

Visual PROMETHEE

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Introduction



P R O M E T H E E
M E T H O D S

Visual PROMETHEE 1.0 Manual

Version 0.92c - May 17, 2012.

This is the beta version of the Visual PROMETHEE 1.0 Manual and Help file.

The content and the layout will be regularly updated.

- [Welcome](#)
- [What is Visual PROMETHEE?](#)
- [What is PROMETHEE?](#)
- [What's new?](#)

Welcome to Visual PROMETHEE

Bienvenue!
Welkom!
Willkommen!
¡Bienvenido!
Benvingut!
Bem-vindo!
Benvenuto!
Dobrodošli!
Witamy!
Sveiki atvykę!
Добро пожаловать!
Fáilte!
Hoşgeldiniz!
ברוך הבא!
!مرحبا
!خوش آمدید
ようこそ!
歡迎!
आपका स्वागत है!
Grata!

What is it about

Visual PROMETHEE is a multicriteria decision aid ([MCDA](#)) software.

It is designed to help you to evaluate and to rank several possible decisions or items according to several potentially conflicting criteria.

Here are some examples:

- Purchase of an equipment
- Procurement - Evaluation of suppliers
- Definition of Key Performance Indicators (KPI)
- Human resources management
- Evaluation of projects
- Investment selection
- Location problems
- Quality assessment
- Health care
- Environmental impacts and sustainable development

More information about possible applications can be found at the [Decision Drive](#) web site.

Visual PROMETHEE relies on the [PROMETHEE](#) and [GAIA](#) methods that have been developed at the ULB and VUB universities of Brussels.

What is Visual PROMETHEE

Visual PROMETHEE is the last and most complete and up-to-date software implementation of the [PROMETHEE](#) and [GAIA](#) multicriteria decision aid (MCDA) methods.

Visual PROMETHEE is developed by Professor [Bertrand Mareschal](#) from the Solvay Brussels School of Economics and Management of the Université Libre de Bruxelles ([ULB](#)).

Professor Bertrand Mareschal has been developing and applying the PROMETHEE and GAIA methods for 30 years together with Professor Jean-Pierre Brans at the [ULB](#) and [VUB](#) universities in Brussels.

With Visual PROMETHEE you can share the expertise of a worldwide expert in the field of multicriteria decision aid and of one of the original authors of the PROMETHEE and GAIA methods.

PROMETHEE Software

Here is a short chronological history of PROMETHEE-based software.

1985 - Back in the 1980's

The first PROMETHEE implementation was made by Bertrand Mareschal on the ULB mainframe computer in FORTRAN around 1984. It was very different from today's software. And it was very difficult to adapt programs to different computers. The University of Split was a pioneer: they got a stack of punched cards and had the software running on their Vax system in a matter of days. Later the software was ported to the IBM PC. It was the basis for PromCalc.

1990 - PromCalc

The PromCalc software was developed around 1990 as an MS-DOS application by Bertrand Mareschal and Jean-Pierre Brans. PromCalc was one of the first truly interactive and graphical software available in the field of MCDA. Many universities and companies worldwide started to use it. At the end of the 1990's Windows 95 and 98 had changed the way of computing. It was time to move on.

2000 - Decision Lab

The Decision Lab 2000 software has been developed as a joint project between ULB and the Canadian company Visual Decision. Decision Lab took the PromCalc ideas and implemented them in a MS Windows program. It was a huge step forward with respect to software usability. It is now discontinued.

2010 - D-Sight

D-Sight is a software developed a few years ago under the lead of Yves De Smet from ULB. The main objective was to develop MCDA business in a spin-off named Decision Sights.

2012 - Smart Picker Pro

This is a recent project led by Philippe Némery. Philippe got his PhD at ULB in the field of multicriteria sorting methods. His software emphasizes this aspect.

2012 - Visual PROMETHEE

The development of Visual PROMETHEE started in 2010. It was initiated by Bertrand Mareschal in order to provide an adequate replacement for Decision Lab 2000. Most development was done in 2011 and 2012. A strong emphasis is given to the quality of the user interface, to visual aspects and to the ease of use of the software, while implementing the latest and more advanced developments of multicriteria decision aid.

What are PROMETHEE and GAIA

The [PROMETHEE](#) and [GAIA](#) methods are among the most widely used multicriteria decision aid methods.

Several hundreds of scientific papers related to PROMETHEE and GAIA have been published in scientific journals all around the world. You can check the online bibliography at <http://biblio.promethee-gaia.net>. There are currently (May 2012) more than 400 references available.

A large number of organizations (private companies, public administrations, research centers, universities, individuals, ...) worldwide have been using PROMETHEE-based software for their decision-making or evaluation problems.

If you want to discuss the potential of Visual PROMETHEE for your own decision or evaluation problems, please contact us at bmaresc@ulb.ac.be.

What's new

Currently (May 15, 2012), Visual PROMETHEE is still in a beta version.

The 1.0 version will be available soon.

Getting Started

- [System requirements](#)
- [Getting help](#)
- [Terminology](#)

System requirements

Visual PROMETHEE is a MS-Windows program. It runs on Windows XP, Vista and 7.

It is possible to run Visual PROMETHEE on Linux or MacOS systems using a virtual machine (e.g. WINE for Linux systems). All functionalities are not necessarily available in this case. Native MacOS and iOS versions of Visual PROMETHEE are considered as a possible development.

The GIS PROMap feature requires an Internet connection.

There are no other special requirements.

Getting help

Help related to Visual PROMETHEE or to the use of the PROMETHEE and GAIA methods can be found:

- In this help file/manual.
- In the PROMETHEE-GAIA FAQ at <http://faq.promethee-gaia.net>
- On the PROMETHEE-GAIA Forum at <http://forum.promethee-gaia.net>

Additional information can also be found:

- On the PROMETHEE-GAIA Blog at <http://blog.promethee-gaia.net>
- On the LinkedIn [PROMETHEE Decision Aid Methods group](#)

Terminology

This is an alphabetical list of the main terms used in this document. Click a term to access its definition.

- [Action](#)
- [Category](#)
- [Cluster](#)
- [Criterion](#)
- [Decision-maker](#)
- [Decision problem](#)
- [Group](#)
- [Hierarchy](#)
- [Qualitative scale](#)
- [Scenario](#)
- [Weight](#)

Action

The term **action** is used to designate either a possible decision or an item to evaluate. Visual PROMETHEE compares different actions that are evaluated on several criteria.

Actions can be created or modified from the [Actions](#) dialog. Click "**Model | Actions...**" to open the dialog.

Category

An action **category** defines a subset of actions that share the same symbol and colors in the analysis.

Categories can be created or modified from the [Action Categories](#) dialog. Click "**Model | Action Categories...**" to open the dialog.

Cluster

A **cluster** defines a subset of criteria within one or several [criteria groups](#). It is at the top level of the Visual PROMETHEE [hierarchy](#) of criteria.

Clusters can be created or modified from the [Clusters](#) dialog. Click "**Model | Clusters...**" to open the dialog.

Criterion

A **criterion** is an attribute associated to each action that makes it possible to compare the actions and to determine the best ones.

It can be quantitative (a number is associated to each action, such as the price of an item) or qualitative (in this case, a qualitative scale must be defined with a number of ordered levels such as for instance: very bad, bad, average, good, very good).

Criteria can be created or modified from the [Criteria](#) dialog. Click "**Model | Criteria...**" to open the dialog.

Decision-maker

In the context of Visual PROMETHEE a **decision-maker** is a person or an organization that is responsible for a decision or implied in the decision process.

For a given decision problem there can be either a single or multiple decision-makers.

In Visual PROMETHEE each decision-maker can be associated to one [scenario](#) and thus express his/her preferences and priorities independently from the other decision-makers.

Synonyms are **actor** or **stakeholder**.

Decision Problem

In Visual PROMETHEE a **decision problem** is defined by:

- A set of [actions](#): These are the possible decisions or choices, or are items to evaluate.
- A set of [criteria](#): These are the attributes that are used to compare the actions. They represent the objectives of the [decision-maker](#).
- One or several [scenarios](#): Each scenario contains specific evaluations and preference information. Scenarios can represent the points of view of different [decision-makers](#) or different hypotheses.

General information related to the decision problem can be edited in the [Problem Info](#) dialog.

Group

An **criteria group** defines a subset of criteria that share the same outline color within a cluster in the analysis.

Each criteria group belongs to a cluster. It is the intermediate level of the Visual PROMETHEE criteria hierarchy.

Criteria groups can be created or modified from the [Criteria Groups](#) dialog. Click "**Model | Criteria Groups...**" to open the dialog.

Hierarchy

The criteria **hierarchy** in Visual PROMETHEE has three levels:

- At the top level are the [clusters](#). They are identified by a shape and a fill color.
- At the intermediate level are the [criteria groups](#). Each criteria group belongs to a cluster. They are

identified by their cluster shape and fill color and by a specific outline color.

- At the bottom level are the individual criteria. Each [criterion](#) belongs to a criteria group.

The [Hierarchy Assistant](#) can help you to define the criteria hierarchy.

Qualitative scale

Qualitative criteria are evaluated on a **qualitative scale** rather than with numbers.

In Visual PROMETHEE a qualitative scale is defined by:

- a number of ordered levels (from worst to best),
- numerical values associated to these levels,
- whether the numerical values should be minimized or maximized (scale orientation).

Different qualitative scales can be defined with Visual PROMETHEE using the [Qualitative Scales](#) dialog.

Scenario

A **scenario** is a set of evaluations and preference parameters that is defined for a decision problem.

Scenarios can represent:

- the point of view of different [decision-makers](#),
- different hypotheses.

Scenarios can be created or modified from the [Scenarios](#) dialog. Click "**Model | Scenarios...**" to open the dialog.


Weight

The **weight** of a criterion is a positive number that represents the criterion relative importance.

The [Weighing Assistant](#) can be used to assess the weights of the criteria.

Tutorial

After you have installed Visual PROMETHEE on your computer, a Visual PROMETHEE icon will appear on the desktop.

Double-click the  icon to start Visual PROMETHEE.

The tutorial is organized in five sections in the following order:

- [The main window](#)
- [A guided tour](#)
- [Working with multiple scenarios](#)
- [Advanced features](#)
- [Starting a new problem](#)

The main window

When you start Visual PROMETHEE the main window is displayed.

Visual PROMETHEE beta - unnamed (saved)

File Edit Model Control PROMETHEE-GAIA GDSS GIS Custom Assistants Snapshots
Options Help

Unit: k€, kW, L/100km, 5-point, 5-point

	Price	Power	Consumption	Habitability	Comfort
Preferences					
Min/Max	min	max	min	max	max
Weight	1,00	1,00	1,00	1,00	1,00
Preference Fn.	V-shape	Linear	V-shape	Level	Level
Thresholds	absolute	absolute	absolute	absolute	absolute
- Q: Indifference	n/a	5	n/a	1,0	0,5
- P: Preference	15,000€	30	2,0	2,5	2,5
- S: Gaussian	n/a	n/a	n/a	n/a	n/a
Statistics					
Minimum	15,000€	50	7,0	1,0	1,0
Maximum	38,000€	110	9,0	5,0	5,0
Average	28,083€	83	8,2	3,2	3,0
Standard Dev.	7,407€	18	0,7	1,3	1,3
Evaluations					
<input checked="" type="checkbox"/> Tourism B	25,500€	85	7,0	good	average
<input checked="" type="checkbox"/> Luxury 1	38,000€	90	8,5	good	very good
<input checked="" type="checkbox"/> Tourism A	26,000€	75	8,0	average	average
<input checked="" type="checkbox"/> Luxury 2	35,000€	85	9,0	very good	good
<input checked="" type="checkbox"/> Economic	15,000€	50	7,5	bad	very bad
<input checked="" type="checkbox"/> Sport	29,000€	110	9,0	very bad	bad

All Bertrand

Actions: 6 (6 enabled) Criteria: 5 (5 enabled) Scenarios: 1 (1 enabled) Saved

The main window is organized as follows, from top to bottom:

- The [Main Menu](#) is displayed on the top of the window.
- There are two [Toolbars](#) with important commands:
 - Data management on the upper row.
 - Analysis management on the lower row.
- The main part of the window is the spreadsheet:
 - Most data are displayed and can be edited from the spreadsheet.
 - On the top section are the current scenario name ("Bertrand" in the above screen shot) and the criteria names together with check boxes for activating/deactivating the criteria and unit and cluster/group information. Click on the buttons to access [scenario](#) or [criterion](#) dialogs.
 - The spreadsheet contains three collapsible sections: Preferences, Statistics and Evaluations. Click on the small icons in the leftmost column to collapse/expand these sections.
 - Preferences: For each criterion, the following data are available:

- Min/max: select whether the criterion has to be minimized or maximized.
- Weight: enter the weight of the criterion (weights are automatically normalized by the software).
- Preference Fn.: select the preference function type (or select "Help me" to use the [Preference Function Assistant](#)).
- Thresholds: select either "absolute" (thresholds expressed on the criterion scale of measurement) or "percentage" (thresholds expressed as percentages)
- Q: Indifference: Indifference threshold.
- P: Preference: Preference threshold.
- S: Gaussian: Gaussian threshold.
- Statistics: For each criterion, the following statistics are computed from the active actions: minimum and maximum values, arithmetic average and standard deviation.
- Evaluations: There is one row for each action. The check box is used to control the activation/deactivation of the action. Click on the name button to open the [action](#) dialog. The shape identifies the action's category. Evaluations can be entered in different ways:
 - For quantitative criteria, enter the numerical value.
 - For qualitative scales, a drop-down list allows to choose the evaluation.
 - Missing values are allowed: enter "?" for a missing value. "n/a" (not available) stands for missing values.
- At the bottom of the spreadsheet are tabs:
 - For each scenario, there is a tab. Click on the tab to switch to that scenario.
 - The "All" tab switches to the multi-scenarios analysis.
- The bottom of the main window displays a status bar with some general information related to the current problem (dimensions and save status).

A guided tour

When starting Visual PROMETHEE a demo dataset is automatically loaded.

The screenshot shows the Visual PROMETHEE beta software interface. The main window displays a table with the following data:

	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
	Price	Power	Consumption	Habitability	Comfort		
Unit	k€	kW	L/100km	5-point	5-point		
Cluster/Group							
Preferences							
Min/Max	min	max	min	max	max		
Weight	1,00	1,00	1,00	1,00	1,00		
Preference Fn.	V-shape	Linear	V-shape	Level	Level		
Thresholds	absolute	absolute	absolute	absolute	absolute		
- Q: Indifference	n/a	5	n/a	1,0	0,5		
- P: Preference	15,000€	30	2,0	2,5	2,5		
- S: Gaussian	n/a	n/a	n/a	n/a	n/a		
Statistics							
Minimum	15,000€	50	7,0	1,0	1,0		
Maximum	38,000€	110	9,0	5,0	5,0		
Average	28,083€	83	8,2	3,2	3,0		
Standard Dev.	7,407€	18	0,7	1,3	1,3		
Evaluations							
<input checked="" type="checkbox"/>	Tourism B		25,500€	85	7,0	good	average
<input checked="" type="checkbox"/>	Luxury 1		38,000€	90	8,5	good	very good
<input checked="" type="checkbox"/>	Tourism A		26,000€	75	8,0	average	average
<input checked="" type="checkbox"/>	Luxury 2		35,000€	85	9,0	very good	good
<input checked="" type="checkbox"/>	Economic		15,000€	50	7,5	bad	very bad
<input checked="" type="checkbox"/>	Sport		29,000€	110	9,0	very bad	bad

At the bottom of the window, the status bar shows: Actions: 6 (6 enabled) Criteria: 5 (5 enabled) Scenarios: 1 (1 enabled) Saved

The demo dataset is about the purchase of a new car. This problem has been used as an example in many PROMETHEE presentations (check the resources section at <http://www.promethee-gaia.net> to download presentations) and it was also provided as a tutorial with the Decision Lab software. So previous users should be familiar with it.

Let us suppose that somebody (the [decision-maker](#)) wants to purchase a new car and hesitates between six possible models (the [actions](#)):

- Two cars that we name **Tourism A** and **Tourism B**. These are classical family sedans.
- A more economical car that we name **Economic**.
- Two more luxury cars: **Luxury 1** and **Luxury 2**.
- And a more powerful car that we call **Sport**.

The names are chosen on purpose to reflect the characteristics of each car and to make it easier to understand how PROMETHEE and GAIA can help the decision-maker. In actual decision problems, the characteristics of the actions are usually much less obvious at first sight and PROMETHEE and GAIA will help you to discover these.

We suppose that the decision-maker has identified five [criteria](#) as important for choosing his/her new car:

- **Price**: That is the price of the car, expressed in Euros (€). Obviously the decision-maker prefers a lower price so this criterion should be minimized.
- **Power**: That is the power of the car, expressed in kW. This criterion should be maximized as more power is preferable.
- **Consumption**: Gas efficiency is measured the European way: it is the number of liters of gas consumed per hundred kilometers. It has thus to be minimized.
- **Habitability**: The perception of space is subjective and this criterion calls for a qualitative scale. Here we use the classical 5-point scale: very bad, bad, average, good and very good.
- **Comfort**: The comfort of each car is evaluated on the same 5-point scale (very bad to very good).

As you see Visual PROMETHEE can handle quantitative as well as [qualitative](#) criteria.

There is a column for each criterion and a row for each action (at the bottom of the spreadsheet).

The **Preferences** section contains information about the preferences of the decision-maker:

- **Min/max**: indicates whether the criterion should be minimized or maximized.
- **Weight**: the weight of a criterion is a measure of how much it is important with respect to the other criteria. In the demo all the weights are equal so that the five criteria are considered to be equally important. The weights can be adjusted according to the priorities of the [decision-maker](#), to the position of the [GAIA](#) decision axis or to the results of a [sensitivity analysis](#).
- **Preference Fn.:** Here you can see what type of [preference function](#) has been associated to each criterion.
- **Thresholds**: Absolute thresholds have been selected for all the criteria. The corresponding thresholds are thus expressed on each criterion's scale.
 - Q: Indifference threshold.
 - P: Preference threshold.
 - S: Gaussian threshold.

The **Statistics** section displays some basic statistics for the criteria:

- **Minimum**: for instance the cheapest car has a price of 15,000 €.
- **Maximum**: the most expensive car has a price of 38,000 €.
- **Average**: the average price (over all active actions) is equal to 28,083 €.
- **Standard Dev.:** the standard deviation of the prices of the active actions is equal to 7,407 €.

For each criterion, the best value is displayed in green and the worst one in red: for instance the **Economic** car is the cheapest one while the **Luxury 1** is the most expensive.

Actions, criteria and scenarios (in this dataset there is only one [scenario](#) named **Bertrand**) names are actually buttons that you can click to open the corresponding [Actions](#), [Criteria](#) and [Scenarios](#) dialogs in order to display and edit specific data.

The check boxes on the top row and in the leftmost column of the spreadsheet allow to control which criteria and/or actions are active. If you un-check one box, the corresponding criterion or action will be removed from the analysis. It is thus very easy to make what-if analysis and to see the impact of one action or criterion on

the results of the analysis.

The colored symbols (circles, squares or diamonds) associated to the actions and the criteria correspond to the defined action [categories](#) and to the criteria [hierarchy](#).

Let us now start the analysis of the data.

- [Have a look at the PROMETHEE rankings.](#)
- [Learn to use the GAIA plane.](#)
- [Make a sensitivity analysis.](#)

The PROMETHEE rankings

There are two PROMETHEE rankings that are computed:

- The PROMETHEE I Partial Ranking is based on the computation of two [preference flows](#) (Phi+ and Phi-). It allows for incomparability between actions when both Phi+ and Phi- preference flows give conflicting rankings.
- The PROMETHEE II Complete Ranking is based on the net [preference flow](#) (Phi).

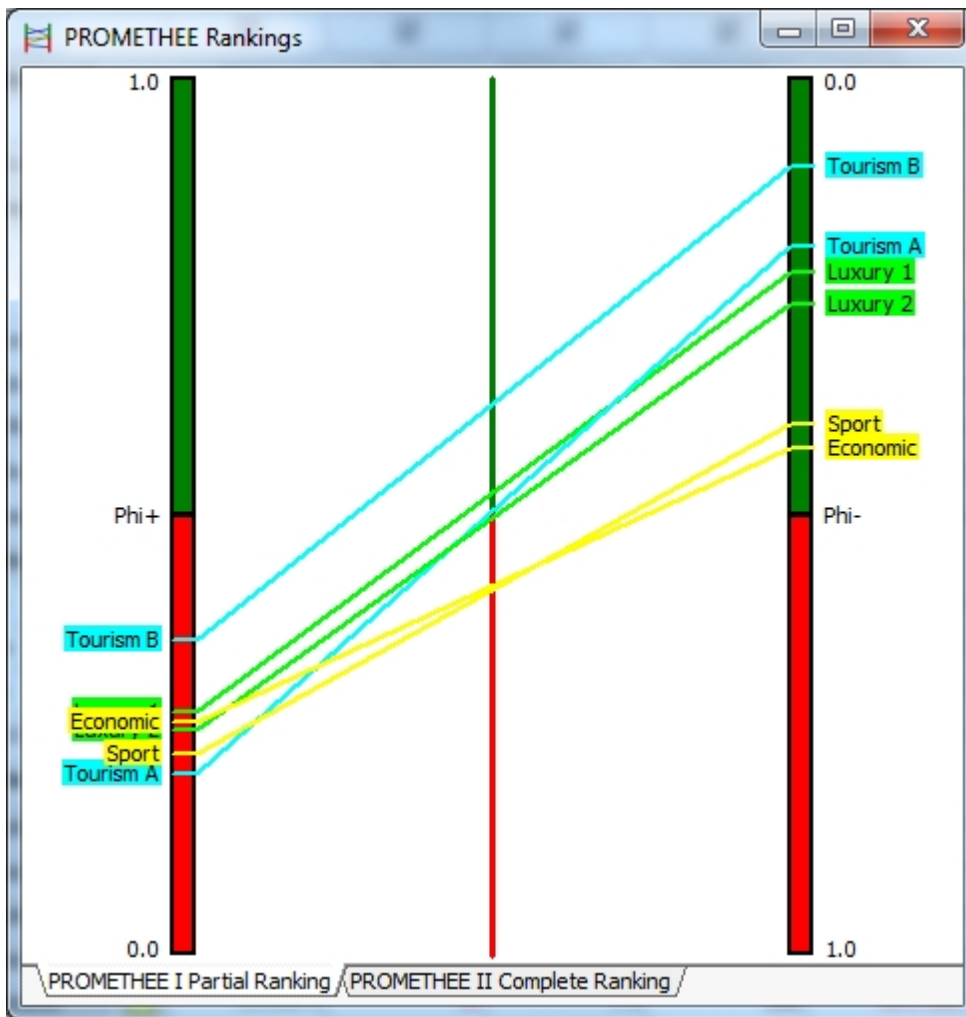
Visual PROMETHEE offers several ways to display the PROMETHEE rankings.

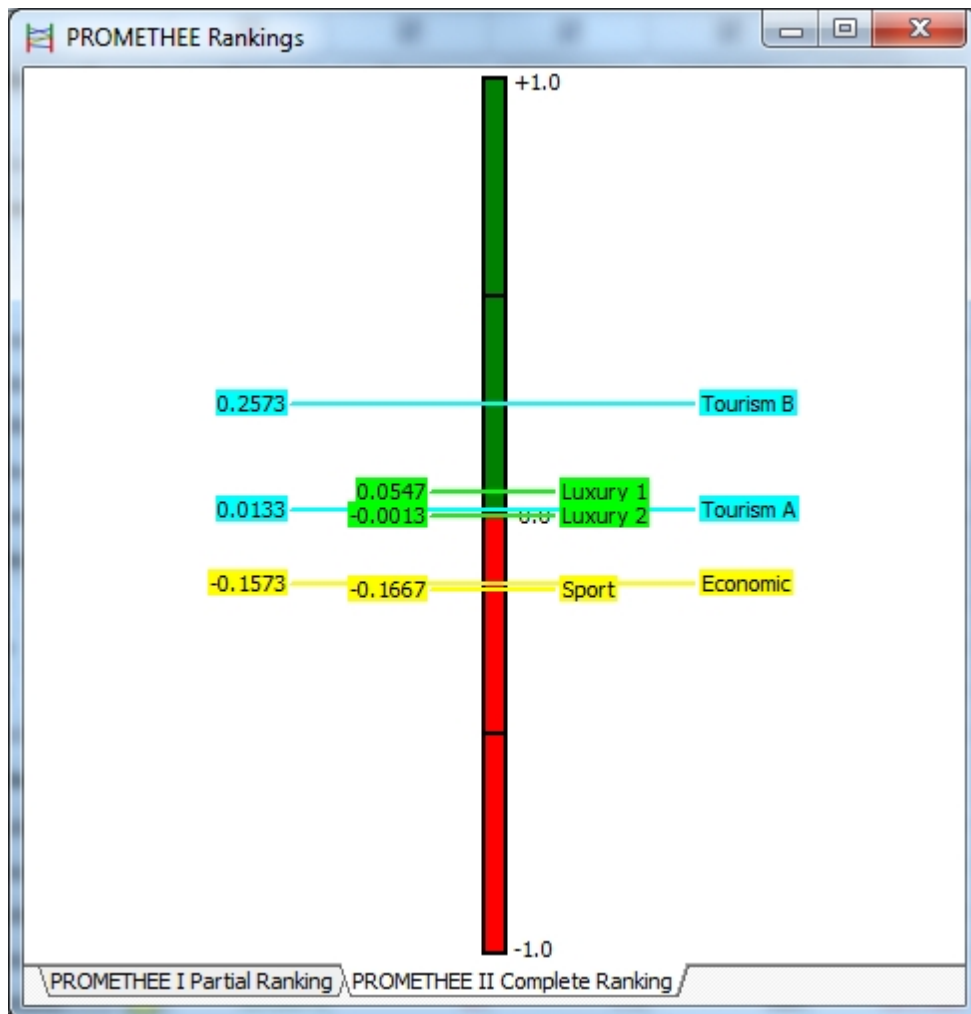
PROMETHEE Rankings

Click **PROMETHEE-GAIA | PROMETHEE Rankings** to open this window.

The [PROMETHEE Rankings](#) window has two tabs that can be selected at the bottom of the window:

- PROMETHEE I Partial Ranking
- PROMETHEE II Complete Ranking





On the PROMETHEE I Partial Ranking tab (left figure), the leftmost column shows the ranking of the actions according to Phi+: **Tourism B** is on top, followed by **Luxury 1**, **Economic**, **Luxury 2**, **Sport** and **Tourism A**. The rightmost column shows the ranking according to Phi-: **Tourism B** is still on top, but it is followed by **Tourism A**, **Luxury 1**, **Luxury 2**, **Sport** and **Economic**.

We can conclude that:

- **Tourism B** is preferred to all the other actions in the PROMETHEE I ranking.
- **Luxury 1** is on top of **Luxury 2** but they are very close to each other.
- **Tourism A** is incomparable with the **Luxury** cars because it has a worse score on Phi+ and a better one on Phi-.
- **Sport** and **Economic** are also incomparable with each other but they are lagging with respect to the other ones. Indeed even if their Phi+ score are similar to the previous cars, their Phi- scores are well behind.

This is confirmed by the PROMETHEE II complete ranking (right figure). Three groups of actions appear clearly:

- **Tourism B** has a higher Phi score.
- **Luxury 1**, **Tourism A** and **Luxury 2** have lower scores and are all very close to zero. They are more average actions.
- **Economic** and **Sport** have also very close but negative scores. They are at the bottom of the PROMETHEE II ranking.

While the PROMETHEE II complete ranking is easier to explain it is also less informative as the differences between Phi+ and Phi- scores are not visible anymore. Incomparability in the PROMETHEE I ranking is interesting because it emphasizes actions that are difficult to compare and thus helps the decision-maker to

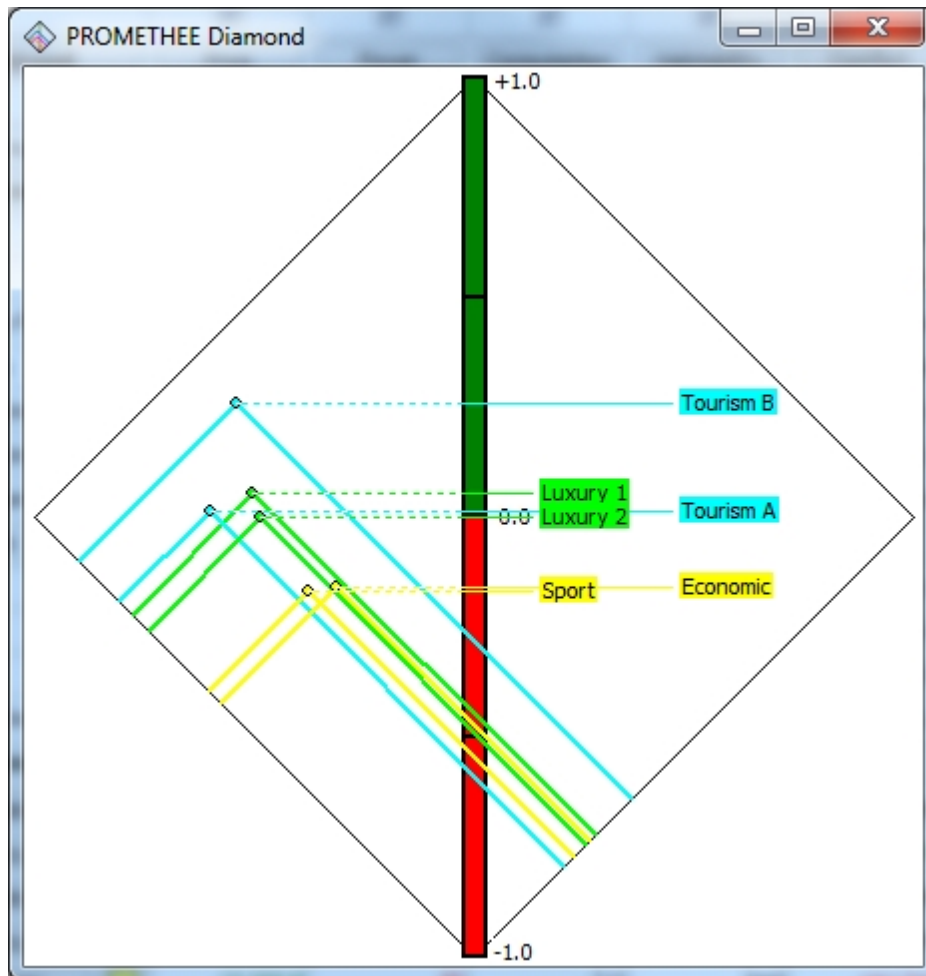
focus on these difficult cases.

PROMETHEE Diamond

Click **PROMETHEE-GAIA | PROMETHEE Diamond** to open this window.

The [PROMETHEE Diamond](#) is an alternative two-dimensional joint representation of both PROMETHEE I and II rankings.

The square corresponds to the (Phi+,Phi-) plane where each action is represented by a point. The plane is angled 45° so that the vertical dimension gives the Phi net flow. Phi+ scores increase from the left to the top corner and Phi- scores increase from the left to the bottom corner.



For each action, a cone is drawn from the action position in the plane.

As the **Tourism B** cone overlaps all the other ones this action is preferred to all the other ones in the PROMETHEE I partial ranking.

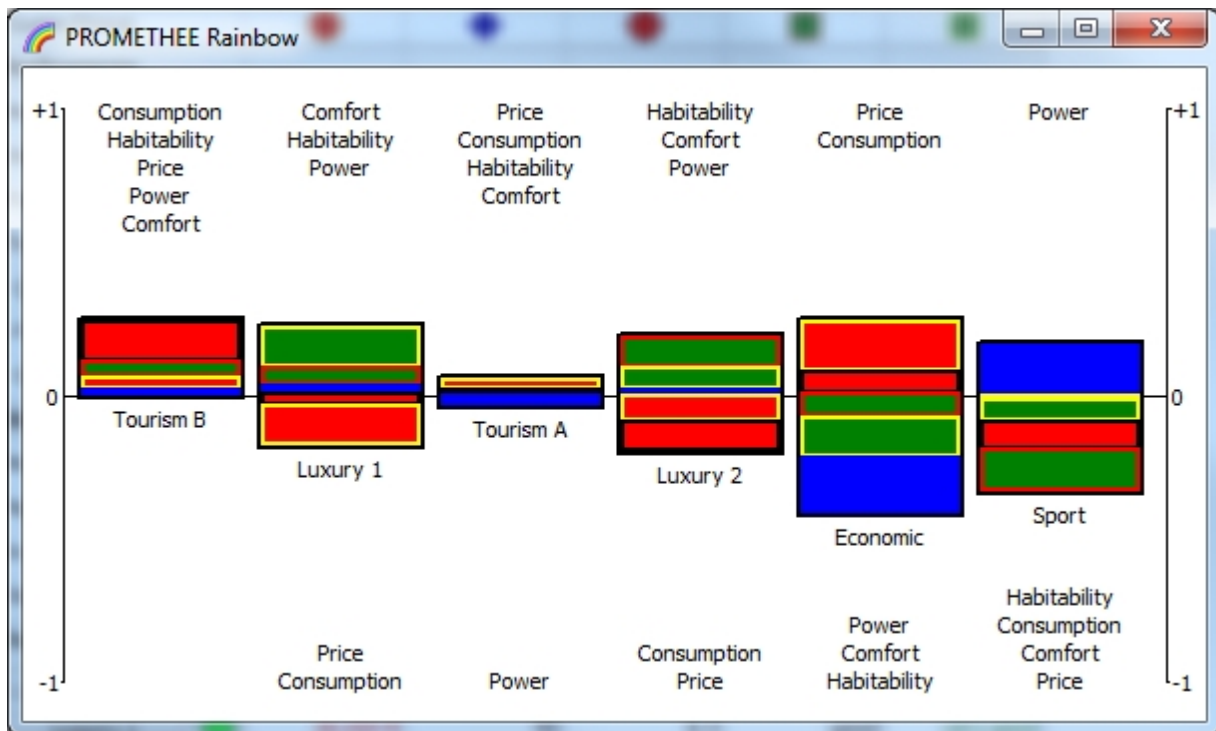
On the contrary the intersecting yellow cones corresponding to **Sport** and **Economic** indicate an incomparability.

An advantage of the PROMETHEE Diamond is that it is easy to visualize the proximity between Phi+ and Phi- scores globally.

PROMETHEE Rainbow

Click **PROMETHEE-GAIA | PROMETHEE Rainbow** to open this window.

The [PROMETHEE Rainbow](#) is a disaggregated view of the PROMETHEE II complete ranking.



Actions are displayed from left to right according to the PROMETHEE II ranking: **Tourism B** to **Sport**.

For each action the stacked slices show the components of the action net flow. For instance:

- **Tourism B** exhibits no negative slices as all criteria contribute positively to its net flow score. This action presents no weaknesses with respect to the other actions. The larger red slice indicates that **Consumption** is the most important feature of this action. Its Phi score is positive.
- **Tourism A** has very small slices. It has no real weakness but also no real advantage. It is quite average. Its Phi score is close to zero.
- **Economic** is much more of a mixed bag with a very good **Price** (the upper red slice) and a very low **Power** (the lower blue slice). Globally, the negative slice more than compensate the positive ones and the Phi score is negative.

PROMETHEE Table

Click [PROMETHEE-GAIA | PROMETHEE Table](#) to open this window.

	Car	Phi	Phi+	Phi-
1	Tourism B	0.2573	0.3573	0.1000
2	Luxury 1	0.0547	0.2760	0.2213
3	Tourism A	0.0133	0.2060	0.1927
4	Luxury 2	-0.0013	0.2560	0.2573
5	Economic	-0.1573	0.2647	0.4220
6	Sport	-0.1667	0.2280	0.3947

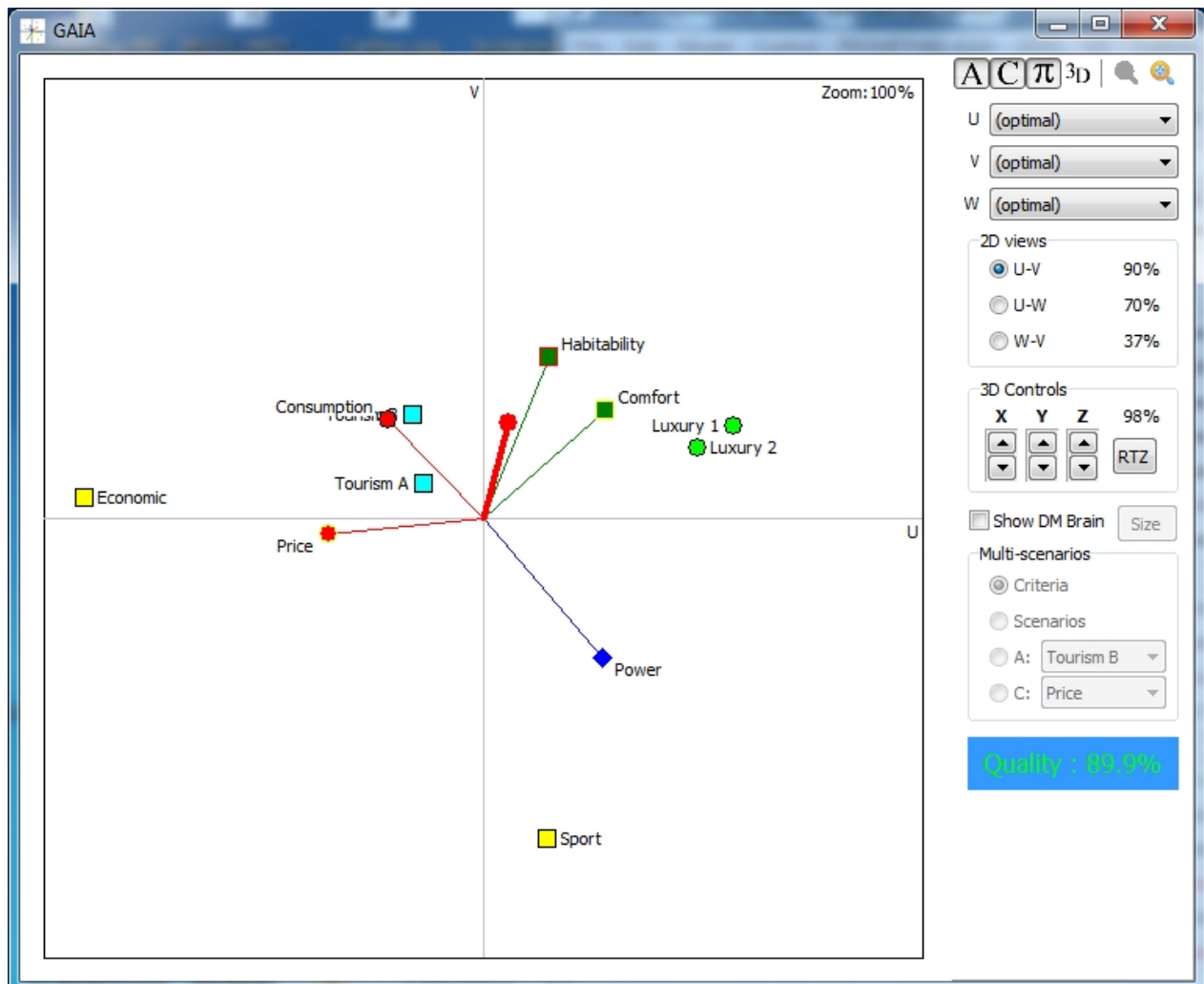
The [PROMETHEE Table](#) displays the Phi, Phi+ and Phi- scores. The actions are ranked according to the PROMETHEE II complete ranking. This can be handy when the number of actions is large or to export the

data to another program such as e.g. Excel (right-click the table to open the local menu and select **Copy** to copy the data to the clipboard).

The GAIA plane

The GAIA plane is a descriptive complement to the PROMETHEE rankings.

Click **PROMETHEE-GAIA | GAIA Visual Analysis** to open this window.



The [GAIA](#) analysis displayed when you start Visual PROMETHEE is a standard 2D (U,V) analysis.

GAIA starts from a multidimensional representation of the decision problem with as many dimensions as the number of criteria (five in this tutorial). A mathematical method called the Principal Components Analysis is used to reduce the number of dimensions while minimizing the loss of information.

In Visual PROMETHEE three dimensions are computed:

- U is the first principal component, it contains the maximum possible quantity of information,
- V is the second principal component, providing the maximum additional information orthogonal to U,
- W is the third principal component, providing the maximum additional information orthogonal to both U and V.

The standard GAIA analysis includes U and V only, as in older software such as PromCalc, Decision Lab, D-Sight or Smart Picker Pro. Visual PROMETHEE adds a third W component to improve the analysis when the (U,V) representation quality is too low.

The U, V, W list boxes are not functional yet. Currently optimal representations only are available.

The 2D views controls allow to switch between three 2D views:

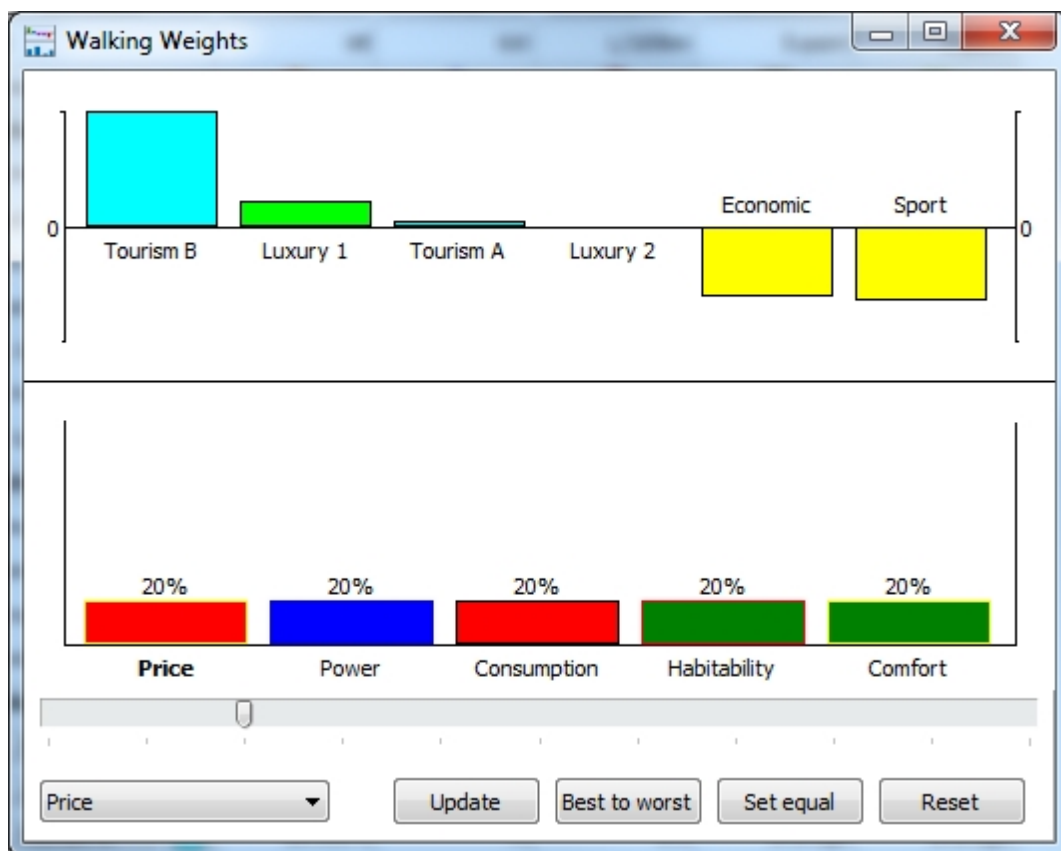
- U-V: This is the best possible 2D view. In this tutorial it gathers 90% of information.
- U-W: With respect to the U-V view, it is viewed from the side (W is orthogonal to both U and V), it gathers 70% of information.
- W-V: With respect to the U-V view, it is viewed from the top, it gathers only 37% of information.

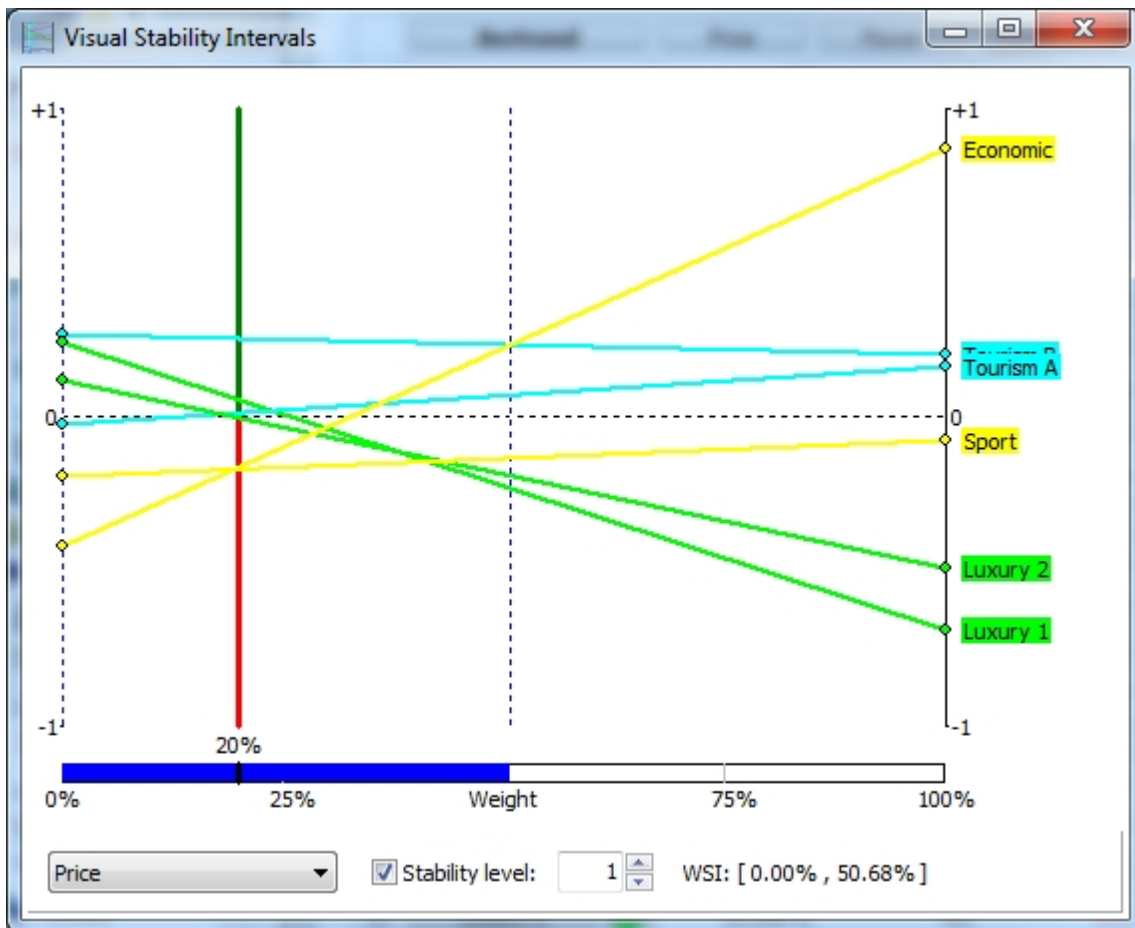
The Walking Weights

Visual PROMETHEE provides you with several tools to perform an extensive weight sensitivity analysis on your data.

Walking Weights

Click **PROMETHEE-GAIA | Walking Weights** to open this window.





Working with multiple scenarios

To learn about working with multiple scenarios in Visual PROMETHEE you are first going to load another dataset.

In the [Main Menu](#), click **File** and then **Open**. Find the **TutorSites.vpg** file (it should be located in the Visual PROMETHEE install folder) and open it.

Visual PROMETHEE beta - TutorSites.vpg (saved)

File Edit Model Control PROMETHEE-GAIA GDSS GJS Custom Assistants Snapshots Options Help

	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	Industrial	Investment	Operations	Employment	Transportation	Environment	Social
Unit	M\$	M\$	works	5-point	impact	impact	
Cluster/Group	◆	◆	◆	◆	◆	◆	
Preferences							
Min/Max	min	min	min	max	min	min	
Weight	25.00	15.00	20.00	20.00	10.00	10.00	
Preference Fn.	Linear	Linear	Linear	Level	Level	Level	
Thresholds	percentage	percentage	percentage	absolute	absolute	absolute	
- Q: Indifference	0.05	0.05	0.05	0.5	0.5	0.5	
- P: Preference	0.25	0.25	0.1	1.5	1.5	1.5	
- S: Gaussian	n/a	n/a	n/a	n/a	n/a	n/a	
Statistics							
Minimum	\$74	\$7	95	2.0	1.0	1.0	
Maximum	\$128	\$12	175	5.0	4.0	4.0	
Average	\$98	\$9	139	3.6	2.4	2.2	
Standard Dev.	\$20	\$2	32	1.0	1.0	1.2	
Evaluations							
<input checked="" type="checkbox"/>	Site 1	\$74	\$12	175	average	high	low
<input checked="" type="checkbox"/>	Site 2	\$86	\$9	170	good	low	very low
<input checked="" type="checkbox"/>	Site 3	\$89	\$7	145	very good	very low	moderate
<input checked="" type="checkbox"/>	Site 4	\$115	\$8	95	bad	low	high
<input checked="" type="checkbox"/>	Site 5	\$128	\$10	110	good	moderate	very low

All Industrial Political Environmental Social

Actions: 5 (5 enabled) Criteria: 6 (6 enabled) Scenarios: 4 (4 enabled) Saved

This dataset corresponds to a location problem. An industrial company wants to build a new plant and hesitates between five different locations (**Site 1** to **Site 5**).

Six criteria are considered relevant to compare the five locations:

- **Investment:** This is the investment cost in million Euros. It should be minimized.
- **Operations:** This is the annual operating cost. It is also expressed in million Euros and has to be minimized as well.
- **Employment:** This is the number of workers required to run the plant. Different locations correspond to different plant configuration or different technologies, so the choice has an impact on that number. As it is linked to salaries and to social costs, this criterion should be minimized.
- **Transportation:** This is a qualitative criterion that evaluates the site adequacy with respect to transportation. It encompasses factors such as the proximity to transportation networks, the distance to suppliers and to customers, etc. It is expressed on a 5-point scale (very bad to very good).
- **Environment:** This is a global evaluation of the environmental impact, on a 5 point impact scale: from very low (best) to very high (worst).
- **Social:** This is a global evaluation of the social impact, on the same 5 point impact scale: from very low (best) to very high (worst).

At the bottom of the spreadsheet, there are five tabs corresponding to the following scenarios:

Advanced features

Documentation available soon!

Starting a new problem

Documentation available soon!

How to

- [Define a new problem](#)
 - [Define the actions](#)
 - [Define the criteria](#)
 - [Define the scenarios](#)
 - [Model preferences](#)
 - [Organize the criteria](#)
 - [Weigh the criteria](#)
- [Rank different actions](#)
- [Use the GAIA analysis](#)
- [Perform a sensitivity analysis](#)
- [Use weight presets](#)
- [Generate a report](#)

Define a new problem

- [Define the actions](#)
- [Define the criteria](#)
- [Define the scenarios](#)
- [Model preferences](#)
- [Organize the criteria](#)
- [Weigh the criteria](#)

Define the actions

Documentation available soon!

Define the criteria

Documentation available soon!

Define qualitative scales

Documentation available soon!

Define the scenarios

Documentation available soon!

Model preferences

Documentation available soon!

Organize the criteria

Documentation available soon!

Weigh the criteria

Documentation available soon!

Rank different actions

Documentation available soon!

Use the GAIA analysis

Documentation available soon!

Perform a sensitivity analysis

Documentation available soon!

Use weight presets

Documentation available soon!

Generate a report

Documentation available soon!

User Interface

- [Main Menu](#)
- [Toolbars](#)
- [Local Menus](#)

Main Menu

The Visual PROMETHEE Main Menu is organized as follows:

The screenshot shows the Visual PROMETHEE beta software interface. The main window displays a table with columns for criteria: Price, Power, Consumption, Habitability, and Comfort. The table is organized into sections: Preferences, Statistics, and Evaluations. The 'Evaluations' section shows results for various scenarios like Tourism B, Luxury 1, etc.

	Price	Power	Consumption	Habitability	Comfort
Unit	k€	kW	L/100km	5-point	5-point
Category	●	◆	●	■	■
Preferences					
Min/Max	min	max	min	max	max
Weight	1,00	1,00	1,00	1,00	1,00
Preference Fn.	V-shape	Linear	V-shape	Level	Level
Thresholds	absolute	absolute	absolute	absolute	absolute
- Q: Indifference	n/a	5	n/a	1,0	0,5
- P: Preference	15,000€	30	2,0	2,5	2,5
- S: Gaussian	n/a	n/a	n/a	n/a	n/a
Statistics					
Minimum	15,000€	50	7,0	1,0	1,0
Maximum	38,000€	110	9,0	5,0	5,0
Average	28,083€	83	8,2	3,2	3,0
Standard Dev.	7,407€	18	0,7	1,3	1,3
Evaluations					
<input checked="" type="checkbox"/> Tourism B	25,500€	85	7,0	good	average
<input checked="" type="checkbox"/> Luxury 1	38,000€	90	8,5	good	very good
<input checked="" type="checkbox"/> Tourism A	26,000€	75	8,0	average	average
<input checked="" type="checkbox"/> Luxury 2	35,000€	85	9,0	very good	good
<input checked="" type="checkbox"/> Economic	15,000€	50	7,5	bad	very bad
<input checked="" type="checkbox"/> Sport	29,000€	110	9,0	very bad	bad

At the bottom of the window, it shows: All Bertrand / Actions: 6 (6 enabled) Criteria: 5 (5 enabled) Scenarios: 1 (1 enabled) Saved

- [File](#)
 - [New](#)

- To start entering the data for a new problem. This opens the [New](#) dialog.
 - **[Problem Creation Assistant](#)**
This launches the [Problem Creation Assistant](#).
 - **[Open](#)**
To open an existing Visual PROMETHEE file.
 - **[Save](#)**
To save the current problem under its existing file name.
 - **[Save As](#)**
To save the current problem under a new file name.
 - **[Import](#)**
To import data from various formats of text files.
 - **[Export](#)**
To export data and results to a text file.
 - **[Report](#)**
To generate an HTML report.
 - **[PROMETHEE Certificate](#)**
To manage the PROMETHEE Certification of your files (this is NOT available in the beta version).
 - **[Exit](#)**
To exit Visual PROMETHEE.
- **Edit**
This is a standard Edit menu.
- **Model**
This is the menu that gives access to the different components of the current problem. From here you can edit most data.
 - **[Info](#)**
General information related to the current problem.
 - **[Qualitative Scales](#)**
Definition and management of the qualitative scales.
 - **[Actions](#)**
Definition and management of the actions.
 - **[Criteria](#)**
Definition and management of the criteria.
 - **[Scenarios](#)**
Definition and management of the scenarios.
 - **[Weighing Assistant](#)**
 - **[Hierarchy Assistant](#)**
 - **[Action Categories](#)**
 - **[Criteria Groups](#)**
 - **[Clusters](#)**
 - **[Coalitions](#)**
- **Control**
 - **[Activate](#)**
Opens the activity center.
 - **[Filter](#)**
 - **[Sort](#)**
- **PROMETHEE-GAIA**
This is the menu from where most analysis results can be accessed.
 - **[PROMETHEE Rankings](#)**
 - **[PROMETHEE Diamond](#)**
 - **[PROMETHEE Rainbow](#)**

- [PROMETHEE Table](#)
- [GAIA Visual Analysis](#)
- [Action Profiles](#)
- [GAIA Webs](#)
- [Walking Weights](#)
- [Visual Stability Intervals](#)
- [PROMETHEE V Selection](#)
- [Sorting](#)
- [Performance Analysis](#)
- [Preference Flows](#)

- **GDSS**
 - This is a specialized menu for Group Decision Support System (GDSS) features of Visual PROMETHEE.
 - [Scenarios Comparison](#)
 - [Balance of Power](#)

- **GIS**
 - This is a specialized menu for Geographical Information System (GIS) features of Visual PROMETHEE.
 - [PROMap](#)
 - Integrate PROMETHEE-GAIA analyses with Google Maps.

- **Custom**
 - This is the menu where the custom functions available in specialized versions of Visual PROMETHEE are located.

- **Assistants**
 - [Create](#)
 - [Hierarchize](#)
 - [Weigh](#)
 - [Analyze](#)

- **Snapshots**
 - [Weight Presets](#)
 - [Layouts](#)

- [Options](#)

- [Help](#)

Toolbars

There are two tool bars in the main Visual PROMETHEE window.

Visual PROMETHEE beta - unnamed (saved)

File Edit Model Control PROMETHEE-GAIA GDSS GIS Custom Assistants Snapshots
Options Help







	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Bertrand	Price	Power	Consumption	Habitability	Comfort	
Unit	k€	kW	L/100km	5-point	5-point	
Category						
Preferences						
Min/Max	min	max	min	max	max	
Weight	1,00	1,00	1,00	1,00	1,00	
Preference Fn.	V-shape	Linear	V-shape	Level	Level	
Thresholds	absolute	absolute	absolute	absolute	absolute	
- Q: Indifference	n/a	5	n/a	1,0	0,5	
- P: Preference	15,000€	30	2,0	2,5	2,5	
- S: Gaussian	n/a	n/a	n/a	n/a	n/a	
Statistics						
Minimum	15,000€	50	7,0	1,0	1,0	
Maximum	38,000€	110	9,0	5,0	5,0	
Average	28,083€	83	8,2	3,2	3,0	
Standard Dev.	7,407€	18	0,7	1,3	1,3	
Evaluations						
<input checked="" type="checkbox"/> Tourism B		25,500€	85	7,0	good	average
<input checked="" type="checkbox"/> Luxury 1		38,000€	90	8,5	good	very good
<input checked="" type="checkbox"/> Tourism A		26,000€	75	8,0	average	average
<input checked="" type="checkbox"/> Luxury 2		35,000€	85	9,0	very good	good
<input checked="" type="checkbox"/> Economic		15,000€	50	7,5	bad	very bad
<input checked="" type="checkbox"/> Sport		29,000€	110	9,0	very bad	bad

All Bertrand

Actions: 6 (6 enabled) Criteria: 5 (5 enabled) Scenarios: 1 (1 enabled) Saved

The top row tool bar includes typical management options:

- New: Start a new problem.
- Open: Open an existing data file.
- Save: Save the current data.
- Cut: Cut to Clipboard.
- Copy: Copy to Clipboard.
- Paste: Paste from Clipboard.
- Add action: Add a new action to the current problem.
- Delete action: Delete the current action.
- Add criterion: Add a new criterion to the current problem.
- Delete criterion: Delete the current criterion.

- Add scenario: Add a new scenario to the current problem.
- Delete scenario: Delete the current scenario.
-  [Creation Assistant](#): Launch the Problem Creation Assistant.
-  [Hierarchy Assistant](#): Launch the Criteria Hierarchy Assistant
-  [Weighing Assistant](#): Launch the Criteria Weighing Assistant
-  [Analysis Assistant](#): Launch the Problem Analysis Assistant
-  [Options](#): Options.
-  Force Recalc: Launch full computation update.

The bottom row tool bar includes most analysis options:

-  [PROMETHEE Rankings](#)
-  [PROMETHEE Diamond](#)
-  [PROMETHEE Rainbow](#)
-  [PROMETHEE Table](#)
-  [GAIA](#)
-  [Action Profiles](#)
-  [GAIA Webs](#)
-  [Walking Weights](#)
-  [Visual Stability Intervals](#)
-  [PROMETHEE V Selection](#)
-  [PROMETHEE Sort](#)
-  [Performance Analysis](#)
-  [Efficient Frontier](#)
-  [Preference Flows](#)
-  [Scenario Comparison](#)
-  [Balance of Power](#)
-  [PROMap](#)
-  [Weight Presets](#)
-  [Layouts](#)

Local Menus

Local menus are available in most Visual PROMETHEE windows.

The local menus usually include:

- Options to control the current display.
- Copy to clipboard function.

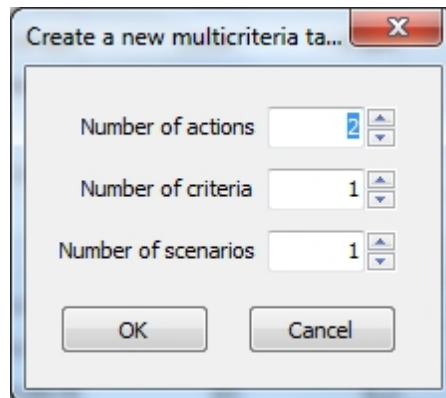
Right-click on the window to open the local menu.

Dialogs

- [New](#)
- [Import data](#)
- [Export data](#)
- [Report generator](#)
- [PROMETHEE Certificate](#)
- [Model](#)
 - [Problem Info](#)
 - [Qualitative Scales](#)
 - [Actions](#)
 - [Criteria](#)
 - [Scenarios](#)
 - [Action Categories](#)
 - [Criteria Groups](#)
 - [Clusters](#)
 - [Coalitions](#)
- [Options](#)

New

When you click "New", the following dialog opens:

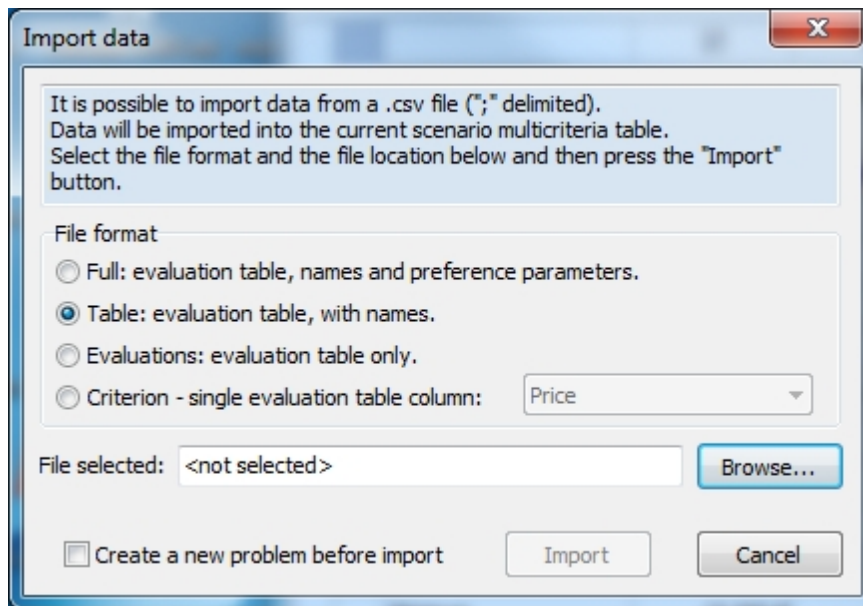


You can select the number of actions, the number of criteria and the number of scenarios.

When you press the "Ok" button an empty data set is created.

Import data

The "Import" dialog allows you to import data into a new problem. Data should be prepared in a .csv (";" delimited) file. This can be done easily from Excel for instance. Data will be imported into the current scenario.



From the "Import" dialog you can specify the file format:

- Full: Evaluation table, including actions and criteria names as well as preference parameters (weights, preference functions and thresholds).
- Table: Evaluations with actions and criteria names.
- Evaluations: Evaluations only.
- Criterion: A single column of evaluations is imported. The corresponding criterion name has to be selected.

Examples of file formats are given in the Excel file provided with the Visual PROMETHEE install.

Use the "Browse" button to locate the file you want to import.

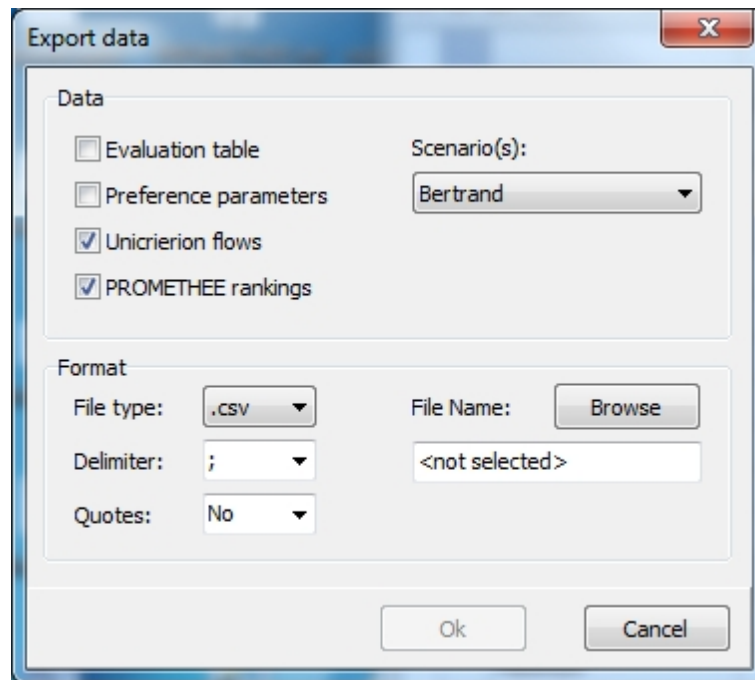
Then press the "Import" button to import the data.

Be sure that the import file is not open in Excel. Close it from Excel before you click "Import" otherwise Visual PROMETHEE will not be able to open the file and to import it.

If you check the "Create a new problem before import" box, a new problem will be created. Otherwise existing data will be overwritten.

Export data

You can export data to a text file for use in other software, such as for instance Excel or Word.



The "Data" section of the dialog allows you to specify what data you want to export:

- Evaluation table.
- Preference parameters (weights and preference functions).
- Unicriterion net flows.
- PROMETHEE rankings (multicriteria flows: Φ^+ , Φ^- and Φ).

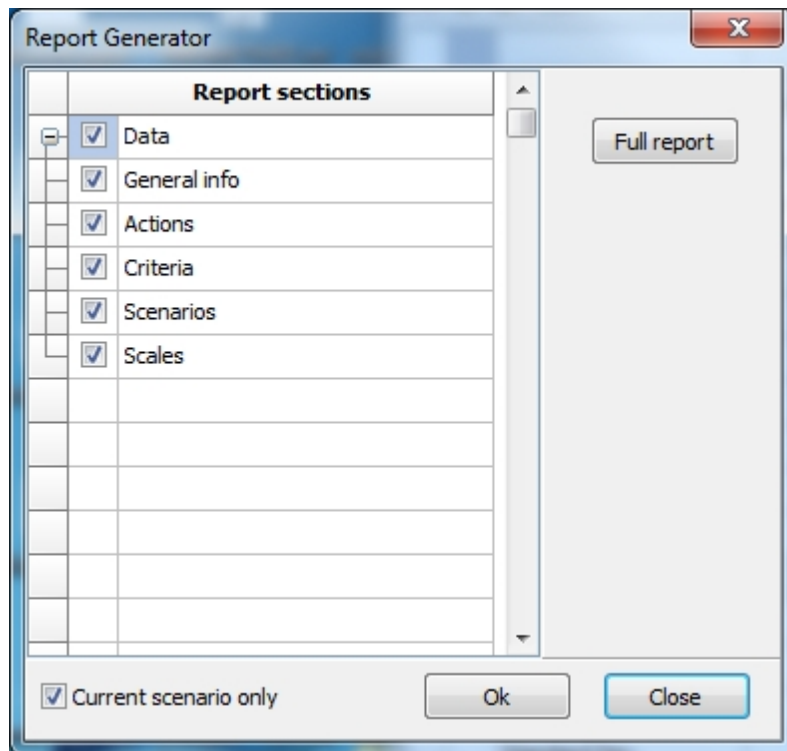
The "Format" section allows you to control the format of the export file:

- File type: either .csv or .txt or .pm
- Delimiter: choose the delimiter used in the export file.
- Quotes: choose whether to use quotes for strings in the export file.
- Click the "Browse" button to define the name and location of the export file.

Click the "Ok" button to export the data.

Report generator

The Report Generator allows to generate a tailor-made HTML report. **It is not yet implemented.**



PROMETHEE Certificate

How can you tell that the analysis you made is correct?

How can you tell that the analysis you are shown by a third party is correct?

That will be possible with Visual PROMETHEE.

This feature is not implemented yet and will be available only in the Business Edition of Visual PROMETHEE.

Model

- [Problem Info](#)
- [Qualitative Scales](#)
- [Actions](#)
- [Criteria](#)
- [Scenarios](#)
- [Action Categories](#)
- [Criteria Groups](#)
- [Clusters](#)
- [Coalitions](#)

Problem Info

To access this dialog, click: "Model | Info...".

This dialog allows you to enter some general information related to the current problem.

You can specify:

- A description of the problem.
- The name of the author.
- Custom description of action (and plural): for instance in the example we are comparing car(s).
- Custom description of criterion (and plural): it could indicator(s) for instance.

Press the "Ok" button to confirm.

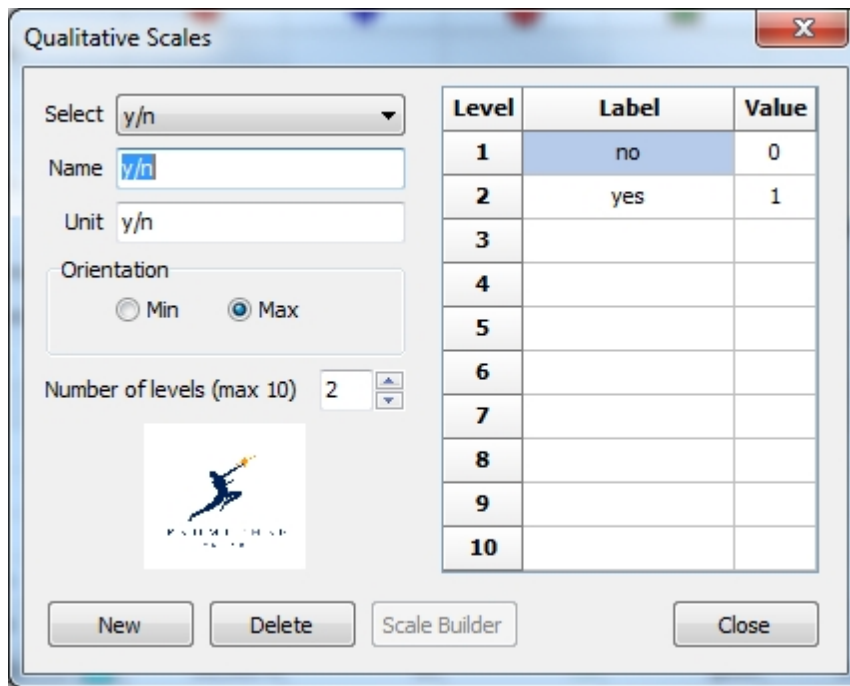
Qualitative Scales

To access this dialog, click: "Model | Qualitative scales...".

This is where you can define and manage qualitative scales.

There are four standard qualitative scales that are predefined when you create a new problem. These are:

- y/n: a simple 2-level scale.
- impact: this is a 5-level scale ranging from "very low" (best) to "very high" (worst) ; it is adequate for e.g. environmental or social impacts.
- 5-point: this is the classical 5-level scale ranging from "very good" to "very bad".
- 9-point: this extends the 5-point scale by adding intermediate levels.



To create a new scale, click the "New" button, set the number of levels and fill all the fields.

The maximum number of levels is set to 10. In practice you should try to keep the number of levels in a qualitative scale as low as possible (preferably no more than five) to ensure a consistent evaluation.

Each level is associated to a numerical value. When the number of levels is low, they are usually quite different from each other and you will probably use the usual preference function, so that actual values are not important. What is important is the order: from best to worst. Check that the "Orientation" is consistent with your choice.

You can also modify existing scales.

Scales are saved with the problem data and are thus problem-dependent. You can have different scales in different problems.

Click "Close" to exit.

Actions

To access this dialog, click: "Model | Actions...".

Here you can set the main properties of the actions.

- Select: Let you select one action.
- Name: To change the action name.
- Shortname: To change the action short name.
- Active: To activate/deactivate the action (deactivated actions are not taken into account in the computation).
- Description: Enter a description of the action.
- Picture: Click on the picture to change the picture linked to the action.
- Category: Select the category to which the action belongs.
- Location: Click to set the geo-localization of the action.

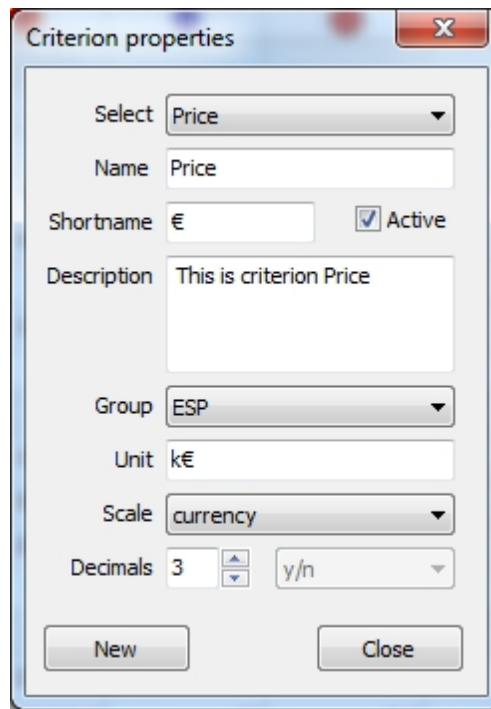
Click "New" to add a new action or "Delete" to delete the current action.

Click "Close" to close the window.

Criteria

To access this dialog, click: "Model | Criteria...".

Here you can set the main properties of the criteria.



- Select: Let you select one criterion.
- Name: To change the criterion name.
- Shortname: To change the criterion short name.
- Active: To activate/deactivate the criterion (deactivated criteria are not taken into account in the computation).
- Description: Enter a description of the criterion.
- Group: Select the criterion group to which the criterion belongs.
- Unit: Set the unit of measurement of the criterion.
- Scale: You can select the type of scale that will be use for the criterion. There are three possibilities:
 - numerical: numbers,
 - currency: evaluations will be displayed as a currency using the [localization](#) options,
 - qualitative: [qualitative scale](#), select the name of the scale in the drop-down list below.
- Decimals: Set the number of decimal places to display for this criterion.

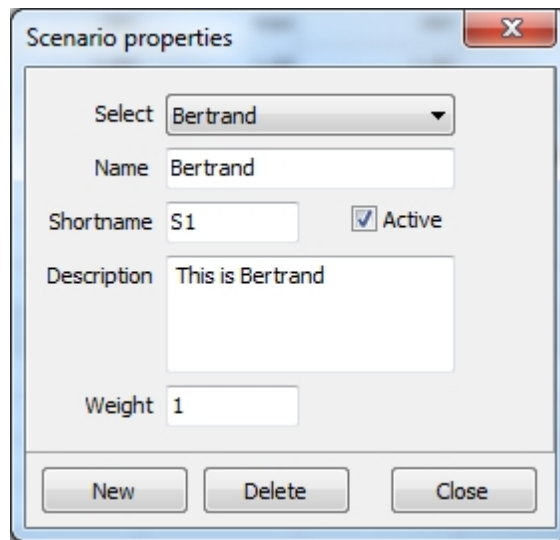
Click "New" to add a new action or "Delete" to delete the current criterion.

Click "Close" to close the window.

Scenarios

To access this dialog, click: "Model | Scenarios...".

Here you can set the main properties of the scenarios.



- Select: Let you select one scenario.
- Name: To change the scenario name.
- Shortname: To change the scenario short name.
- Active: To activate/deactivate the scenario (deactivated scenarios are not taken into account in the computation).
- Description: Enter a description of the scenario.
- Weight: Set the weight of the scenario.

Click "New" to add a new action or "Delete" to delete the current criterion.

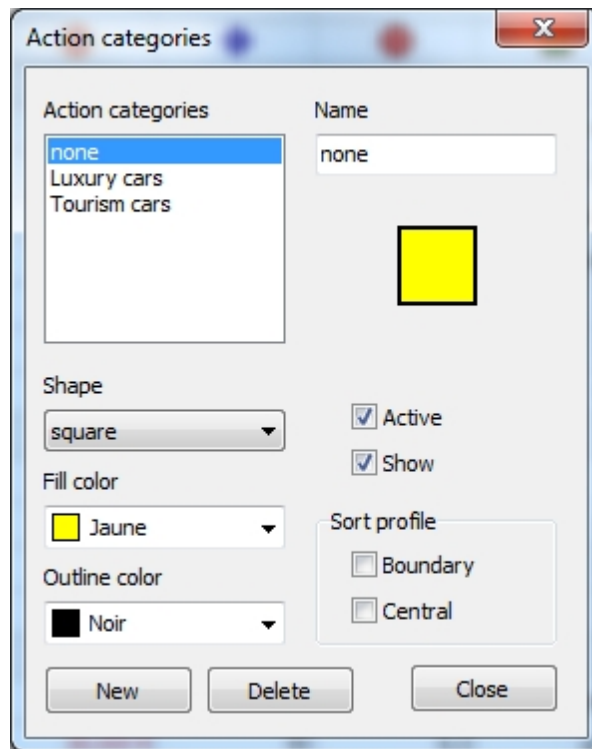
Click "Close" to close the window.

Action Categories

To access this dialog, click "**Model | Action categories...**".

Visual PROMETHEE allows you to define action categories. Each action category is identified by a specific symbol and fill and outline colors. This can be useful to identify subsets of actions according to some characteristics such as e.g. localization, nationality, technology, etc.

Each action belongs to one category. There is a default category named "none". When you define a new action it is automatically assigned to the "none" category.



From this dialog you can edit existing categories or create new ones.

The "Action categories" list let you select one existing category.

- Name: Let you change the name of the selected category.
- Shape: Let you select the shape for the selected category.
- Fill color: Let you select the color that will fill the selected shape.
- Outline color: Let you select the outline color for the selected shape.
- Active: To activate/deactivate the category (deactivated categories are not taken into account in the computation).
- Show: To activate/deactivate the display of the actions within the category. **This feature is not implemented yet.**
- Sort profile: **This feature will be implemented with the sort algorithm.**

Click "New" to add a new category or "Delete" to delete the current category.

Click "Close" to close the window.

Criteria Groups

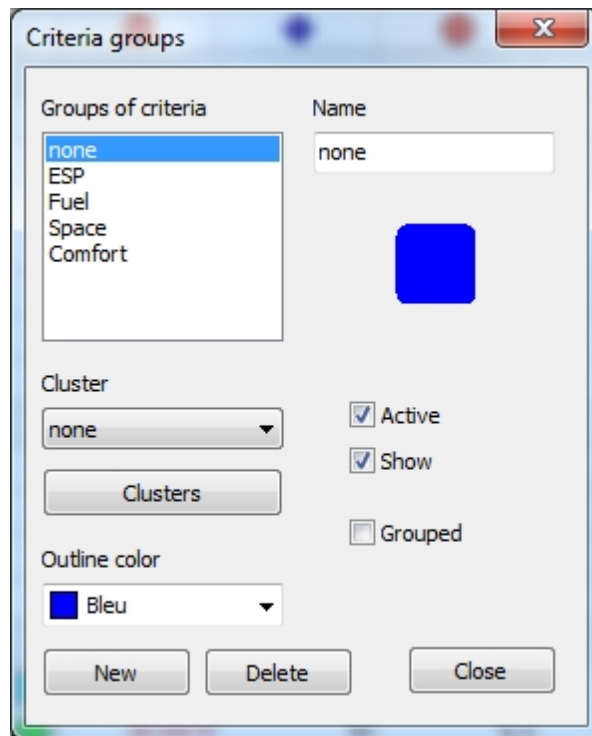
To access this dialog, click: "Model | Criteria groups...".

Visual PROMETHEE allows to organize criteria in a three-level hierarchy:

- at the bottom level are the individual criteria,
- each criterion belongs to a criterion group,
- each criterion group belongs to a cluster.

Each criterion belongs to one group. There is a default group named "none". When you define a new criterion it is automatically assigned to the "none" group.

The [Hierarchy Assistant](#) can be used to facilitate the setup of the criteria groups and clusters.



From this dialog you can edit existing criteria groups or create new ones.

The "Criteria Groups" list let you select one existing criteria group.

- Name: Let you change the name of the selected group.
- Cluster: Let you select the cluster to which the selected group belongs.
- Clusters button: Let you manage [clusters](#).
- Outline color: Let you select the outline color for the selected group.
- Active: To activate/deactivate the group (deactivated groups are not taken into account in the computation).
- Show: To activate/deactivate the display of the criteria within the group. **This feature is not implemented yet.**
- Grouped: When checked all the criteria within the group are considered and appear as a single dimension. The weights of the criteria within the group are always kept in the same relation even when the weight of the group is modified.

Click "New" to add a new group or "Delete" to delete the current group.

Click "Close" to close the window.

Clusters

To access this dialog, click: "Model | Clusters...".

Visual PROMETHEE allows to organize criteria in a three-level hierarchy:

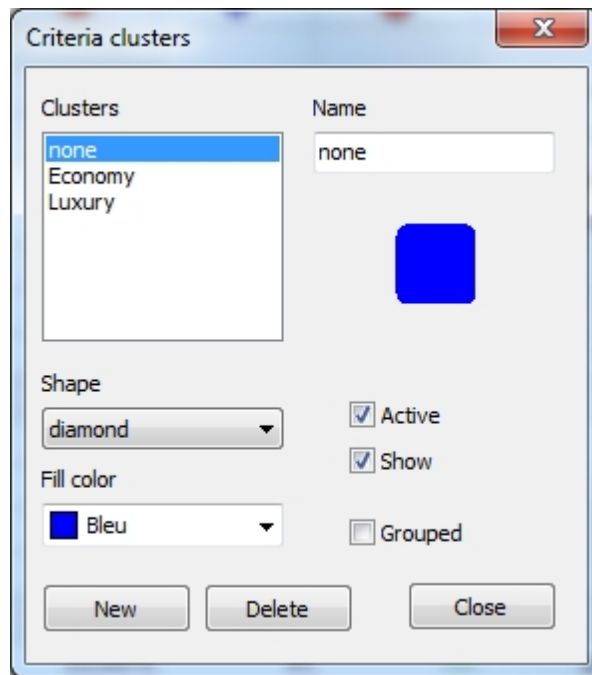
- at the bottom level are the individual criteria,
- each criterion belongs to a criterion group,
- each criterion group belongs to a cluster.

Each criterion belongs to one group. There is a default group named "none". When you define a new criterion it is automatically assigned to the "none" group.

There is a default cluster named "none". The "none" group as well as any new defined group are

automatically assigned to the "none" cluster.

The [Hierarchy Assistant](#) can be used to facilitate the setup of the criteria groups and clusters.



From this dialog you can edit existing clusters or create new ones.

The "Clusters" list let you select one existing cluster.

- Name: Let you change the name of the selected cluster..
- Shape: Let you select the shape for the selected cluster.
- Fill color: Let you select the fill color for the selected shape.
- Active: To activate/deactivate the cluster (deactivated clusters are not taken into account in the computation).
- Show: To activate/deactivate the display of the criteria within the cluster. **This feature is not implemented yet.**
- Grouped: When checked all the criteria within the cluster are considered and appear as a single dimension. The weights of the criteria within the cluster are always kept in the same relation even when the weight of the cluster is modified.

Click "New" to add a new cluster or "Delete" to delete the current cluster.

Click "Close" to close the window.

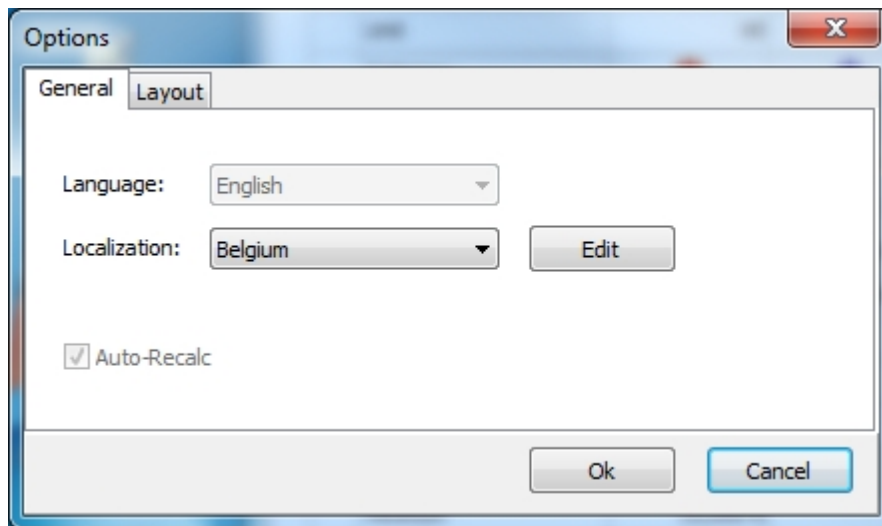
Coalitions

To access this dialog, click: "Model | Coalitions...".

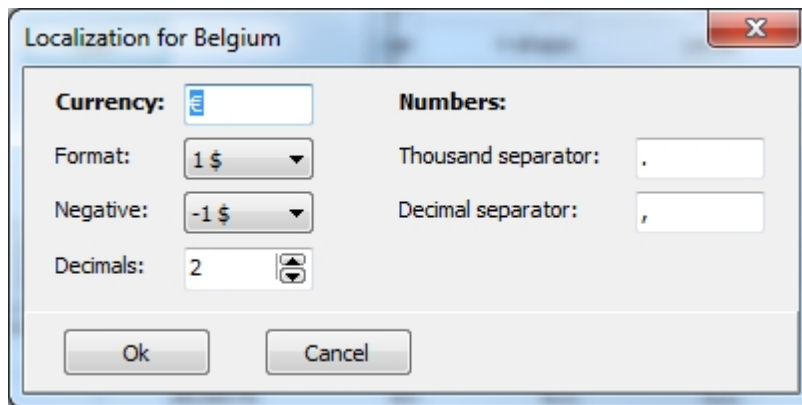
This feature is not implemented yet.

Options

Currently the only operational options are for localization of the data.



Several countries are predefined including Belgium, México, United Kingdom and the United States. It is also possible to define custom locations. Depending on the selection, numbers and currency values will be displayed differently. The formats can be checked and modified by clicking the "Edit" button.



As seen on the above screen shot, it is possible to define the currency symbol, the currency format and number of decimal places. Thousand and decimal separators can also be modified.

Assistants

It is important to use tools the way they should be used. Otherwise you will end sorry. To avoid this Visual PROMETHEE includes several assistants to help you in the setup and analysis of your problem:

- [Problem Creation Assistant](#)
This Assistant will lead you all the way from the problem definition to the analysis of the PROMETHEE and GAIA results. **This is not yet fully implemented.**
- [Preference Function Assistant](#)
Choosing the right preference function for your criteria is essential to ensure a correct PROMETHEE analysis. This Assistant incorporates thirty years of experience to make sure you select the best type of preference function and assess the corresponding thresholds correctly.
- [Hierarchy Assistant](#)
This Assistant will help you to organize your criteria into clusters and criteria groups.
- [Weighing Assistant](#)
With this Assistant you will be able to assess the criteria weights visually, either directly or hierarchically to insure a proper weighing for clusters and criteria groups.
- [Analysis Assistant](#)
This Assistant is under development.

Problem creation

This is not yet fully implemented.

Preference Function

What is it?

The **Preference Function Assistant** is designed to help you to choose a preference function type and to set the corresponding thresholds values for a given criterion.

How to use it?

To start the Preference Function Assistant click on the **Preference Fn.** cell for the criterion you want to work with and select **Help me...** in the drop-down list. The Preference Function Assistant will open and display the first of five pages.

At the top of the window, five tabs are available to switch from one page to an other.

At the bottom of the window are buttons to navigate from one page to the next or the previous one or to exit the Assistant.

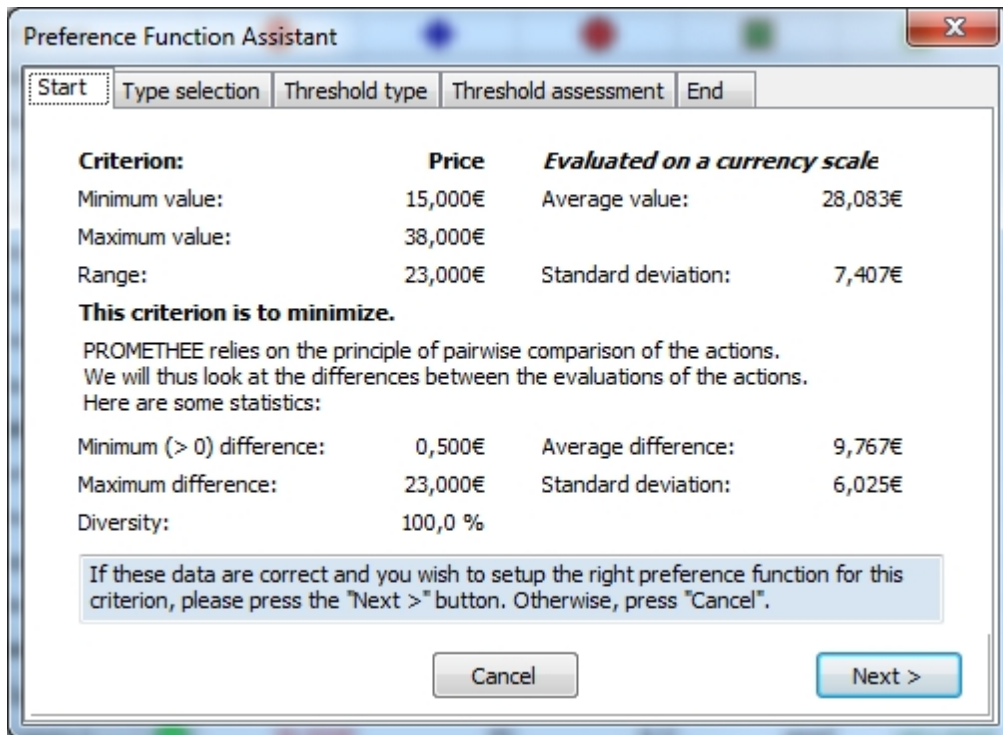
The Preference Function Assistant

Page 1: Start

This first page contains a summary of the criterion information. From top to bottom:

- A first block of information is related to the distribution of the evaluations of the actions. It displays:
 - The type of scale of the criterion: numerical, currency or qualitative.
 - The minimum evaluation.
 - The maximum evaluation.
 - The range of the evaluations (maximum - minimum value).
 - The average evaluation.
 - The standard deviation of the evaluations.
 - Whether the criterion has to be maximized or minimized.
- A second block of information is related to the distributions of the pairwise differences between the evaluations of the actions. This is important as the preference function is a function of pairwise differences. This block displays:
 - The minimum (smallest) positive difference between the evaluations.
 - The maximum (largest) difference between the evaluations.

- The average difference.
- The standard deviation of the differences.
- A diversity measure that is equal to 100% if all the evaluations are different from each other and decreases when the number of ties increases.



The inspection of these data can be helpful for the more experienced user.

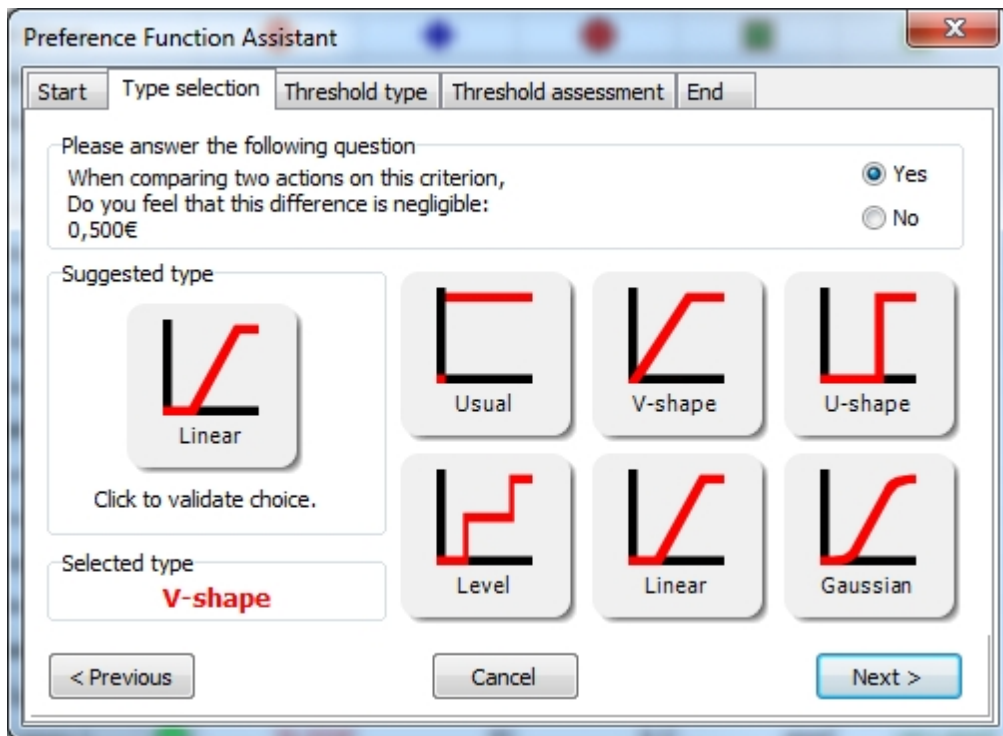
Click the **Next >** button to proceed to Page 2 and select a preference function type.

Page 2: Type selection

At the top of the window is a question that you should answer. It is different for quantitative (as shown here) and for qualitative criteria. Depending on your answer a preference function type is suggested by the assistant ("Suggested type" at the left center of the window). Just below the suggestion you can see the currently selected type. In the screen shot, it appears in red as the currently selected type (V-shape) is different from the suggested type (Linear).

You now have several options:

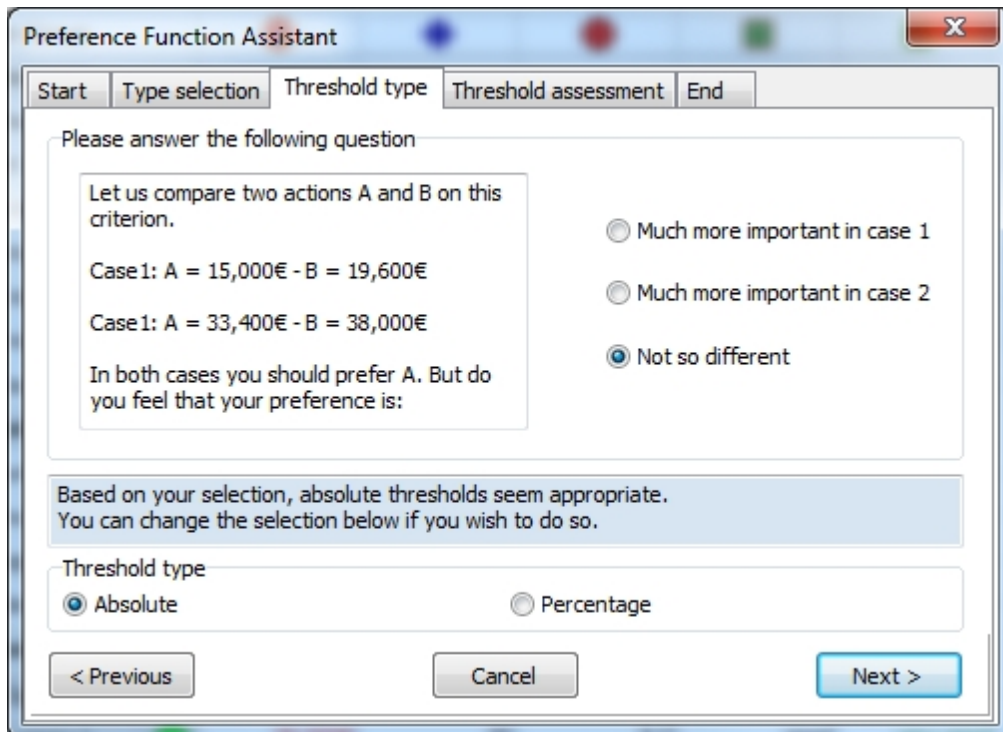
- Click on the suggested type icon to select this preference function type.
- Click on any other icon to select an alternative preference function type.
- Click on the **Next >** button to proceed with the current selection.
- Click on the **< Previous** button to go back to Page 1.
- Click on the **Cancel** button to exit the Assistant.



Click the **Next >** button to proceed to Page 3 and assess the type of thresholds you will use.

Page 3: Threshold type

A single question has to be answered to determine whether you should use absolute or percentage thresholds. If you hesitate, leave the selection as it is.



Click the **Next >** button to proceed to Page 4 and assess the values of thresholds.

Page 4: Threshold assessment

Depending on the preference function type that has been selected up to two thresholds (Q, P or S) have to be assessed.

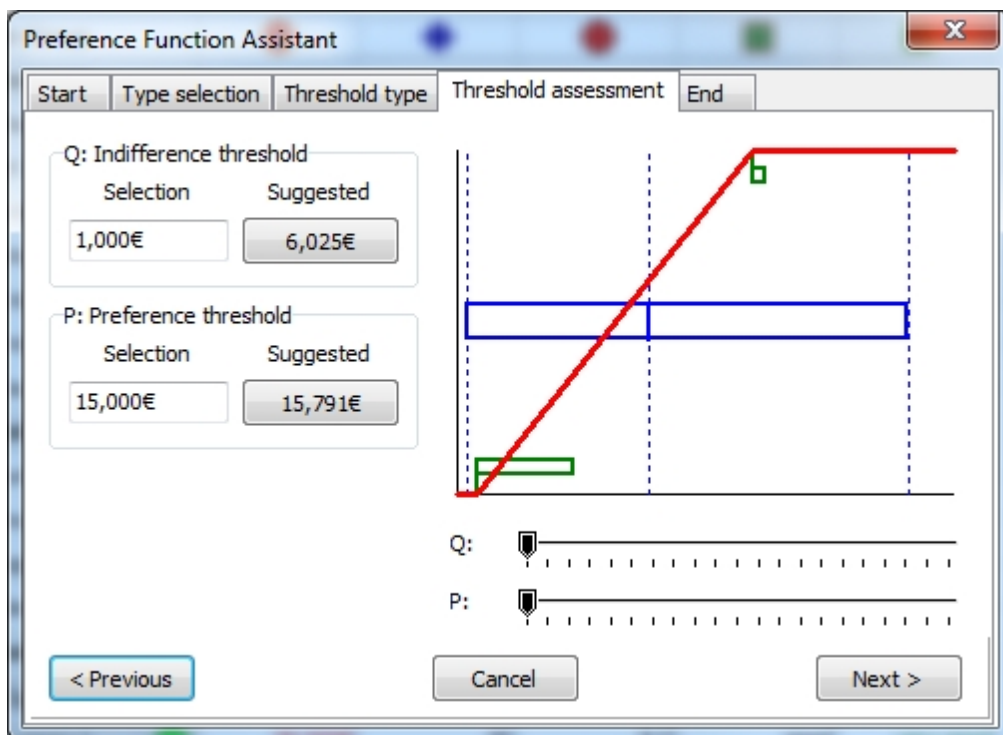
On the left side of the window are boxes for each threshold that has to be assessed depending on the type of preference function selected.

In each box you can see the selected value as well as the value suggested by the Assistant. You can enter a new value or click on the suggested value button to accept it.

On the right side of the window is a graphical representation of the currently selected preference function. Several pieces of information are displayed:

- The blue rectangle represents the distribution of the pairwise differences between evaluations, from the minimum to the maximum difference, the middle bar corresponds to the average difference.
- The green rectangles show the difference between the current and suggested values for the thresholds.

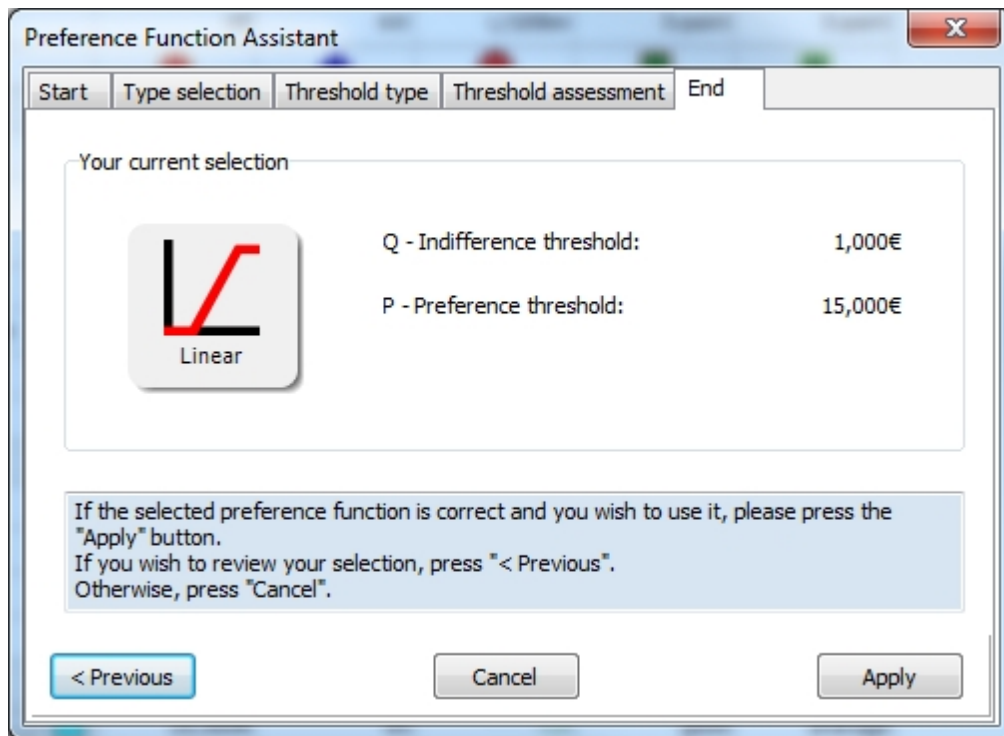
The two sliders are currently inactive.



Click the **Next >** button to proceed to Page 5 and validate your choice.

Page 5: End

This page displays your current selection.



Click the **Apply** button to proceed to validate your choice.

Criteria Hierarchy

What is it?

The **Criteria Hierarchy Assistant** is designed to help you to define the criteria hierarchy.

How to use it?

To start the Criteria Hierarchy Assistant select **Assistants | Hierarchize...** The Criteria Hierarchy Assistant will open and display the first of three pages.

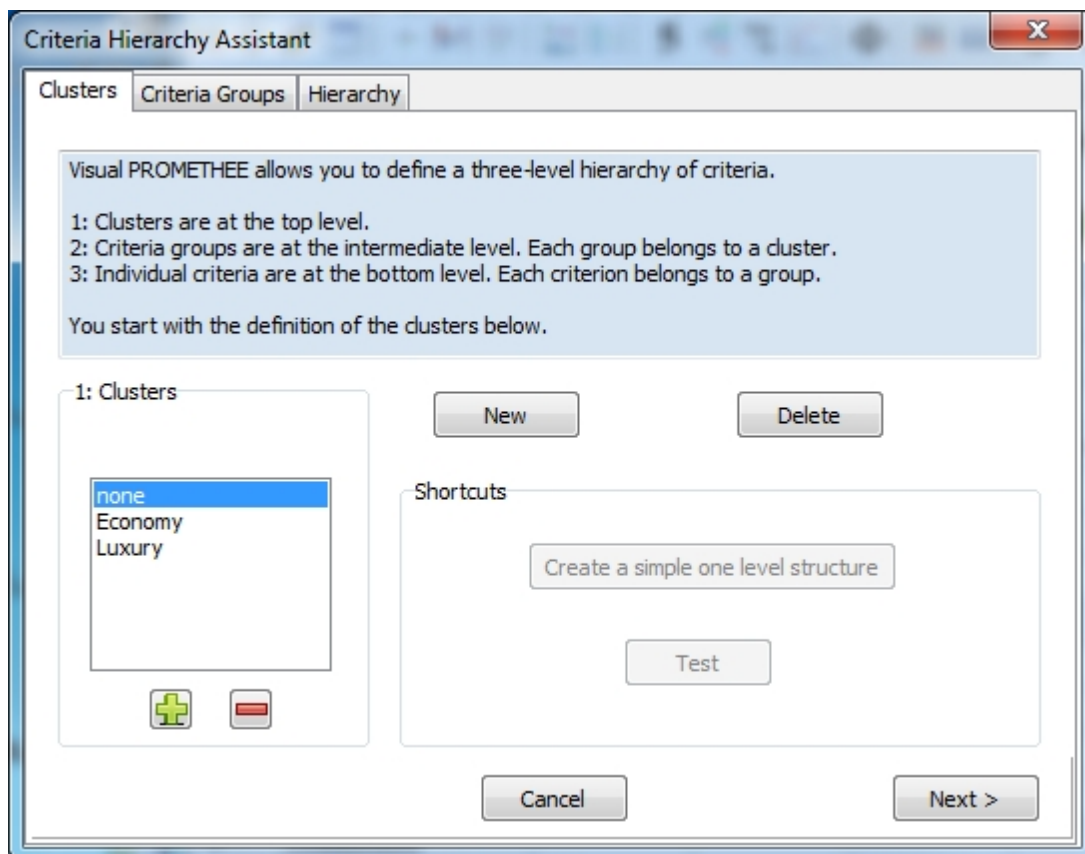
At the top of the window, three tabs are available to switch from one page to an other.

At the bottom of the window are buttons to navigate from one page to the next or the previous one or to exit the Assistant.

The Criteria Hierarchy Assistant

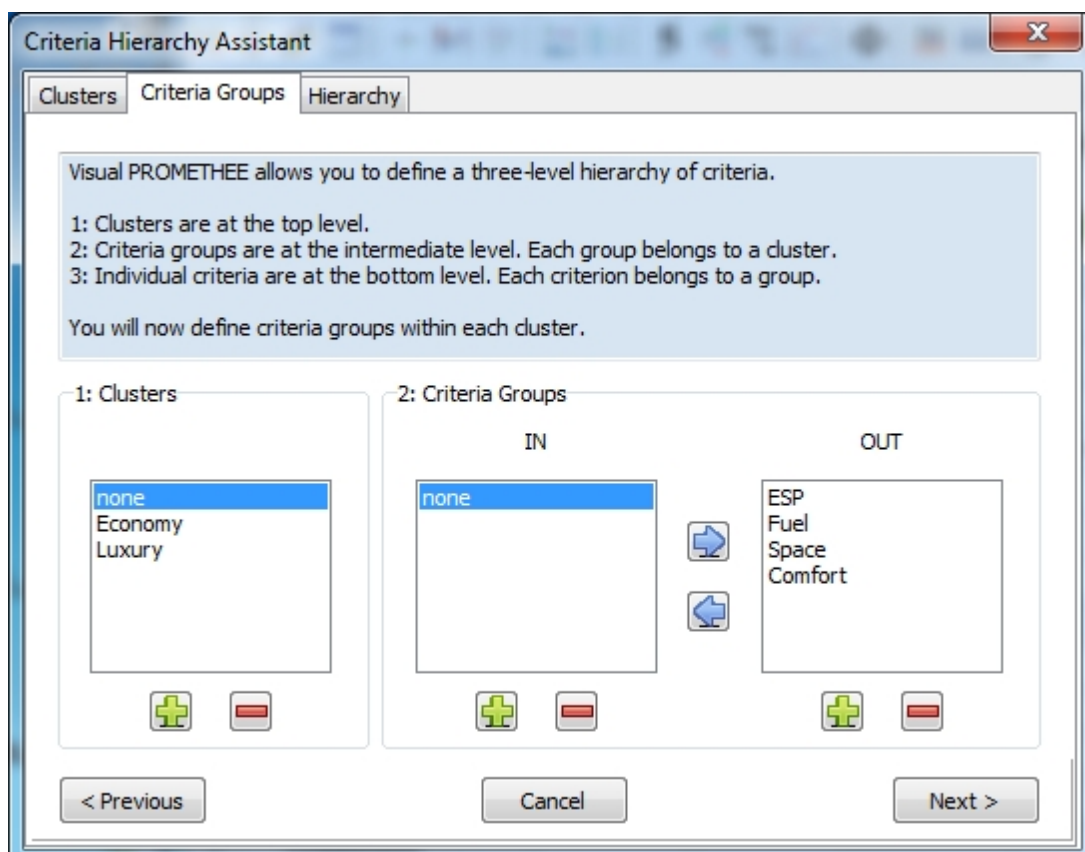
Page 1: Clusters

This first page is where you define the cluster.



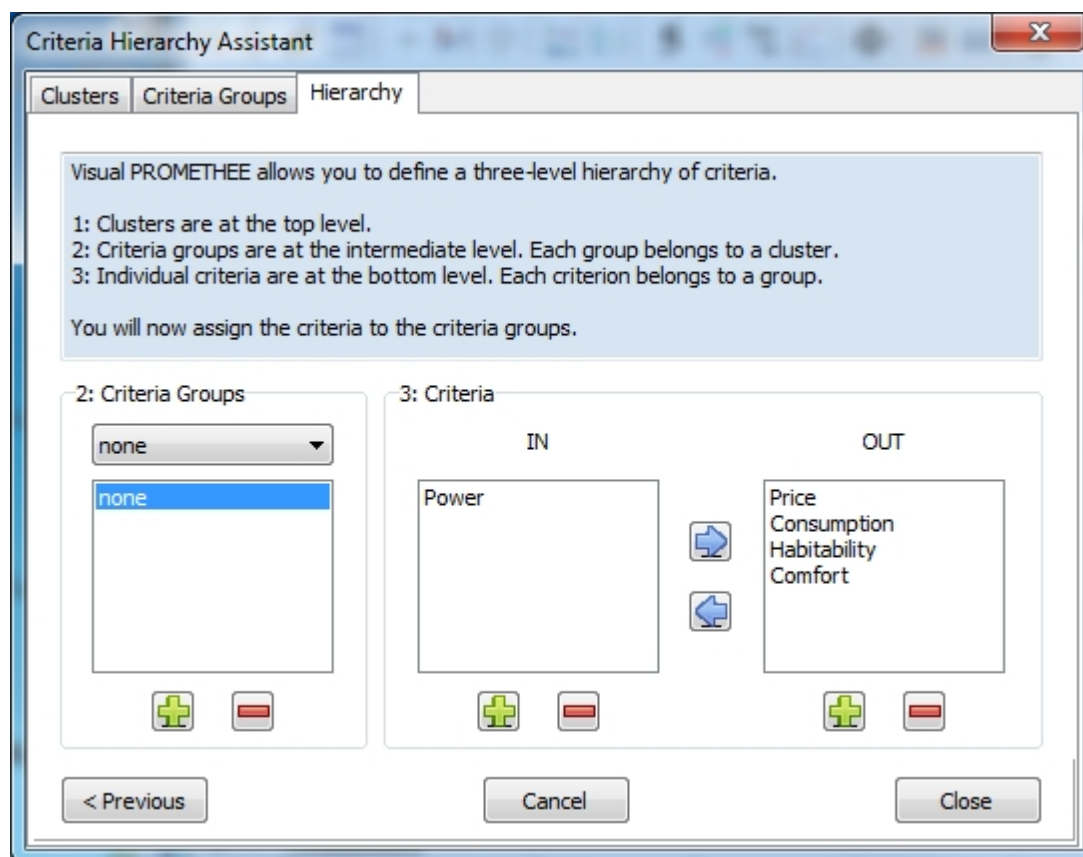
Page 2: Criteria Groups

This second page is where you define the criteria groups and assign them to the cluster. Each criteria group belongs to one cluster.



Page 3: Hierarchy

This third page is where you assign the criteria to their respective criteria groups within the hierarchy. Each criterion belongs to one criteria group.



Weighing

What is it?

The **Weighing Assistant** is designed to help you to weigh the criteria within the criteria hierarchy.

How to use it?

To start the Weighing Assistant select **Assistants | Weigh...** The Weighing Assistant will open. At the bottom of the window are several buttons:

- Two radio buttons allow to switch between the **Hierarchical** and **Absolute** modes.
- The **Set Equal** button is used to set all weights equal.
- The **Apply** button saves the current weights to the spreadsheet.
- The **Cancel** button exits the Assistant.

The Weighing Assistant

The Assistant can be used in two modes:

- In the hierarchical mode, weights are assigned at the three levels of the hierarchy:
 - At the top level, clusters are assigned weights.
 - At the intermediate level, criteria groups are assigned relative weights within each cluster.
 - At the bottom level, individual criteria are assigned relative weights within each criteria group.
- In the absolute mode, weights are assigned directly to all the individual criteria, independently from their criteria groups and clusters.

The Assistant window contains four columns. From left to right:

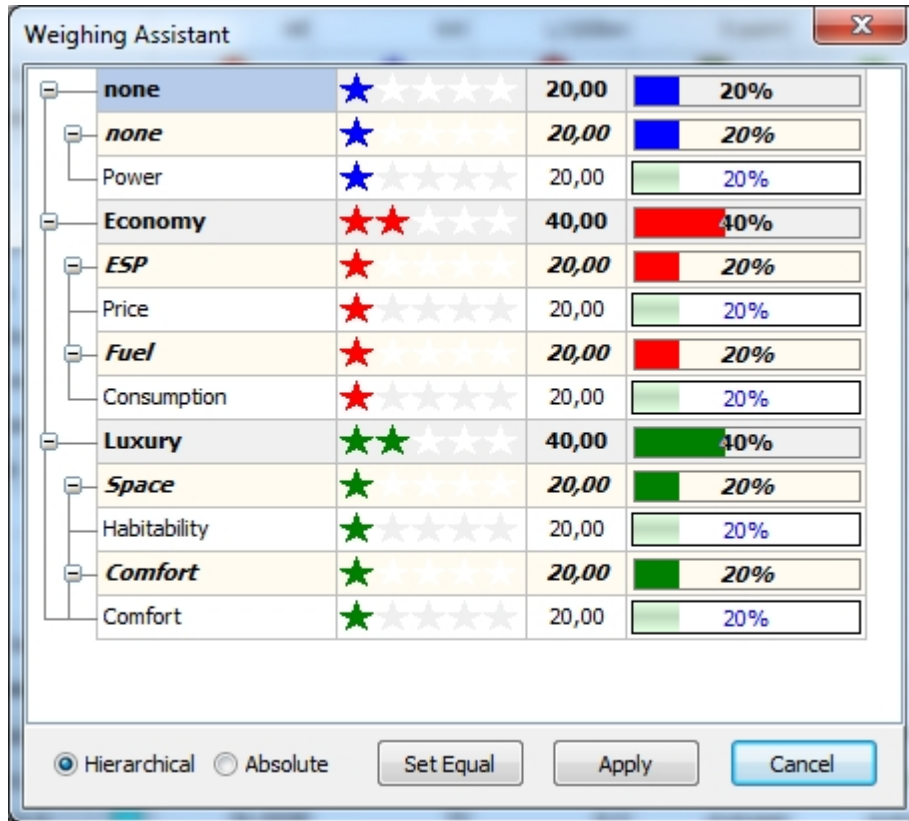
- The name of the cluster, criteria group or criterion.
- A visual five-star rating for assessing the weight: click on the stars to define the weight.

- The corresponding weight value on 0 to 100 scale (one star is equal to 20).
- The bar in the rightmost column show the resulting relative weight expressed in percent.

To the left are buttons that can be used to contract or expand the hierarchy display.

Hierarchical mode

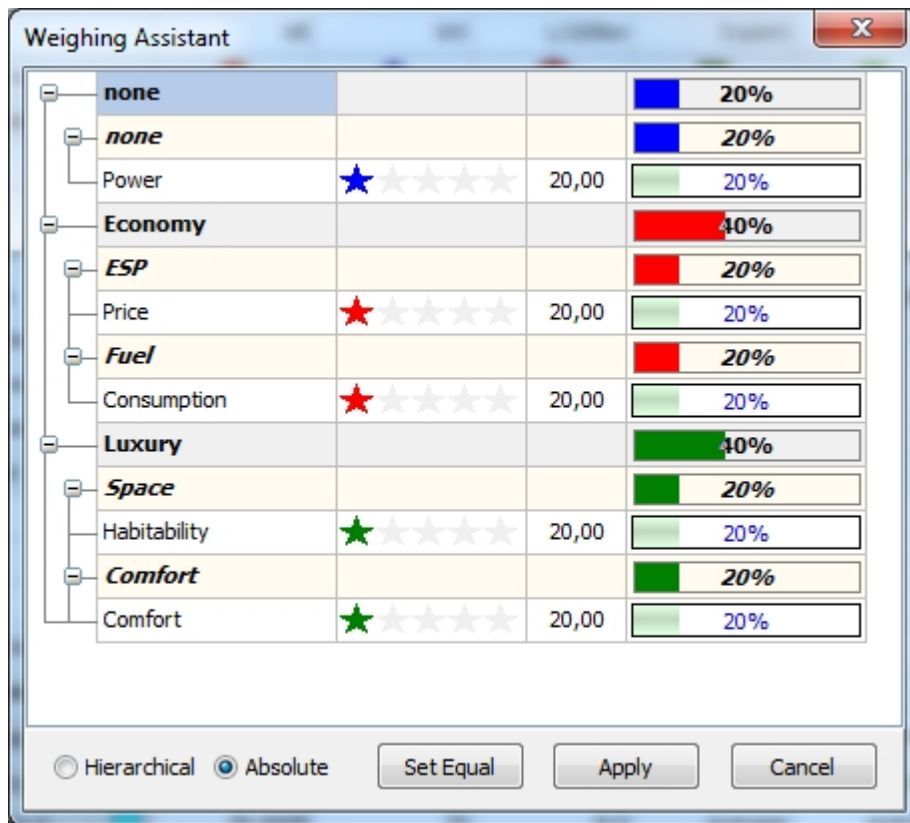
When the Hierarchical mode is selected the following dialog is available.



Weights are input at all the hierarchy levels and the resulting absolute weights of the criteria are automatically computed.

Absolute mode

When the Absolute mode is selected the following dialog is available.



Weights are input at the individual criteria level only. The resulting weights of the criteria groups and clusters are automatically computed.

Analysis

This is not yet implemented.

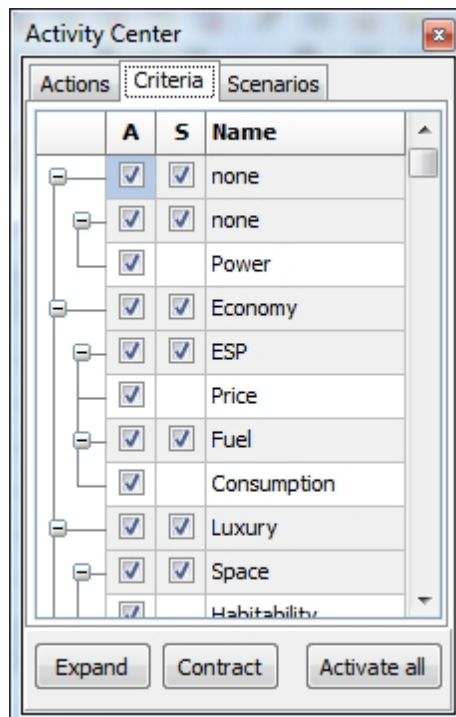
Windows

- [Activity Center](#)
- [Filter](#)
- [Sort](#)
- [PROMETHEE Rankings](#)
- [PROMETHEE Diamond](#)
- [PROMETHEE Rainbow](#)
- [PROMETHEE Table](#)
- [GAIA](#)
- [Action Profiles](#)
- [GAIA Webs](#)
- [Walking Weights](#)
- [Visual Stability Intervals](#)
- [PROMETHEE V Selection](#)
- [Sorting](#)
- [Performance Analysis](#)
- [Preference Flows](#)
- [Scenarios Comparison](#)
- [Balance of Power](#)
- [PROMap](#)
- [Weight Presets](#)
- [Layouts](#)

Activity Center

The Activity Center enables you to quickly control which actions, criteria or scenarios are active or not.

There are three tabs: Actions, Criteria and Scenarios.



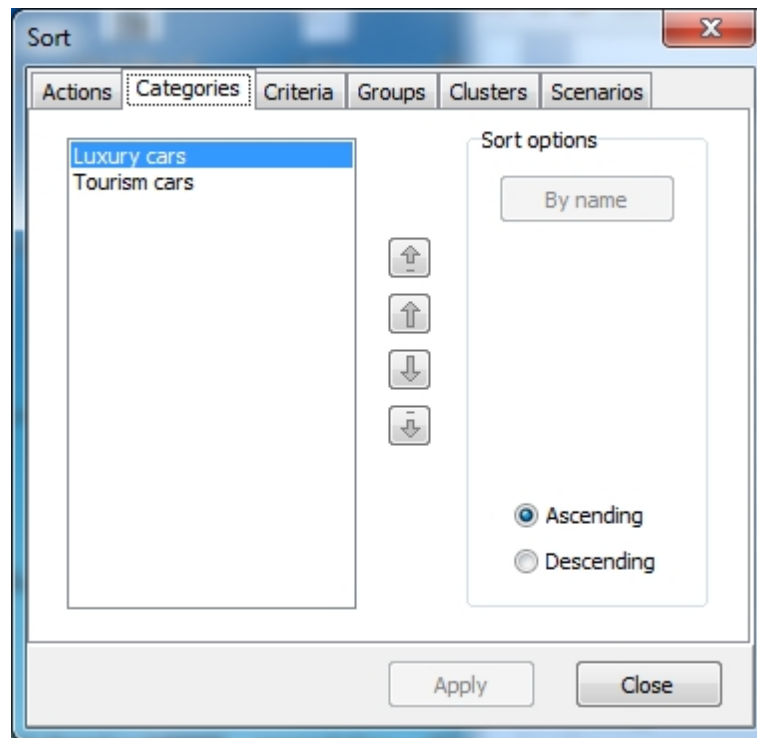
From each tab you can control which actions, criteria or scenarios are active or not.

Filter

This feature is not implemented yet.

Sort

Various sort options are available.



They will affect the way that actions, criteria or scenarios are displayed in the Visual PROMETHEE windows.

PROMETHEE Rankings

What is it?

The PROMETHEE Rankings window displays the PROMETHEE I and II rankings in two separate tabs.

How to interact?

There are two tabs at the bottom of the window. You can select the PROMETHEE I partial ranking or the PROMETHEE II complete ranking.

There is also a local menu. Right-click on the drawing to open it.

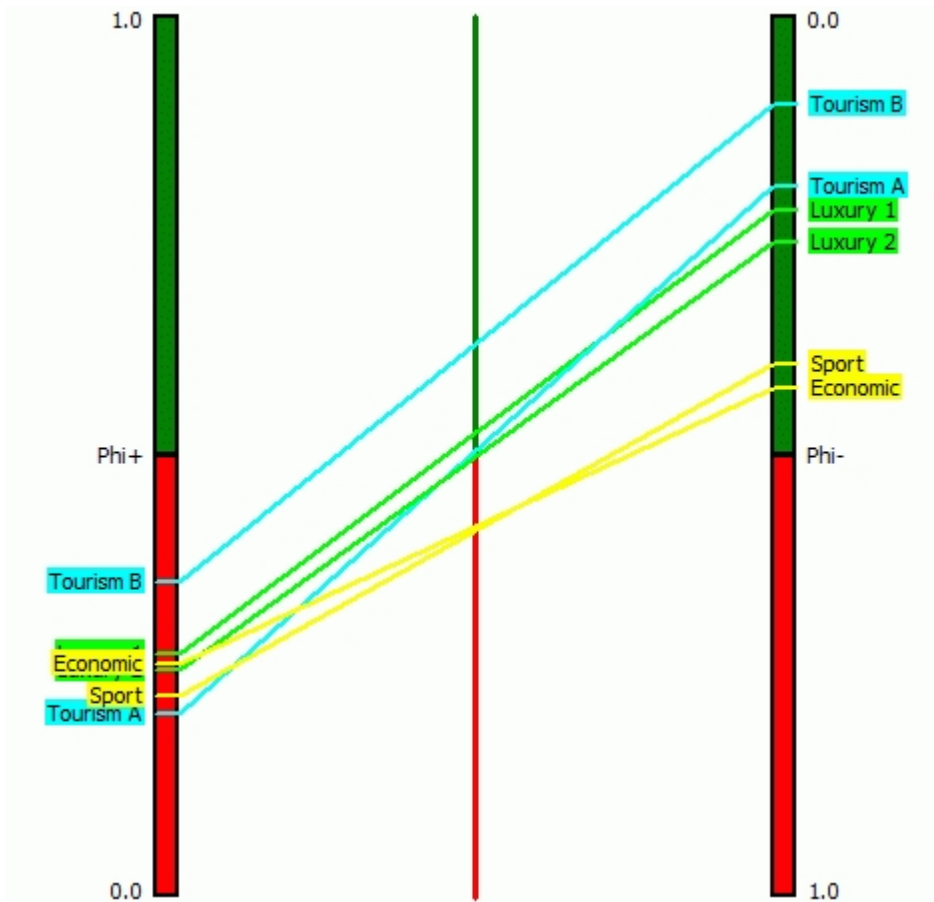
Local Menu

From the local menu the following options are available:

- Copy: Make a copy of the window to the clipboard. You will be able to paste it into another application such as e.g. Word, Excel or PowerPoint.
- Shortnames: You can choose to display the actions full names or short-names.
- Locate: You can select an action that will be highlighted on the display. That makes it easier to locate a particular action, especially when the number of actions is larger.

PROMETHEE I Partial Ranking

The PROMETHEE I Partial Ranking is based on the comparison of the leaving flow (Φ^+) and the entering flow (Φ^-).



The left column corresponds to the Phi+ scores and the right column to the Phi- scores. They are oriented such that the best scores are upwards. This way the middle column corresponds to the net flow (Phi-scores).

On the left side you can see the ranking of the actions according to Phi+.

On the right side you can see the ranking of the actions according to Phi-.

For each action a line is drawn from its Phi+ score to its Phi- score.

When a line is completely on top of another one it means that the corresponding action is better on both Phi+ and Phi-. This action is thus preferred to the other in the PROMETHEE I Partial Ranking.

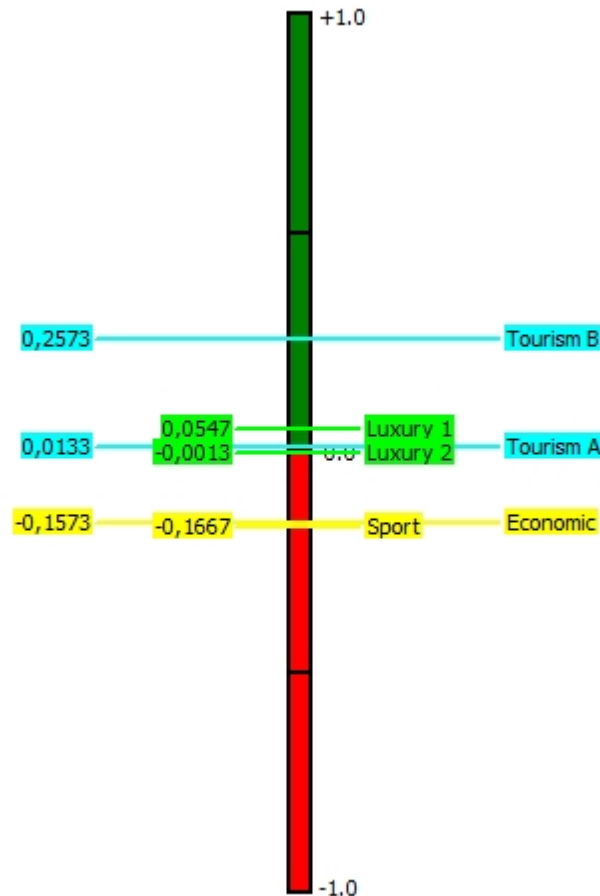
When two lines intersect the Phi+ and Phi- rankings are different and the two actions are thus incomparable in the PROMETHEE I Partial Ranking.

For instance, in the Visual PROMETHEE example shown here, Tourism B is preferred to all the other actions. While Sport and Economy are incomparable actions.

PROMETHEE II Complete Ranking

The PROMETHEE II Complete Ranking is based on the net flow Phi.

The top half of the scale (in green) corresponds to positive Phi scores and the bottom half (in red) to negative scores.



In the example shown here, three groups of actions appear clearly:

- Tourism B is on top of all the other actions.
- Luxury 1, Luxury 2 and Tourism A are very close to each other in the middle of the ranking.
- Sport and Economy are at the bottom of the ranking.

PROMETHEE Diamond

What is it?

The PROMETHEE Diamond is an alternate display of the PROMETHEE I and II rankings. It shows both rankings in one 2-dimensional representation.

How to interact?

There is a local menu. Right-click on the drawing to open it.

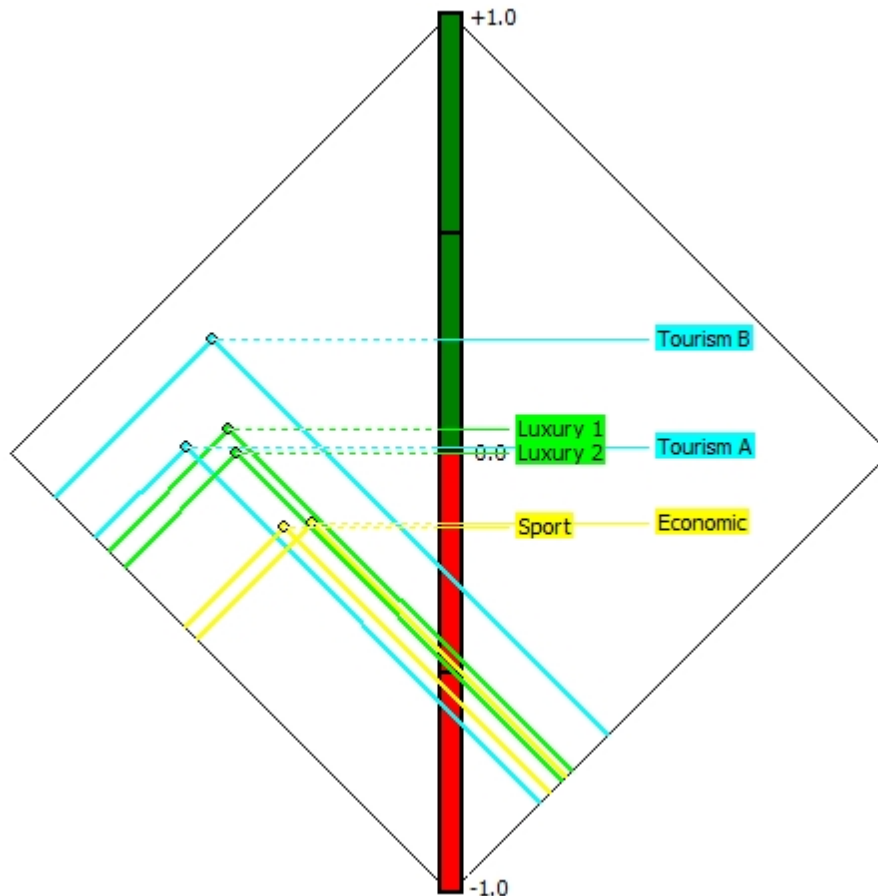
Local Menu

From the local menu the following options are available:

- Copy: Make a copy of the window to the clipboard. You will be able to paste it into another application such as e.g. Word, Excel or PowerPoint.
- Shortnames: You can choose to display the actions full names or short-names.
- Locate: You can select an action that will be highlighted on the display. That makes it easier to locate a particular action, especially when the number of actions is larger.

PROMETHEE Diamond

In the PROMETHEE Diamond each action is represented as a point in the (Phi+,Phi-) plane. The plane is angled 45° degrees so that the vertical dimension (green-red axis) corresponds to the Phi net flow.



A cone is drawn for each action. When a cone is overlapping another one it means that the action is preferred to the other one in the PROMETHEE I Partial Ranking. Intersecting cones correspond to incomparable actions.

In the example, Tourism B is clearly preferred to all the other actions, while Sport and Economic are incomparable.

The vertical dimension corresponds to Phi, so it is possible to visualize both PROMETHEE rankings at the same time.

PROMETHEE Rainbow

What is it?

The PROMETHEE Rainbow is a disaggregated view of the PROMETHEE II complete ranking. It shows the detail of the Phi net flow computation, emphasizing the good and weak features of each action.

How to interact?

There is a local menu. Right-click on the drawing to open it.

Local Menu

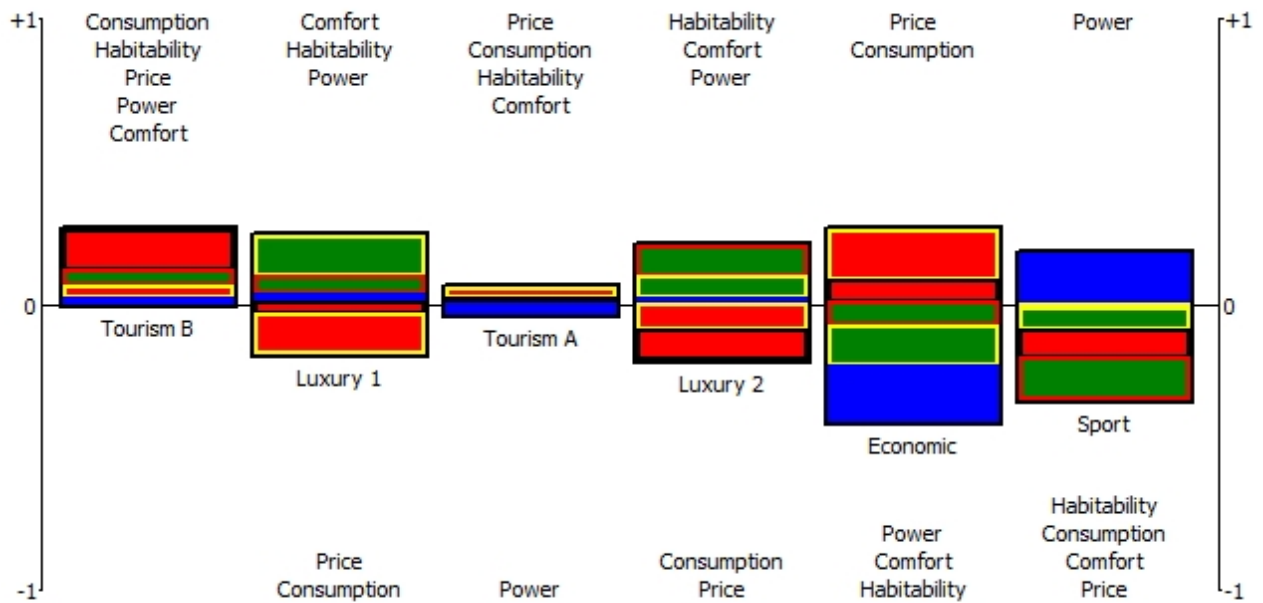
From the local menu the following options are available:

- Copy: Make a copy of the window to the clipboard. You will be able to paste it into another application such as e.g. Word, Excel or PowerPoint.
- Show criteria: Control whether the names of the criteria are displayed or not.
- Shortnames: You can choose to display the actions and/or criteria full names or short-names.

PROMETHEE Rainbow

For each action a bar is drawn. The different slices of each bar are colored according to the criteria. Each slice is proportional to the contribution of one criterion (flow value times the weight of the criterion) to the Phi net flow score of the action. Positive (upward) slices correspond to good features while negative (downward) slices correspond to weaknesses. This way, the balance between positive and negative slices is equal to

the Phi score. Actions are ranked from left to right according to the PROMETHEE II Complete Ranking.



In the example, Tourism B shows no weaknesses. Tourism A seems very average. And Economic exhibits some very good features as well as some very weak features.

PROMETHEE Table

What is it?

The PROMETHEE Table window displays the PROMETHEE preference flows in a tabular format.

How to interact?

There is a local menu. Right-click on the drawing to open it.

Local Menu

From the local menu the following options are available:

- Copy: Make a copy of the window to the clipboard. You will be able to paste it into another application such as e.g. Word, Excel or PowerPoint.

PROMETHEE Table

This is a table where actions are ranked according to the PROMETHEE II Complete Ranking. The Phi, Phi+ and Phi- scores are displayed.

	Site	Phi	Phi+	Phi-
1	Site 3	0.3768	0.5764	0.1995
2	Site 2	0.0876	0.3469	0.2592
3	Site 5	-0.0817	0.3219	0.4036
4	Site 4	-0.1384	0.3307	0.4691
5	Site 1	-0.2444	0.2525	0.4969

GAIA

What is it?

The GAIA window displays the results of the GAIA analysis.

How to interact?

- There is a local menu. Right-click on the drawing to open it.

Local Menu

From the local menu the following options are available:

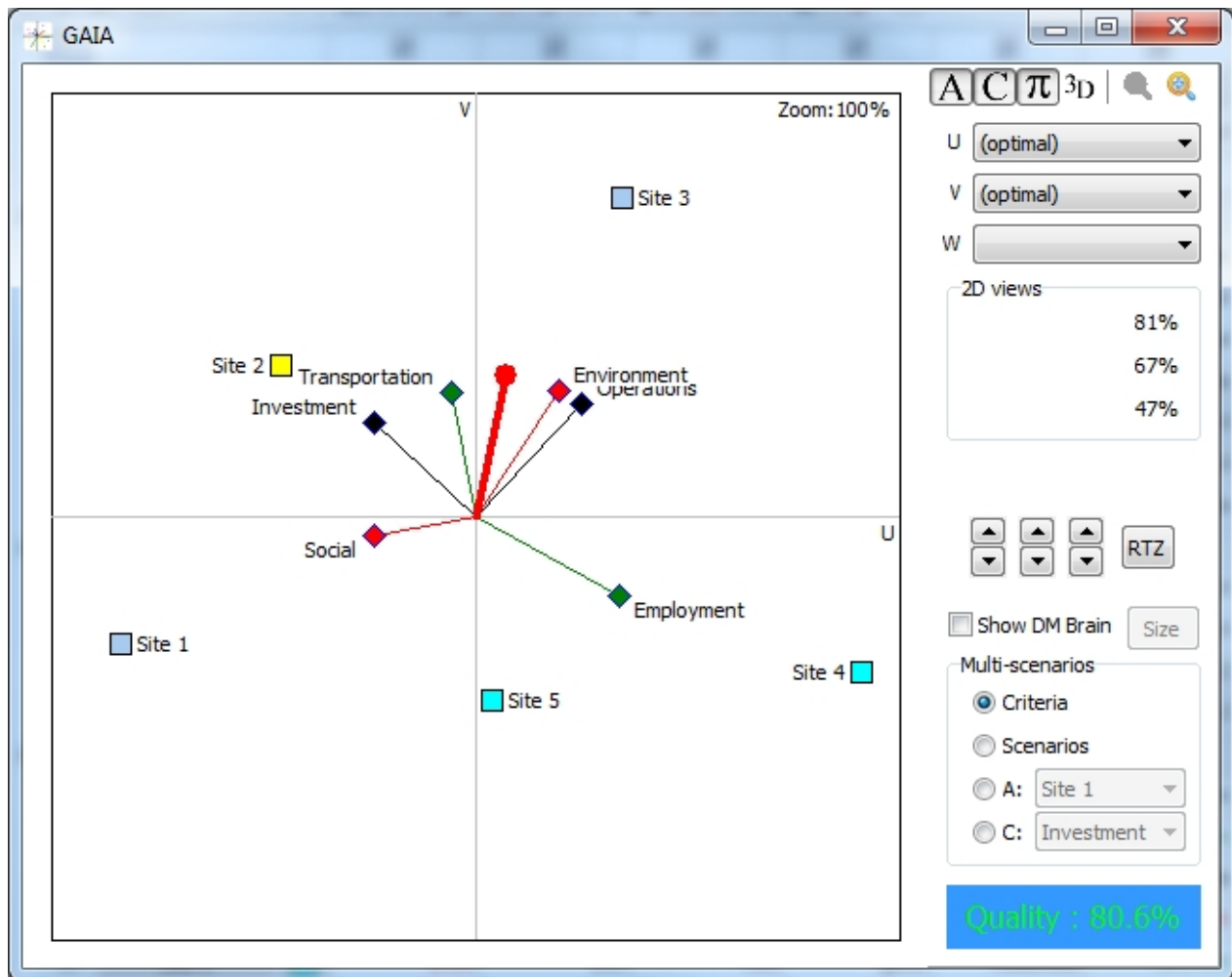
- Copy: Make a copy of the window to the clipboard. You will be able to paste it into another application such as e.g. Word, Excel or PowerPoint.
- Shortnames: You can choose to display the actions and/or criteria full names or short-names.
- Zoom: You can zoom in or out to focus on some part of the GAIA plane.
- Show axis: You can select a criterion to display the projections of the actions on its axis, in order to check the actions performance on that criterion.
- Locate: You can select an action that will be highlighted on the display. That makes it easier to locate a particular action, especially when the number of actions is larger.

GAIA

The GAIA window has a lot of options. On the right side you can find the following options:

- The top tool bar includes six buttons:
 - A: controls the display of the actions on the GAIA plane.
 - C: controls the display of the criteria on the GAIA plane.
 - PI: controls the display of the decision axis on the GAIA plane.
 - 3D: switches between 2D and 3D views.
 - Zoom in.
 - Zoom out.
- The u,v,w drop-down lists: control the displayed axes. (This is currently NOT operational)
- The 2D views check-boxes:
- The 3D controls can be used to change the orientation of the 3D display.
- The "Show DM Brain" check-box toggles the PROMETHEE VI display of the DM Brain. The "Size" button is used to control the weight variations.
- The Multi-Scenarios buttons can be used to activate the GAIA GDSS features (This is currently NOT operational).

At the bottom right of the window, the percentage of information retained in the GAIA display is shown. A color code is used: green indicates a satisfying quality level while red corresponds to a too low level.



Action Profiles

What is it?

The Action Profile window displays the profile of one action.

How to interact?

There is a drop-down list to select the action you want to see. The "Phi" checkbox controls whether the multicriteria net flow value is displayed or not.

There is also a local menu. Right-click on the drawing to open it.

Local Menu

From the local menu the following options are available:

- Copy: Make a copy of the window to the clipboard. You will be able to paste it into another application such as e.g. Word, Excel or PowerPoint.

Action Profile

The Action Profile window shows a graphical representation of the unicriterion net flow scores for the selected action.



Positive scores (upward bars) correspond to good features while negative scores (downward bars) correspond to bad ones.

In the example above, there are no bad features and Consumption is very good.

GAIA Webs

What is it?

The GAIA Web window displays an enhanced spiderweb display for one action.

How to interact?

There is a drop-down list to select the action you want to see.

The "Decision Axis" checkbox controls whether the decision axis and the multicriteria net flow value are displayed or not.

The "Rounded" checkbox can be used to generate a "rounded" version of the GAIA Web.

There is also a local menu. Right-click on the drawing to open it.

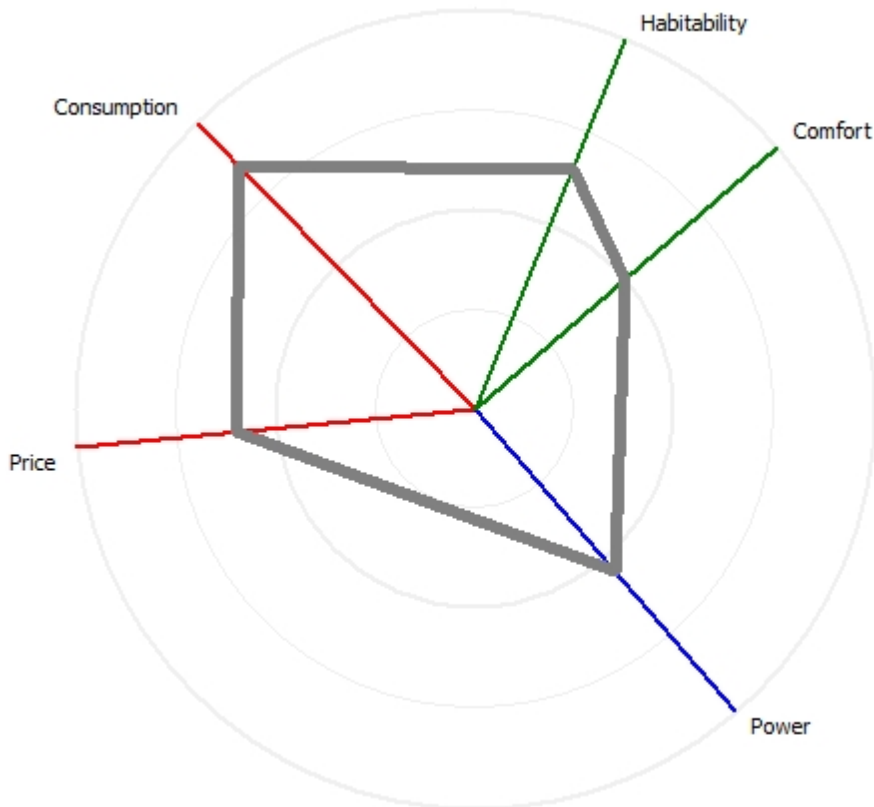
Local Menu

From the local menu the following options are available:

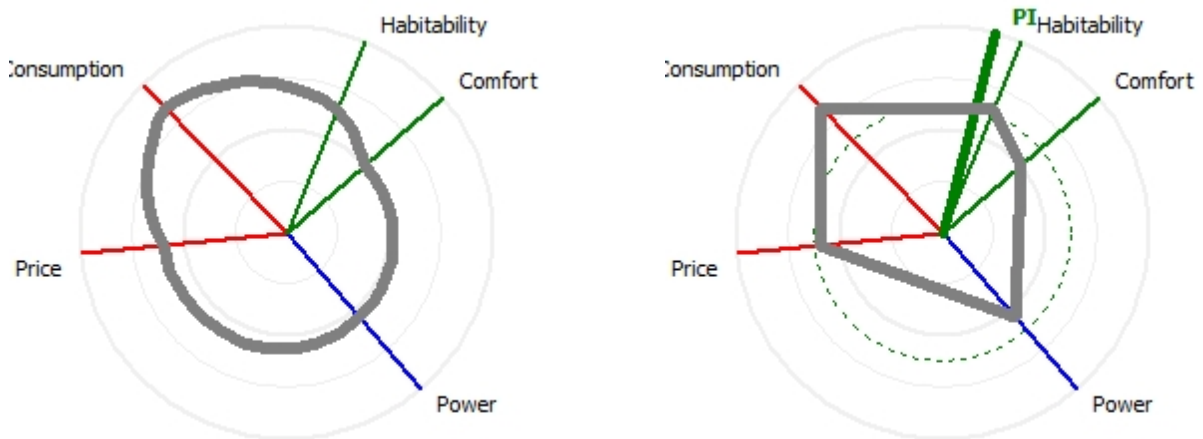
- Copy: Make a copy of the window to the clipboard. You will be able to paste it into another application such as e.g. Word, Excel or PowerPoint.
- Name: Either full or short names or no names can be displayed.

GAIA Web

The GAIA Web window shows a graphical representation of the unicriterion net flow scores for the selected action.



In usual spiderweb displays the variables (criteria) are equally spaced around the center of the display. The shape of the spiderweb is thus highly dependent on the arbitrary order of the criteria. In a GAIA Web, criteria axes are oriented as in the GAIA plane. Thus criteria expressing similar preferences are located close to each other and the spiderweb shape is more meaningful. For each dimension (individual criterion or grouped criteria group or cluster), the radial distance corresponds to the net flow score (-1 at the center and +1 on the outer circle).



The "Rounded" option replaces the straight lines that are drawn between axes by curves, allowing for a smoother and more consistent shape. For instance an action with equal scores on all dimensions would be represented as a circle instead of as a polygon.

The "Decision Axis" option shows the location of the decision axis as well as a dotted circle corresponding to the multicriteria net flow score of the actions (drawn in green if Phi is positive and in red if it is negative).

In the example above, there are no bad features and Consumption is very good. It is even clearer to see with the rounded option.

Walking Weights

What is it?

The Walking Weights let you easily change the weights of the criteria and check the impact on the analysis.

How to interact?

There is a drop-down list to select the criterion you want to control.

The "Update" button is used to update the initial weights of the criteria with the current values.

The "Best to worst" button is used to rank the actions in the upper part of the window according to the PROMETHEE II Ranking.

The "Set equal" button is used to set all weights equal.

The "Reset" button is used to reset the weights to their initial values.

There is also a local menu. Right-click on the drawing to open it.

Local Menu

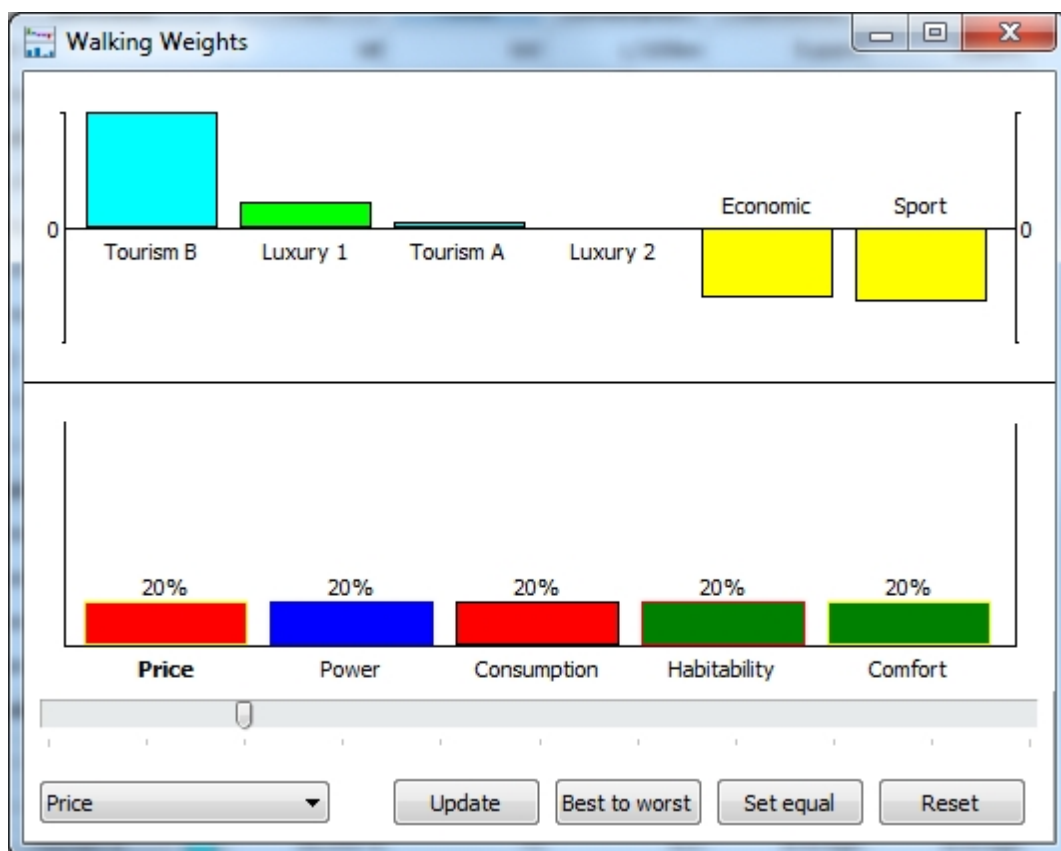
From the local menu the following options are available:

- Copy: Make a copy of the window to the clipboard. You will be able to paste it into another application such as e.g. Word, Excel or PowerPoint.
- Shortnames: To display full or short names for actions and/or criteria.

Walking Weights

The Walking Weights windows contains two graphics:

- The upper part shows the PROMETHEE II Phi net flow scores for the active actions.
- The lower part shows the relative (percent) weights of the criteria (or grouped criteria groups or clusters).



You use the bottom left drop-down list to select a criterion (or grouped group or cluster) and you use the slider to change its weight. The change is reflected in the other opened windows.

Visual Stability Intervals

What is it?

The Visual Stability Intervals window let you easily change the weights of the criteria and check the impact on the analysis.

How to interact?

There is a drop-down list to select the criterion you want to visualize.

The "Stability level" check box controls the display of the weight stability interval. The level can be adjusted from 1 to the total number of active actions.

There is also a local menu. Right-click on the drawing to open it.

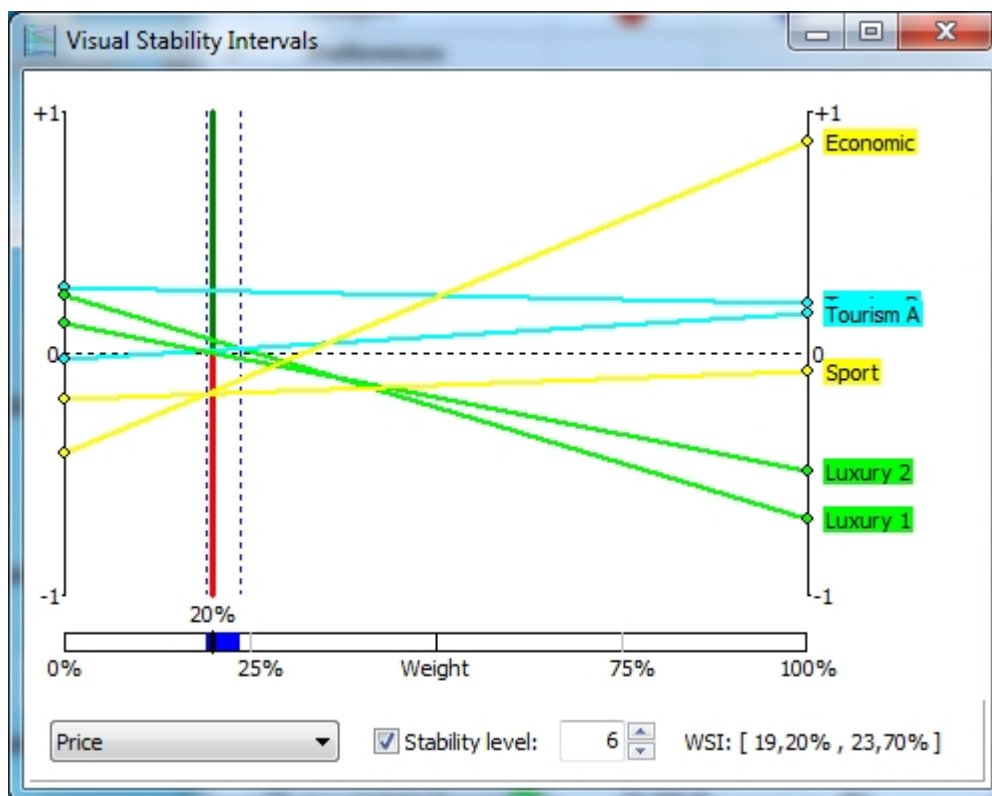
Local Menu

From the local menu the following options are available:

- Copy: Make a copy of the window to the clipboard. You will be able to paste it into another application such as e.g. Word, Excel or PowerPoint.
- Shortnames: To display full or short names for the actions.
- Locate: Select an action that will be highlighted on the display.

Visual Stability Interval

The Visual Stability Intervals window shows how the Phi multicriteria net flow scores change as a function of the weight of a criterion.



The horizontal dimension corresponds to the weight of the selected criterion. And the vertical dimension corresponds to the Phi net flow score. For each action a line is drawn that shows the net flow score as a function of the weight of the criterion. At the right edge of the display the weight of the criterion is equal to 100% and the actions are ranked according to that single criterion. At the left edge, the weight of the criterion is equal to 0%.

The position of the vertical green and red bar corresponds to the current weight of the criterion. The intersection of the action lines with the vertical bar gives the PROMETHEE II complete ranking.

On the example above, one can see that the scores of the Luxury 1 and 2 cars go down when the weight of the Price criterion increases (they are indeed expensive) while the score of the Economic car increases (it is the cheapest one).

When the "Stability level" check box is checked, two dotted vertical lines are drawn to show the weight interval within which the top of the PROMETHEE II complete ranking remains unchanged (WSI - weight stability interval). The number of actions taken into account (stability level) can be set from 1 (top ranked action only) to the number of active actions (full ranking).

PROMETHEE V Selection

What is it?

PROMETHEE V uses the net flow computation to optimize the selection of a subset of actions under constraints such as maximum budget, location, etc.

How to interact?

There are two tabs in this window:

- Constraints:
To setup the selection constraints.
- Solution:
To view the optimal selection and perform what-if analyses.

PROMETHEE V

The PROMETHEE V is used to select a best subset of actions according to several user-defined constraints. It is based on a 0-1 linear program where the objective function is to maximize the sum of the net flow (Phi) scores of the selected actions.

Constraints

The top of the windows includes two fields to set the minimum and maximum number of actions that should be selected. The two buttons allow to add or delete constraints in the bottom table.

For each constraint, it is possible to enter the coefficients, to specify the type of constraint (\leq , $=$ or \geq), to enter the right hand side, to specify the name and additional information (by clicking the button), and to activate or deactivate the constraint.

	T.B	L.1	T.A	L.2	Eco	Sp		
Net flow	0,2573	0,0547	0,0133	-0,0013	-0,1573	-0,1667		
<input checked="" type="checkbox"/> Budget	25,50	38,00	26,00	35,00	15,00	29,00	<=	55,00

In the above example, one single "Budget" constraint has been added. Budget values (the prices of the cars, expressed in k€) have been entered for the different actions and the maximum budget is set to 55 k€. The number of cars to select is set to 2.

Solution

When this tab is selected, a branch and bound algorithm is started to find the optimal solution of the 0-1 linear program.

The left table shows the optimal solution that was found. The actions are displayed in the PROMETHEE II

rank from top to bottom. The "Optimal" column displays the optimal solution. The buttons in the "Compare" column can be used to change the selection for comparison. The "Total" rows shows the value of the objective function (i.e. the sum of the net flow scores of the selected actions) for both selections. The right table shows the left and right hand sides of the constraints for both the optimal and the compared selections. Constraint violations appear in red.

Cars		Net Flow	Optimal	Compare	Constraints		Optimal		Compare		
		Total:	0,2707	0,3120	LHS		RHS	LHS		RHS	
Tourism B	<input checked="" type="checkbox"/>	0,2573	Yes	Yes	Minimum	2,00	>=	2,00	2,00	>=	2,00
Luxury 1	<input checked="" type="checkbox"/>	0,0547	No	Yes	Maximum	2,00	<=	2,00	2,00	<=	2,00
Tourism A	<input checked="" type="checkbox"/>	0,0133	Yes	No	Budget	51,50	<=	55,00	63,50	<=	55,00
Luxury 2	<input checked="" type="checkbox"/>	-0,0013	No	No							
Economic	<input checked="" type="checkbox"/>	-0,1573	No	No							
Sport	<input checked="" type="checkbox"/>	-0,1667	No	No							

In the above example, PROMETHEE V proposes to select the Tourism B (1st ranked in PROMETHEE II) and Tourism A (3rd ranked) cars for a total flow of 0,2707. It doesn't select the second best action (Luxury 1) as this would violate the "Budget" constraint. This can be checked in the "Compare" columns: the total flow is higher (0,3120) but the budget is too large (63,5 k€).

Sorting

This feature is not implemented yet.

Performance Analysis

What is it?

This section introduces an extension of the PROMETHEE method for the evaluation of the relative performance of a set of units, according to several input and output criteria.

It is still in a research development phase and is intended as an alternative to methods such as Data Envelopment Analysis (DEA).

The actions correspond to the units to evaluate and two clusters of criteria have to be defined: all input criteria should be in a single cluster, and all output criteria should be in another single cluster.

Performance Analysis

There are two types of analyses that are available:

- Aggregated score
- I-O Efficiency

Aggregated Score

The table displays for each action:

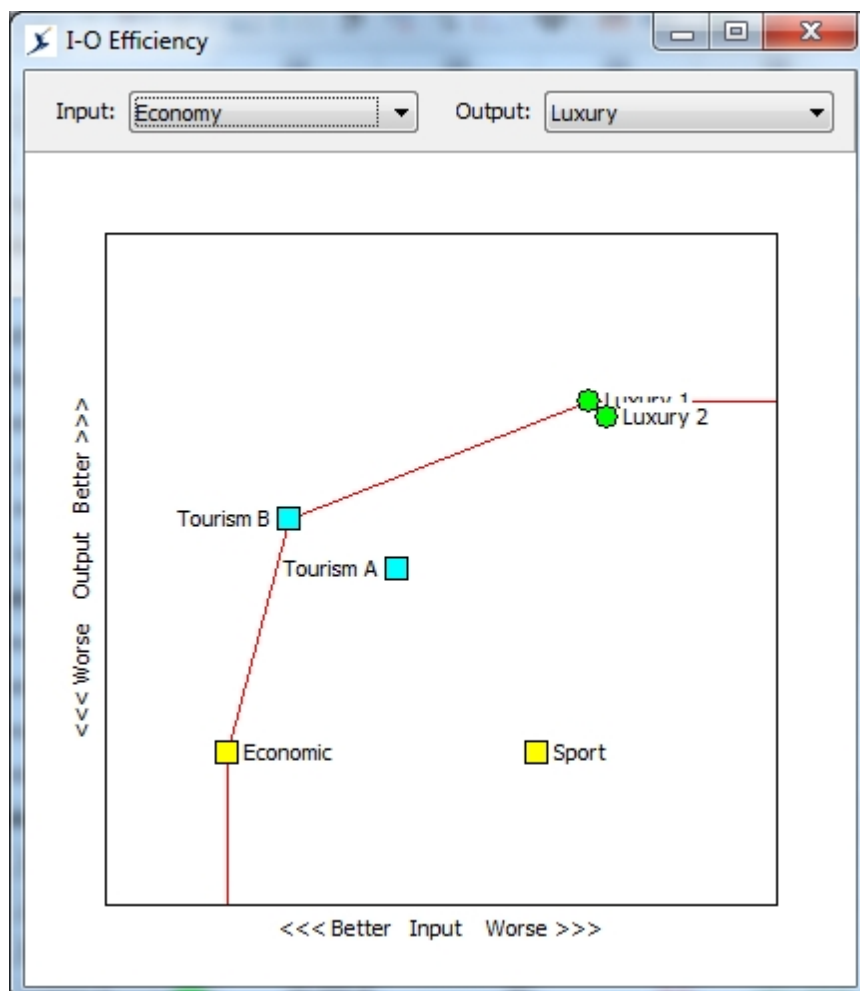
- Input: The net flow computed for the input cluster of criteria.
- Output: The net flow computed for the output cluster of criteria.
- O/I ratio: A performance measurement computed as a ratio between normalized output and input flows.
- Score: A percentage score corresponding to the O/I ratio: the best performing action has a 100,00 score.

	Input	Output	O/I ratio	Score
Tourism B	0,4533	0,1500	2,1037	100,00
Luxury 1	-0,4433	0,5000	1,0393	49,40
Tourism A	0,1333	0,0000	1,1538	54,85
Luxury 2	-0,4933	0,4500	0,9710	46,16
Economic	0,6367	-0,5500	1,2385	58,88
Sport	-0,2867	-0,5500	0,3497	16,63

The example above is not very realistic and is just introduced for demonstration purpose: Economy (Price and Consumption) criteria are considered as the input and Luxury (Habitability and Comfort) criteria are considered as the output. (Power is thus not taken into account here.)

I-O Efficiency

This is a two-dimensional representation of the Input and Output flows. An "efficiency" frontier is drawn in red.



In the example above, three actions are on the efficient frontier with quite different performance profiles:

- Economic: lower input use but lower output as well,
- Luxury 1: high input use but higher output as well,

- Tourism B: more average input and output levels.

It is difficult to compare those three actions with respect to I/O performance.

The other three actions lag behind the efficient frontier. Their performance could be improved comparatively to the "efficient" actions.

Preference Flows

What is it?

The Preference Flows window displays the PROMETHEE unicriterion and multicriteria preference flows in a tabular format.

How to interact?

There are two tabs in this window:

- Unicriterion: The unicriterion net flows are displayed.
- Multicriteria: The multicriteria positive, negative and net flows are displayed.

There is also a local menu. Right-click on the drawing to open it.

Local Menu

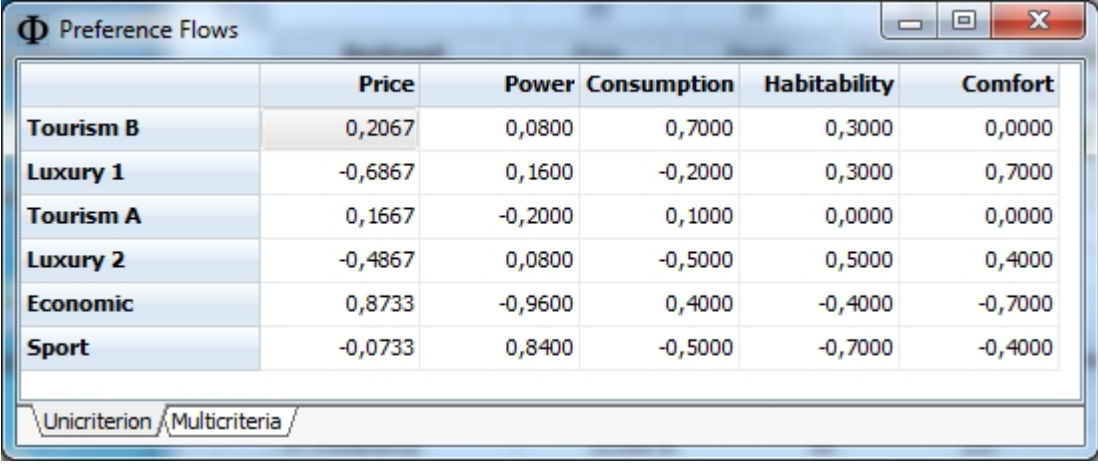
From the local menu the following options are available:

- Copy: Make a copy of the window to the clipboard. You will be able to paste it into another application such as e.g. Word, Excel or PowerPoint.

Preference Flows

Unicriterion

The unicriterion net flows are displayed for each criterion (or grouped group or cluster).



	Price	Power	Consumption	Habitability	Comfort
Tourism B	0,2067	0,0800	0,7000	0,3000	0,0000
Luxury 1	-0,6867	0,1600	-0,2000	0,3000	0,7000
Tourism A	0,1667	-0,2000	0,1000	0,0000	0,0000
Luxury 2	-0,4867	0,0800	-0,5000	0,5000	0,4000
Economic	0,8733	-0,9600	0,4000	-0,4000	-0,7000
Sport	-0,0733	0,8400	-0,5000	-0,7000	-0,4000

Multicriteria

The multicriteria positive (Phi+), negative (Phi-) and net (Phi) flows are displayed.

	Phi+	Phi-	Phi
Tourism B	0,3573	0,1000	0,2573
Luxury 1	0,2760	0,2213	0,0547
Tourism A	0,2060	0,1927	0,0133
Luxury 2	0,2560	0,2573	-0,0013
Economic	0,2647	0,4220	-0,1573
Sport	0,2280	0,3947	-0,1667

Unicriterion Multicriteria

Scenarios Comparison

What is it?

The PROMETHEE Rankings window displays the PROMETHEE I and II rankings in two separate tabs.

How to interact?

There are two tabs at the bottom of the window:

- Pairwise: For comparing two scenarios side by side.
- All scenarios: To compare all the scenarios together.

There is also a local menu. Right-click on the drawing to open it.

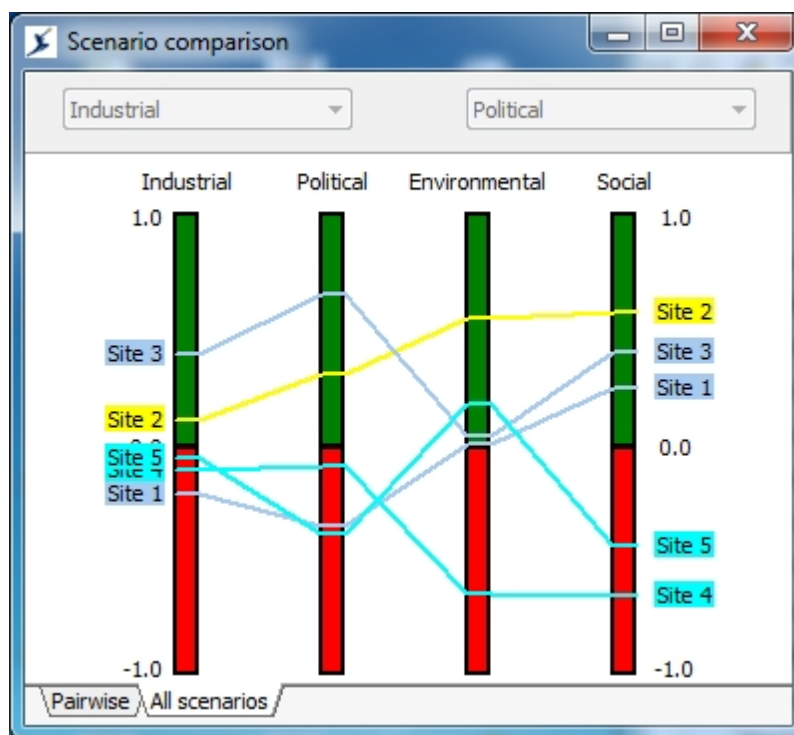
Local Menu

From the local menu the following options are available:

- Copy: Make a copy of the window to the clipboard. You will be able to paste it into another application such as e.g. Word, Excel or PowerPoint.
- Locate: You can select an action that will be highlighted on the display. That makes it easier to locate a particular action, especially when the number of actions is larger.

Scenario Comparison

This windows allows to compare the PROMETHEE II rankings obtained for several scenarios.



The above example shows the "All scenarios" tab: the PROMETHEE II ranking for each scenario is displayed on a vertical green-red bars and a line is drawn for each active action.

In the "Pairwise" tab, only two scenarios are displayed. The two drop-down list boxes located at the top of the window are used to select the scenarios to compare.

Balance of Power

This feature is not implemented yet.

PROMap

What is it?

PROMap provides Visual PROMETHEE with GIS features.

How to interact?

There are several controls available in this window:

- To the left and top right of the window are the usual Google Maps controls you can use to explore the map.
- At the bottom of the window are several controls:
 - Locate: Click this button to center the map on the selected action.
 - Display: Select the type of information to be displayed on the map.
 - Copy: Copy the map to the clipboard.
- Clicking on an action marker opens an information window.

PROMap

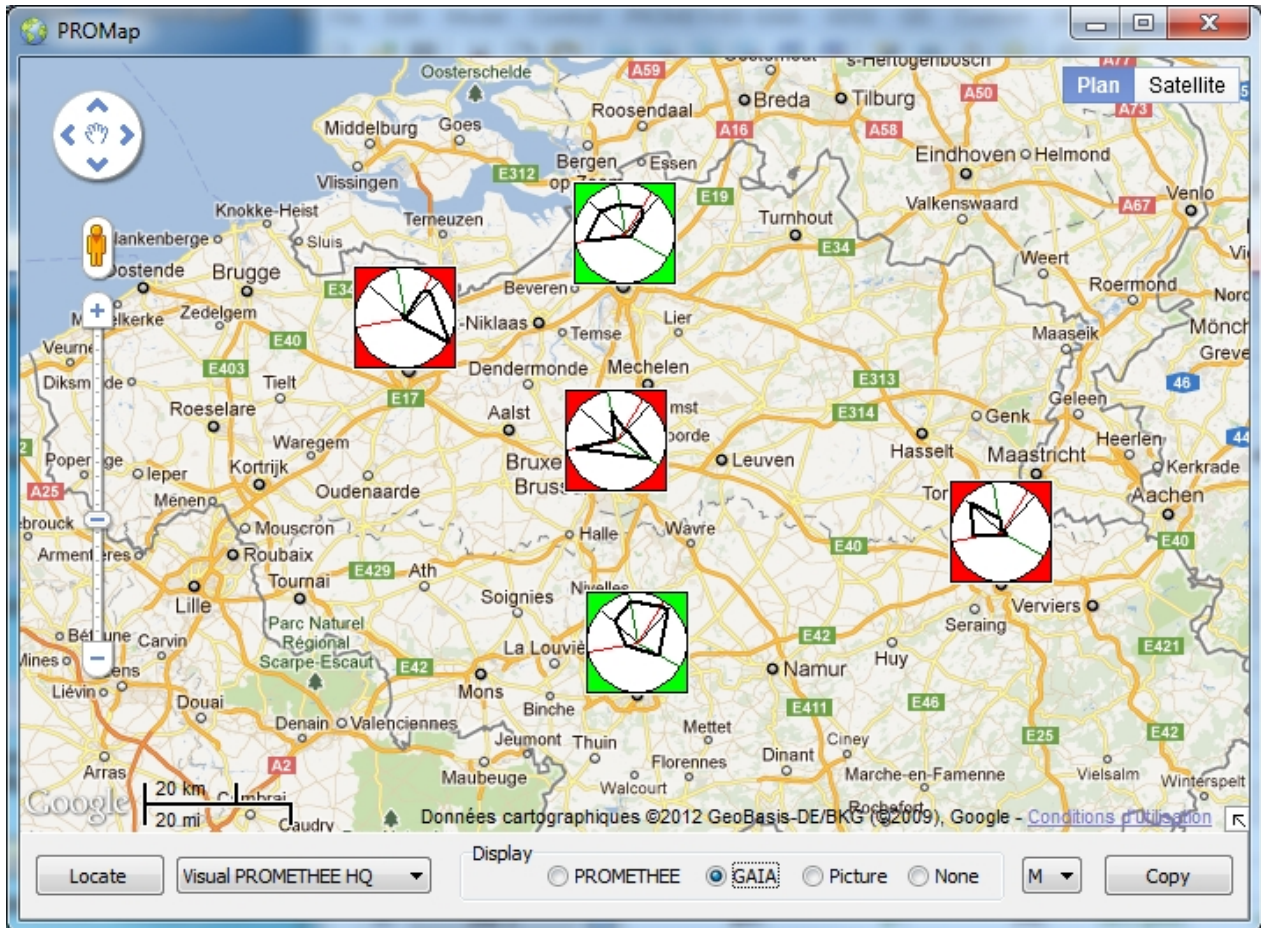
The PROMap display provides the integration of the Visual PROMETHEE analysis with Google Maps. To use it an active Internet connection is required.

Each action can be associated to a geographical location on the map. This can be done in the [Actions](#) dialog.

The results of the PROMETHEE-GAIA analysis can then be displayed in Google Maps. There are four possible displays:

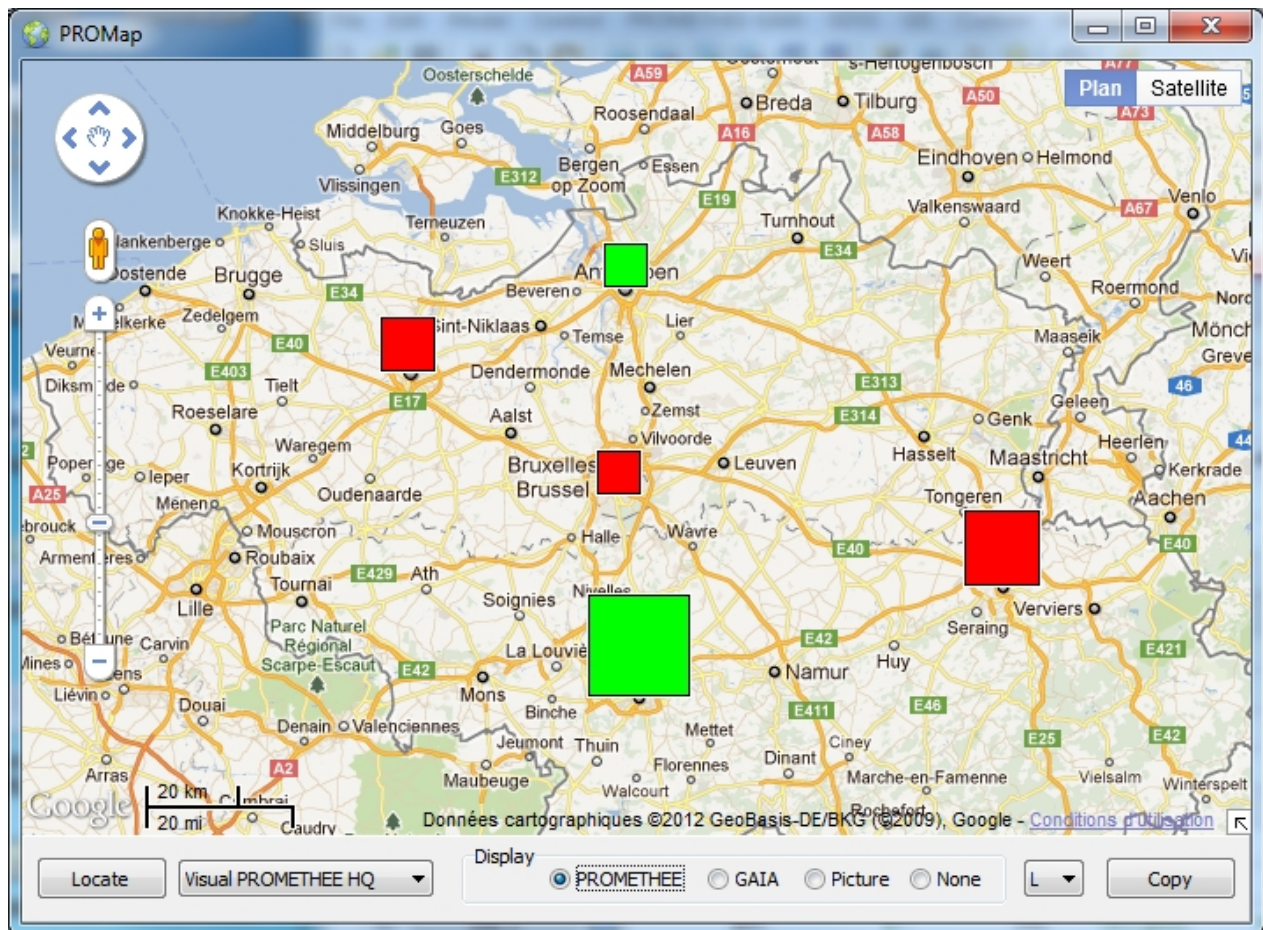
- PROMETHEE: Actions are represented by squares. Positive flow scores are displayed in green and negative scores in red. The size of the square is increasing with the absolute value of the score. So, best ranked actions correspond to large green squares and worst actions to large red squares.
- GAIA: Miniature versions of the GAIA Webs are displayed with a green or red square outline according to whether the action's net flow score is positive or negative.
- Picture: The picture associated to the action is displayed.
- None: Standard Google Maps markers are displayed.

The size of the markers can be changed from S (small) to XL (extra-large) using the drop-down list box.



In the above example, GAIA Webs are displayed. Quite different profiles are visible.

In the second screen shot, the PROMETHEE ranking is represented by squares. The best action is located to the South while the worst one is located to the East.



Weight Presets

What is it?

Weight presets allow to save different sets of weights for easy comparison.

How to interact?

There are two columns of buttons in this small window:

- Clicking on a left column button loads the corresponding weight preset.
- Clicking on a right column button ("Update") allows to save the current weights to that preset and to change its name if necessary.

Weight Presets

Five different weight presets can be defined for a given data set. The presets are saved with the data.



When starting a new problem, the presets are automatically set to equal weights for all the criteria.

Layouts

What is it?

Layouts allow to save different windows configurations for different types of analyses and to switch easily from one layout to another.

How to interact?

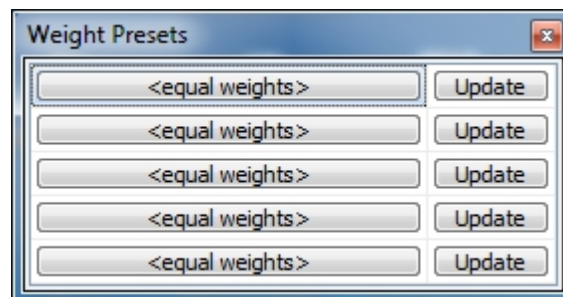
There are two columns of buttons in this small window:

- Clicking on a left column button switches the windows positions to the corresponding layout.
- Clicking on a right column button ("Update") allows to save the current layout to that row and to change its name if necessary.

The two buttons at the bottom of the window allow to reset the position of all the windows and to close all the windows.

Layouts

Five different layouts can be defined. The layouts are saved within the software and can be used with any data set. Each layout stores the position and state (visible, hidden, maximized) of the different windows.



PROMETHEE and GAIA methods

- [PROMETHEE Rankings](#)
 - [PROMETHEE I Partial Ranking](#)
 - [PROMETHEE II Complete Ranking](#)
- [GAIA](#)

MCDA

PROMETHEE Rankings

There are two PROMETHEE rankings.

- [PROMETHEE I Partial Ranking](#)
- [PROMETHEE II Complete Ranking](#)

Preference Flows

Documentation available soon!

PROMETHEE I Partial Ranking

Documentation available soon!

PROMETHEE II Complete Ranking

Documentation available soon!

GAIA

Documentation available soon!

Useful links

Useful links

You can find additional information at:

- www.promethee-gaia.net
This is the official PROMETHEE-GAIA web site. Here you can find and exchange information related to the methods and their implementation:
 - blog.promethee-gaia.net
 - forum.promethee-gaia.net
 - faq.promethee-gaia.net
 - biblio.promethee-gaia.net
- www.decision-drive.com
- www.sustainable-decisions.com
- and more coming soon...