferences of the alternatives with respect to each objective. A synthesis of these priorities, along with some sensitivity analysis and iteration, will produce a result that is both intuitively appealing, easily communicated, defendable, as well as mathematically sound.

For those cases where hard data is also available, the decision maker's knowledge and experience can be applied to develop formulas that translate the hard data into ratio scale priorities using utility curves or step functions. If the data is contained in one or more tables or databases, the patented Expert Choice Desktop data mapping capability can be employed to map the data in the external data bases.

It is important to realize, however, that regardless of the quantity or quality of data that is available, as long as the decision or resource allocation has more than one dimension (multi-objective) and *all* important decisions are of this type, data alone will not produce a rational choice. Judgment is always required to prioritize objectives.

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Evaluation - Top down or bottom up

When an individual or small group derives priorities in an AHP model, they can evaluate either from the top down (from goal to objectives to alternatives) or bottom up (from alternatives, to covering objectives, to top level objectives).

A top down evaluation is advantageous in that the strategic importance of the top level objectives is paramount and not overly influenced by tactical considerations (the alternatives). This is consistent with the 3rd AHP axiom – hierarchic composition.

On the other hand, a strategy that is pursued without adequate consideration of the means available to achieve the strategic objectives can be shortsighted. That is, *the hierarchic composition axiom which states that judgments about, or the priorities of, the elements in a hierarchy do not depend on lower level elements, is not necessarily realistic*. There is a formal, mathematical way to measure and incorporate feedback. But a simpler and more intuitive way is to evaluate the hierarchy from the bottom up. In so doing, the decision makers gain an insight into the trade-offs among the alternatives before being asked to evaluate the importance of the objectives. This is referred to as feedback.

A Bottom up evaluation is recommended when alternatives are not yet well understood. Doing a bottom up evaluation can save time compared to iterating later on. Both top down and bottom up can be employed iteratively.

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AIJ and AIP

Prioritization and decision making is often performed in a group context. There are two ways to aggregate individuals' judgments and preferences with AHP, depending on whether the group is assumed to act together as a synergistic group in achieving common objectives, or as separate individuals, each with their own objectives. An example of the former is a group of department heads meeting to set corporate policy. An example of the latter is a group consisting of representative constituencies with stakes in welfare reform, such as taxpayers, those on welfare, welfare providers, politicians, etc.

In the former case, which is by far the most common, the individual judgments are combined by taking the
of the judgments to derive a "combined" set of priorities for each cluster of objectives in the hierarchy, as well as for alternatives with respect to each of the covering objectives. This is referred to as Aggregating Individual Judgments, or
. It has been shown that the geometric mean is the only aggregation method that will assure that the reciprocal axiom of AHP holds for the combined judgments in a matrix of combined judgments.

In the latter case, overall alternative priorities are computed for each participant and then an average of these priorities is computed. This is referred to as Aggregating Individual Priorities or
. In this case, the objectives hierarchy for each participant need not even be the same.

NOTE: Due to the nature of AIP, objectives charts, grid, and all sensitivity analysis pages are disabled when AIP is selected.

If desired, weighted averages can be computed for each of the above two aggregation methods. Since the geometric average is the *n*th root of the product of each of the pairwise comparisons, it can be thought of as the product of each person's judgment raised to the $1/n^{th}$ power, where *n* is the number of participants. If all participants are considered to be equally important, this is equivalent to the product of each participant's judgment raised to the power of their priority. If all participants are not considered to be equally important, but have priorities designated by w_1, w_2, … w_n, then the geometric average is simply the product of each person's judgment raised to the power of their priority.

For more information see:

Forman, Ernest H., with Peniwati, Kirti "Aggregating Individual Judgments and Priorities with the Analytic Hierarchy Process", European Journal of Operations Research, 108 (1998), 165-169.

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Means and Variances

Two types of means and two types of variances are used in Expert Choice Comparion:

An Arithmetic Mean is the average interval -- and is the mean or average used in common practice. It is computed as the sum of the values divided by the number of values.

A Geometric Mean is the average ratio -- and is useful when proportions are of interest, as they are in pairwise comparisons. It is computed as the *n*th root of the product of values.

Similarly:

An Arithmetic Variance is the variability of the interval of measures computed around the arithmetic mean.

A Geometric Variance is the variability of ratio measures computed relative to the geometric mean.

It is computed as follows:

Take the ratio of each judgment to the geometric mean of all judgments for the cluster.

If this ratio is less than 1, invert it.

Multiply these ratios for all judgments and take the *n*th root.

Compute the Geometric Variance as the Log(result) / Log(maxJudg!)

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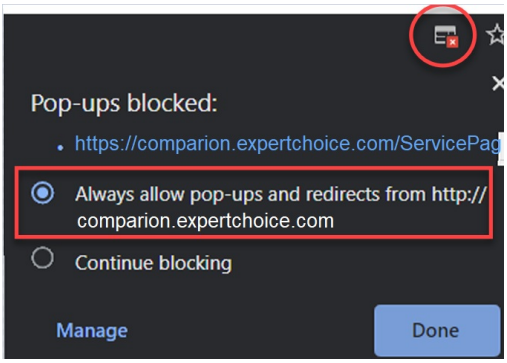
Allowing Pop-ups (Browsers Pop-up Blocker)

There are some places in Comparion where a new window or tab will need to be opened. Browsers often prevent these pop-ups from displaying unless you give permission to do so.

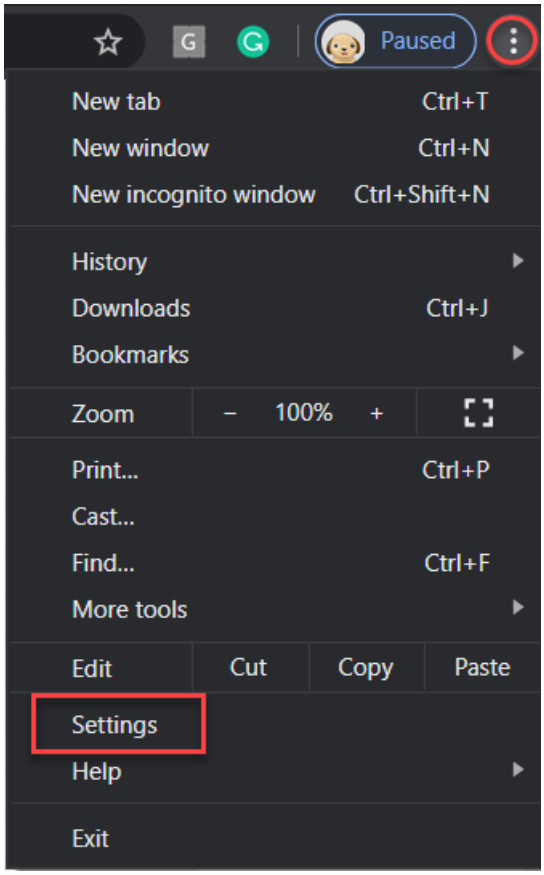
Google Chrome

By default, Google Chrome blocks pop-ups from automatically showing up on your screen. When a pop-up is blocked, the address bar will be marked "Pop-up blocked." Click the icon and select to allow pop-ups.



Pop-up blocker settings

1. At the top right, click More > **Settings**.



2. Under "**Privacy and security**," click **Site settings** (Hint: you can type in "pop" on the Search options field)

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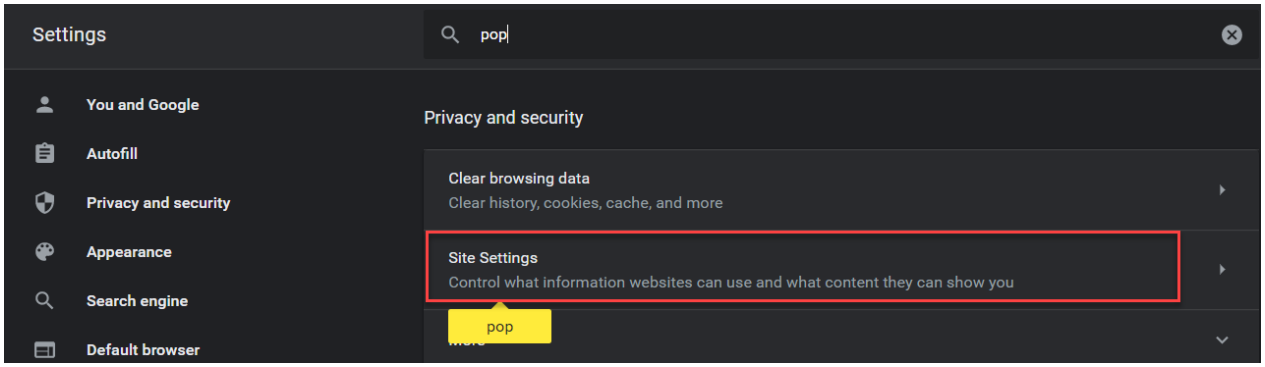
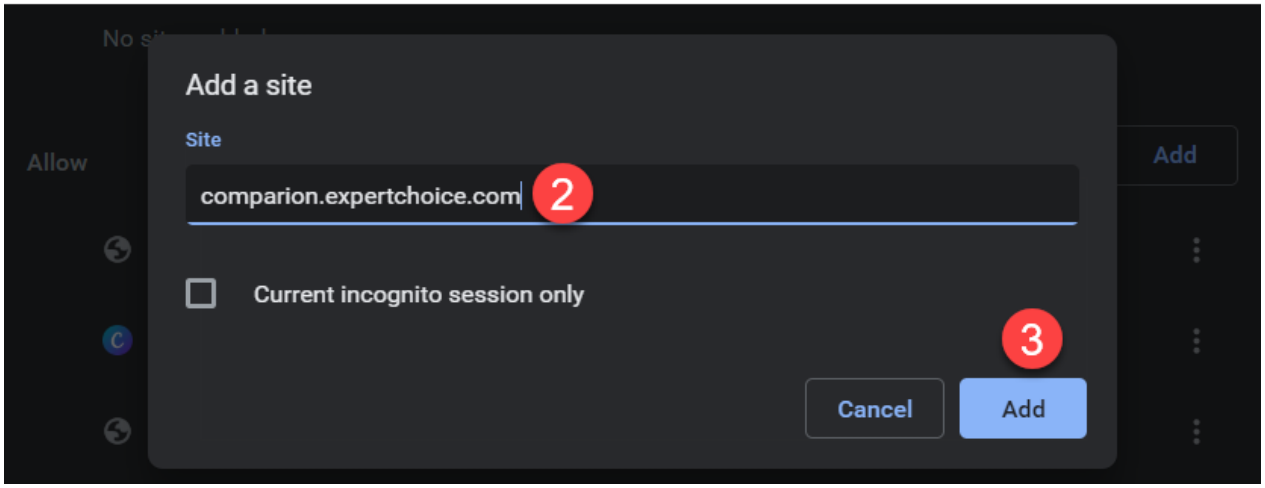


3. Click **Pop-ups and redirects**.

4. Turn on the switch to allow pop-ups altogether.

5. Or Add comparion.expertchoice.com (or any site you are using for accessing Comparion) to allow pop-ups.



Firefox

When blocking a pop-up, Firefox displays an information bar (if it hasn't been previously dismissed – see below), as well as an icon in the address bar.

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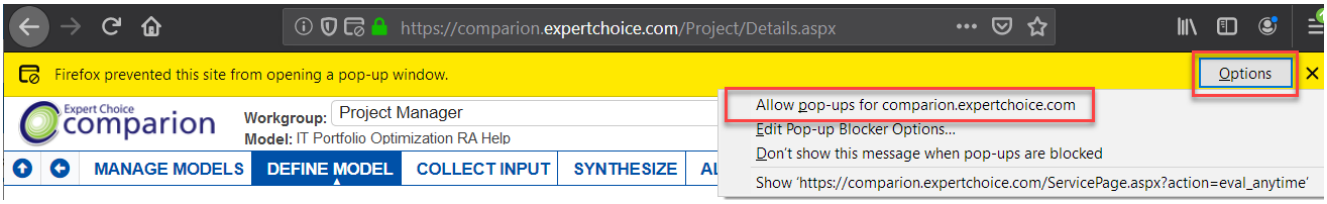


When you click either the Options button in the info bar or the icon in the address bar, a menu is displayed with the following choices:

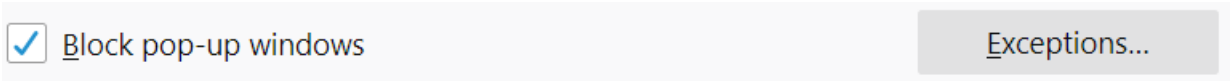
- Allow pop-ups for comparion.expertchoice.com (or any site where you are accessing Comparion)
- Edit Pop-up Blocker Options…
- Don't show this message when pop-ups are blocked
- (show the blocked pop-up)

Select to Allow pop-ups for our site.

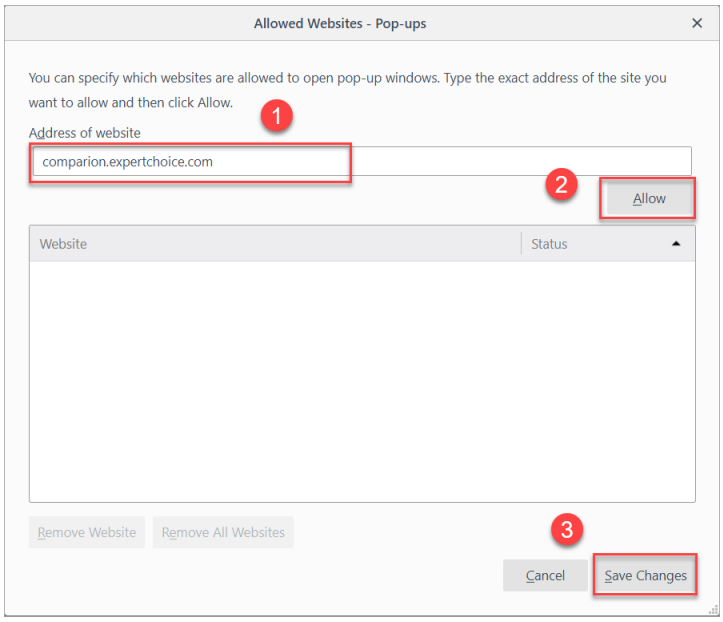
Pop-up blocker settings

To access the pop-up blocker settings:

1. Click the menu button ☰ and select Options.
2. Select the Privacy & Security panel.



- Under the **Permissions** section, uncheck the box next to **Block pop-up windows** to disable the pop-up blocker altogether; or
- Clicking on **Exceptions**… opens a dialog box with a list of sites that you want to allow to display pop-ups.
  - Enter comparion.expertchoice.com (or the site where you are using Comparion)
  - Click Allow and Save Changes.



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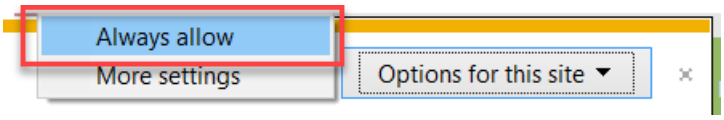
Internet Explorer

The message below will appear when a pop-up is blocked:

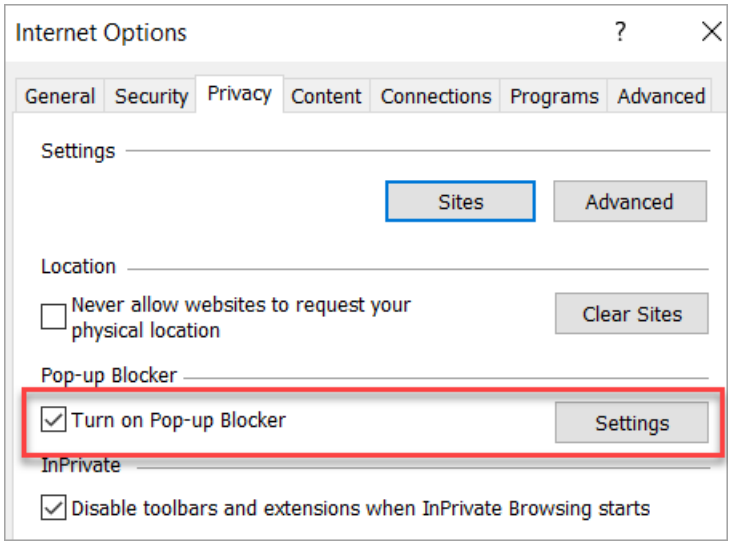
By clicking the "Options for this site" button, you will see two options:



Select "Always allow" option.

Pop-up blocker settings

- Open Internet Explorer, select the **Tools** button, and then select **Internet options**.
- On the **Privacy** tab, under Pop-up Blocker, uncheck the **Turn on Pop-up Blocker** check box to disable the pop-ups altogether:



or,

- Click **Settings** and then add comparion.expertchoice.com (or the site you are using to access Comparion)

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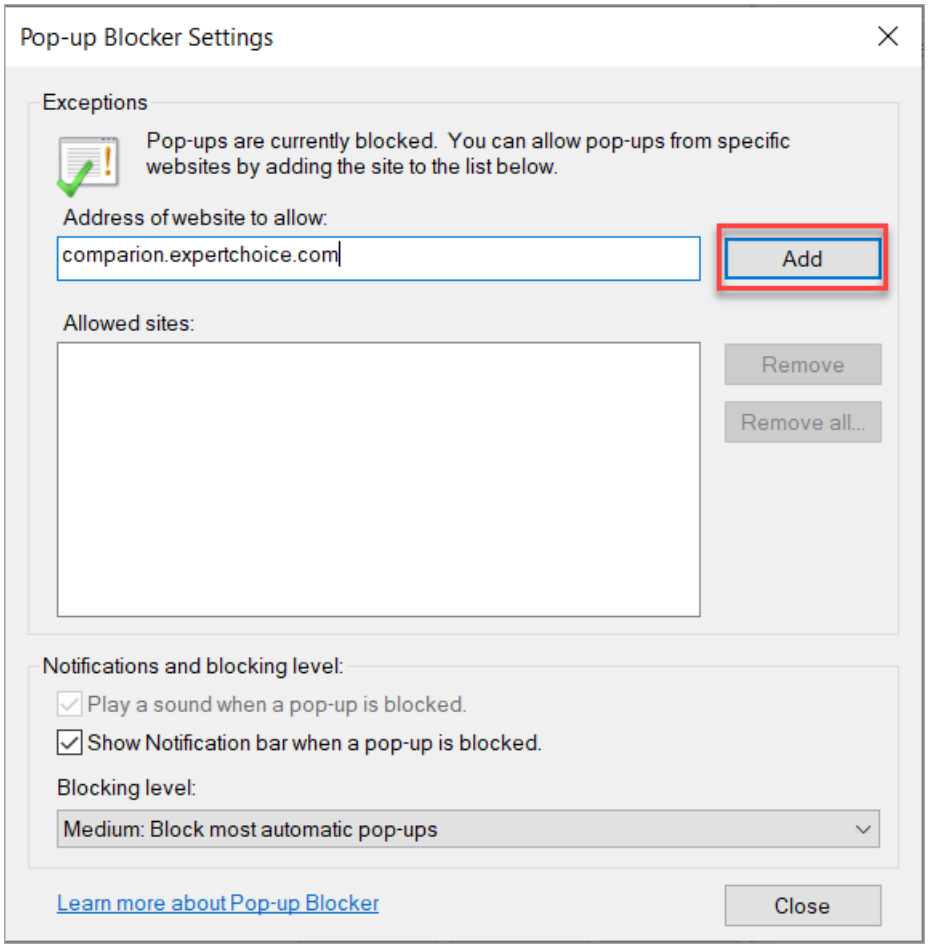

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Wikis

Learn more from different wikis and experiments, plus common applications!

Collaborative Decision Making (37)

- Limitations of effective decision making (11)
- Counterproductive strategies (8)
- Elements of effective decision making methodologies (15)
- The Analytic Hierarchy Process (AHP) (1)
- Validating Experiments (1)
- Common Applications (1)

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Collaborative Decision Making

Being a good leader requires more than just knowing the right way to do things. It also requires knowing *how to choose the right things to do*. Decision-making is arguably the most difficult, and the most essential, task a manager performs. Effective decision-making makes it possible for organizations to succeed by aligning their resources with their objectives.

Decision-making is hard because of various cognitive and organizational limitations such as limited memory capacity, framing bias, overconfidence, politics, groupthink, loss aversion, sunk costs, endowment effect, availability bias, anchoring, and representativeness. To cope with these and other limitations, managers have resorted to various decision-making strategies, such as intuition (aka "seat of the pants judgment"), BOGSAT("bunches of guys and gals sitting around talking"), rules of thumb, heuristics, simple tradeoffs, nutshell briefings, satisficing, and misuse of numbers.

Executives rate decision-making ability as the most important business skill, but few have the training they need to consistently make good decisions. Decision-making skills are easily taught. Coaching helps decision-makers improve their performance, as it does for athletes.

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Limitations of effective decision making

Decision-making is hard because of various cognitive and organizational limitations such as

- llimited memory capacity
- framing bias
- overconfidence
- politics
- groupthink
- loss aversion
- sunk costs
- endowment effect
- availability
- anchoring
- representativeness

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Limited Memory Capacity

Intuition alone is not sufficient for making complex, crucial decisions. The human brain is limited, in both short-term memory capacity and discrimination ability, to about seven things - plus or minus two. Decision-making for every complex, crucial decision takes place under constraints of human information-processing limitations.

Working memory, or “short-term” memory, is a cognitive system with limited capacity that is responsible for temporarily holding information available for processing. Working memory is important for reasoning and guidance in decision making. Cognitive tasks can be completed only with sufficient ability to hold information as it is processed. Working memory is necessary for mental tasks, such as language comprehension (for example, retaining ideas from early in a sentence to be combined with ideas later in a sentence), problem solving (in arithmetic, carrying a digit from the ones to the tens column while remembering the numbers), and planning.

[1] "The Magical Mystery Four: How is Working Memory Capacity Limited, and Why?" Nelson Cowan, University of Missouri; Curr Dir Psychol Sci. 2010 Feb 1; 19(1): 51–57.

[2]Gyslain Giguère and Bradley C. Loveb. "Limits in decision making arise from limits in memory retrieval." Edited by John R. Anderson, Carnegie Mellon University, Pittsburgh, PA, and approved March 21, 2013 (received for review November 17, 2012).

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Framing bias

When a manager looks at the world through only one mental window, s/he fails to see other views. This may lead to the use of outdated, or even wrong, frames.

Frame Blindness is setting out to solve the wrong problem (or failure to adequately solve a problem) due to creating a mental framework for the decision with little thought, which can result in overlooking or losing sight of the best options.

The frame is how you narrow and pinpoint what your decision is about. Better framing leads to better solutions. Frames make things simpler and help focus attention on the issues we determine to be most important. According to Marvin L. Minsky, "A frame is a stable, coherent cognitive structure that organizes and simplifies the complex reality that a manager operates in. Many frames reside in memory and are usually evoked or triggered automatically." The terms "frame" and "framing" have their origins in cognitive science and artificial intelligence (AI), and refer to the mental representations that allow humans to perceive, interpret, judge, choose, and act.

Frames simplify issues, but excessive simplification leads to distortion. Albert Einstein once said, "We should make things as simple as possible, but not simpler."[1] Many important things may be kept in the shadows by frames. Excessive simplification leads to the preclusion of important options. For example, a manager's domestic frame may miss out on global expansion. Improper yardsticks and reference points may also be set up due to frames.

Framing a decision inevitably sets boundaries[2]; it controls what is in and what is out. Moreover, not all elements that are “in” will be treated equally. Our frames tend to focus us on certain things while leaving others obscured. Frames have enormous power. The way people frame a problem greatly influences the solution they will ultimately choose. Also, the frames that people or organizations routinely use for their problems control how they react to almost everything they encounter.

The focusing effect (also known as focusing illusion) is a cognitive bias that occurs when people place too much importance on one aspect of an event, causing an error in accurately predicting the utility of a future outcome.[3]

[1] Paul J. H. Schoemaker and J. Edward Russo, contained in Wharton on making decisions, edited by Stephen J. Hoch, Howard C. Kunreuther, and Robert E. Gunther, published by John Wiley & Sons, 2001

[2] http://idea-sandbox.com/blog/frame-your-problems-to-create-better-solutions/#ixzz4tuD52ply.

[3]Zoltán Vass. A Psychological Interpretation of Drawings and Paintings. The SSCA Method: A Systems Analysis Approach. Alexandra Publishing. p. 83.

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Overconfidence

Overconfidence is the tendency to overestimate our ability to make good decisions. Research [1] indicates that the more experience a manager has, the more likely it is that he or she will be overconfident in making decisions. Therefore, awareness of overconfidence bias is especially important for people in leadership positions.

Overconfidence is defined in several distinct ways. [2] Overestimation of one's actual performance is the tendency to overestimate one's standing on a dimension of judgment or performance. This is manifested in the certainty one feels in his or her own ability, performance, level of control, or chance of success.

Another definition of overconfidence is overplacement of one's performance relative to others or how one judges his or her own performance compared to another. This overconfidence occurs when one believes himself to be better than others or rates herself as superior to others.

Yet another definition is overprecision, or excessive confidence that one knows the truth compared to what others know.

People vary widely in their awareness of what they do and do not know (metacognitive ability) and, in general, are too confident when evaluating their own performance. Although being confident confers a reward-like component for leaders, it can lead to overconfidence which, in turn, undermines effective decision making.[3]

[1] Research on Overconfidence in Decision-Making for the Capacity Recovery of Damaged Power Systems by Xing Bao Discrete Dynamics in Nature and Society, Volume 2014 (2014), Article ID 527598
[2] https://en.wikipedia.org/wiki/Overconfidence_effect.
[3] Monash University. "How Overconfidence Can Lead to Poor Decision Marking." NeuroscienceNews, 15 August 2016. .

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Politics of Organizational Decision Making

Organizational politics, also known as workplace politics or office politics, can be good or bad. Some definitions include:

- The use of power and social networking within an organization to achieve changes that benefit the organization or individuals within it.[2]
- A tool to assess the operational capacity and to balance diverse views of the interested parties. [3]

Organizational politics can increase efficiency, form interpersonal relationships, expedite change, and profit the organization and its members simultaneously. On the other hand, self-serving political actions can negatively influence social groupings, cooperation, information sharing, and other organizational functions.[4] Questions for executives in the decision-making process include who is involved, what drives the decisions, how deep is the analysis, how unfettered are the discussions, and how and where are politics involved?[1]

Decision-making disciplines that make a difference must include several factors:

- ensuring that people with the right skills and experience are included in the process;
- making decisions based on transparent objectives; and
- ensuring that the person who will be responsible for implementing a decision is involved in making that decision.

McKinsey Global Survey[1] results indicated that decisions initiated and approved by the same person generate the worst financial results, indicating the value of good discussion. Results also indicated that decisions made at companies without any strategic planning process are twice as likely to have generated extremely poor results as extremely good ones, which may indicate an overall lack of rigor at these companies. Although corporate politics may at times seem to undermine strong decision making, some types of consensus-building and alliances apparently can help create good outcomes.

[1] https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/how-companies-make-good-decisions-mckinsey-global-survey-results.
[2] Musa, Dr. Sam. "Tip Sheet for Leaders on Politics."
[3] Marilyn Haight, Office Politics, BigBadBoss.com
4 Larsen, James. "Business Psychology - Latest Findings". Supervision Findings. Retrieved 1 December2012.

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Groupthink

Groupthink is a common pitfall in group decision-making and problem-solving. People feel reluctant to present alternatives, challenge others' opinions, or express their own opinions. Conditions are ripe for Groupthink when one or more of these factors is present:

- There is a strong, persuasive group leader;
- There is a high level of group cohesion;
- There is intense pressure from the outside to make a good decision.

Key symptoms of Groupthink:

- Rationalization is when team members go to great lengths to convince themselves that, despite evidence to the contrary, the decision or alternative being presented is the best one.
- Peer Pressure is pressuring a member into agreeing with the group even though the member has a different opinion, or questions the rationale behind a decision.
- Self-Censorship occurs when members of the group censor their own opinions to conform to those of the group.
- Illusion of Unanimity is when no one in the group speaks out, making it feel like the group's decision is unanimous.

In addition to leading to sub-optimal decisions, Groupthink also decreases buy-in for the decision. This can be especially harmful because the people responsible for implementing a decision do a much better job when they buy in to the decision, instead of questioning the wisdom of the decision.

[1] https://www.mindtools.com/pages/article/newLDR_82.htm

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Loss aversion

Loss aversion refers to the tendency to prefer avoiding a loss rather than acquiring an equivalent gain. This leads to **risk aversion**, which is when people prefer avoiding losses to making gains when they evaluate an outcome comprising similar gains and losses.[1] Another way of stating this idea is that the pain of losing is psychologically about twice as powerful as the pleasure of gaining.[2] Amos Tversky and Daniel Kahneman developed a successful behavioral model, called prospect theory, using the principles of loss aversion, to explain how people assess uncertainty.[3] Essentially, they found that people react more strongly to possible losses than to potential gains.

Loss aversion explains a phenomenon called the e ndowment effect, which is a tendency for people to place a higher value on something they have purchased or already own than an identical or similar thing that they don't own. This may explain why we are inclined to "throw good money after bad" – as the saying goes and what economists refer to as the *sunk costs fallacy* – so we won't waste what we've already spent. We stick with our plan and hope for a gain, even though that may lead to a bigger loss in the long run.[4]

[1] Kahneman, D. & Tversky, A. (1992). "Advances in prospect theory: Cumulative representation of uncertainty". Journal of Risk and Uncertainty. 5 (4): 297–323. doi:10.1007/BF00122574

[2] https://www.behavioraleconomics.com/mini-encyclopedia-of-be/loss-aversion/.

[3] https://www.scientificamerican.com/article/what-is-loss-aversion/.

[4] http://www.beinghuman.org/article/loss-aversion.

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Sunk costs

A **Sunk Cost** is a cost that is incurred and can not be meaningfully recovered by any practical means. [1] For example, a business may have invested a million dollars in new hardware. This money is now gone and cannot be recovered, so it shouldn't figure into the business's decision-making process.[2] These costs are excluded from future business decisions, because costs will be the same regardless of the outcome of a decision.[3] This may be termed *sunk cost trap* – when an organization irrationally follows through on an activity that is not meeting expectations due to time and money already spent on it, rather than cutting their losses and making a decision that will give them better outcomes going forward.

When making an informed decision, organizations should consider the costs that are a result of the decision (relevant costs); sunk costs that do not change should not be considered.[3]

[1] https://www.accountingtools.com/articles/what-is-a-sunk-cost.html.
[2] http://www.lifehack.org/articles/communication/how-the-sunk-cost-fallacy-makes-you-act-stupid.html.
[3] http://www.investopedia.com/terms/s/sunkcost.asp.

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Endowment effect

The **Endowment Effect**, an emotional bias, is the hypothesis that people will value something they already own more than a similar item they don't own. This happens even when there is no cause for attachment or even if the item was only obtained literally minutes ago.[1]

One of the most famous examples of the endowment effect in the literature is from a study by Daniel Kahneman, Jack Knetsch & Richard Thaler.[2] This involves participants who were given a mug and then offered the chance to sell it or trade it for an equally valued alternative (pens). They found that the amount of money the participants required as compensation for the mug - once their ownership of the mug had been established ("willingness to accept" or WTA) - was approximately twice as high as the amount they were willing to pay to acquire the mug ("willingness to pay" or WTP).

In behavioral finance, the endowment effect is sometimes referred to as *divestiture aversion*: the perceived greater value of ownership occurs merely because the individual possesses the object in question. Investors, therefore, tend to stick with certain assets because of familiarity and comfort, even if they are inappropriate or become unprofitable.[3]

The endowment effect has been raised as a possible explanation for the lack of demand for reverse mortgage opportunities in the United States (contracts in which a home owner sells back her/his property to the bank in exchange for an annuity) (Huck, Kirchsteiger & Oechssler, 2005).[4]

[1] Morewedge, Carey K.; Giblin, Colleen E. (2015). "Explanations of the endowment effect: an integrative review." Trends in Cognitive Sciences. 19 (6): 339–348.
[2] Kahneman, Daniel; Knetsch, Jack L.; Thaler, Richard H. (1990). "Experimental Tests of the Endowment Effect and the Cause Theorem." Journal of Political Economy. 98 (6): 1325–1348.
[3] http://www.investopedia.com/terms/e/endowment-effect.asp.
[4] Huck, Steffen; Kirchsteiger, Georg; Oechssler, Jörg (2005). "Learning to like what you have – explaining the endowment effect." The Economic Journal. 115 (505): 689–702.

Also:
http://endowment-effect.behaviouralfinance.net/.

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Availability Bias

Availability Bias is the tendency to let an example that easily comes to mind easily affect decision-making or reasoning. [1] This occurs when we overweight evidence that comes more easily to mind or is more prevalent in our memories.

The study of Availability Bias was pioneered by psychologists Amos Tversky and Daniel Kahneman, who developed a model called *prospect theory* to explain systematic bias in human decision-making. [2] You may remember the classic study in which different people, witnessing the same crime or accident event, each report a different version of events. Though each presumably sane, sober person witnessed the events with his or her own two eyes, individual expectations and biases influenced how they perceived what happened. Our thinking is often strongly influenced by what is personally most relevant, recent, or dramatic.[3]

[1] Esgate, Anthony; Groome, David (2005). An Introduction to Applied Cognitive Psychology. Psychology Press. p. 201.

[2] http://www.innovateus.net/health/what-availability-bias.

[3] http://www.businessinsider.com/the-availability-bias-is-driving-investor-decisions-2012-10.

Also:

http://www.howtogetyourownway.com/biases/availability_bias.html.

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Anchoring

Anchoring (or focalism) is a cognitive bias that describes the common human tendency to rely too heavily on the first piece of information offered (the "anchor") when making decisions. During decision-making, anchoring occurs when one uses an initial piece of information to make subsequent judgments.[1] Once an anchor is set, other judgments are made by adjusting away from that anchor, and there is a bias toward interpreting other information around the anchor. For example, the initial price offered for a used car sets the standard for the rest of the negotiations, so that prices lower than the initial price seem more reasonable even if they are still higher than the car's actual value.[2]

In their original study, Tversky and Kahneman put forth a view later termed anchoring-as-adjustment. According to this theory, once an anchor is set, people adjust away from it to get to their eventual answer; however, they adjust insufficiently, resulting in their final guess being closer to the anchor than it would be otherwise.[3]

A third explanation of anchoring has been proposed concerning attitude change. According to this theory, providing an anchor changes someone's attitudes to be more favorable to the attributes of that anchor, biasing future answers to have similar characteristics as the anchor.[4]

[1] Anchoring Definition, Investopedia, retrieved September 29, 2015.
[2] https://en.wikipedia.org/wiki/Anchoring.
[3] Tversky, Amos; Kahneman, Daniel (1992). "Advances in prospect theory: Cumulative representation of uncertainty". Journal of Risk and Uncertainty. 5 (4): 297–323.
[4] Wegener, Duane T.; Petty, Richard E.; Detweiler-Bedell, Brian T.; Jarvis, W.Blair G. (2001). "Implications of Attitude Change Theories for Numerical Anchoring: Anchor Plausibility and the Limits of Anchor Effectiveness". Journal of Experimental Social Psychology. 37 (1): 62–69.

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Representativeness Heuristic

Representativeness is the tendency to over/underestimate based on generalizations or imprecise deductive reasoning, or where certain important pieces of information are overlooked. The Representativeness heuristic is commonly used when making judgments about the probability of an event under uncertainty.

Tversky and Kahneman defined representativeness[1] as "the degree to which an event:

- is similar in essential characteristics to its parent population, and
- reflects the salient features of the process by which it is generated."

When people rely on representativeness to make judgments, they are likely to judge wrongly because the fact that something is more representative does not actually make it more likely.[2]

[1] Kahneman & Tversky 1972
[2] Tversky & Kahneman 1982
Also: https://en.wikipedia.org/wiki/Representativeness_heuristic

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Counterproductive strategies

To cope with the limitations of decision making, managers have resorted to various decision-making strategies, such as

- Intuition
- BOGSAT
- Rules of thumb
- Heuristics
- Simple tradeoffs
- Nutshell briefings
- Satisficing
- Misuse of numbers

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Intuition

Intuitive decision-making is described as the process by which information, acquired through associated learning and stored in long-term memory, is accessed unconsciously to form the basis of a judgment or decision.[1] Intuition is based on the implicit knowledge of the decision-maker.

Followers of the heuristics-and-biases school of thought - developed by Amos Tversky and Daniel Kahneman - believe that intuitive judgments are derived from an "informal and unstructured mode of reasoning" that ultimately does not include any methodical calculation. Tversky and Kahneman identify availability, representativeness, and anchoring as three heuristics that influence many intuitive judgments made under uncertain conditions.[2]

Intuitive decision-making is far more than using common sense, because it involves additional sensors for perceiving and being aware of the information from outside. Sometimes it is referred to as gut feeling, sixth sense, inner sense, instinct, inner voice, spiritual guide, etc.[3]

[1] Betsch, Cornelia (2008). Intuition in judgment and decision making. New York: Lawrence Erlbaum Associates.
[2] Kahneman, Daniel (1982). Judgment under uncertainty: heuristics and biases. Cambridge New York: Cambridge University Press.
[3] http://timeforchange.org/definition-of-intuition-intuitive.

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BOGSAT

BOGSAT is decision-making by a Bunch of Guys/Gals Sitting Around Talking, which is a management practice of using often inexperienced committee members to make the most important decisions.[1] Even though there may be considerable preparation for a BOGSAT, including information-gathering and detailed analyses, there are numerous problems with this approach. BOGSAT sessions, which are rarely facilitated, are often dominated by the leader, who sets the tone and is often not challenged. Once the group sets off on the wrong path, they rarely look back.[2]

[1] Bible, Michael J. and Susan S. Bivins. Mastering Project Portfolio Management: A Systems Approach to Achieving Strategic Objectives. J. Ross Publishing, 2011.
[2] Forman, Ernest H. and Mary Ann Selly. Decision by Objectives: How to Convince Others That You Are Right. World Scientific Publishing Company, 2001.

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Rules of thumb

A **rule of thumb** is a principle with broad application that is not intended to be strictly accurate or reliable for every situation. [1] It is based not on theory but on practical experience.

FW Taylor, who is often called "The Father of Scientific Management," proposed four scientific principles of management to solve problems in the organization. His focus was to improve efficiency of workers and have optimum utilization of resources. His first principle was to "replace rule-of-thumb methods with methods based on scientific study...."[2]

[1] https://en.wikipedia.org/wiki/Rule_of_thumb[2] http://www.netmba.com/mgmt/scientific/

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Heuristics

Heuristics are decision-making techniques that simplify the process of coming to a reasonable decision when the "perfect" decision is unreachable or unknowable. Heuristics may be understood as mental shortcuts that enable individuals to make quick decisions, rather than taking the time necessary, or avoiding the decision-making process altogether. Behavioral economist Herbert Simon argued that, when faced with complex decisions, individuals resort to heuristics.[1]

[1] http://www.economicsonline.co.uk/Behavioural_economics/Decision_making_bias.html.

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Simple tradeoffs

Making decisions involves making **tradeoffs** among objectives; this is a difficult and poorly understood aspect of decision making. Decisions become difficult when they involve several competing objectives. The greater the number of objectives, the more complex the decision. Experimental evidence has shown that "people do find it difficult to make consistent judgments when more than one attribute is involved," so there is "a strong argument for providing some structured means of helping them think through their choices."[1]

[1] Forman, Ernest H. and Mary Ann Selly. Decision by Objectives: How to Convince Others That You Are Right. World Scientific Publishing Co., 2001.

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Nutshell briefings

The nutshell briefing rule is a quick and easy approach to decision making that can sometimes save time and effort in arriving at adequate judgments; however, reliance on such rules more often results in judgmental errors and can create grossly misleading expectations about a chosen course of action.[1]

[1] Janis, Irving L. Crucial Decisions: Leadership in Policymaking and Crisis Management. The Free Press, 1989.

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Satisficing

Satisficing is a decision-making strategy that aims for a satisfactory or adequate result rather than the optimal result, because aiming for the optimal solution may necessitate needless expenditure of time, energy and resources.[1]

A combination of satisfy and suffice, the term satisficing is used to explain the behavior of decision makers under circumstances for which an optimal solution cannot be determined. Herbert Simon formulated the concept of satisficing within a novel approach to rationality ("bounded rationality"), which posits that rational choice theory is an unrealistic description of human decision processes.[2]

Satisficing refers to the use of aspiration levels when choosing from different paths of action; decision-makers select the first option that meets a given need, or they select the option that seems to address most needs rather than the optimal solution.[3]

[1] https://www.investopedia.com/terms/s/satisficing.asp.
[2] Simon, H. A. (1956). "Rational Choice and the Structure of the Environment" (PDF). Psychological Review. 63 (2): 129–138.
[3] https://en.wikipedia.org/wiki/Satisficing.

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Levels of Measurement

There are four types of number scales: NOIR

The **nominal scale** of measurement only satisfies the *identity property* of measurement. Values assigned to variables represent a descriptive category, but they have no inherent numerical value with respect to magnitude. Gender is an example of a variable that is measured on a nominal scale. Individuals may be classified as "male" or "female," but neither value represents more or less "gender" than the other. Religion and political affiliation are other examples of variables that are normally measured on a nominal scale.[1]

The **ordinal scale** of measurement has the property of both *identity and magnitude*. Each value on the ordinal scale has a unique meaning, and it has an ordered relationship to every other value on the scale. An example of an ordinal scale in action would be the results of a horse race, reported as "win," "place," and "show." We know the rank order in which horses finished the race. The horse that won finished ahead of the horse that placed, and the horse that placed finished ahead of the horse that showed. However, we cannot tell from this ordinal scale whether it was a close race or whether the winning horse won by a mile.

The **interval scale** of measurement has the properties of *identity, magnitude, and equal intervals*. A perfect example of an interval scale is the Fahrenheit scale to measure temperature. The scale is made up of equal temperature units, so that the difference between 40 and 50 degrees Fahrenheit is equal to the difference between 50 and 60 degrees Fahrenheit. With an interval scale, you know not only whether different values are bigger or smaller, but you also know how much bigger or smaller they are. For example, suppose it is 60 degrees Fahrenheit on Monday and 70 degrees on Tuesday. You know not only that it was hotter on Tuesday, but you also know that it was 10 degrees hotter.

The **ratio scale** of measurement satisfies all four of the properties of measurement: *identity, magnitude, equal intervals, and a minimum value of zero*. The weight of an object would be an example of a ratio scale. Each value on the weight scale has a unique meaning, weights can be rank ordered, units along the weight scale are equal to one another, and the scale has a minimum value of zero. Weight scales have a minimum value of zero because objects at rest can be weightless, but they cannot have negative weight.

Why does this matter? This matters because of the epidemic misuse of numbers in decision making. Ordinal scales are useful and ubiquitous. However, common practice in prioritization and risk analysis is to use ordinal scale numbers in multiplication, which is an invalid mathematical operation. Ordinal numbers should not be used in multiplication because only the order is known; the interval and ratio are unknown and therefore the product is meaningless. Assigning meaning to something that is meaningless is misuse and such misuse is epidemic.

[1] http://stattrek.com/statistics/measurement-scales.aspx?Tutorial=AP.

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Elements of effective decision making methodologies

- Focus on objectives
- Compensatory
- Brainstorming
- Screening
- Pros and cons
- Structuring
- Qualitative judgment
- Quantitative data
- Collaboration
- Roles
- Synthesis
- Identification of inconsistent judgments
- Consensus
- Sensitivity analysis
- Iteration

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Focus on Objectives

Management by Objectives (MBO) as a concept first appeared in a 1954 book *The Practice of Management*. The author, Peter Drucker, has since become known as one of the world's most influential business experts. Management by Objectives is "*a management model that aims to improve performance of an organisation by clearly defining objectives that are agreed to by both management and employees.*"[1] Peter Drucker saw Management by Objectives as a tool to help organizations identify and achieve goals.[2]

Decision-making is arguably the most important part of every manager's duties, and focusing on objectives that contribute to the achievement of goals is a crucial ingredient for effective decision-making. The key is to focus on objectives, rather than alternatives, criteria, or attributes.[3] The benefits of focusing on objectives include:

- Alignment of the decision to the objectives that, when met, are expected to achieve the goal.
- An understanding of the trade-offs between alternatives with respect to objectives. This is a difficult and poorly understood aspect of decision-making.
- Rational decisions. A rational decision is one which best achieves the multitude of objectives of the decision maker(s). [3]

Organizations with mature decision-making processes typically define decision objectives through collaborative brainstorming of the factors that are expected to contribute to achievement of the goal. Then, after the alternatives are identified, a check of the pros and cons of alternatives may reveal:

- Objectives that may have been overlooked and should be added; and
- Objectives that none of the identified alternatives contribute to. In this case, it may be desirable to:
    - Identify more alternatives; and/or
    - Remove objectives to which no available alternatives contribute.

[1] https://www.cleverism.com/management-by-objectives-guide/

[2] Peter Drucker, "The Practice of Management", 1954

[3] Forman, Ernest H. and Mary Ann Selly. Decision by Objectives: How to Convince Others That You Are Right. World Scientific Publishing Company, 2001.

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Compensatory

Compensatory decisions are rational decisions. In compensatory decisions, poor performance of alternatives with respect to some objectives can be overcome with excellent performance with respect to other objectives. For instance, a plane ticket that costs $100 more may ultimately be the better choice because it is a direct flight, especially if the priority for the "travel time" objective is higher than the priority for the "cost" objective.

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Brainstorming

There are numerous ways to identify objectives, alternatives, etc., although brainstorming may be the most common method. The main point of brainstorming is to generate as many ideas as possible. Get the right people – it is often useful to get together people of many disciplines/backgrounds. Consider writing down ideas individually first, then reading them out to the group. This helps to avoid group-think and improves creativity.

Every member of the group should contribute; and avoid criticism of individual contributions/intimidation of any group member by more vocal or competitive group members. Because creativity is such an important part of brainstorming, think about the ideal/perfect situation. Push extremes, think about unlikely as well as likely situations, go off on tangents,[1] and build on others' ideas.[2]
In decision-making, it is common to brainstorm for:

- Objectives
- Alternatives
- Pros and cons of alternatives
- Risk Events - what could go wrong
- Risk Sources - what could cause a Risk Event
- Risk Controls (a kind of Alternative) - what can be done to reduce the likelihood of Risk Sources, the vulnerability of Risk Events to Risk Sources, or the Impact of Risk Events on Objectives

[1] Forman, Ernest H. and Mary Ann Selly. Decision by Objectives: How to Convince Others That You Are Right. World Scientific Publishing Company, 2001.
[2] https://www.uvm.edu/crs/resources/citizens/decision.htm#F

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Screening

When there are hard and fast "criteria" (as opposed to "objectives"), it is useful to screen out alternatives that do not satisfy the criteria. For example, alternatives for a decision may be required to be "technically feasible." Alternatives that are not technically feasible would be screened out and the contributions they are expected to make to objectives would not be evaluated at all.

Be careful not to mis-classify objectives as criteria. For example, if you treat cost as a criteria and specify that no alternative should cost more than $100, you could potentially eliminate a $101 alternative that significantly outperforms all the other alternatives that cost $100 or less. (See Compensatory Decision Making.)

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Pros and cons

Perhaps the most common "formal" approach to making a choice among alternatives is to list the pros and cons of each alternative. Certainly it would be wrong to calculate the net number of pros over cons for each alternative and then select the alternative with the largest net number, because the relative importance of the pros and cons differ. How then can one proceed?

Benjamin Franklin considered this problem over two hundred fifty years ago. In a letter addressed to Priestly, Franklin explained how he analyzed his decisions. Considering alternatives, for example, Franklin would look for the pros of one alternative that were about equal in importance to those of the other alternative, and for each such pair, eliminate them from the lists. He did the same thing for the cons. He then looked for a pro of one alternative that seemed to be equal to two pros of the other alternative – and, if found, remove all three from the lists. He proceeded until he could go no further, at which time he would be left with a hopefully small list of pros and cons from which he could make the decision.

Franklin's insights were far beyond his time. He sensed that the human brain is limited in the number of factors that can be kept in mind at any one time. Psychologists discovered this in the mid-twentieth century. Franklin knew enough not to rush an important decision, but to devote several days to the study of the pros and cons, attempting to make trade-offs based on relative importance. And he tried to develop a "moral or prudential" algebra, recognizing that some way of measuring qualitative as well as quantitative factors was necessary in the decision process. Not only was Franklin far ahead of his time, but his decision process is superior to that used by the vast majority of today's decision makers who fool themselves into thinking that they can make a good decision after a few hours of unstructured discussion and some "hard" thought.

Although Franklin was able to reduce the number of factors (pros and cons) under consideration by a process of cancellation, he could not complete a decision analysis because of his inability to "measure" the remaining factors. We have had significant advancements in the meaning and use of numbers and measurement since Franklin's time. However, our use of numbers and measurement can sometimes be misleading or even wrong as discussed in Levels of Measurement.

Today, pros and cons are useful for checking objectives for completeness. Brainstorming the pros and cons of alternatives and mapping them to objectives can help identify objectives that may have been overlooked.

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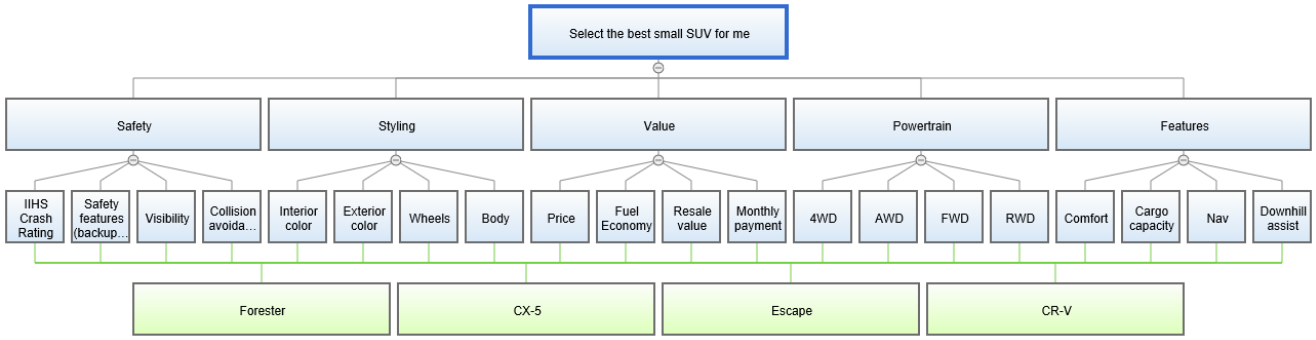
Structuring

All non-trivial decisions have multiple objectives, and sometimes sub-objectives. The resulting complexity opens the door to the limitations of effective decision making and the use of counter productive strategies. Structuring objectives into a hierarchy is the most effective way to manage the complexity.



Structured decision making is a general term for carefully organized analysis of problems in order to reach decisions that are focused on achieving fundamental objectives. Alternatives can be evaluated by using a reasoned approach entailing an evaluation of the relative importance of objectives, as well as an evaluation of the relative preference for the alternatives with respect to each of the objectives.[1] The decision hierarchy construct may use either a *strategic* (top down) or *tactical* (bottom up) approach.[1]

The *strategic* construction of a decision hierarchy focuses first on identification and organization of objectives. The *tactical* approach focuses first on the alternatives - that is, identifying the pros and cons of each alternative, which will help in identifying objectives. If the decision maker(s) have a good understanding of their objectives, then a *strategic* approach is recommended; otherwise, a *tactical* approach should be used.[1]

[1] Forman, Ernest H. and Mary Ann Selly. Decision by Objectives: How to Convince Others That You Are Right. World Scientific Publishing Company, 2001.

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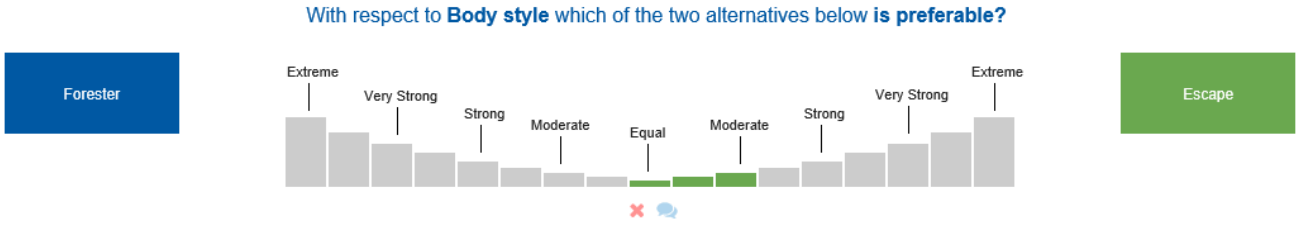
Qualitative judgment

Qualitative judgments are subjective judgments based on factors or information that can't be easily or accurately quantified. The importance of objectives, which is by definition subjective, is a qualitative judgment.

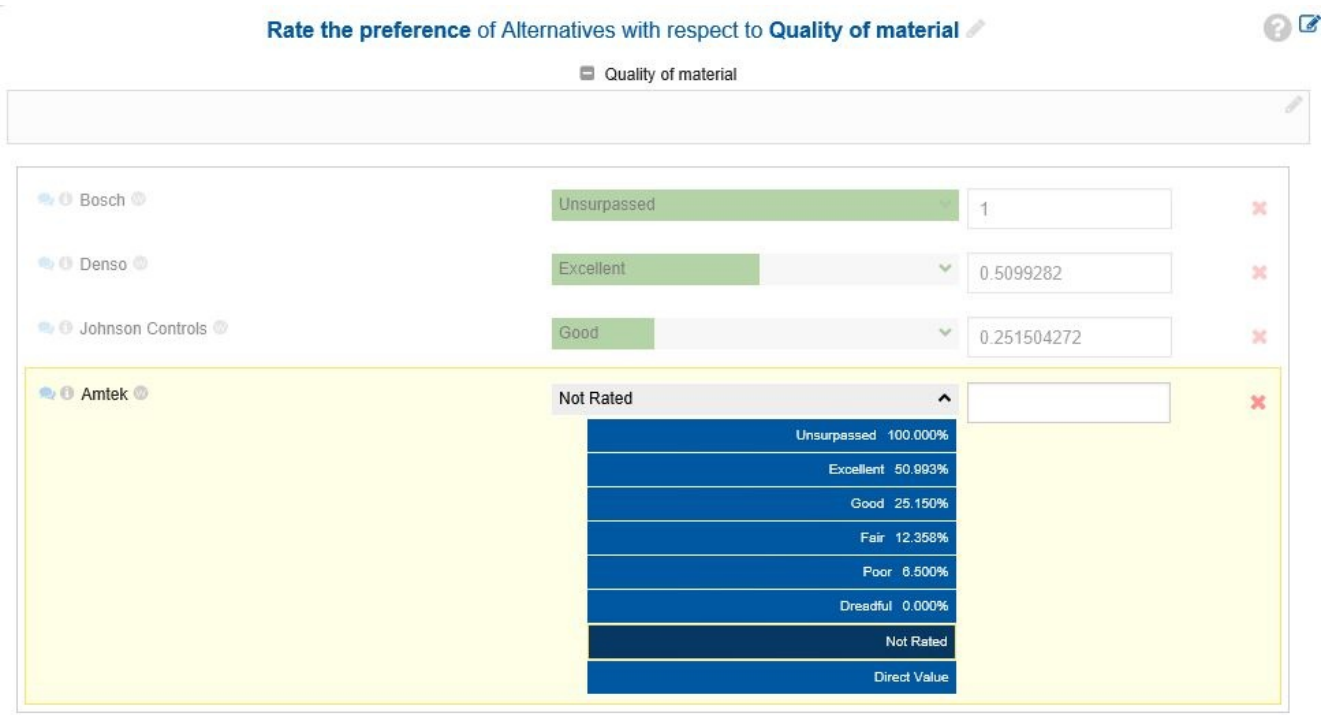
The anticipated performance of alternatives with respect to objectives can be based on qualitative judgments and/or quantitative data.

The Analytic Hierarchy Process (AHP) is a structured technique for organizing and analyzing complex decisions, based on mathematics and psychology.[2] AHP synthesizes human judgment into accurate ratio scale data. This is significant because it avoids the common, and mathematically meaningless, use of ordinal scale numbers in multiplication.[3]

With **Pairwise Comparisons**, participants compare objectives or alternatives with respect to a parent objective. For example, "with respect to body style, which alternative is preferable, and by how much: Subaru Forrester or Ford Escape."



With **Rating Scales**, participants evaluate alternatives on a predefined scale where the value of the rating scale intensities are on the ratio scale level of measurement, having been derived with pairwise comparisons.



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1 https://bizfluent.com/info-11384887-qualitative-judgment-method.html

2 https://en.wikipedia.org/wiki/Analytic_hierarchy_process

3 https://en.wikipedia.org/wiki/Level_of_measurement

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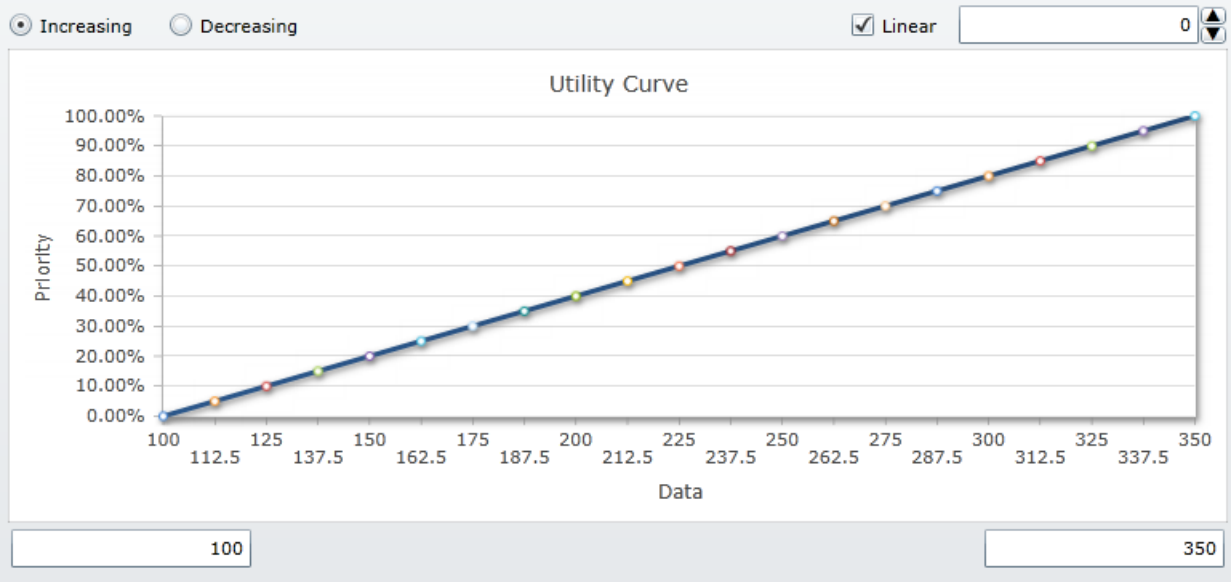
Quantitative data

Quantitative data is highly valued. But there are several potential problems using raw quantitative data:

- It may not represent what you think it does; for example, data about the past does not necessarily reflect what will happen in the future.
- To be useful, quantitative data often requires interpretation by subject matter experts.
- If the quantitative data is not ratio scale data (e.g., a percentage from 0 to 100) it has to be converted to ratio scale data before it can be used in a meaningful way with other data.

There are some techniques available for overcoming these problems.

A **Utility Curve** converts quantitative data into quantitative ratio scale data. The Utility Curve can be increasing or decreasing, concave or convex.



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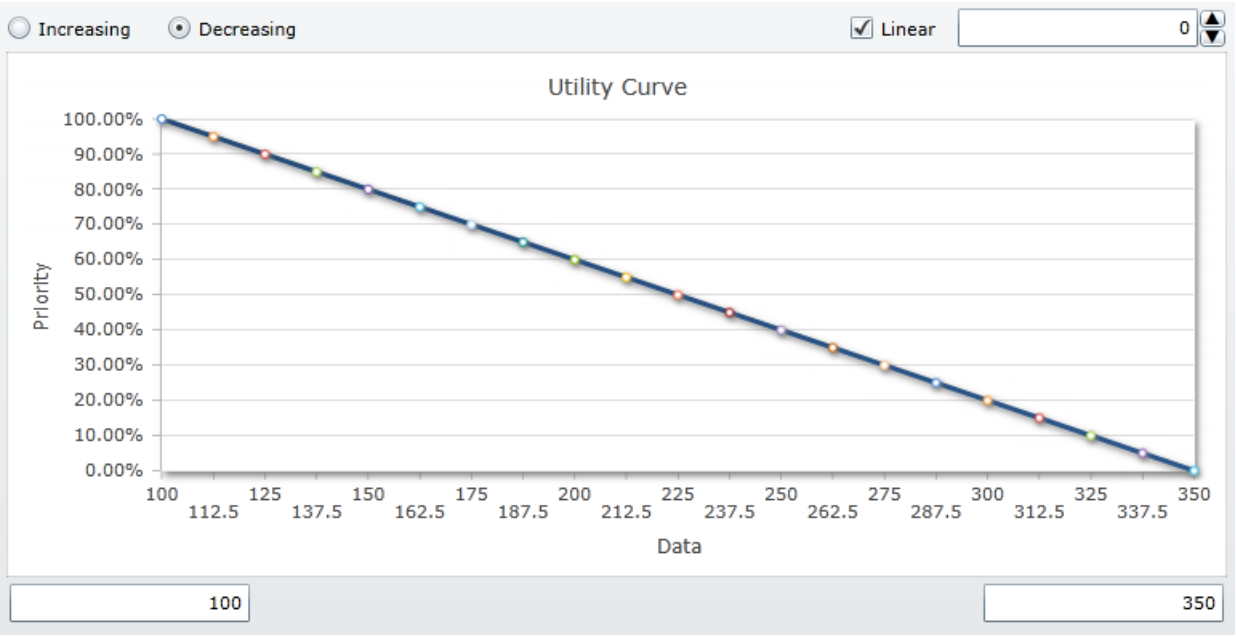
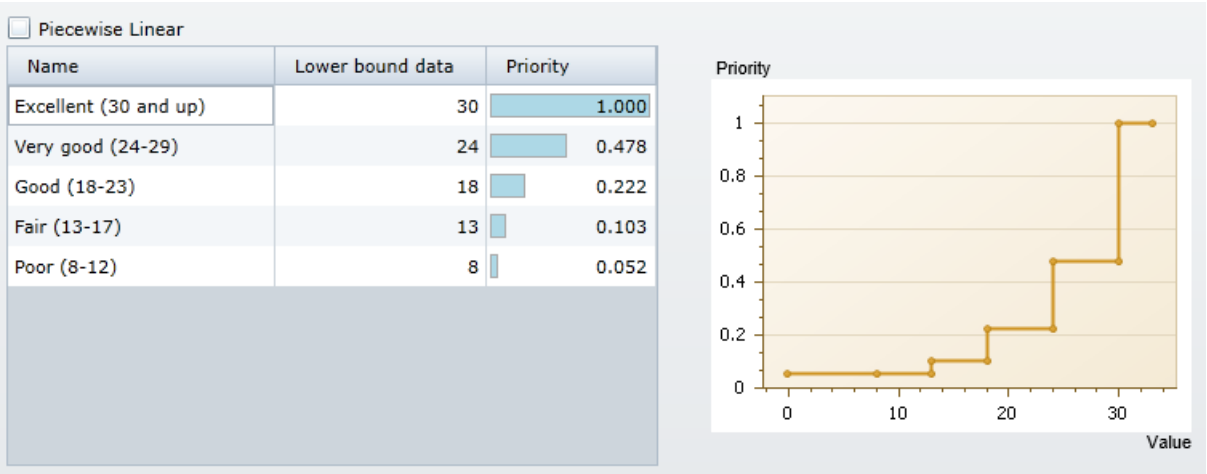
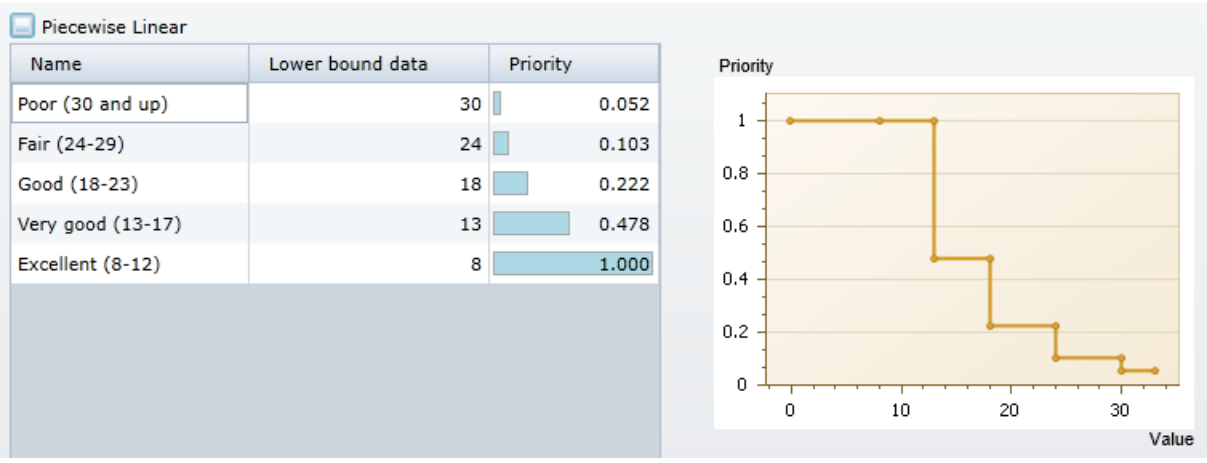


A **Step Function** also converts quantitative data into quantitative ratio scale data, but in discreet steps. The priorities for each step are derived using pairwise comparison. Step functions can be increasing or decreasing, piecewise linear or not piecewise linear.





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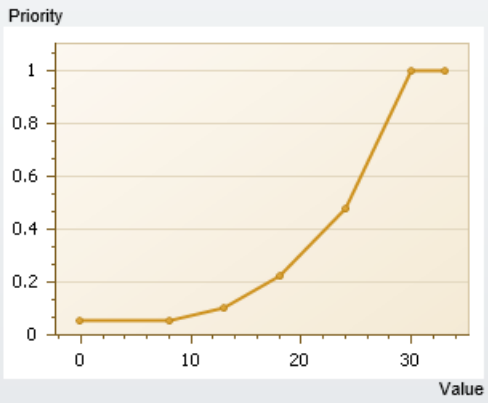
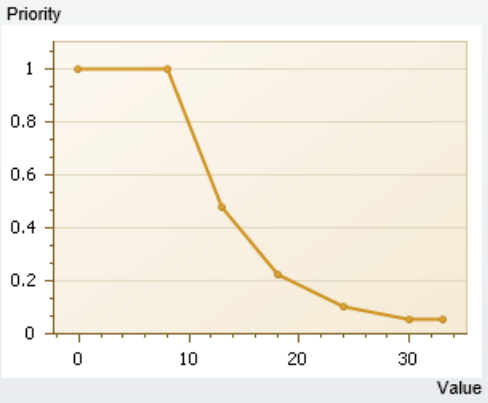
Piecewise Linear

Name	Lower bound data	Priority
Excellent (30 and up)	30	1.000
Very good (24-29)	24	0.478
Good (18-23)	18	0.222
Fair (13-17)	13	0.103
Poor (8-12)	8	0.052



Piecewise Linear

Name	Lower bound data	Priority
Poor (30 and up)	30	0.052
Fair (24-29)	24	0.103
Good (18-23)	18	0.222
Very good (13-17)	13	0.478
Excellent (8-12)	8	1.000



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Collaboration

Engaging stakeholders and subject matter experts ***increases participation***. As people feel more engaged with decision-making and planning, they will also ***feel more motivated***. Both increased participation and motivation can further lead to ***higher job satisfaction***. Studies have shown how better inclusion of different opinions and backgrounds doesn't just ***provide better results***, but also ***improves relationships***. When management and employees are not divided and kept secret, ***communication between the two groups improves***.

Collaboration tools include:

- Virtual whiteboard. Participants share and control a common virtual whiteboard as they brainstorm for:
  - Objectives (Criteria)
  - Alternatives (Projects, Vendors, Strategies, Prospects, Controls, Candidates, etc.)
  - Pros and Cons of Alternatives
  - Sources (Hazards, Threats) of Risk Events
  - Risk Events
  - Controls (Treatments) to reduce Risk
- TeamTime™ evaluation (voting) sessions. Facilitators elicit judgments from stakeholders. The shared session promotes discussion and understanding.
- AnyTime evaluation (voting) sessions. Conveniently elicit judgments from participants any time and any place.
- Screen sharing analysis of priorities, sensitivity, consensus,

https://www.cleverism.com/management-by-objectives-guide/

Peter Drucker, "The Practice of Management", 1954

Forman, Ernest H. and Mary Ann Selly. Decision by Objectives: How to Convince Others That You Are Right. World Scientific Publishing Company, 2001.

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Roles

A major challenge of almost all organizations today is finding a way to integrate the knowledge and expertise of their personnel in decision making and forecasting. In *The Wisdom of Crowds,*[1] James Surowiecki shows that under certain conditions -- diversity, independence, and a particular kind of decentralization, the aggregation of judgments of a group will produce better decisions and forecasts than even the most skilled decision maker.

By assigning roles for providing data and judgments, and by aggregating judgments based on data, knowledge, and experience from people throughout an organization or population, the conditions for creating the wisdom of crowds rather than delusions of crowds (*Extra Ordinary Popular Delusions and the Madness of Crowds* [2]) can be achieved. Assigning roles to decision makers is also important in terms of higher level management maintaining control where they feel it is necessary (usually by limiting roles for prioritizing the high level objectives). Also, assigning roles helps distribute some of the workload in gathering judgments.[3]

Consensus is a worthy goal, but as a decision-making standard, it can be an obstacle to action or a recipe for lowest-common-denominator compromise.[4] A more practical objective is to get the stakeholders for a decision involved in some way, and assigning roles is an excellent way to do this. Often it is the stakeholders who will make a decision succeed or fail, and getting them involved in the decision is a proven way to increase buy-in.

[1] Surowiecki, James. *The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economies, Societies and Nations*. New York: Anchor Books, 2005.

2 MacKay, Charles. Extraordinary Popular Delusions and the Madness of Crowds. United Kingdom: Richard Bentley (publisher), 1841.

[3] Expert Choice Comparion online help

[4] Rogers, Paul and Marcia W. Blenko. "Who has the D?: How Clear Decision Roles Enhance Organizational Performance." Harvard Business Review, January 2006.

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Synthesis

Synthesis involves putting together or combining parts into a whole. Analysis - the separating of any material or abstract entity into its constituent elements - is the opposite of synthesis.[1]

Organizations have become quite good at doing analysis; however, few organizations know how to synthesize. The Analytic Hierarchy Process (AHP) might as well be called the *Synthesis* Hierarchy Process because, at its core, AHP helps us measure and synthesize the multitude of factors involved in complex decisions.[1]

In order for an organization to make a rational decision (i.e., one that best achieves the multitude of their objectives) they *must* be able to synthesize.[1]

[1] Forman, Ernest H. and Mary Ann Selly. Decision by Objectives: How to Convince Others That You Are Right. World Scientific Publishing Company, 2001.

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Measures of inconsistency

Humans are unreliable decision makers because our judgments as humans are generally strongly influenced by irrelevant factors.[1] This is the expert opinion of Daniel Kahneman, the Nobel Prize winner in Economic Sciences and a master in understanding, disseminating, and synthesizing the psychological complexities of human cognition - including human heuristics and biased decision making. The more complex a decision, the more likely subjective judgments are made.[2]

Most executives and managers often contradict their own prior judgments when given the same data on different occasions. Research has confirmed that, in many tasks, experts' decisions are highly variable. Therefore, better decisions are made, and overall decision making processes are improved, through the design and implementation of algorithms. Studies have shown that algorithms are more accurate than human professionals at making consistent decisions.[2]

Kahneman suggests that personnel should adopt procedures that promote consistent results by ensuring that those in the same position use similar methods to seek information, integrate it, and translate it into a repeatable decision making process.[2]

[1]https://www.linkedin.com/pulse/noise-how-inconsistent-subjective-judgement-decision-making-kiaos/.

[2]Kahneman,D.,Rosenfield, A., Gandhi, L & Blaser.T. (2016). Inconsistent Decision Making Is A Huge Hidden Cost For Many Companies. Here's How To Overcome What We Call Noise. Harvard Business Review, pp 34-44.

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Measures of consensus

Consensus decision-making is a group decision-making process in which group members develop, and agree to support, a decision in the best interest of the whole.

Consensus decision-making is a dynamic way of reaching agreement between all members of a group by ensuring that all opinions, ideas, and concerns are taken into account. In the decision-making process, consensus means looking for "win-win" solutions that are acceptable to every person involved. It is neither compromise nor unanimity; it aims to go further by weaving together everyone's best ideas and key concerns, and is a process that often results in surprising and creative solutions.[1]

When everyone agrees with a decision, they are much more likely to implement it and stay involved in the long run.

[1]https://www.seedsforchange.org.uk/consensus.

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Sensitivity analysis

Most, if not all, decisions are made under uncertain conditions. Sensitivity analysis is a technique used to determine how different values of an independent variable impact a particular dependent variable under a given set of assumptions. It is used to identify how much variation, in the input values for a given variable, will impact the results for a mathematical model.[1]

This uncertainty imposes a limit on our confidence in the response or output of the model. Sensitivity analysis is an integral part of any decision-making process accompanied by the creation of a decision-support model.[2]

Also known as the *What-If* analysis,[3] sensitivity analysis can be used for any activity or system - from planning a family vacation with the variables in mind, to the decisions at corporate levels.

It helps in analyzing how sensitive the output is, by the changes in one input while keeping the other outputs constant. Sensitivity analysis works on this simple principle: Change the model and observe the behavior.[3]

[1]Maverick, J.B. "What are some examples of ways that sensitivity analysis can be used?" Investopedia, Mar. 2018. .

[2]Borgonovo E., Peccati L. (2008) Sensitivity Analysis in Decision Making: A Consistent Approach. In: Abdellaoui M., Hey J.D. (eds) Advances in Decision Making Under Risk and Uncertainty. Theory and Decision Library (Series C: Game Theory, Mathematical Programming and Operations Research), vol 42. Springer, Berlin, Heidelberg.

[3]*All you want to know about Sensitivity Analysis* . .

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Iteration

Iteration is the act of repeating a process to generate a sequence of outcomes, with the aim of approaching a desired goal, target, or result. Each repetition of the process is also called an *iteration*. The results of one iteration are used as the starting point for the next iteration.[1]

In decision making, *iteration* is a process for arriving at a decision or a desired result, by repeating rounds of analysis or a cycle of operations. The objective is to bring the desired decision or result closer to discovery with each repetition (iteration). The iterative process can be used where the decision is not easily revocable - such as a marriage or war - or where the consequences of revocation could be costly.[2]

[1].

[2].

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The Analytic Hierarchy Process (AHP)

The analytic hierarchy process (AHP) is a structured technique for organizing and analyzing complex decisions, based on mathematics and psychology. It was developed by Thomas L. Saaty in the 1970s and has been extensively studied and refined since then (Wikipedia). AHP helps overcome the limitations and counterproductive strategies of decision making to reach decisions that are defensible, auditable, transparent, and that utilize a consistent process.

Using AHP involves the mathematical synthesis of numerous judgments about the decision problem at hand. It is not uncommon for these judgments to number in the dozens or even the hundreds. While the math can be done by hand or with a calculator, it is far more common to use one of several computerized methods for entering and synthesizing the judgments. The simplest of these involve standard spreadsheet software, while the most complex use custom software, often augmented by special devices for acquiring the judgments of decision makers gathered in a meeting room.

Executives rate decision-making ability as the most important business skill, but few people have the training they need to make good decisions consistently. INFORMS has a paper titled "Exercises for Teaching the Analytic Hierarchy Process" [1].

[1] Lawrence Bodin, Saul I. Gass, (2004) Exercises for Teaching the Analytic Hierarchy Process. INFORMS Transactions on Education 4(2):1-13. https://doi.org/10.1287/ited.4.2.1

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Validating Experiments

Every day, people face decisions in domains as diverse as choosing among shampoos, stocks, medical treatments, and friends. When people have not learned what to do through trial and error, they need a suite of generally applicable decision-making skills. These include extracting relevant information, applying general values in specific settings, and integrating these pieces with a coherent decision rule.[1]

Behavioral decision research has often found deficiencies in these skills. These limits are reflected in such phenomena as preference reversals, anchoring and (insufficient) adjustment, sunk costs effects, poorly calibrated confidence judgments, and hindsight bias.[1] Investigators disagree about the level of external validity, pointing to the unnatural tasks and artificial environments used in the lab.

Accounts of decision-making processes typically point to four fundamental skills: assessing beliefs; assessing values; combining beliefs and values in order to identify choices; and having a meta-cognitive understanding of one's abilities.[1]

Expert Choice Inc area validation exercise

Saaty's validation exercises

[1]Parker, Andrew M. and Baruch Fischhoff. Decision-making Competence: External Validation through an Individual-differences Approach. Journal of Behavioral Decision Making J. Behav. Dec. Making, 18: 1-27, 2005.

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Common Applications for the AHP Methdology

Prioritization of strategic objectives

Site selection

Source selection

Vendor selection

HR candidate selection

Performance evaluation

360° reviews

Project portfolio management

Capital budgeting

Resource allocation

Voice of the customer

Forecasting

Risk management

Any important decision!

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Can inconsistency ratio be measured for multiple participants or groups?

Every measure of inconsistency is for one participant and one cluster of judgments. Inconsistency **cannot** be summed across multiple participants or clusters.

The inconsistency ratio is useful for finding instances where the participant may not have been focused or patient enough to make consistent judgments. Or perhaps the participant clicked on one side (right or left) when they intended to click on the other side.

Some level of inconsistency is perfectly acceptable. The AHP theory says you should look at inconsistencies over 10% (0.1) but, in practice, you can accept more because inconsistency is a natural human attribute.

An inconsistency measure of 100% (1) or more indicates random judgments.

To deal with high inconsistencies, you can:

1) ask the participant to review their judgments and make revisions as necessary;

2) remove the participant from the model, or take away their roles for the inconsistent cluster;

3) create a participant group that excludes participants with high inconsistency and do your analysis on that group.

You can also look at the consensus report, which calculates the standard deviation across participants.

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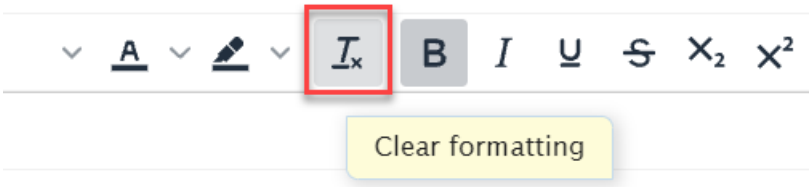
How to fix the formatting issues on the information documents?

Information Documents formatting can be inconsistent for a few reasons, such as when the information was copied from an external source document and pasted to the rich text editor.

We suggest clearing or resetting the formatting using the icon below:



After clearing the formatting, you can then reformat your information document on our Rich Text Editor.

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How to fix/prevent broken images on the information documents?

Images can be added to the information documents. If the image does not show up, you have what's called a broken image.

A broken image looks like this:

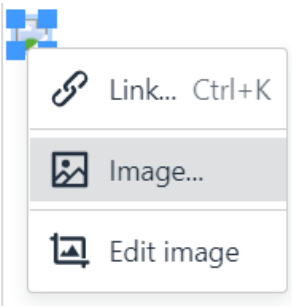
- Chrome and Microsoft Edge:
- Firefox:
- Internet Explorer:

Image can be added to information documents by:

1. Uploading an image from your local machine
2. Adding an image from an absolute image path (public URL)
3. Copying-Pasting an image

Broken image may occur when:

- **The Image no longer exists given the absolute image path** -- images from the internet (public URL) may be broken when the image was deleted or moved.
  - **Fix: Update the Source URL**
    - Open the editor
    - Right-click the broken image icon and then select "Image"



    - On the General tab, update the Source URL
- **Copying an image from one information document and then pasting it to another information document.** Copying an image from one information document to another will cause an incorrect image relative path. The image may temporarily show up but once the site is rebuilt or you upload the model to another site, you will see the broken image icon.
  - **Possible Fixes:**
    - Upload the image file;
    - Copy the image from the original source, not from an information document, and then paste it to the editor;
    - If you want to copy an image from one information document to another, you can also **download** the information document as a **.MHT** file and then **upload** it. This is also helpful if you want to download the entire information document, not just the image.

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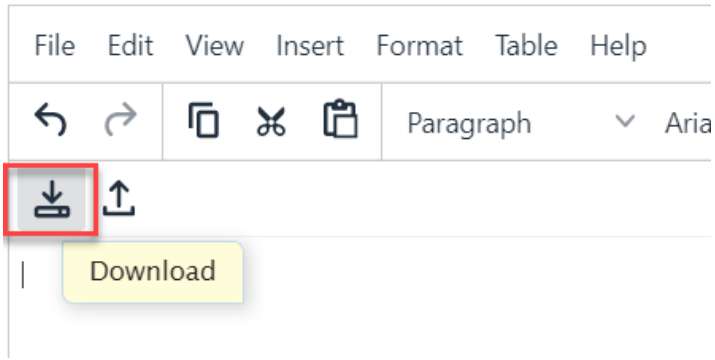

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How to make sure that my judgments are being saved?

Your judgments are automatically recorded when you move to another step, using the " **Next,**" "**Previous**," or "**Next Unassessed**" button.

You can also click the step number you are currently at to save your judgments and to stay on that page.

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Why I cannot see the options to manage my workgroup/models?

- If you are a Workgroup Manager/Owner, you have permission to create new models and manage **all** existing models and participants in your workgroup.
    - If you cannot see these options, your workgroup permission might be assigned incorrectly; please contact us at: support@expertchoice.com or thru our live chat.
- If you are a Project Organizer, you can create new models and manage **only** the models you created or you have a Project Manager's permission.
    - If you think your permission is not right, please contact your Workgroup Manager.

Please note that your workgroup license also determines if you can create more models.

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When I average participant priorities, why does it not agree with overall priorities?

Comparion computes the eigenvector of the **judgments** (not the priorities) across the selected participants to calculate combined priorities. There is no native spreadsheet function to do this -- this is what Comparion does.

For the combined priorities, first the geometric average is computed by taking the nth root of the product of the n judgments of the n participant's judgment for each pair. Then Comparion computes the eigenvector of these geometric averages. These derived priorities are shown to more accurately reflect the overall priorities.

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Do you have basic troubleshooting techniques?

Here are common troubleshooting techniques that often help.

1. **Try a hard refresh.**

   Browsers store cached versions of web pages to speed up your experience. However, sometimes this causes you to view an older version of a site or application. If the site looks weird or is glitching, doing a hard refresh often can fix the problem.
   1. Windows: Control + F5
   2. Apple/Mac: Command + R or Apple + R
   3. Linux: F5

2. **Log out and log back in.**

   The software equivalent of turning it off and on, this is probably the most common troubleshooting technique there is. It's common because it works a lot of the time. Not successful? Try totally logging out and totally closing your browser. If you happen to leave your browser open for long periods of time, it can become very slow and cause performance issues with many sites and applications.

3. **Clear your cache and cookies.**

   Your browser stores a lot of information about your web history in cookies and cache. Over time, this can slow down your browser and, with certain sites or applications, can cause conflicts with newer versions. Sometimes it might be helpful to clear your cache and cookies to improve browser and application performance.
   1. Chrome: https://support.google.com/accounts/answer/32050
   2. Firefox Cache: https://support.mozilla.org/en-US/kb/how-clear-firefox-cache
   3. Firefox Cookies: https://support.mozilla.org/en-US/kb/delete-cookies-remove-info-websites-stored
   4. Internet Explorer: http://windows.microsoft.com/en-us/internet-explorer/manage-delete-browsing-history-internet-explorer
   5. Safari Cookies: https://support.apple.com/kb/PH19215
   6. Safari Cache: https://support.apple.com/kb/PH19215

4. **Try a different browser.**

   Some issues may be browser-specific or caused by an extension or plugin. Trying a different browser can help you narrow down what is causing a problem.

If you are still having trouble, please reach out to support. We're here to help.

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