



SAP® USER INTERFACE GUIDELINES

FOR DASHBOARD DESIGN

DOCUMENT VERSION 1.0 – 11 APRIL 2011

Target Audience

- User Interface Designers
- User Interface Developers
- Solution and Product Management
- Consultants
- Architects
- Information Developers



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1 Introduction

A dashboard is a visual display of the most important information needed to achieve one or more objectives, consolidated and arranged on a single screen so the information can be monitored at a glance. Dashboards have the purpose to serve one specific role by giving it a well-structured overview over a dedicated area with focus on and visual guidance to important business facts and the possibility and guidance to navigate to further details and resolution applications.

In this document the word "dashboard" describes a general layout composed of one or more panels. Each panel displays graphical information, such as a chart, graph, table with micro-charts, or a collection of key performance indicators (KPIs) presented in a form with micro-charts.

A monitor is a detailed look at a specific area or even just one aspect in a specific area. A dashboard is not a monitor, although a monitor may also display graphical information but rather an overview on a whole area or even across several areas (and then at a fairly high level).

2 Characteristics of Good Dashboards

- **Simple** – not by reduction of information but by giving clear guidance to the most important facts, e.g. by ranking, highlighting and graphical representation.
- **Actionable**. Basic interactivity features include navigation within the dashboard, progressive disclosure of information, single-click actions and further navigation for detailed analysis and for transactional tasks. Focus on providing guidance through information, rather than just data.
- **Customizable and Personalizable** by the customer to ensure that the information displayed is relevant for the job in question.

3 Layout Possibilities

The dashboard is made up of one or more panels, each of which displays a graph, chart, table, or other form of visual information. The layout and the number and shape of the panels depend on the amount and format of the information to be displayed. Figure 1 displays some of the many possible arrangements.

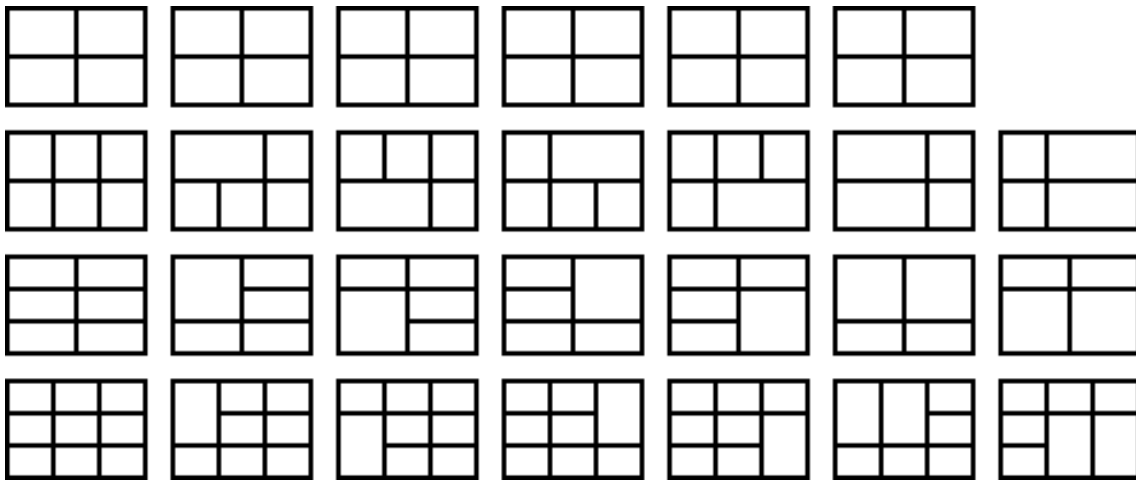


Figure 1: Overview of alternative dashboard layouts

4 Design Recommendations

To properly design and develop dashboards, use the following design guidelines.

4.1 Place Important According to their Importance

Place the most important data on the left or at the top. Similarly, for panels arrange them according to the following hierarchy of importance: top left (most important), top right, bottom left, bottom right (least important). If a panel or a collection of fields must be included for identifying or setting the data scope of the whole dashboard, put this at the top or at the top left. If the dashboard includes an exceptions area, put it at the top or at the top left.

Place panels adjacent to each other when their data must be compared, or is related. If possible and applicable, integrate the data into one panel. Align panels vertically and horizontally whenever possible to give the screen a clear structure.

4.2 Group KPIs Logically

Group KPIs logically for example, by component or KPI type, such as availability or performance. Spatially separate different groups if they are in one panel.

4.3 Keep to Single Screen

By fitting the dashboard onto a single screen, you allow a quick overview at a glance. It provides the right level of aggregation of the information that is needed to achieve specific objectives, giving guidance where to navigate to get more information and to perform actions to solve issues. Means of guidance are layout, sort order, preset filters, and highlighting (alerting). Similarly, avoid the use of scroll bars for the components on the screen, tab strips, and multiple pages.

4.4 Use Appropriate Themes

Use an appropriate theme which defines the visual design of the components, like fonts and colors and deviate from its default settings only when necessary.

4.5 Use Few Selectors

Use as few pure selectors as possible (e.g. radio button, combo box, or tab strip). If you need to filter dashboard data, it is better to use selectors equipped with indicators that give guidance as to which entry to select (e.g. color code, status icon) or use charts or tables that provide this guidance.

4.6 Minimize Master-Detail Relationships

Avoid complex master - detail relationship of graphical components. In most cases one level is sufficient.

4.7 Use a Compact Design

Use a compact design to gain space for additional valuable information:

- Avoid gauges (speedometers)
- Provide as much useful information as possible but avoid unnecessary data or decoration
- Often forms or tables serve the same purpose as a Cartesian chart but require less space:

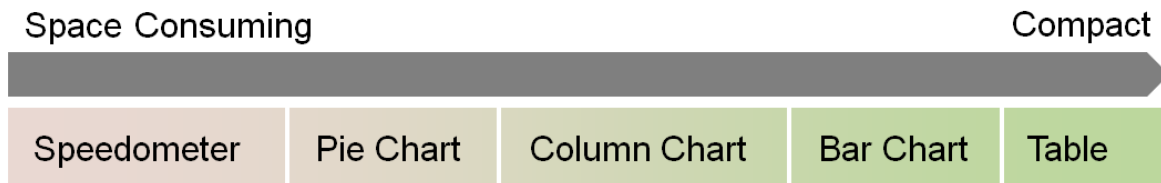


Figure 2: Space consuming versus compact designs.

4.8 Use Bar Charts Instead of Pie Charts

Use bar charts instead of pie charts for the following reasons:

- Same colors for same items in all charts are possible
- Linear rather than radial display of measures is better since lengths can be evaluated more easily than angles
- Cartesian charts have axis labels for values - pie charts in Xcelsius have only tool tips
- They need less space
- Category labels are directly shown at the bars whereas in pie charts only in legend

4.9 Use Linear Gauges instead of Speedometers

Usually use progress bars instead of speedometers for the following reasons:

- Linear display of measures is better than radial display since lengths can be evaluated more easily than angles.
- Current alert colors are shown more prominent
- Less space is required

4.10 Provide Means to Evaluate Data

Provide means to evaluate the displayed data such as

- Ranking by the most important key figure
- Highlighting (coloring or alerting) via thresholds or comparison to other data
- Comparison to other values (e.g., plan/target/budget, history, average/total)

4.11 Provide Readable Text

- Provide short, precise and well-readable text.

- Use precise dashboard and chart titles that often make axis titles superfluous, and where possible, avoid vertical labels.
- Use units (where necessary) and use pure plurals instead of "#", "No. of" or "Number of".
- For numbers, reduce the displayed digits per number to maximum of 4 (which might imply scaling).
- For percentages in most cases no decimals are necessary.

4.12 Minimize Visual Complexity and Clutter

Emphasize critical items and de-emphasize structural items by observing the following rules:

- The default arrangement of KPIs in a panel or a list should be done from most important at the top to the least important at the bottom
- Avoid group frames for panels (or use very modestly)
- Use very modest grid lines in tables
- Use intensive colors only for critical items
- Use non-distracting colors for neutral or uncritical items

4.13 Provide Evaluation Aids for KPIs

Additional contextual information should be provided to evaluate the severity of the KPI value(s). Such information can be

- Display KPI values (with colors or icons) according to pre-set thresholds
- Standard deviation (or minimum and maximum values) for aggregated key figures. For example, an aggregated KPI might still be rated as good although one of the underlying items is to be rated as bad
- Trends (arrows or mini line charts) for key figures with history to display historical development of a KPI in the recent past and can help in forecasting the future trend by extrapolation
- Distribution (value distribution bars or mini column charts) for aggregated key figures

4.14 Optimization of Small Charts

Even on a canvas with the size of only 800x600 pixels you can use a 3x3 grid of charts with more than one series in a readable and meaningful way. Use the following to increase the available space for the plot area:

- Scale down the numbers by using larger units or currency factors
- If the chart area is wider than it is high, use (stacked) bar charts instead of (stacked) column charts if the category names are long (this also avoids vertical categories)
- Avoid using subtitles although they are better than word wrapping in titles

- Include the value and category names in the title - similarly, if there is not enough space in a chart's lower left corner, you can mention the unit in the title or subtitle
- If a chart is shown inside a frame (e.g. for small charts you can slightly reduce the padding of the surrounding frame).
- If two charts have the same categories or value ranges, combine them so that you can omit one set of labels - similarly, you can also combine a table with a chart – as long as the table is not scrollable

5 Examples

5.1 Visually Appealing but Little Information



Figure 3: Example for a dashboard, which has focus on visual attractiveness but conveys only little information.

This dashboard is visually appealing and offers:

- Rich navigation facilities: Drill-down navigation with various filters
- Flexible views: KPIs of interest can be selected
- Choice between totals and history
- Not too much information at once
- Viewing of totals all three key figures
- Simple UI by hiding some navigation

5.2 Complex Interaction, Overloaded, and Not Precise



Figure 4: Example for a dashboard that has a complex interaction and presents many options while conveying only little detailed information.

This dashboard presents challenges:

- Requires multiple clicks to get an overview
- Only small part of the information visible at once
- Precise values only visible through tooltips
- Difficult to recall values after changing filter values
- No comparison between different entities
- No guidance as to which filter values to select to find the most important information
- $4 \times 4 \times 26 \times 3 \times 2 = 2496$ selection possibilities using the three drop-down list boxes, three radio-buttons and the toggle button

5.3 High Information Density Well-structured

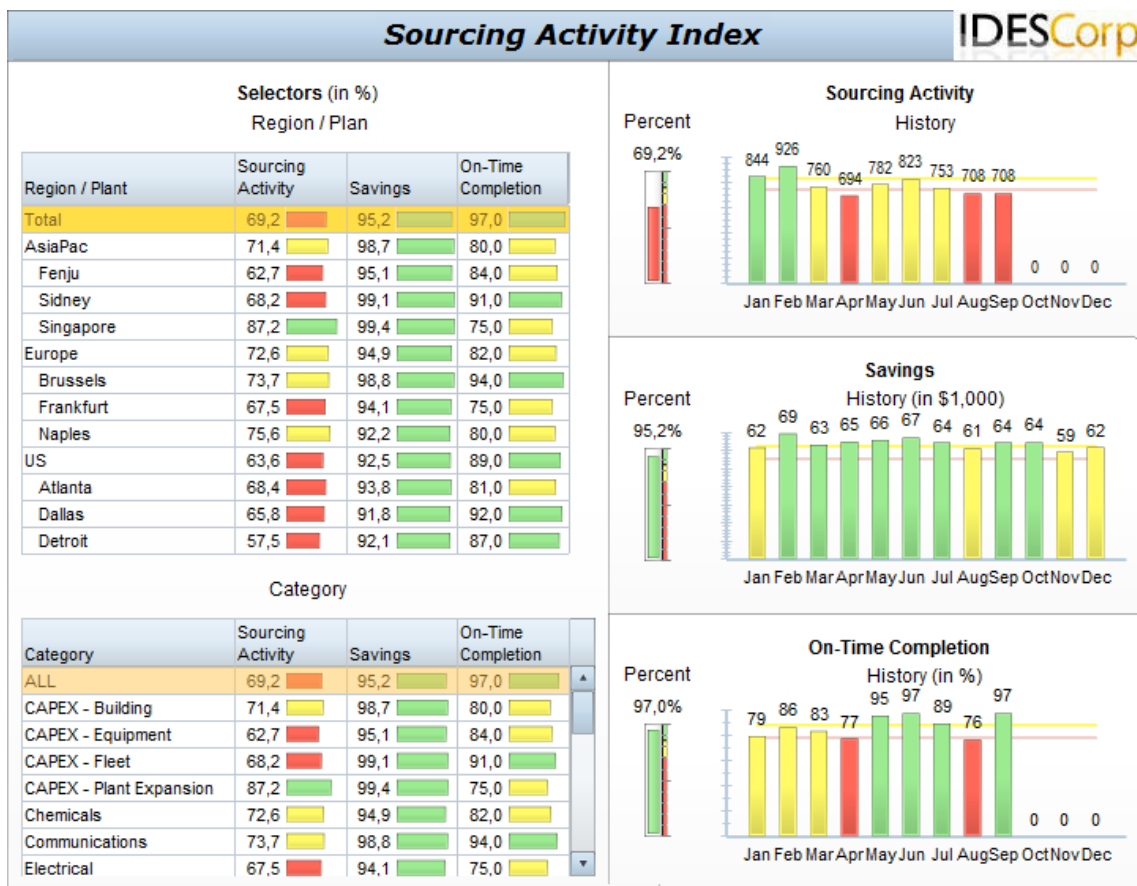


Figure 5: Example for a highly informative but well-structured dashboard allowing comparative as well as absolute analyses.

This dashboard displays the same data as the previous example but is much easier and faster to use.

- More information visible at the same time in a well-structured way. All information on the highest level is visible in the upper left table without navigation
- Do not have to navigate as much to get the full picture. Although you would still need $13 \times 26 = 338$ selections to see every detail, this is more than 7 times fewer than the 2,496 possibilities in the other design
- The only two selectable tables with charts on the left side give you guidance as to which entries to select for drill-down to get more details
- Can directly see absolute values
- Can compare multiple entities more easily

6 Recommended Chart Types

The following guidelines look at the chart types that are most commonly used in dashboards. They suggest which chart types are best used with which types of data or KPI.

6.1 Bar Charts

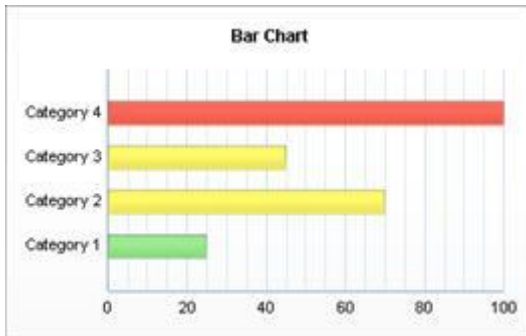


Figure 6: Example for a Bar Chart

It is recommended to use a **Bar Chart** for the following cases:

- If single values are to be compared across static categories
- If there are many categories or if they have longer names
- If values are considered to be longer or shorter

You should **not** use a Bar Chart in these cases:

- If values have to be compared across time or another continuous category, use a line chart.
- If the values of each category add up to 100% and if this fact is important use a stacked bar chart.
- For comparing proportions, i.e. the relative distribution of a given amount over the categories, use a stacked bar chart or pie chart, if the fact that they add up to 100% or to another KPI is important.
- If you do not have much space or want to combine the display of the KPI with additional KPIs or attributes, use instead of the bar chart a table with one or more columns that contain a single bar and a number per KPI cell:

Categories	Series X	Series Y	Series Z
Category A	20	1	16
Category B	18	3	13
Category C	17	2	15
Category D	16	2	11
Category E	16	4	10
Category F	13	3	12
Category G	8	5	13
Long Category H	5	5	9

6.2 Column Chart

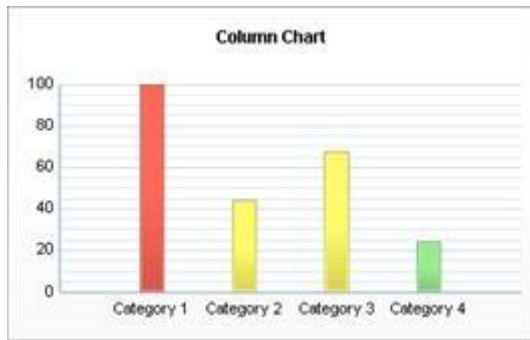


Figure 7: Example for a Column Chart

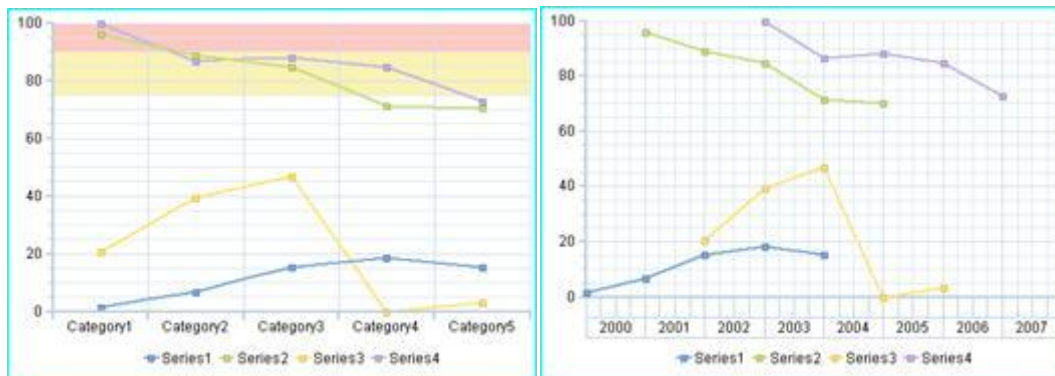
It is recommended to use a **Column Chart** for the following cases:

- If single values are to be compared across static categories
- If there are only a few categories and if they have only short names
- If values are considered to be higher or lower

You should **not** use a Column Chart in these cases:

- If the category names are too long to fit horizontally oriented into one row use a bar chart.
- If the values of each category add up to 100% and if this fact is important use a stacked column chart.
- If values have to be compared across time or another continuous category, use a line chart.
- For comparing proportions, i.e. the relative distribution of a given amount over the categories, use a stacked bar chart or pie chart, if the fact that they add up to 100% or to another KPI is important.
- If you do not have much space or want to combine the display of the KPI with additional KPIs or attributes, use instead of the column chart a table with one or more columns that contain a single bar and a number per KPI cell.

6.3 Line Chart



It is recommended to use a **Line Chart** for the following cases:

- To display trends over time, where the focus is on the trend, not on the individual values
- For spotting dependencies between two or more variables

You should **not** use a Line Chart in these cases:

- If the Y axis is a set of distinct (not successive) categories (not a time line), use a bar chart or a line chart with separate horizontal lines instead.

6.4 Stacked Bar Chart

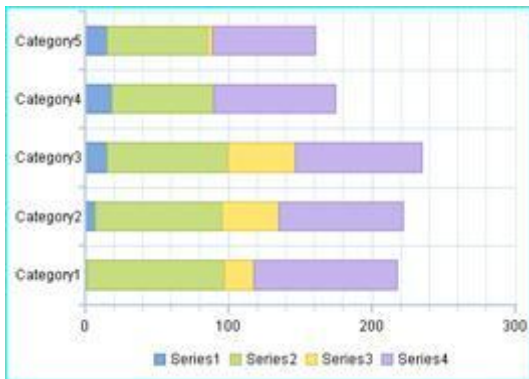


Figure 8: Example for a Stacked Bar Chart

It is recommended to use a **Stacked Bar Chart** for the following cases:

- If single values are to be compared across static categories
- In cases where the values of each category add up to 100% and where this fact is important
- For comparing parts to the whole (proportions)
- If one or multiple points in time or one or multiple categories are to be displayed
- If there are many categories or if they have longer names
- If values are considered to be longer or shorter

You should **not** use a Stacked Bar Chart in these cases:

- If values have to be compared with focus on trends across time or successive categories, use a stacked area chart.
- If the fact that the values of each category add up to 100% is of minor importance, use a bar chart.
- If the areas represent numbers of instances with a specific status and if you do not have much space or want to combine the display of the KPI with additional KPIs or attributes, use instead of the stacked bar chart a table with one or more columns that contain a single stacked bar per KPI cell:

Series	Absolute	Percent
Series 1		
Series 2		

6.5 Stacked Column Chart

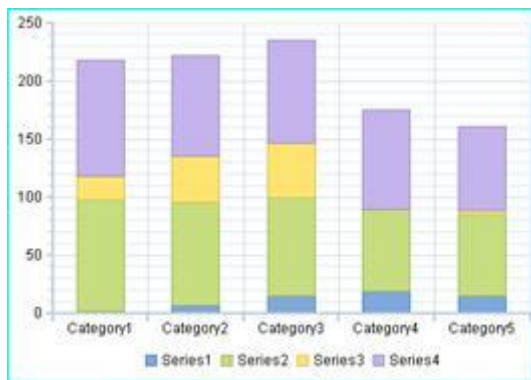


Figure 9: Example for a Stacked Column Chart

It is recommended to use a **Stacked Column Chart** for the following cases:

- If single values are to be compared across static categories
- In cases where the values of each category add up to 100% and where this fact is important
- For comparing parts to the whole (proportions)
- If one or multiple points in time or one or multiple categories are to be displayed
- If there are only a few categories and if they have only short names
- If values are considered to be higher or lower

You should **not** use a Stacked Column Chart in these cases:

- If the category names are too long to fit horizontally oriented into one row use a stacked bar chart.
- If values have to be compared with focus on trends across time or successive categories, use a stacked area chart.
- If the fact that the values of each category add up to 100% is of minor importance, use a column chart.
- If the areas represent numbers of instances with a specific status and if you do not have much space or want to combine the display of the KPI with additional KPIs or attributes, use instead of the stacked column chart a table with one or more columns that contain a single stacked bar per KPI cell:

6.6 Stacked Area Chart or Stacked Profile Area Chart

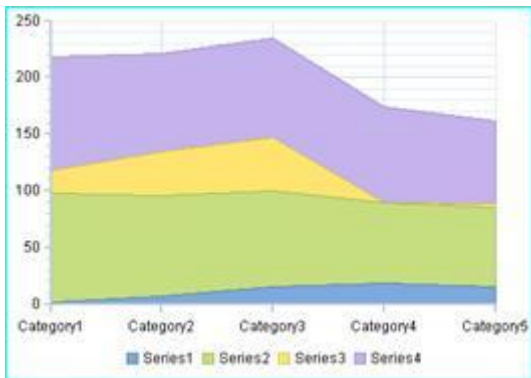


Figure 10: Example for a Stacked Area Chart

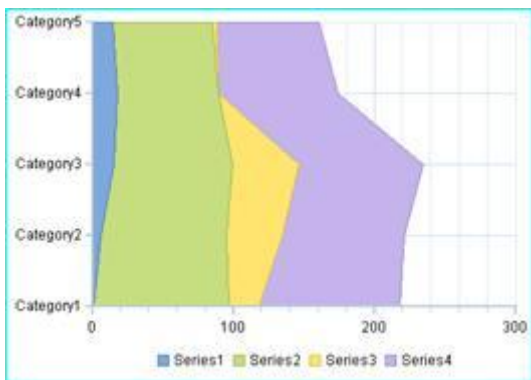


Figure 11: Example for a Stacked Profile Area Chart

It is recommended to use a **Stacked Area Chart** or a **Stacked Profile Area Chart** for the following cases:

- If trends are to be compared across times or successive categories
- In cases where the values add up to 100%
- For comparing parts to the whole (proportions)
- If one multiple points in time or one or multiple categories are to be displayed

You should **not** use this type of charts in these cases:

- Not suited for comparing absolute amounts

6.7 Pie Charts

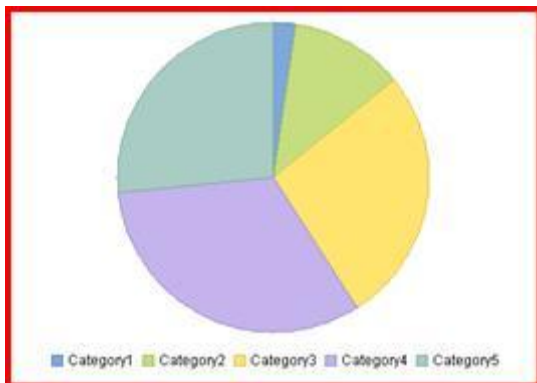


Figure 12: Example for a Pie Chart

It is recommended to use a **Pie Chart** for the following cases:

- Used to give Overviews
- Cases where the values add up to 100% or another specific total KPI value
- Maybe for comparing parts to the whole (proportions)

You should **not** use a Pie Chart in these cases:

- Not suited well for comparing amounts precisely
- The use of pie charts is not very encouraged as it is difficult to perceive values as compared to a linear bar chart, stacked bar chart, column chart or stacked column chart.
- Even when comparing parts to the whole and the information that the values are part of a whole is important, the use of a stacked bar chart with only one bar or a stacked column chart with only one column is preferred to a pie chart.
- If it is more important to compare the different parts that to show that they are part of a whole, use a bar chart or a column chart instead.
- See also the recommendations below in the chapter “Avoid Using Radial or Section Charts”.

6.8 Area Charts

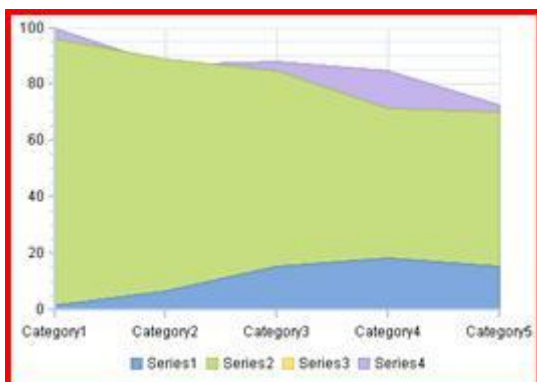


Figure 13: Example for an Area Chart

Avoid using Area Charts. There are several alternatives that can address specific weaknesses of Area Charts:

- If you only want to display trends, use a **line chart**.
- If you only want to display a static distribution, choose a **pie chart** or (better) a **stacked area chart** or a **bar chart with multiple bars**.
- If there is the danger of hidden data: in area charts parts of the data can be hidden by other, to avoid this use either **line charts** or **stacked area charts**, because here the areas do not cover each other. In some cases **semi-transparent area charts** can be appropriate (e.g. for plan/actual comparisons).

6.9 Three-Dimensional Charts

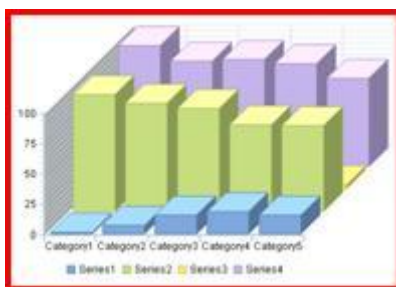


Figure 14: Example for a Three-dimensional Bar Chart

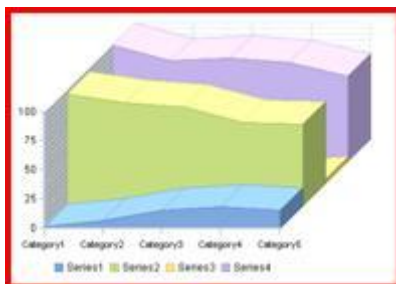


Figure 15: Example of a Three-dimensional Area Chart

Avoid using three-dimensional charts by any means. Use plain charts instead of 3D charts for the following reasons:

- Plain charts show better perception of absolute sizes and values
- Plain charts are easier and faster to read and to compare
- Plain charts have no danger of hidden data
- Plain charts have less visual clutter
- Plain charts require less space

6.10 Radial or Section Charts

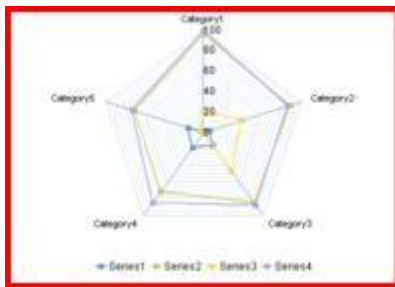


Figure 16: Example for a Section Chart



Figure 17: Example for a Radial Chart

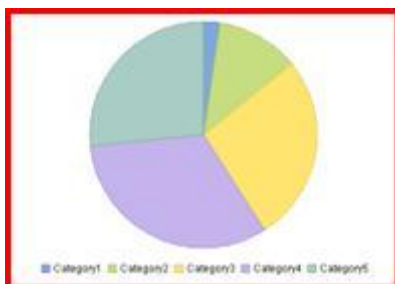


Figure 18: Example for a Pie Chart as one specific Radial Chart.

Avoid using Section Charts or Radial Charts by any means. Use linear charts instead for the following reasons:

- Linear charts offer better perception of relative sizes and values and of absolute sizes and values
- Linear charts require less space
- Linear charts are easier to evaluate (angles are harder to evaluate than distances) and misinterpretations are less likely to occur

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