User Manual for the graphomate bubbles 2.2

for SAP Lumira Designer 2.3
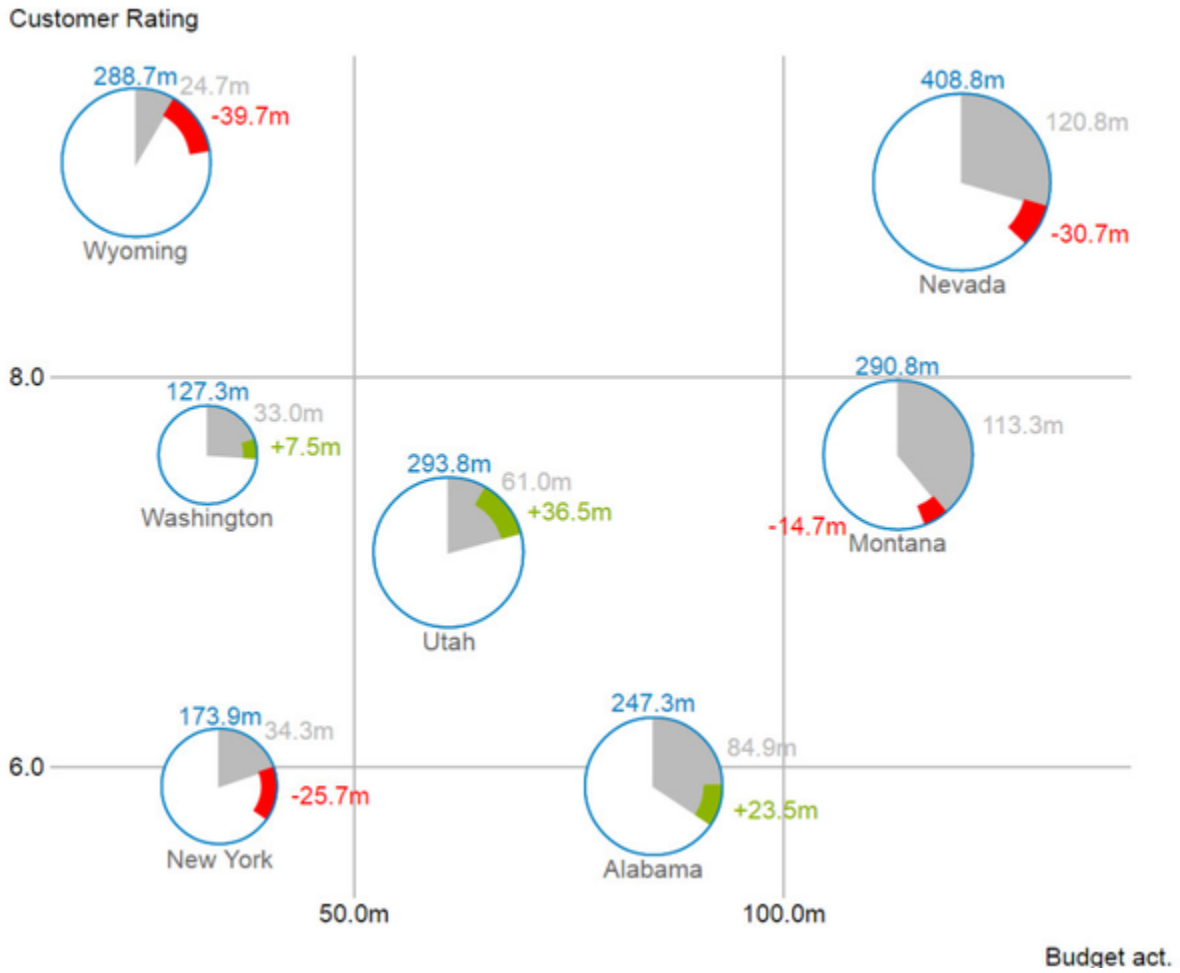
Version 2.2 - as of June 2019

https://www.graphomate.com

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Introduction

Visualizations are gaining more and more importance in regards to quick and safe communication. Information presented in a simple, yet meaningful way supports deciders to find patterns and deviations. Good information design can give you a quick and efficient overview of your business. The International Business Communication Standards (IBCS) are working as a ruleset of how meaningful visualizations are used most effectively for business reporting and dash boarding.

In addition to our *graphomate charts* and the *graphomate tables* we offer the *graphomate bubbles* as another component for SAP Designer (furthermore „Designer"), which aligns itself with the IBCS concepts. Designer is the successor of the Web Application Designer (WAD) from the SAP BEx-Suite and tightly coupled with SAP BW. It uses HTML5 web technologies to produce BI Applications in the browser and as such does not restrict you to certain end devices, including mobile devices.

With our Designer extension *graphomate bubbles* we present a highly configurable visualization solution for this platform. The *graphomate bubbles* extension is suitable to map a portfolio of values for a small number of objects on two value axes. Up to 5 KPIs can be visualized for approximately two dozen bubbles. A two-dimensional utilization as scatterplot supports up to 100 *bubble* elements. In addition it can be used as a „*bubble chart*" to find patterns and correlations in up to 5 dimensions of highly aggregated data. Of course the *graphomate bubbles* also offer many additional features you might be familiar with from our other components. This includes a collision logic for overlapping labels, a number format configuration and optical customization.

> In the sense of a uniform language regulation we speak in the further manual of Lumira Designer or briefly Designer.

For the *graphomate bubbles* extension we recommend the use of Designer 2.0 >= SP03 with the Internet Explorer 11+ or any comparable modern browser. For further information – e.g. regarding the deployment on the Business Intelligence Platform (BIP) or SAP Netweaver – please consult the Product Availability Matrix (PAM).

Please be advised that we not support the Internet Explorer 9 and 10 starting 2017.

Installation

> - Before opening your old dashboards/BI apps with Designer 2.0, you need to migrate them to m mode with Design Studio 1.6.
> - Our extensions for Design Studio 1.6 will also run in Designer 2.0. When starting Lumira Designer 2.0, please do not import our graphomate extension from SAP Design Studio 1.6. Instead we suggest using the versions specifically built for Designer 2.0.

Local installation of the extension to Designer

You have installed Designer 2.0 SP03+ on your computer.

1. Save the zipfile *graphomate_bubbles2.x.x.zip* to a folder of your choice.
2. In Designer, choose *Tools Install Extension to Lumira Designer,* click on *Archive* and select the zipfile which has been saved before.
3. Choose *Finish* to start the installation.
4. Choose *Next* and again *Next* to confirm the installation.
5. Accept the terms of the license agreement and choose *Finish*.
6. Choose *Yes* to allow a restart of Designer.
7. After the restart, the graphomate extension appears in the Component View of Designer.

Removing the extension from Designer

In Designer choose *Help > About….*

1. Click the *Installation Details* button.
2. Select the component *graphomate bubbles 2.x.x*
3. Choose *Uninstall… .*
4. In the UninstallWizard choose *Finish*.
5. Choose *Yes* to allow Designer to restart.

Server installation of the extension

Users need to deploy the locally installed extension to the BI platform before launching the *graphomate bubbles* from the BI platform.

1. Choose in the BI Platform Mode *Tools > Platform Extensions.*
2. Select the extension *graphomate bubbles* that is installed on your local computer.
3. Choose *Install on Platform.*
4. Manually restart the BI Platform Adaptive Processing Servers that host the Analysis Application Service and accept the warnings in Designer.
5. The graphomate extension appears under *Extensions Installed on Platform.*
6. Choose *Close.*
7. Again restart the BI Platform Adaptive Processing Servers that host the Analysis Application manually.

Uninstalling the extension from the Server

1. Choose in the BI Platform Mode *Tools > Platform Extensions.*
2. Choose the *graphomate bubbles.*
3. Choose *Uninstall from Platform.*
4. Confirm the uninstalling by choosing *Yes.*
5. In order to complete the uninstalling process, manually restart the BI Platform Adaptive Processing Servers that host the Analysis Application Service and accept the warnings in Designer.
6. The *graphomate* bubbles is then removed from the *Extensions Installed on Platform.*
7. Choose *Close.*
8. Manually restart the BI Platform Adaptive Processing Servers that host the Analysis Application Service.

Quick Start

You have set up a *Data Source* and now want to visualize a data series of this query with the *graphomate bubbles*.

1. Drag a *graphomate bubbles* component onto the canvas and attach a *Data Source* by dragging it on top of this component.

2. Set the series on the Data tab in the *Additional Properties Sheet* by clicking on the corresponding Button (…). You will be able to choose a row or column from your *Data Source* in the *Initial View*. Confirm the highlighted data by clicking OK .

3. The series labels will be taken <u>automatically</u> from the metadata of the selected dimension members.
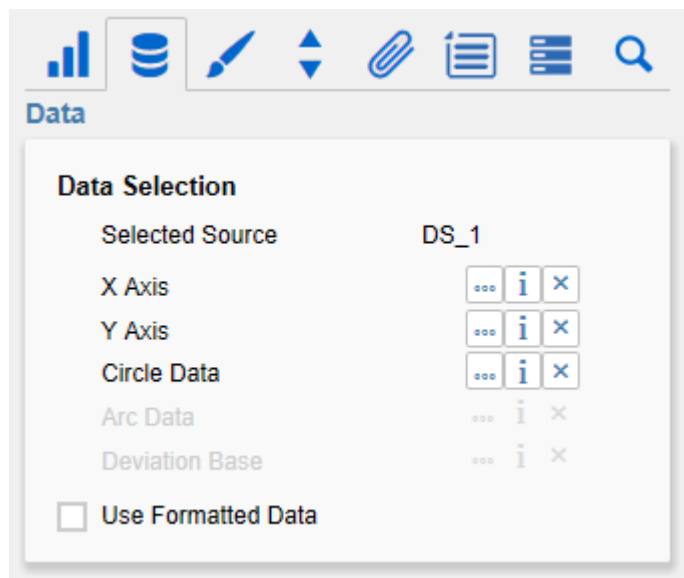
Overview

Data Dimensions of the graphomate bubbles

With the *graphomate bubbles* you will be able to visualize up to five data dimensions. These data series are the following.

Dimension	Description
X Axis	A series of values which will represent the coordinates on the x axis of the data points. The x axis represents the main dimension and serves as source for the extraction of diagram labels.
Y Axis	A series of values which will represent the coordinates on the y axis of the data points. The y axis represents the subordinate dimension which contains a matching value for each element of the x axis.
Circle	A series of values representing the area of the *Bubbles*. Setting data of this series is <u>optional</u>, but it requires the previously described series to be set. If no data is set here the chart will be drawn as a *Scatterplot*.
Arc	A series of values representing the area of the grey segment of each bubble (see picture below). This optional segment show the share of the corresponding value of the *Circle* series. Hence it is obligatory that the *Circle* series is set, if you want to use the *Arc* series.
Deviation	A series of values, also optional, which represents yet another segment of the whole circle. This segment is intended for a previous year value. This value's deviation from the *Arc* value is displayed by a red or green bar (see picture below) for a positive or negative deviation respectively. This series can only be used if the previously described series are set.

> Please take care that you do not select data series with different offsets. For example, do not select the members January to June for the x axis and July to December for the y axis. You should select values of the same members for the y axis to ensure the values to match each other and the diagram labels to be extracted correctly.

Visual objects of the graphomate bubbles
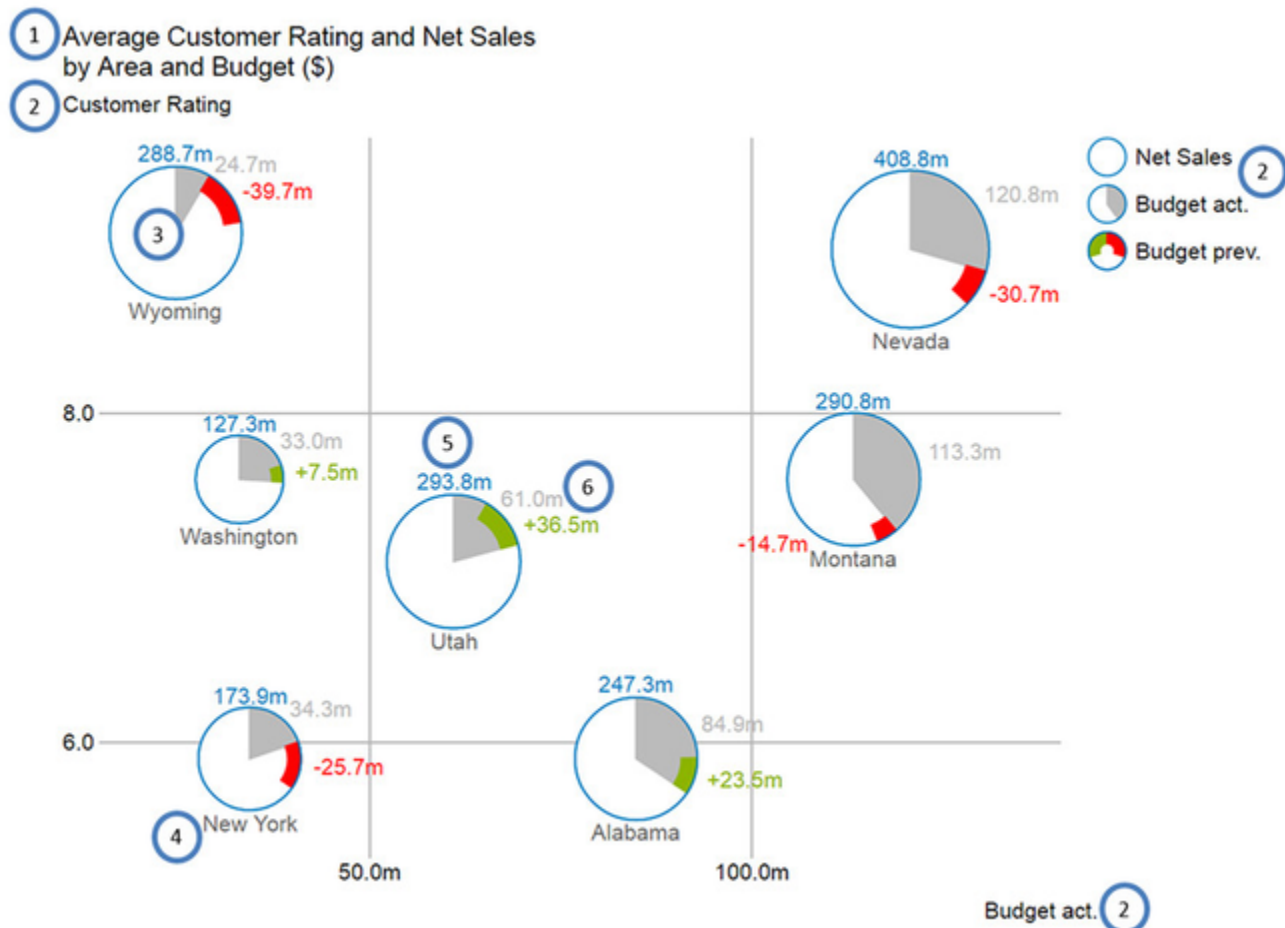
1. *Title* for the diagram (may contain more than one row).
2. *Series Labels*, one for each data series. They are automatically generated from the data selection. The *Series Labels* of the data series *X Axis* und *Y Axis* (see above, *Budget act.* And *Customer Rating*) are displayed on the respective axis. They are called *Axis Labels*. The *Series Labels* for the data series *Circle*, *Arc* and *Deviation* (see above, *Net Sales*, *Budget act.* and *Budget prev.*) are displayed as a legend on the right.
3. *Bubbles*: The elements of this diagram are called *Bubbles* and represent a set of information according to the selected data series.
4. The *Category Label* is the label for a *Bubble*, which is generated from the data selection of the x axis series.
5. The *Circle Label* of a *Bubble* specify the value of its *Circle Dimension*, which is the data series that defines this *Bubbles'* area.
6. The *Value Labels* of a *Bubble* specify the values of *Arc* dimension (see above, grey area) and the deviation from the dimension *Deviation* (see above, red and green bars).

Properties

Generally you have two possible ways to change the properties of the *graphomate bubbles*: The *Standard Properties Sheet*, which contains all parameters as a structured list, or the *Additional Properties Sheet*, which offers a user friendly interface. Please note that some of the more specialized options are only available on the *Standard Properties Sheet*.

The Checkboxes in front of a property in the *Additional Properties Sheet* control the visibility of elements or activation of a functionality. The Data Source to be used can only be set via Drag&Drop onto the component or the entry *Data Binding* on the *Properties Standard Sheet*.

> You can reinitialize the canvas and the *Additional Properties Sheet* by pressing *F5*. This is sometimes necessary when changes in the properties are not adopted directly in the character range.
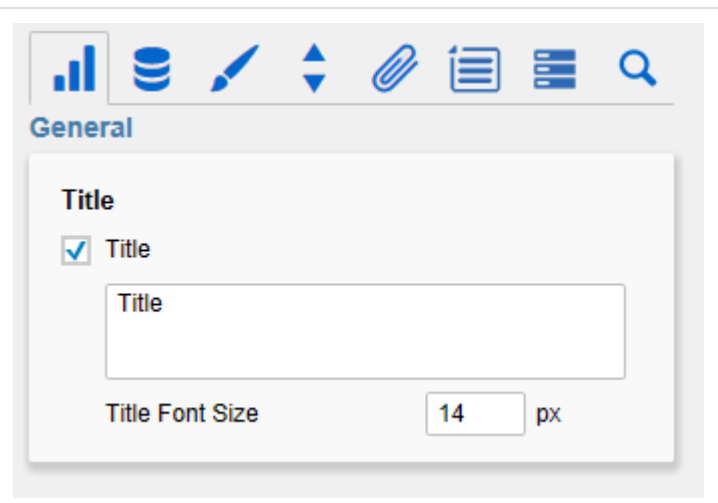
General Tab

TITLE

You can set a title for the Bubble diagram. If the checkbox is enabled the title will be displayed on the canvas. Line breaks are taken into account.

Font Size

Additionally you can set the font size for the title in [px].
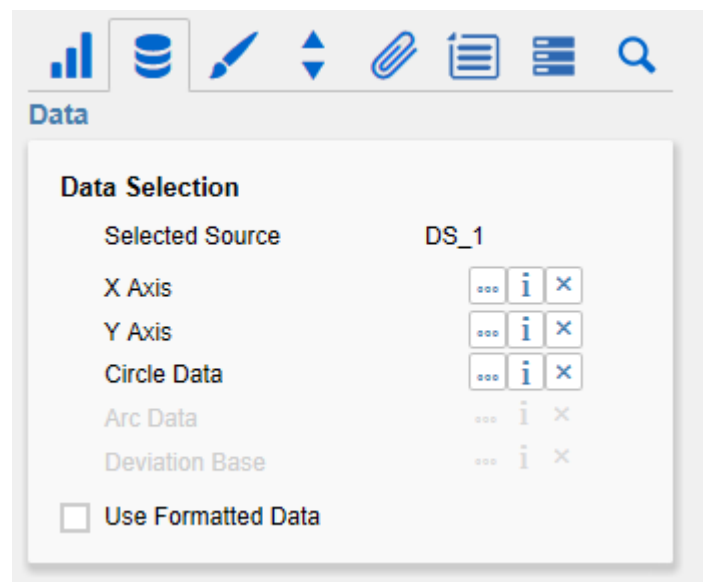
Data Tab

DATA SELECTION

The property *Selected Source* shows the alias of the selected data source. The Data Source which is to be used can only be set via Drag&Drop onto the component or the entry *Data Binding* on the *Standard Properties Sheet*.

Each of the data series *X Axis, Y Axis,…* sets a selection for each data dimension. You can click on the button (…) and select either a row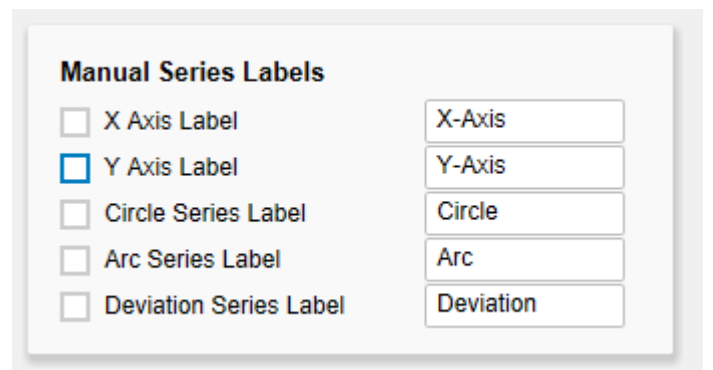 or a column in the popup window. Remove a data selection by clicking on the corresponding ☒ button. Detailed descriptions for the selectable data series can be found under Data dimensions of the graphomate bubbles.

If this checkbox *Use Formatted Data* is set, the formatted data from the data source will be used in the diagram, if there are any. In this case the Deviation Label changes, showing the formatted data series value for Deviation instead oft the difference between the data series value and the Arc value.

Data

Data Selection

Selected Source	DS_1
X Axis	⦾⦾⦾ i ✕
Y Axis	⦾⦾⦾ i ✕
Circle Data	⦾⦾⦾ i ✕
Arc Data	⦾⦾⦾ i ✕
Deviation Base	⦾⦾⦾ i ✕

☐ Use Formatted Data

MANUAL SERIES LABELS

Strings for each data series can be set here. The check boxes decide if the manually set labels are used. Otherwise automatically generated labels are shown.

Manual Series Labels

☐	X Axis Label	X-Axis
☐	Y Axis Label	Y-Axis
☐	Circle Series Label	Circle
☐	Arc Series Label	Arc
☐	Deviation Series Label	Deviation

Appearance Tab

STYLING

Here you can change the options regarding the text elements in the bubbles diagram. You can change the global *font family*, the *Category Label font size* in [px] and the *Value Label Font Size* in [px].

Also, several *colors* can be adjusted here. By clicking on the colored boxes you can open a color picker to choose a color for the corresponding property.

Activating *Fill Circle* results in the area of the circles being filled with Circle Color.

VALUE FORMAT

Configures the format of the data labels.

- *Basic*
  Set the format for absolute and percental values according to the numeral.js rules – see Number Formatting.
  Locale can be changed here. If set to *AUTO* the locale of the data source is used.

- *Extended*
  If you need a fixed format for the data labels you can set it here for all values. Choosing the parenthesis „(" as the Negative Sign leads to negative numbers being shown inside parenthesis: (1234). The parameter in the Scaling field will be used as a divisor to scale the data labels.

DEVIATIONS

By clicking on the colored boxes you can change the color used for the positive (*Good Color*) and negative (*Bad Color*) deviations. The reset Button reverts the color to the default value.

Activating the checkbox *Invert* will cause positive deviations to be considered bad, therefore applying Bad Color to these deviations (and vice versa).

Deviations

Good Color   ☐ reset

Bad Color   ☐ reset

☐ Invert

Behavior Tab

SCALING

Activating the checkbox *Full Boxes* will result in a scaling of the axis that ensures equally sized boxes for the whole grid. If deactivated the scaling will be chosen to optimally use the given space. This may result in half sized boxes. To prevent misleading visualizations the Outer Grid Lines will be omitted.

The option *Begin of X/Y Axis* can be used to set the axis to begin with 0 or any other fix value. Equivalently the option *End of X/Y Axis* can be used.

Min. and Max Radius can be set to restrict a *Bubble's* radius in [px]. This means that regardless of the corresponding values no *Bubble* will be drawn with a radius lower or higher than the min. or max. radius respectively.
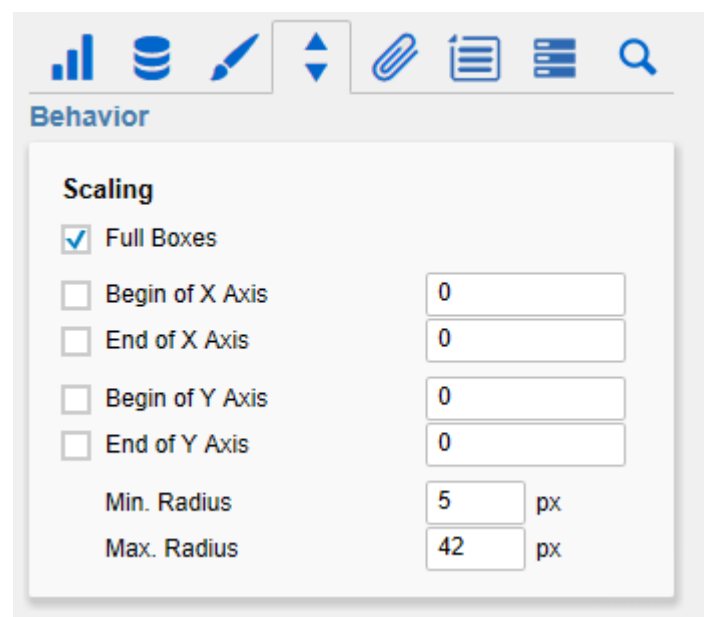
Behavior	
Scaling	
☑ Full Boxes	
☐ Begin of X Axis	0
☐ End of X Axis	0
☐ Begin of Y Axis	0
☐ End of Y Axis	0
Min. Radius	5 px
Max. Radius	42 px

MEASUREMENTS

If *Reserve Space for Annotations* is active the outside padding of the chart will be calculated as to leave enough space for all axis labels. This is especially useful for the labels of a bubble which appear on the axis during runtime activity (i.e. hovering over a bubble).

If Reserve *Space for Hidden Labels* is active, this property takes hidden labels into account when scaling the canvas. This means that the chart will be shrunk to leave space for all bubbles and labels, even if they are hidden by the collision logic.
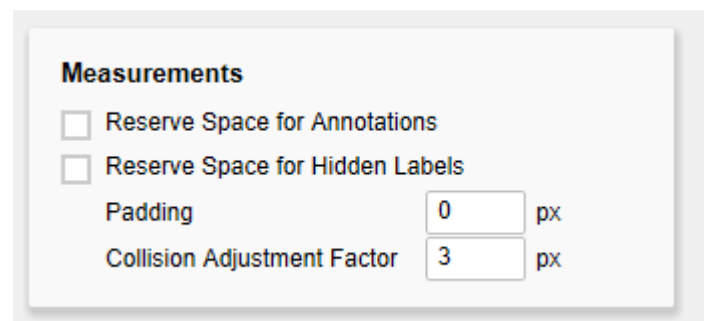
Additionally you can set a *padding* for the whole diagram in [px].

Define with the *Collision Adjustment Factor* a number of [px] with which the labels may overlap without the collision logic beginning to hide them.

Measurements	
☐ Reserve Space for Annotations	
☐ Reserve Space for Hidden Labels	
Padding	0 px
Collision Adjustment Factor	3 px

ELEMENT LABEL BEHAVIOR

With the *Value Labels* option you can activate or deactivate the Value Labels. Please note that the Value Labels have the lowest priority in regard to the collision logic, which means they are hidden first if they overlap with other Bubbles, Value Labels, Category Labels or Circle Labels.

The *Circle Labels* option will result in the Circle Labels being displayed *(Always), (Never)* or according to the collision logic *(Auto)*. The Auto Mode will hide Circle Labels when they are colliding. Circle Labels have a higher priority than Value Labels, but a lower one than Category Labels or other Bubbles. Along these priorities the collision logic will hide or show labels.

The *Category Labels* option will result in the Category Labels being displayed *(Always), (Never)* or according to the collision logic *(Auto)*. The Auto mode will hide Category Labels when they are colliding. Category Labels have a high priority so they will still be displayed when they collide with Value Labels or Circle Labels. They are only hidden when they collide with other Category Labels or Bubbles.

> Priority of label visibility (from high to low) on collision
>
> - Category Labels
> - Circle Labels
> - Value Labels

ZOOM MODE

There are four different zoom modes. The selection is **None**, **Rect**, **Magnify** and **Scale**. These can be used at runtime. For a detailed description, see Runtime Interactivity.

HIGHLIGHT GROUP

Activate the *Highlight Group* to match corressponding bubbles. For detailed information look under Runtime Interactivity.

Helper Tab

ADDITIONAL INFORMATION

If *Legend* is deactivated, no Legend will be displayed. When activated the legend will only show if there is a selection for the Circle, Arc or Deviation series.

Axis Labels controls whether or not the axis labels are displayed, which result from the X Axis and Y Axis data series.

Tooltip defines if a tooltip showing the underlying data should appear while hovering a bubble.

Helper

Additional Information
- ☑ Legend
- ☑ Axis Labels
- ☐ Tooltip
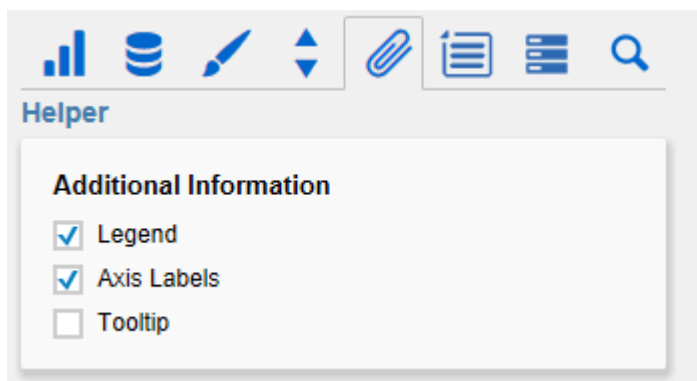
BASIC GRID LINES

Outer and *Inner Grid Lines* can be activated using the checkboxes.

Basic Grid Lines
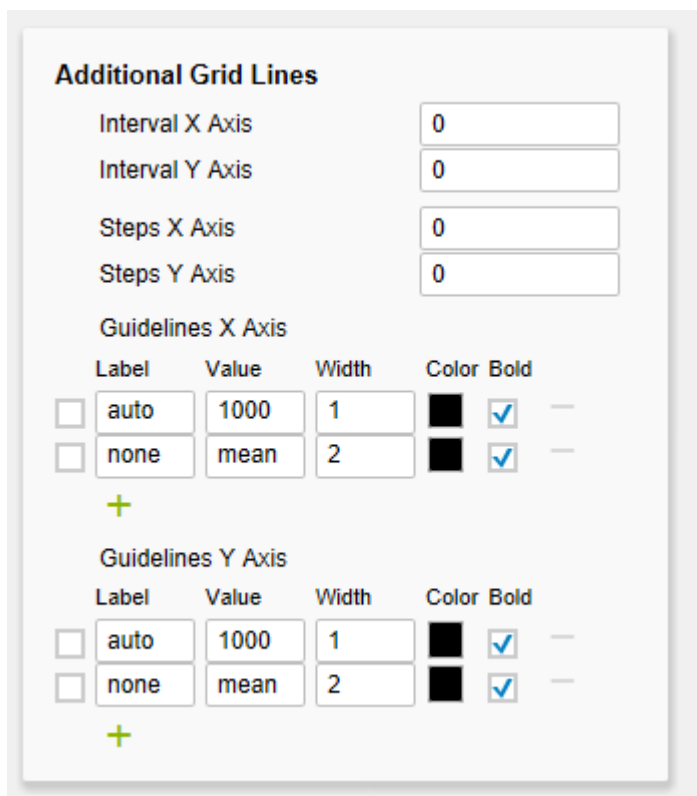- ☐ Outer Grid Lines
- ☑ Inner Grid Lines
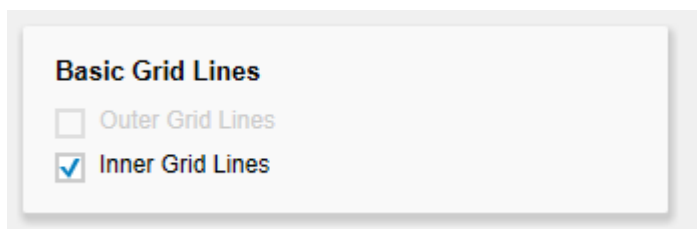
ADDITIONAL GRID LINES

Additional Grid Lines are defined either by the interval size or the step count. The *interval size* describes the line spacing in the respective axis entity. The *step count* defines the number of sections which divide the corresponding axis. For the visualization to make sense the Outer- and Inner-Grid Lines should be deactivated.

To highlight threshold or target values the so called *Guidelines* can be added. Their appearance is highly modifiable. With the + button, new line definitions can be added. For each Guideline the following options are available:

- *Label:* Shown on the axis at the position of the Guideline. For Label *auto* the line will be provided with a label that represents the axis value on the position. If *none* is choosen for the Label, no label will show up. Any other string will be shown as label.
- *Value:* Defines the position of the Guideline on the axis. If instead of a number the string *mean* is entered, the mean value of the series for the corresponding axis is used.
- *Width:* Sets the width of the Guideline.
- *Color:* Opens the color picker, to choose a color for the line.
- *Bold:* Decides if the label is styled bold.

Additional Grid Lines

Interval X Axis	0
Interval Y Axis	0
Steps X Axis	0
Steps Y Axis	0

Guidelines X Axis

	Label	Value	Width	Color	Bold	
☐	auto	1000	1	■	☑	—
☐	none	mean	2	■	☑	—

+

Guidelines Y Axis

	Label	Value	Width	Color	Bold	
☐	auto	1000	1	■	☑	—
☐	none	mean	2	■	☑	—

+

HIGHLIGHT RANGES

To highlight complete ranges of the X or Y dimensions, so-called *Highlight Ranges* can be added. This is done by clicking on the button +. Alternatively, one of the existing sample definitions can be activated and adapted. The Ranges are divided into areas that are to be marked on the X-axis or on the Y-dimension. The checkbox before the definitions activates the respective Range. The following options are also available:

- *Start*: Defines the position as the data value at which the Range should start. Instead of a number the following wildcards are available: *min*, *mean* and *max*. Thus, the minimum, average or maximum of the respective data series is set as the starting point of the range.
- *End*: Defines the position as the data value at which the Range is to end. Instead of a number the following wildcards are available: *min*, *mean* and *max*. Thus the minimum, average or maximum of the respective data series is set as the end point of the range.
- *Opacity*: Sets the transparency of the range in values from 0 (completely transparent) to 1 (not transparent).
- *Color*: Sets the color of the Range.

Highlight Ranges

Highlight Ranges X Axis

	Start	End	Opacity	Color	
☐	500	1000	0.3		—
☐	1000	2000	0.7		—
+					

Highlight Ranges Y Axis

	Start	End	Opacity	Color	
☐	500	1000	0.3		—
☐	1000	2000	0.7		—
+					

TRENDLINE

The checkbox at the beginning activates the so-called Trendline. It is intended to visualize the trend of the development of the displayed data points and to make connections recognizable. This line is the regression line known from the statistics which represents the linear relationship of values in a Cartesian coordinate system. The following options are available:

- *Color*: Defines the color of the Trendline.
- *Width*: Defines the width of the Trendline.
- *Correlation*: Activates the display of the correlation coefficient under the legend of the bubbles. This indicates how exactly the trend of the trendline can be determined. The value fluctuates between 1 (absolute exact trendline) and 0 (trend line not meaningful).

Trendline

	Color	Width		Correlation
☐	■	2		☑

CONDITIONAL FORMATTING CONFIGURATION

Using this configuration, the optical image of the bubbles can be adapted based on conditions. For each bubble, the value from the selected *Source* is compared to the *Operand* via the condition (*Operato r*). If the condition matches, the selected (optical) *Eff ect* is applied. Depending on the selected operator, you need to choose between none and 2 operands.

Example:

For the Source *circle* is selected. The *Operator* has been set to *><*. This Operator requires 2 Operands. *Operand* 1 was set to 200 and *Operand* 2 was set to 300. The *Effect* was chosen so that the *circle color* is set to *red* in the positive case. So now every bubble whose area is between 200 and 300 units is dyed red.

Further definitions can be added by clicking on the ✛ button. The checkbox before the respective definition determines whether this definition should be applied or not. The following options are available:

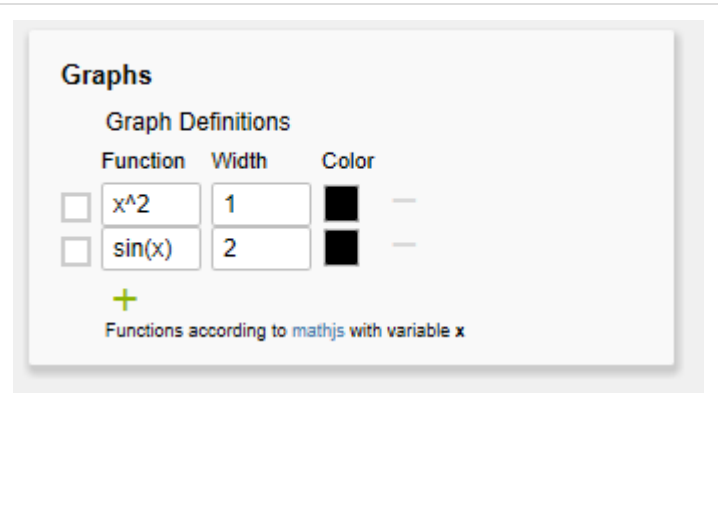**Conditional Formatting Configuration**

	Source	Operator	Operand	Effect	
☐	circl ⌄	< ⌄	200000	▶ show	—
☐	x ⌄	<> ⌄	▶ show	▶ show	—
☐	x ⌄	<> ⌄	▶ show	▶ show	—
☐	x ⌄	alwa ⌄		▶ show	—

✛

- *Source*: Determines with which data series the operand (s) are compared.
  - *x*: The data value from which the position of the bubble on the X-axis results.
  - *y*: The data value from which the position of the bubble on the Y-axis results.
  - *circle*: The data value from which the area of the bubble results.
  - *arc*: The data value from which the area of the Arc of the bubble results.
  - *dev*: The data value from which the deviation circular section of the bubble results.
  - *label*: The label below the bubbles.
- *Operator*: Defines the condition for comparing the value with the *Operand* (s).
  - *= | equal*: Is the value equal to the *Operand*?
  - *!= | unequal*: Is the value unequal to the *Oper and*?
  - *< | smaller*: Is the value smaller than the *Ope rand*?
  - *<= | smaller/equal*: Is the value smaller than or equal to the *Operand*?
  - *> | greater*: Is the value greater than the *Ope rand*?
  - *>= | greater/equal*: Is the value greater than or equal to the *Operand*?
  - *>< | between*: Is the value between the two *O perand*?
  - *<> | outside*: Is the value not between the two *Operand*?
  - *always*: The effect is always applied regardless of the data.
  - *contains*: Does the value contain the *Operan d*? (for *label*)
- *Operand*: Determines with which values the values from the data series are compared.
  - *Operand 1*: Not required for *Operator always*.
  - *Operand 2*: Not required for *Operator always, contains, >=, >, <=, <, !=* and =
- *Effect*: Applied when the condition evaluates positively.
  - *circle color*: Changes the fill color of the circle.
  - *stroke color*: Changes the color of the circle border.
  - *stroke width*: Changes the width of the circle border.
  - *css class*: Adds the specified CSS class.

Graphs

For orientation in the coordinate system multiple Graphs can be added via their function and will than be plotted. This is done by clicking on the button +. Alternatively, one of the existing sample definitions can be activated and adapted. The checkbox before the definitions activates the respective Graph. The following options are also available:
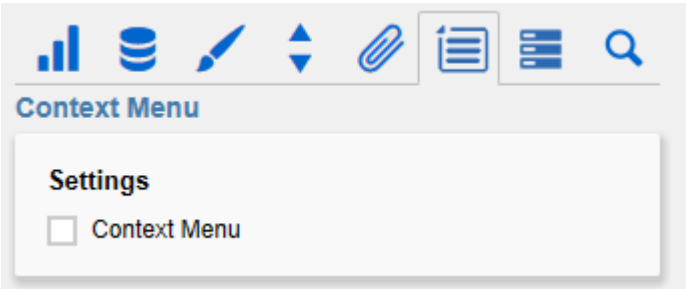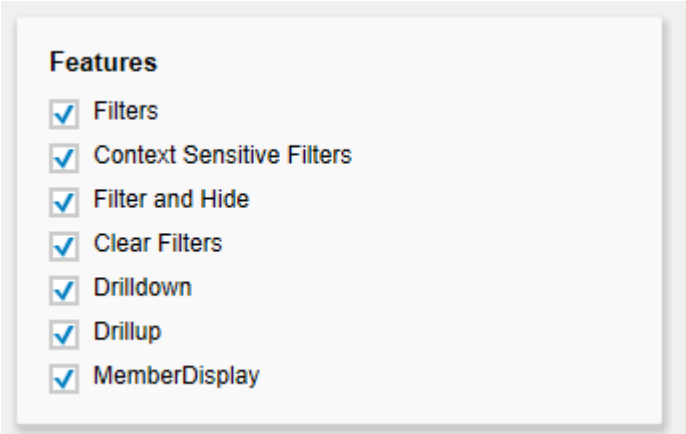
- *Function*: The function that defines a Graph appearance. It can be written according to math.js and will depend on variable **x**. E.g. *x, x^2, sin(x), sqrt(x), log(x)*.
- *Width*: The width of the function plot.
- *Color*: The color of the function plot.

Graphs

Graph Definitions

	Function	Width	Color	
☐	x^2	1	■	—
☐	sin(x)	2	■	—

+

Functions according to mathjs with variable **x**

Context Menu Tab

SETTINGS

This checkbox enables or disables the context menu altogether. Once activated the context menu will be accessible during runtime by right clicking on a bubble.

FEATURES

Here you will be able to choose which options are available in the context menu. An activated checkbox means this options will be shown. The active operations will be usable as follows.

Filters

Allows you to filter the data by member for all available dimensions.

Context Sensitive Filters

Shows filters corresponding to the currently clicked dimension.

Filter and Hide

In addition to the normal filtering this operation also removes the corresponding dimension from our initial view.

Clear Filters

Resets previously set filters.

Drilldown

Adds another dimension to the component.

Drillup

Removes a dimension from the chart (this can cause an error which makes a reload neccessary).

Member Display

Lets you choose the way member names are displayed (text or key).

CUSTOM EVENT NAMES

There are 9 possible events which can be linked to your own scripts. These can be defined in the *Stand ard Properties Sheet* and triggered using the corresponding button in the context menu.
In the *Additional Properties Sheet* the names for these buttons is customizable.

> All operations are executed directly on the data source, but without changing it. A reload resets all changes made with the context menu.

The tenth event is predefined and is used to reset the Zoom state of the Bubbles.

Custom Event Names

✓	customEvent1	Custom Entry 1
✓	customEvent2	Custom Entry 2
☐	customEvent3	Custom Entry 3
☐	customEvent4	Custom Entry 4
☐	customEvent5	Custom Entry 5
☐	customEvent6	Custom Entry 6
☐	customEvent7	Custom Entry 7
☐	customEvent8	Custom Entry 8
☐	customEvent9	Custom Entry 9
✓	customEvent10	Reset Zoom

▲ less

Server Tab

SERVER CONFIGURATION

Here you can enter the *Server URL* to which the component should connect and from which it should retrieve the templates.
If you have specified the URL to the server, a check mark indicates that a connection could be established.
If another server is used later, you can also press the button next to the Save button and edit the *Server URL*.

The hyperlink below the buttons allows you to jump to the admin panel.

TEMPLATING CONFIGURATION

If the current settings are to be saved as a template, a new template name can be entered in the input field with the name *Create Template* and confirmed by clicking the *Save current State* button. If the naming convention entered is correct, the template is saved on the server and a toast with the corresponding message is displayed in the lower part of the *Additional Properties Sheet*. However, if the name entered does not meet the expected naming conventions, a toast with the permitted characters is displayed accordingly.

Templates stored on the server can be retrieved and applied via the Template List. Just select the desired template and press the *Apply* button. If you want to delete a template, select the template in the list and press the *Delete* button. If changes have been made to the templates on the server side, the list must be updated via the *Refresh List* button. Changes should then be visible.

See Server Properties.

Search Tab

At this point you can search for the name, function or group of a property which are displayed at the *Ad ditional Properties Sheet*. The appropriate settings are then displayed directly and can be changed here.


Search

Search for Property
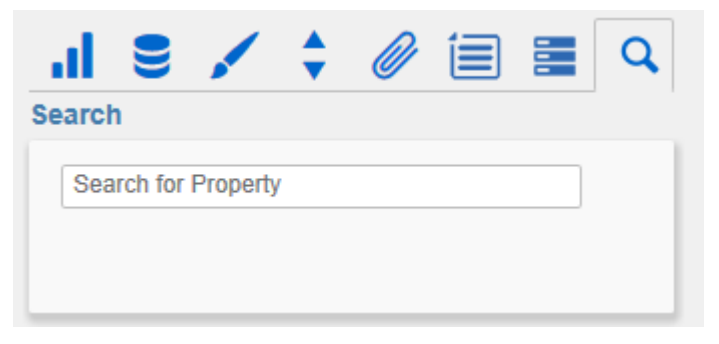
Info Popup and Server Connection Indicator

This tab shows you the version of the *graphomate bubbles* extension you are using, as well as a link to submit errors or feature suggestions. Please always include the version when contacting us.

In the Credits you can find a list of all the free libraries our extensions are using.

The icon next to the Info Popup button will indicate if the connection to the *graphomate server* is successful. In this case it will be in green color. Else it will be grey.
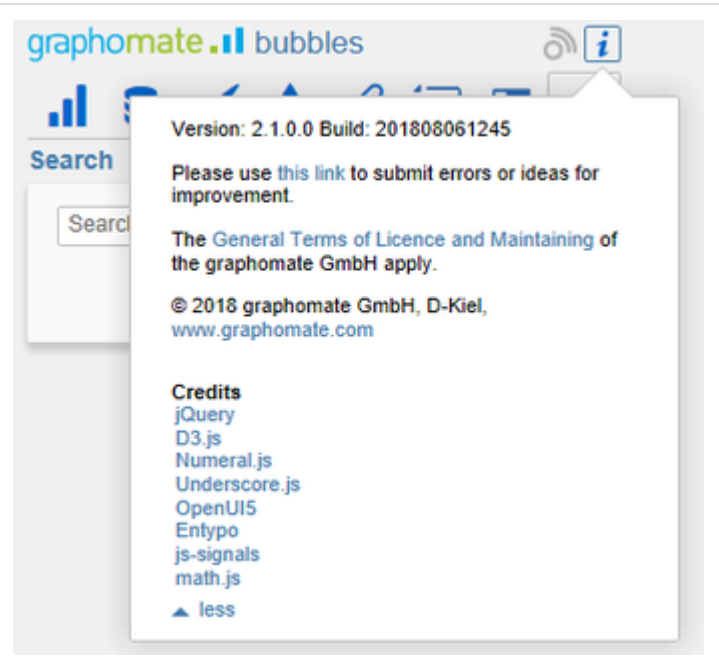
Standard Properties

Some specialized properties can only be changed using the *Standard Properties Sheet* of Designer.

Data Binding

Absolute Circle Values: If set to "true", for every element of the circle selection its absolute value will be used to render the size of the bubbles. Use this property, if your selection contains negative values you would like to display as positive ones.

Item Visibility

Bubbles To Be Highlighted: With this option, certain bubbles can be highlighted directly without moving the mouse over them. For this, a bubble is selected based on a part of the content of its category label. Several selectors are possible at the same time. For example, if the compass direction is part of the category label and all bubbles are to be highlighted from west and north, the value of the property would be: *["North", "West"]*

Display Annotations: If set to "true", annotations are shown by mouse over in the runtime. Annotations are temporarily shown labels which are connected to the bubble by dashed lines. They are showing the corresponding value on the axis.

Opacity Of Other Bubbles While Highlighting: This value determines how far bubbles are to be hidden that are not highlighted. The value starts at 0.0 (completely hidden) and goes to 1.0 (fully visible).

Fonts

Legend Font Size: Sets the font size used by the legend in [px].

Labels

Display Axis Labels: Controls whether or not the axis labels are displayed.

… Label Member: Here you can control which part of the automatically generated Series- and Category Labels are shown. The labels are generated from the names of the selected dimensions of a data series. For example, if the Series Label for the Circle series contains „Gross, Phone, Sum" you could want the "Sum" to be omitted. For this you would need to set the third value of the list Circle Label Member to false.

Manual Series Labels

… Label: This property describes the manual text of the series labels. This will be applied to the labels, if the properties described below are activated.

Use Manual … Label: These properties activate the manually set series labels for every data series. If deactivated the automatically generated labels are used.

Bubble Connection

Connect Bubbles On Hover: Determines if the bubbles should be connected initially or (if this option is activated) as soon as a bubble is highlighted with the mouse.

Connect Related Bubbles: If this feature is activated, bubbles will be connected to the order in the data. This can be used, for example, to represent temporal courses or to better identify the assignment of bubbles to one another. How Bubbles are assigned to each other is defined by the Matcher Index. Redundant elements in category labels are hidden if possible and displayed only on the first element.

Matcher Index For Bubbles Connection: This index defines how bubbles should be assigned to each other. The value *-1* means that all bubbles are connected to each other. All values from 0 to n define where in the category label the element to be assigned lies. For example, if there are two bubbles, the first one has the category label "South, Internet" and the second one "South, Computers" and you want to assign all the bubbles from the south to each other, select Index *0* to use the first element of the category label.

Troubleshooting

Draw Boundaries: This option is meant for testing and debugging. If activated every element will be drawn with its boundaries. These are what are used by the collision logic to calculate overlapping and hide labels.

Performance Limit: Sets the maximal amount of bubbles till no performance issues should occur. Setting values above 100 is not recommended and is done at one's own risk ⚠. If the limit is reached, a performance optimized visualisation for the bubbles is applied. Now only X- and Y-Dimensions are considered for rendering. The single data points are drawn half-opaque. By doing this, clusters of data points appear darker and top priority areas can be detected. To identify outliers, a tooltip is shown on mouse over a bubble.

Layout

Title Padding: You can set the space left between the chart and the title in [px] here.

Legend Offset: You can set a vertical space left between each of the legend rows in [px] here.

Legend Padding: You can set the space left between the legend and the canvas in [px] here.

Legend Radius: Here you can set a radius for the exemplary Bubbles used in the legend in [px] here.

Legend Circle Label Padding: You can set the space left between the exemplary Bubbles and their respective legend text in [px] here.

Runtime Interactivity

Highlight on Hover

The *graphomate bubbles* provide the functionality to selectively show all the information associated with a single *Bu bble*. To highlight a data point use your mouse to hover over a single *Bubble*. Now all the values, labels and annotations will be displayed. The hovered state can be fixated by using **Alt+Click**. If the option *Connect Related Bubles* and *Connect Bubbles On Hover* is activated, all associated bubbles will also be highlighted and the connection will be displayed sequentially. See standard properties.
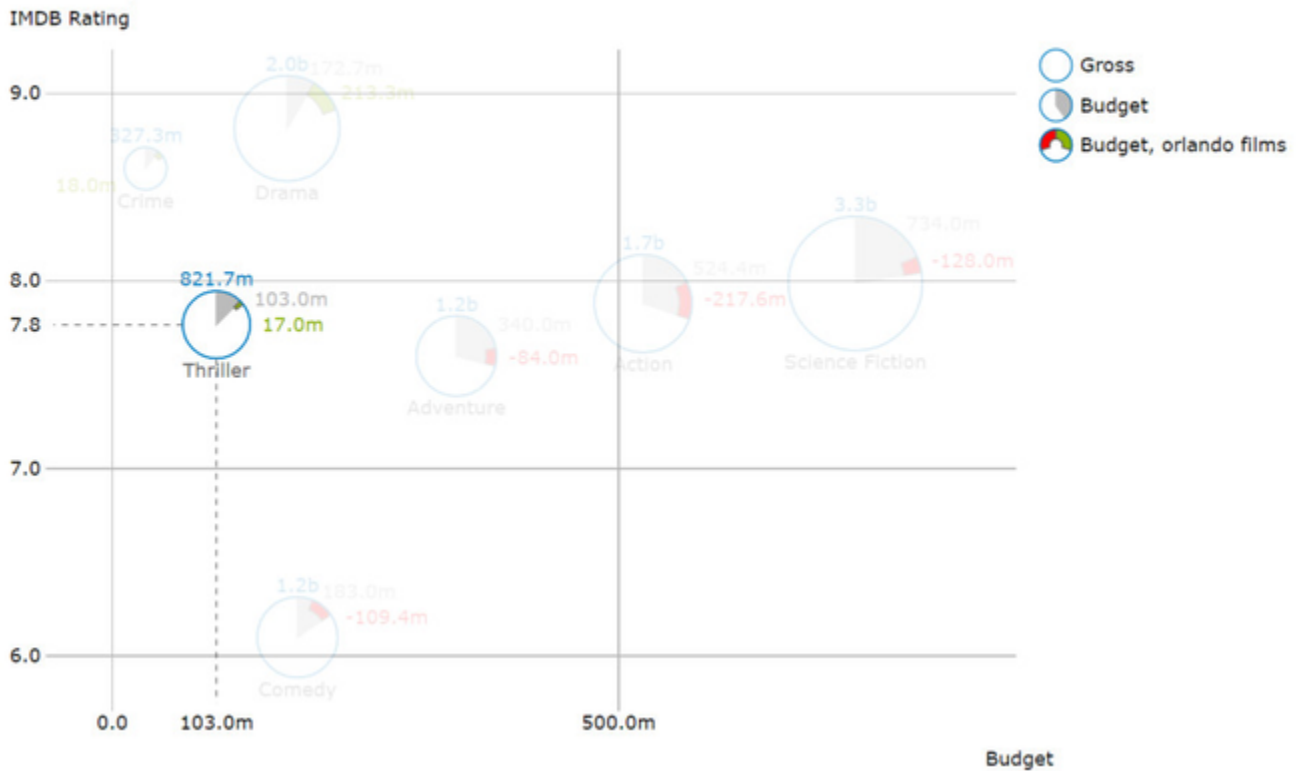
Zoom Modes

The following four Zoom Modes **Rectangular Selection**, **Rectangular Section**, **Magnification** and **Scaling Adjustment** can be set in the Advanced property sheet in the Behavior tab under **Zoom Mode**. The selection **None** activates the rectangular selection, **Rect** the rectangular section, **Magnify** the magnification and **Scale** the scale adjustment.

Rectangular Selection

By doing click&drag on the component at runtime you can select *bubbles* in an rectangular shape. Then the complementary event *on Bubbles Selected* is thrown and you will get the member combination of the selected *bubbl es* using the script methods getSelectedMemberTexts() and getSelectedMemberKeys().
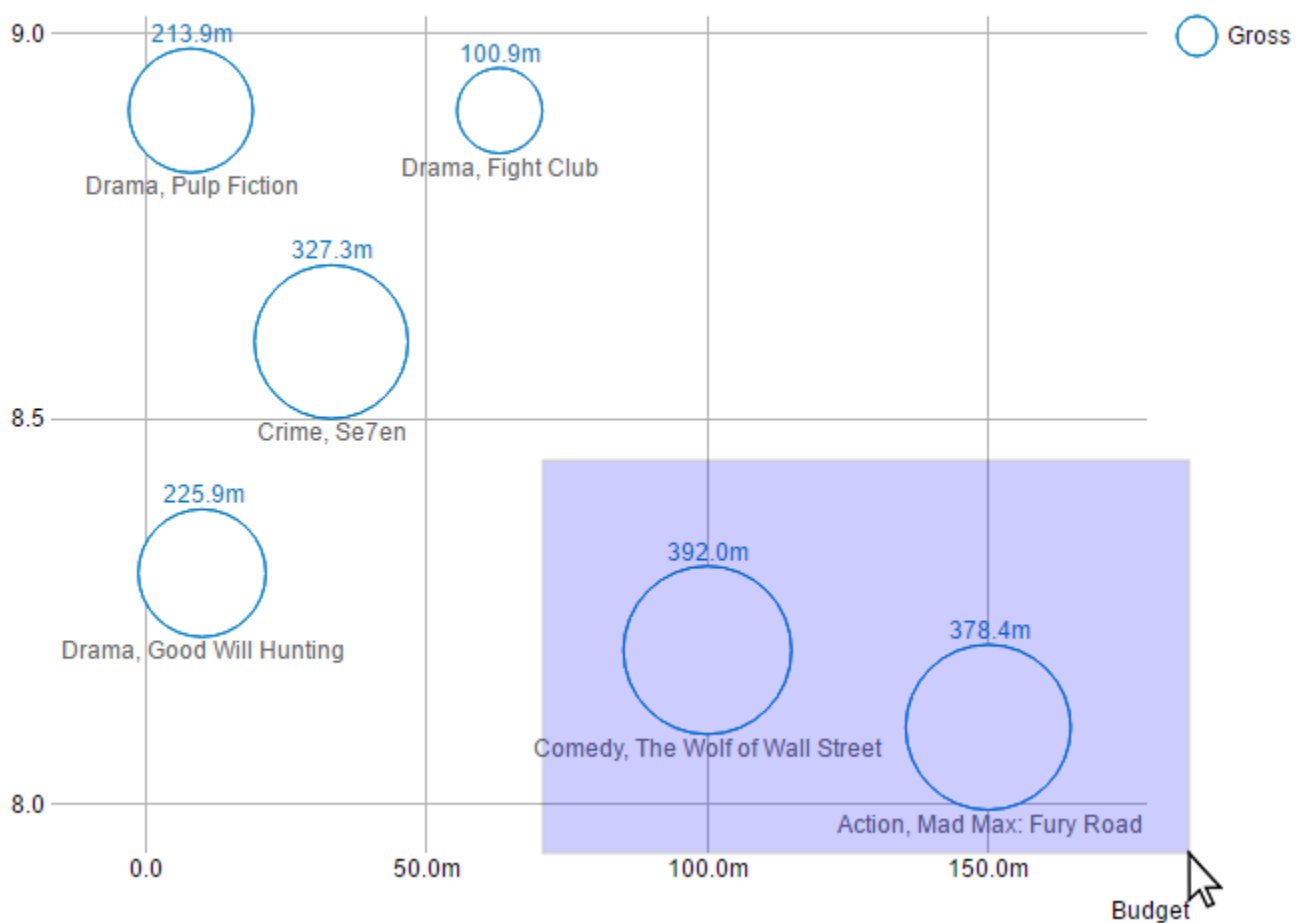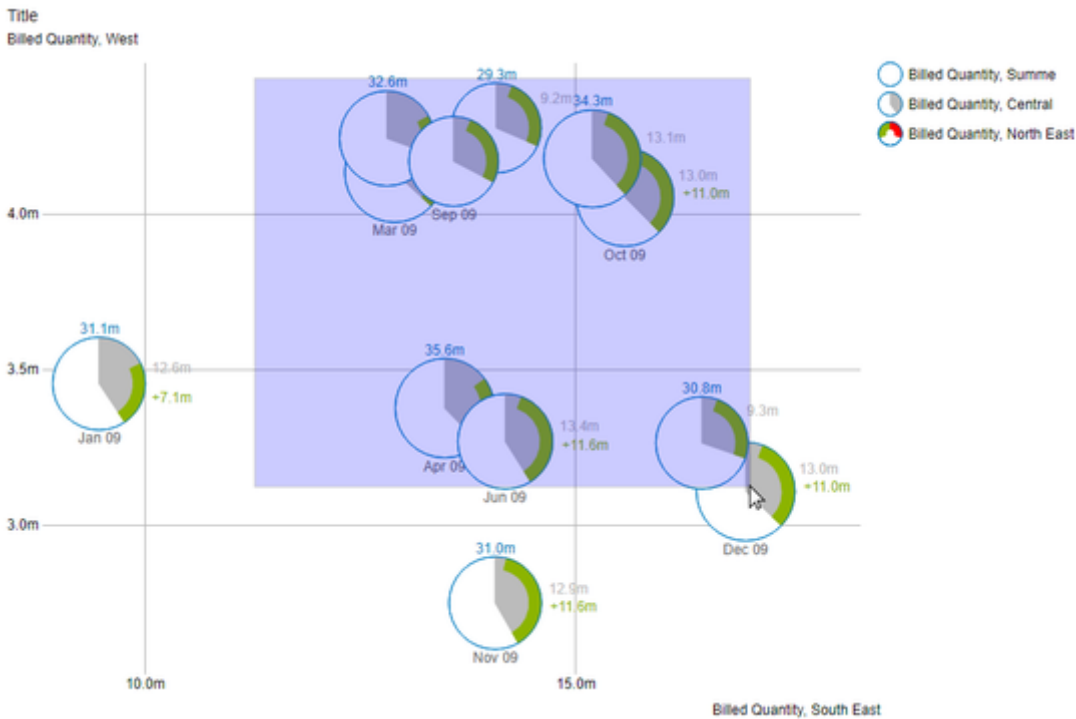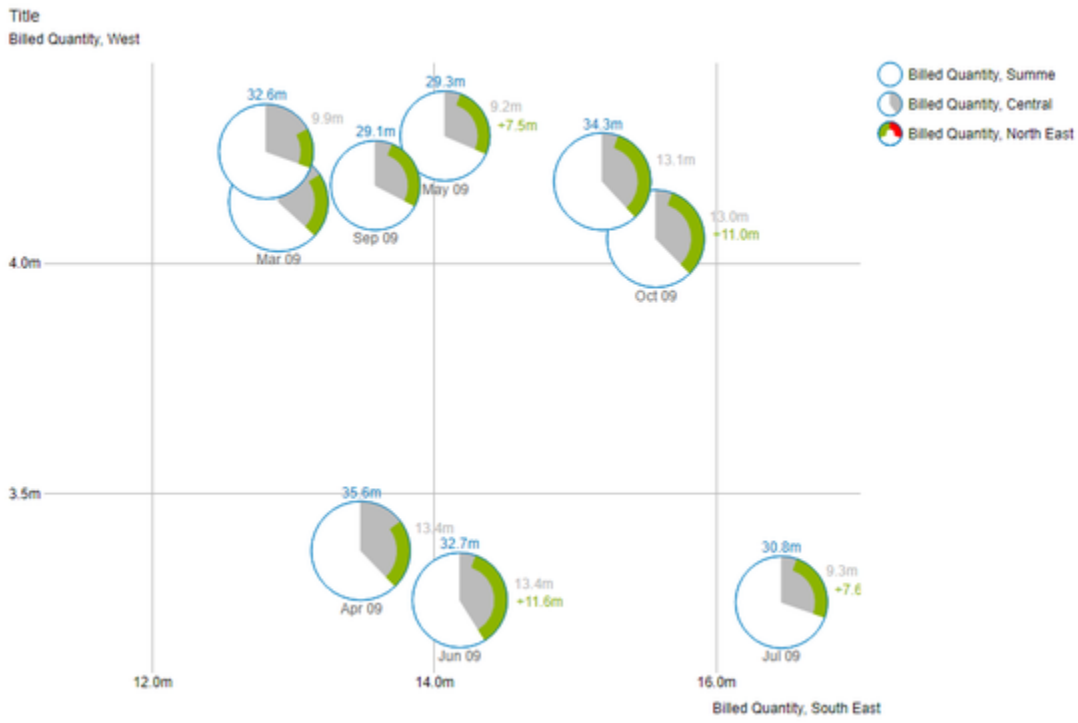
Rectangular Section

The rectangle section behaves exactly like the **Rectangular Selection** with regard to the scripting and the events.
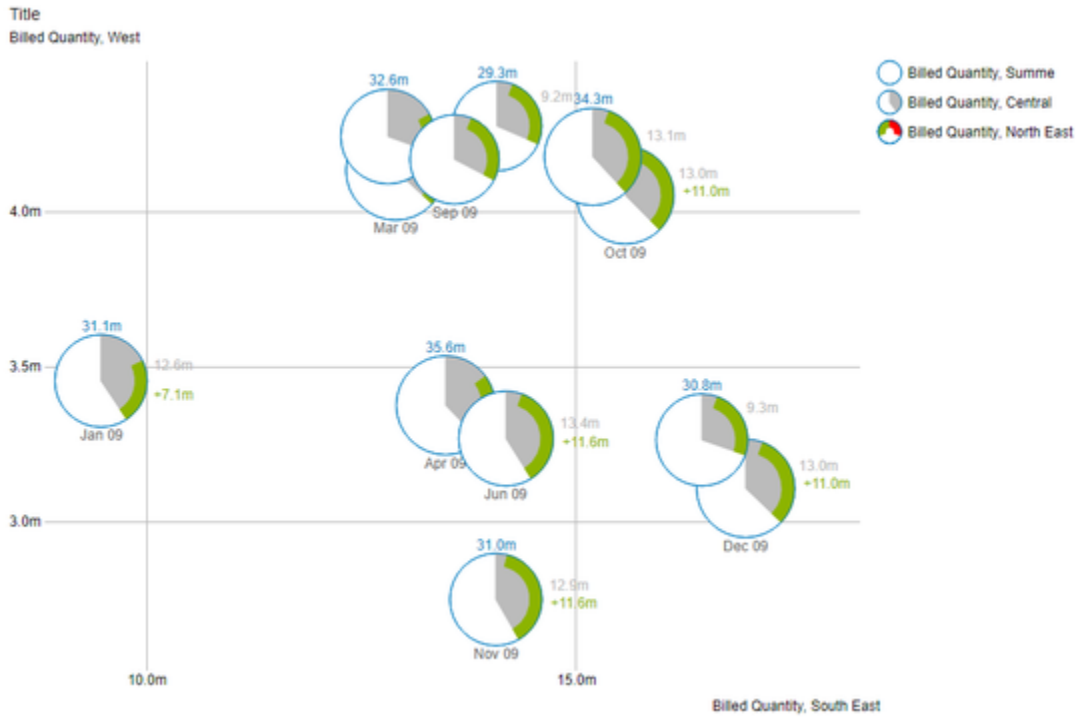
In addition, after the selection has been made (releasing the mouse button), the scaling is changed.

So that only the bubbles, which are in the selected area, are shown.

Title
Billed Quantity, West

Legend:
- Billed Quantity, Summe
- Billed Quantity, Central
- Billed Quantity, North East

Data labels visible in chart:
- 32.6m — 9.9m — Mar 09
- 29.3m — 9.2m +7.5m — May 09
- 29.1m — Sep 09
- 34.3m — 13.1m
- 13.0m +11.0m — Oct 09
- 35.6m — 13.4m — Apr 09
- 32.7m — 13.4m +11.6m — Jun 09
- 30.8m — 9.3m +7.6 — Jul 09

Axis labels: 4.0m, 3.5m, 12.0m, 14.0m, 16.0m
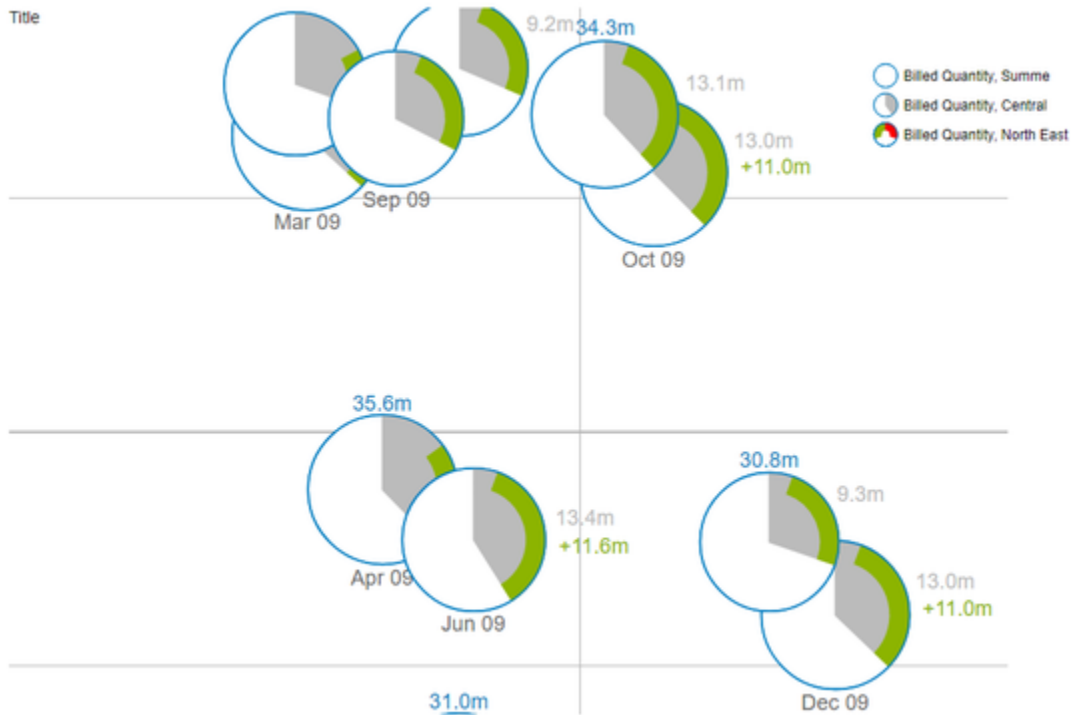
Billed Quantity, South East

Magnification

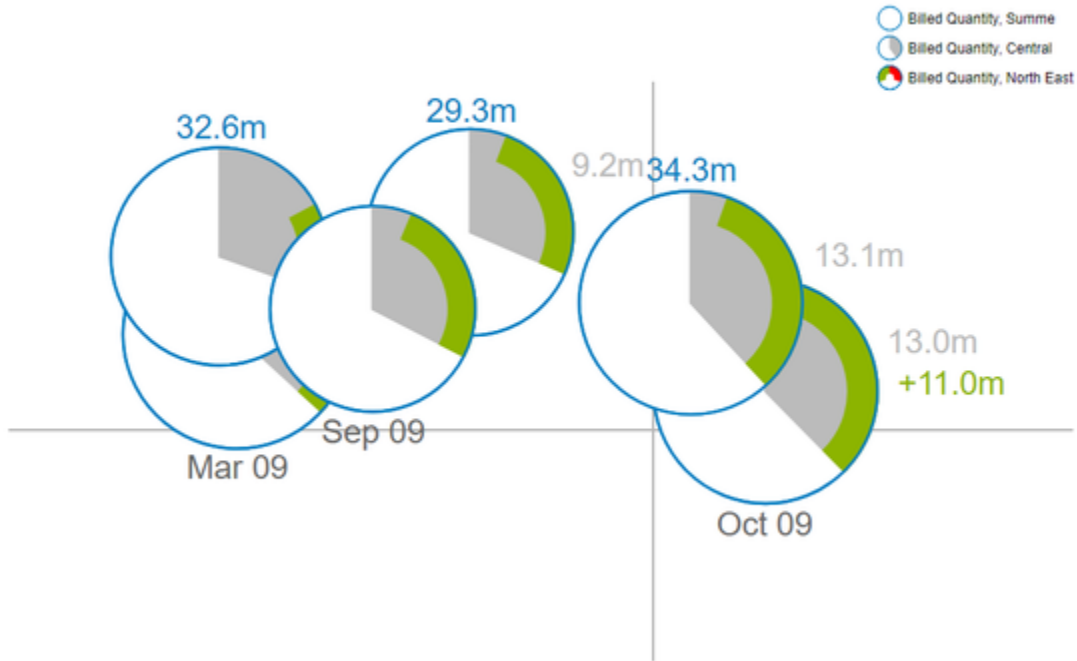A section of the bubbles can be enlarged by means of the mouse wheel (scrolling).
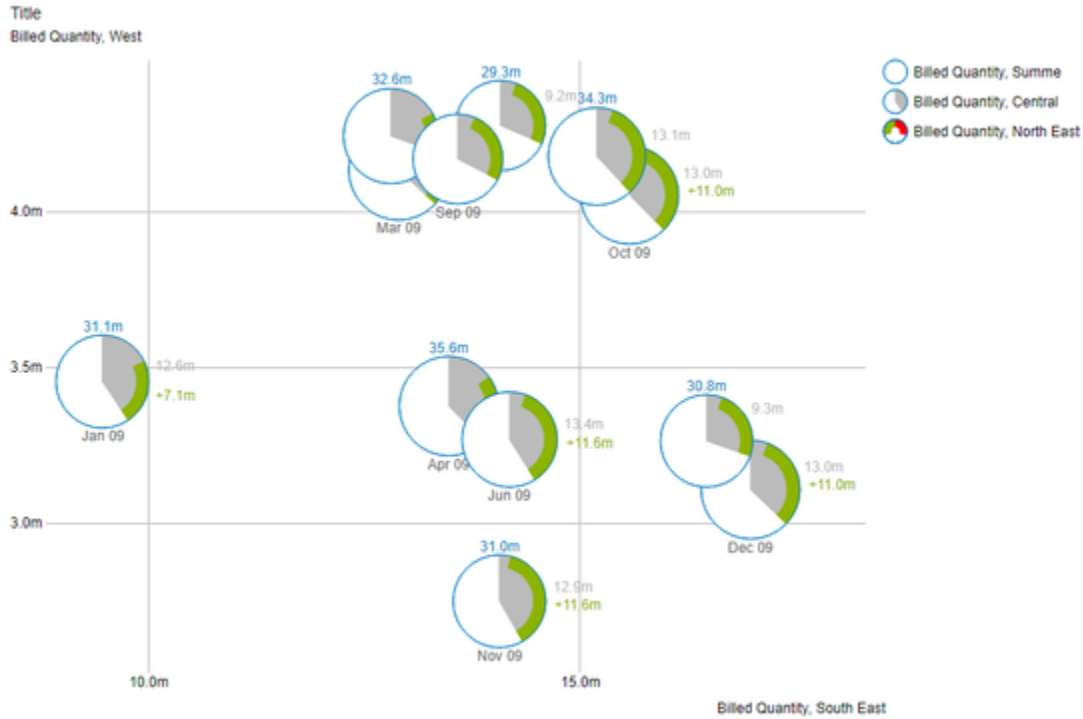
The point at which the magnification is directed is determined by the position of the mouse pointer.
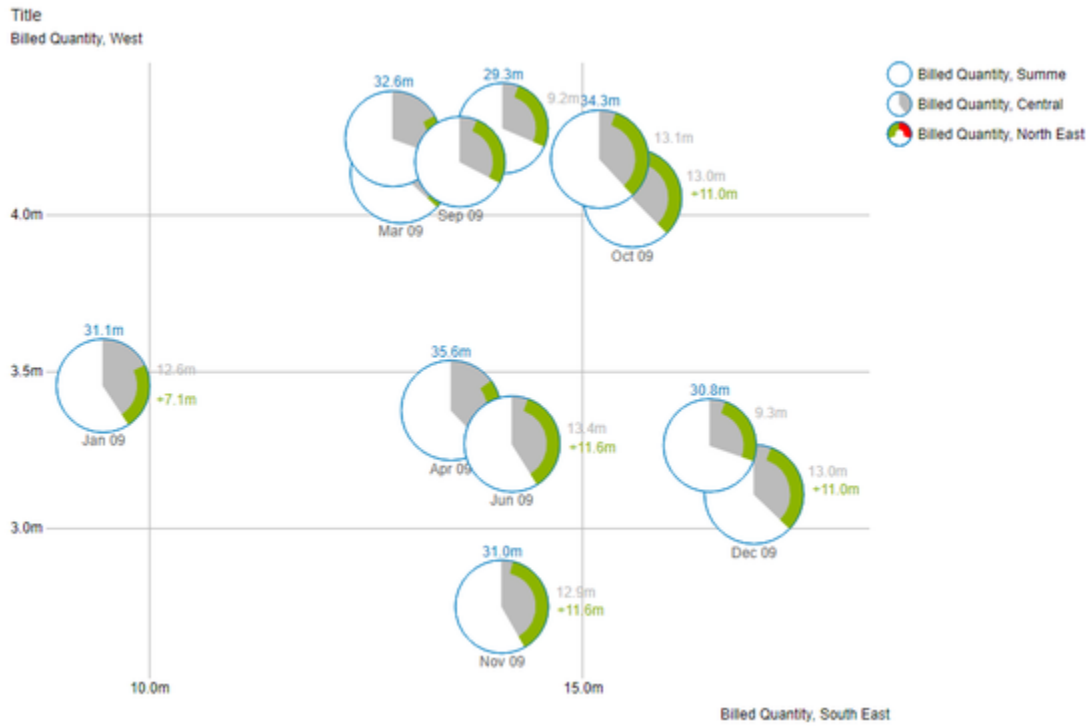
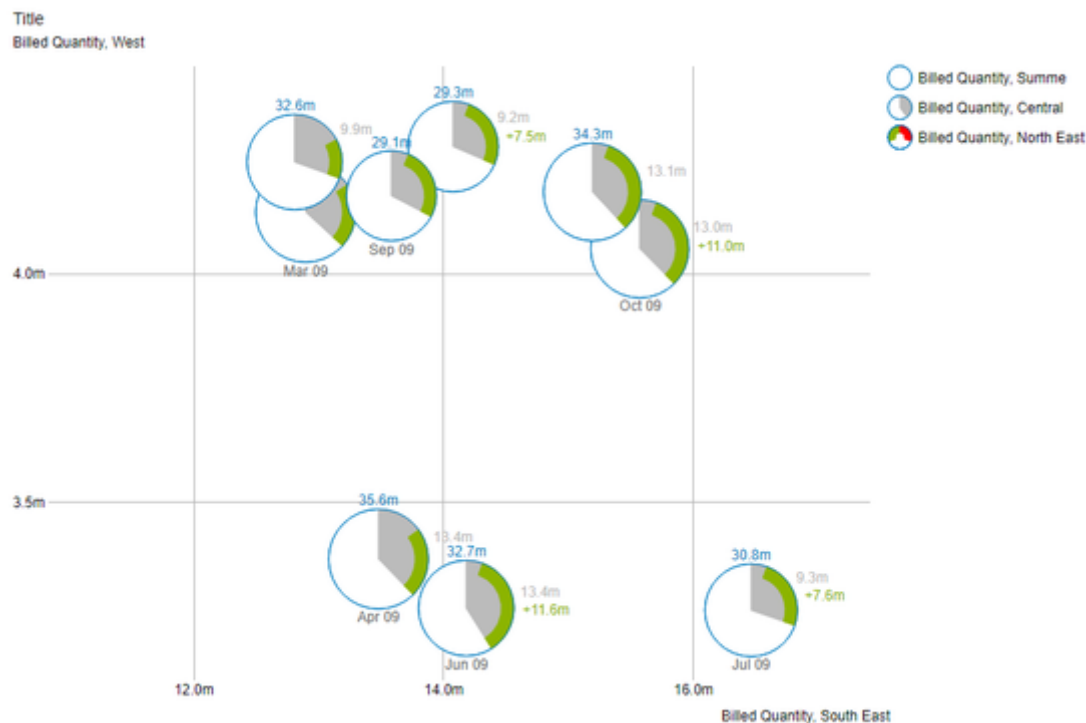In addition, the displayed section can be moved by drag & drop.

Scale adjustment

This mode behaves in the same way as the **Magnification** mode, i.e. Scrolling and drag & drop.

The scaling of the axes is then adjusted so that only a portion of the bubbles is displayed. This section is determined by the position of the mouse pointer.

The displayed section can be moved by drag & drop.

Title
Billed Quantity, West

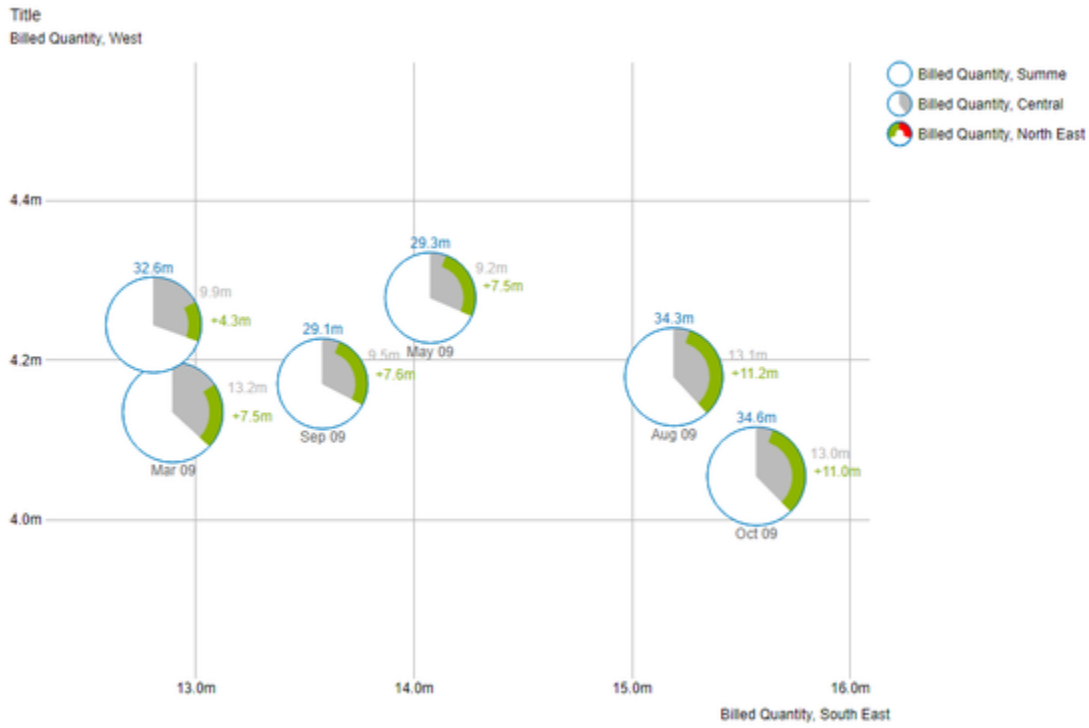For technical reasons, this mode is more complex and thus consumes more resources while expanding. As a result, too many bubbles lead to a delay in drawing. Internet Explorer also leads to a noticeable slowdown.

Clustering

Depending on the data set, Bubbles can be drawn with the same X and Y position and the same radius. The accumulations of bubbles are then characterized by the fact that they lack any labeling and the border is drawn thicker.
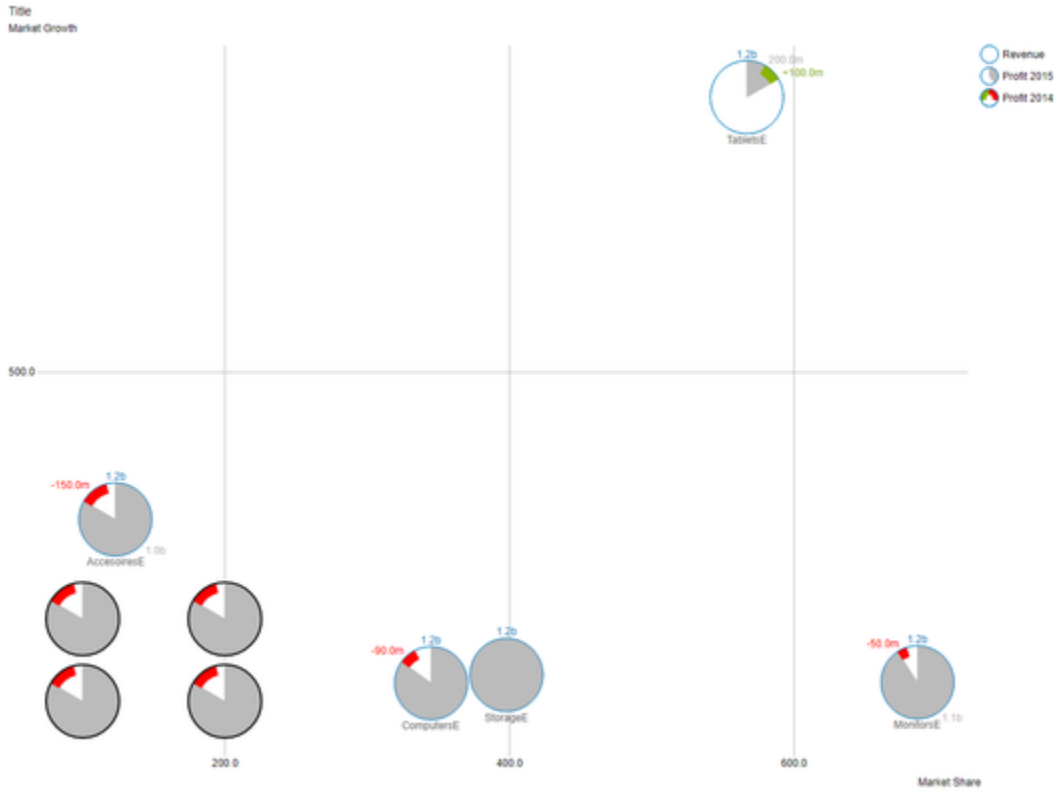
If the mouse is hovered over such a **Cluster** of bubbles, the underlying bubbles fan out aside. The front bubble is displayed completely including their labels.
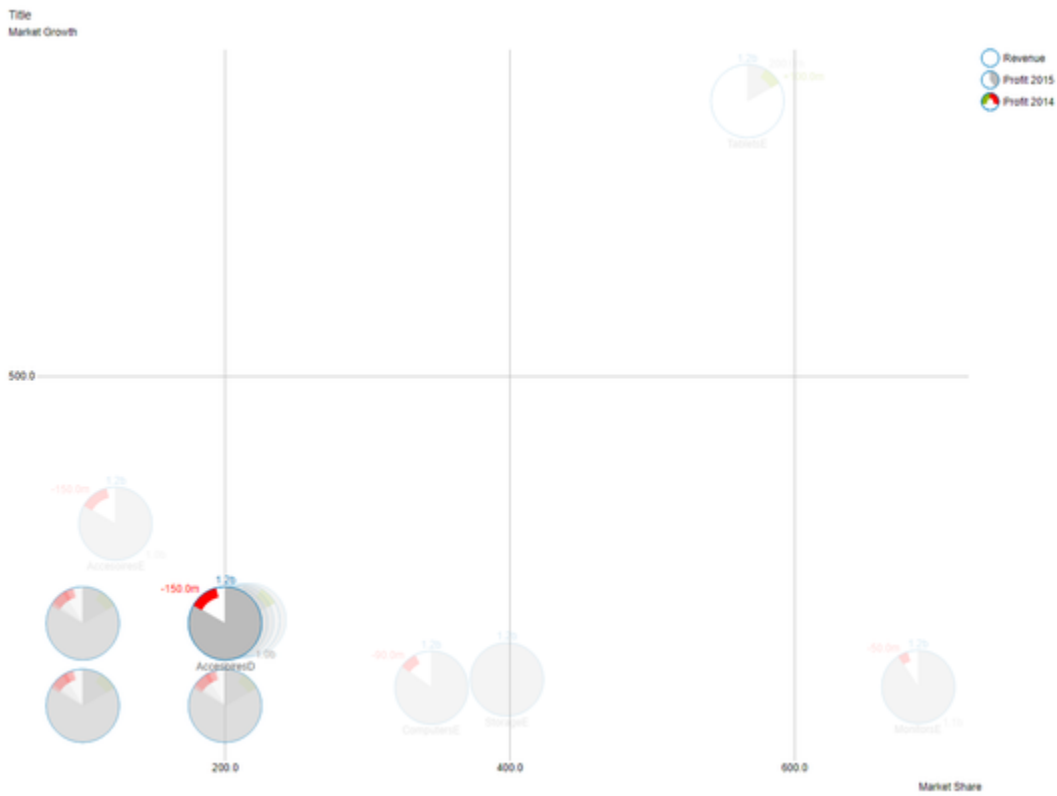
If one of the fanned bubbles is now hovered, this one is brought to the foreground and displayed in the correct (original) position with its labels.
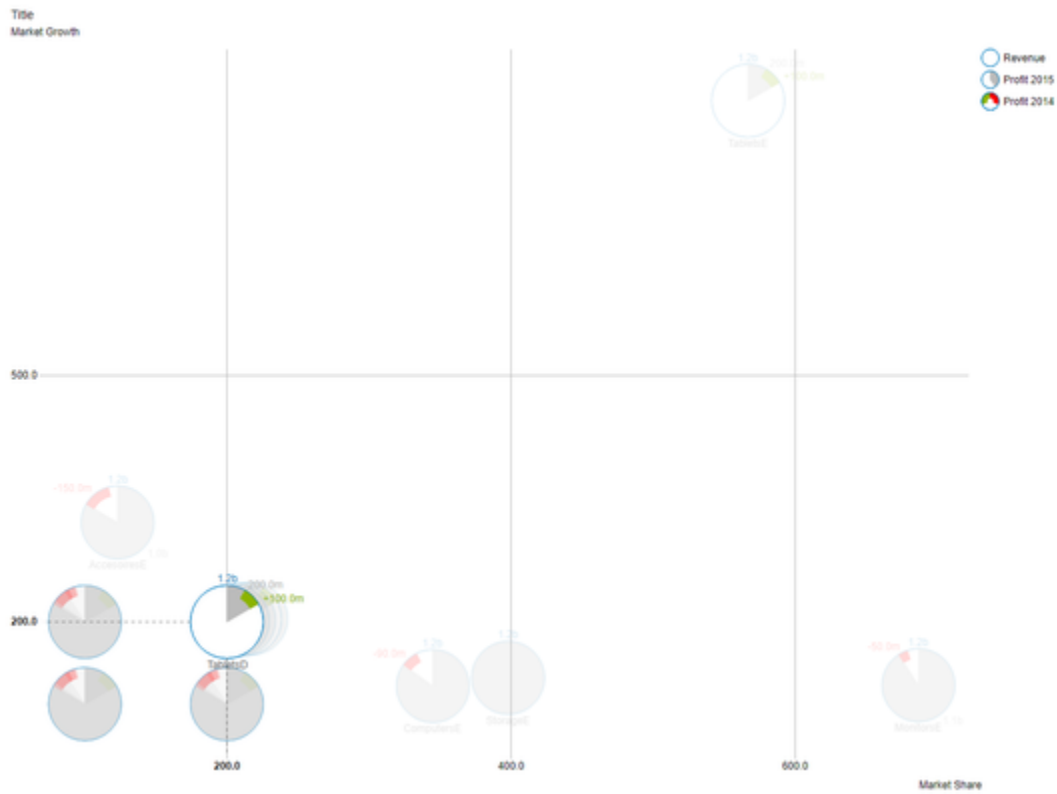
Highlight Group

If the option *Highlight Group* is activated in the *Behavior tab* for a bubbles instance, all elements within this bubbles that have the same member combination (excluding Keyfigure Dimension) compared to the member combination of an element which is hovered by the user will be highlighted with a colored border. If, in addition to the first-mentioned bubbles, there are other bubbles with activated *Highlight Group* in the application, all elements whose member combination are each a superset of the member combination of the hovered element (exclusive Keyfigure Dimension) will be highlighted too. The highlight color can be customized for each bubbles instance using the *Highlight Group Color* option.

Example: In Bubbles 1, an element with the member combination A: = {"Atlantic", "New Brunswik"} is hovered by the user. Bubbles 2 has elements that have the member combinations B: = {"Atlantic", "New Brunswik", "Home Office"}. Since B is a superset of A (all elements of A are contained in B: this includes the equality of A and B), these elements are highlighted accordingly. Conversely, if on select an element from Bubbles 2 with the member combination B, then the elements from Bubbles 1 with member combination A are no longer highlighted, since A is not a superset of B.

If you also want to include the Keyfigure Dimension (Measure) in the member combinations, you can activate the option *Match Measures* for each instance of the bubbles. As an example we extend the member combinations from the first example with a Keyfigure Dimension: A: = {"Atlantic", "New Brunswik", **"Oder Quantity"**} and B: = {"Atlantic", "New Brunswik", "Home Office", **"Profit"**}. Here, too, the behavior described above applies: when hovering an element with the member combination A, all elements whose member combinations are each a superset of A are highlighted. In this case, B is no longer a superset if A, so the members with member combination B are no longer highlighted.

Since the option *Match Measures* can be activated individually for each instance of the bubbles, a final example for the different behavior between the example bubbles mentioned above should be given. In the following case the option *Match Measures* is deactivated in Bubbles 1 and activated in Bubbles 2. If you now choose in Bubbles 1 an element with the member combination A: = {"Atlantic", "New Brunswik"} (with the keyfigure "Order Quantity"), all elements within Bubbles 1 are highlighted, whose member combinations are a superset of A. However, Bubbles 2 is different because the *Match Measures* option is enabled there. Only those elements whose member combinations are a superset of $A_{Measures} := $ {"Atlantic", "New Brunswik", "Order Quantity"} are highlighted here.

Context Menu

If the property *Context Menu Available* is activated, the *Context Menu* will be accessible during runtime by right clicking on the *bubbles*. It allows special filtering (according to the settings made). A reload resets all changes made with the context menu.

Trellis Mode

To draw a Scatter- or Bubble-Diagram Data for the X- and the Y-Axis is neccessary to be set in correlation. If one or both of these Measures is missing, an alternative mode will be used to draw the Bubbles. The so called *Trellis Mode*
.

In this mode all data points will be drawn sorted by the *Circle-Measure* from high to low in small tiles. If there are too many data points to be drawn, the smaller ones will be summarized in the *Rest* tile.

Some options and features that are usable in the normal mode are deactivated while the Bubbles are in *Trellis Mode*
.

Known Issues

- The property *Use Formatted Data* leads to a change in Deviation Labels, showing the formatted data series value instead of the difference between the data series value and the Arc value.

Number Formatting

Possible Inputs for the numeral.js Format String

Floating point		
Number	**Format String**	**Output**
10000	'0,0.0000'	10.000,0000
10000.23	'0,0'	10
-10000	'0,0.0'	-10.000,0
-0.23	'.00'	-,23
-0.23	'(.00)'	(,23)
0.23	'0.00000'	0,23000
0.23	'0.0[0000]'	0,23
1230974	'0.0a'	1,2m
1460	'0 a'	1 k
1	'0o'	1st
Currency		
Number	**Format String**	**Output**
1.000.234	'$0,0.00'	$1.000,23
1000.2	0,0[.]00 $'	1.000,20 $
1001	'$ 0,0[.]00'	$ 1.001
Percentage		
Number	**Format String**	**Output**
1	'0%'	100%
-0.43	'0 %'	-43%

Source

Possible input for the Extended Number format string

Percentages and numbers are formatted separately. For this two format string are used, which follow the same rules and structure. In general the strings of characters in the format string are simply replaced in the input number. Exceptions to this rule would be scaling factors and the number of decimal places.

The separate elements of the format string are separated by the "|" character. Format strings with less than 7 elements (i.e. 6 "|" characters) are considered invalid and therefore ignored. In this case the standard format without scaling and with one position after the decimal point is used.

The format string consists of the following elements, the ordering is obligatory and cannot be changed: *Negative|Prefix|Thousands|Decimal|Scaling|PointsAfterDecimal|Suffix*

Negative	The prefix for negative numbers. The string "()" will result in the number will be placed inside parentheses, including eventual prefixes and suffixes. If *None* is used the absolute number will be shown.
Prefix	A prefixed string of characters, for example a currency symbol or an identifier for the scaling factor.
Thousands	A separator for thousands.
Decimal	A separator for the decimal places.
Scaling	The scaling factor for the value. This can be given as a whole number or a power, formatted as n^m. A whole number will be calculated as a power to the basis 10 internally. In case of a given power the value will be divided by it directly. Even negative numbers are possible, for example "-3" or "10^-3"; in this case the value will get adequately higher. Non numeric inputs are ignored. *Please note:* given a "0" or a "1" will result in a scaling factor of 1. The only way to achieve a scaling by 10 is to input "10^1".
PointsAfterDecimal	The number of places after the decimal.
Suffix	A suffix for the value, analogous to the prefix.