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[http://aka.ms/tellpress](http://aka.ms/tellpress)
In Chapter 8, “Work with shape data,” you viewed and reported on data stored in Visio shapes. Although those techniques are useful in many circumstances, Visio provides an even more effective way to take advantage of data: you can create data graphics that enhance shapes by adding text callouts and icons based on the data contained in the shapes. Even better, data graphics are dynamic, so when the data in a shape changes, Visio refreshes the graphics automatically.

In the next chapter, you will take data graphics to another level by visualizing data stored in an external location. In this chapter, you will work with data graphics by using data that is stored in the diagram and discover the amazing ways you can visualize data by using Visio 2016.

**IMPORTANT** The information in this chapter applies only to the Professional edition of Visio 2016.

This chapter guides you through procedures related to enhancing diagram effectiveness, creating and applying data graphics, editing data graphics, and creating data graphic legends.

**In this chapter**
- Enhance diagram effectiveness
- Create data graphics
- Apply data graphics
- Edit data graphics
- Create data graphic legends

**Practice files**
For this chapter, use the practice files from the Visio2016SBS\Ch09 folder. For practice file download instructions, see the introduction.
Enhance diagram effectiveness

A person using a Visio diagram that you created can learn a lot about the subject of the diagram based on your choice of shapes, their positions on the page, the way they are connected, and many additional visual cues. The five sections in this topic demonstrate the power of data visualization to tell even more of the story.

View network and datacenter performance

Chapter 7, “Create network and datacenter diagrams” contains several hints about the data available in computer, network, and rack diagram shapes. This section explores techniques you can use to capitalize on the data that is included in the Visio network shapes.

The diagrams in this section might be used in a scenario such as the following:

- You are a datacenter manager and have created rack diagrams for each rack in your computer room.
- You’ve populated your diagrams with data.
- Each rack-mounted server includes the data fields shown in Figure 9-1. (The values shown in this figure will be visualized in the next two figures.)

![Sample server data](image)

**Figure 9-1 Sample server data**

You can visualize data like that shown in Figure 9-1 by using Visio data graphics to turn an ordinary rack diagram into a powerful means to understand server attributes.
In Figure 9-2, several data graphics are applied to the servers in an equipment rack to highlight the following:

- Server name and type (left)
- Server status (center)
- CPU and memory configuration (right)

![Diagram of servers with data graphics](image)

**Figure 9-2** A rack diagram showing server status and vital statistics

Figure 9-3 shows the same equipment rack, but it uses different data graphics to highlight different information. In this version of the rack diagram, you find the following:

- Server name and IP address (left)
- Server status (center) shown by applying a fill color to the servers instead of attaching a status icon.
- Operating system name (right)

![Diagram of servers with different data graphics](image)

**Figure 9-3** Alternate visualizations provide different information
Part of the appeal of data graphics is represented by these two examples—you can apply different graphics at different times depending on what you need to know.

**Improve processes**

In this example, data graphics are applied to process steps in a swimlane diagram for two reasons: to number each process step (the number appears above the upper-right corner of each shape), and to show several process quality measurements. The information in Figure 9-4 includes the following:

- The average duration of each step, in days, is shown in a progress bar across the bottom of each task shape.
- A warning icon appears in the lower-left corner of a shape if a step is taking 5 to 9 days or 10 or more days.
- The shape color indicates whether a step is improving or being investigated.

The symbolism used for each of these metrics is explained in the data graphic legend that appears in the upper-right corner of the page. You will learn more about legends in “Create data graphic legends” later in this chapter.

![Figure 9-4](image.png)

Figure 9-4  *A process diagram that displays data-driven graphics*
Manage casino operations

Figure 9-5 illustrates the types of near-real-time information that a casino manager might view in Visio, with a goal of monitoring critical operations. In all likelihood, your job doesn’t involve managing a casino, but you can probably think of important operations that you do need to monitor.

![Figure 9-5 A casino manager’s view of a blackjack table](image)

In the graphic, text callouts highlight each bettor’s recent history, including current dollar standing, average bet, and number of blackjacks. In addition, a red or green arrow represents how each player is trending.

**TIP** The real-time nature of the graphics in this example are significantly enhanced when the diagram is linked to a live, external data source. You will explore this topic in Chapter 10, “Link to external data.”

Manage employee performance

The organization chart in Figure 9-6 looks like those you explored in Chapter 5, “Create organization charts,” with one notable exception: Trey Research has turned this org chart into more than just a picture of who reports to whom by including two key performance measures:

- Each employee’s progress toward their annual training goal is depicted by an icon containing a combination of blue and gray squares.
- The three red manager shapes include a bar graph displaying quarterly performance numbers. Note that the bar graph is a single graphic item that contrasts data from four different shape data fields.
The legend in the upper-right corner of the page is automatically generated by Visio; however, you can customize the text and other aspects of the legend. In this example, the descriptions were customized and the font color was changed.

Figure 9-6 An org chart enhanced with employee performance data

TIP You can apply only one data graphic to a shape at any given moment. However, as Figure 9-6 shows, one data graphic can contain multiple visual elements. In addition, you can apply different graphics to different shapes on the same page.

Assess risks
In the example shown in Figure 9-7, you are viewing part of a process map that was created by using a Visio add-in called TaskMap (www.taskmap.com).
This portion of the TaskMap shows three tasks in the middle of a sales proposal process, and data graphics depict the following two aspects of risk management:

- Yellow triangles and green diamonds identify risks and controls, respectively. The number in each risk triangle relates to an entry in a master list of risks. The number in each diamond identifies the control that the organization has put in place to mitigate the risk. (An organization might maintain the master list of risks and controls in something as simple as a worksheet, or they might employ a formal risk management system.)

  In a task like the one in the center, the organization has identified a risk but not a control, so the risk is more significant.

- The red arrows highlight tasks that exceed a defined time threshold—30 minutes in the case of this example.

Figure 9-7 also includes a third data graphic: two of the three tasks display a red diamond to indicate that they are decision points in the process.

**Figure 9-7  A TaskMap process map used to convey risk and time threshold data**

---

**TIP** If you would like to look at the full page from which Figure 9-7 was taken, open the RiskManagementTaskMap PDF in the Visio2016SBS\Ch09 folder. In addition, a web-published version of this TaskMap that includes hyperlinks to Microsoft Word and Excel documents is available at [www.visiostepbystep.com/downloads/2016/RiskManagementTaskMap.htm](http://www.visiostepbystep.com/downloads/2016/RiskManagementTaskMap.htm).

The examples in this section highlight the importance of the data behind a diagram and suggest a variety of creative ways you can add value to diagrams that contain data.
Create data graphics

In Chapter 10, “Link to external data,” you will discover a simple technique for applying data graphics to shapes that are linked to data in an external file or database. However, linking to external data is not a requirement for using data graphics. Even if you’ve manually entered data into your shapes, you can still represent that data visually.

Each data graphic you create can contain one or more graphic items. Each graphic item is associated with a data field and presents data by using one of the following formats:

- **Callout** A formatted text box, sometimes accompanied by an icon, that is used to display text

  TIP In some places in the Visio user interface, the name of this category is shown as Text Callout or just Text.

- **Icon Set** A collection of up to five icons that are used to represent specific values or ranges of values

- **Data Bar** One of a set of progress bars, star ratings, pie charts, graphs, or other graphics used to represent numeric values

- **Color by Value** A technique for setting the color of a shape based on the value of a data field in the shape

You create and apply data graphics by using options on the Data tab. Portions of the Data tab—the Data Graphics gallery and several buttons—will be dimmed (unavailable) if you have not linked your diagram to external data; these portions are omitted from the images of the Data tab shown in Figure 9-8. However, the Advanced Data Graphics button on the right end of the tab is always available, and that’s the button you use to create data graphics in an unlinked diagram.

![Figure 9-8 The Visio Professional Data tab](image-url)
Clicking the Advanced Data Graphics button opens the Data Graphics gallery, which includes a Create New Data Graphic button. The first step in creating a data graphic is to create a graphic item, and the first step in doing that is to select a data field.

The list of available data fields varies depending on which shapes are selected when you click the Create New Data Graphic button. If no shapes are selected, or if the selected shapes have one or more data fields in common, a list like the one shown in the upper half of Figure 9-9 is displayed. If a set of shapes with no common fields is selected, an abbreviated list such as the one shown in the lower half of Figure 9-9 is displayed.

In either case, you can use the More Fields entry shown in both parts of Figure 9-9 to create more sophisticated data graphics. For example, instead of creating a graphic based on a shape data field, you can create a graphic based on a document or page property, or based on a calculated result.

![Figure 9-9 New data graphics can be based on shape data fields or data that resides elsewhere in a diagram](image)

After selecting a data field, your next choice is which of the four graphic item types you want to use. The first three graphic types provide a list of choices, as shown from left to right in Figure 9-10 for the Text, Data Bar, and Icon Set lists.
Choosing an icon set requires you to specify which value, or range of values, applies to each icon. Figure 9-11 shows the settings for a data graphic you will apply in the following topic. Although this figure designates a specific value for each icon, you have considerable flexibility in defining the conditions for each flag. You can:

- Use the list in the center column to create a range of values for each icon and to set other conditions.
- Use the list on the right to enter more sophisticated values than simply typing a number or text into the field.

The fourth data graphic type, Color By Value, extracts data values from the selected field and matches each with a color, as shown in Figure 9-12.

**TIP** The colors selected by Visio in Figure 9-12 are suitable for some purposes but might be too bold for other purposes. In the latter case, you can display the Fill Color list for any field and change the color setting. You can also leave the text color of affected shapes at the default setting (as shown in the figure) or you can manually change it.

**IMPORTANT** Notice the Insert and Delete buttons to the right of the Color Assignments section in Figure 9-12. You can delete any combination of value and color, or you can add new ones, depending on what you want to highlight in the drawing. For example, if you don’t want to apply a fill color when the selected field has a blank value, delete the row in which the value box is blank.
The options for configuring icon set graphics are flexible.

Visio identifies existing data values and selects colors when you create a color-by-value data graphic.
To select a field to create a data graphic

1. Open the **New Data Graphic** dialog box by doing either of the following:
   - On the **Data** tab, in the **Advanced Data Linking** group, click **Advanced Data Graphics**, and then click **Create New Data Graphic**.
   - Right-click any shape that does not contain a data graphic, click **Data**, and then click **Edit Data Graphic**.

2. Click the **New Item** button.

3. In the **New Item** dialog box, click the **Data field** arrow, and then click the name of the field you want to visualize.

   **IMPORTANT** You can add more than one graphic item to any data graphic as you create it. To do so in each of the next four procedures, click the New Item button again before clicking OK to close the New Data Graphic dialog box.

To create a Text data graphic

1. Select a field to visualize, click the **Displayed as** arrow, and then click **Text**.
2. Click the **Style** arrow, and then click the name of the text callout you want.
3. **(Optional)** Change configuration values in the **Details** section.
4. **(Optional)** Either select the **Use default position** check box, or use the **Horizontal** and **Vertical** lists to select a specific position for your data graphic.
5. Click **OK** to close the New Item dialog box, and then click **OK** to close the New Data Graphic dialog box.

To create a Data Bar data graphic

1. Select a field to visualize, click the **Displayed as** arrow, and then click **Data Bar**.
2. Click the **Style** arrow, and then click the name of the data bar you want.
3. **(Optional)** Change **Minimum Value**, **Maximum Value**, or other configuration values in the **Details** section.
4. **(Optional)** Either select the **Use default position** check box, or select an option from the **Horizontal** and **Vertical** lists to select a specific position.
5. Click **OK** to close the New Item dialog box, and then click **OK** to close the New Data Graphic dialog box.
To create an Icon Set data graphic

1. Select a field to visualize, click the Displayed as arrow, and then click Icon Set.
2. Click the Style arrow, and then click the icon set you want.
3. Click the appropriate condition from the list in the center column of the Rules for showing each icon section, and then enter values in the right column in the same section.
4. (Optional) Either select the Use default position check box, or select an option from the Horizontal and Vertical lists to select a specific position.
5. Click OK to close the New Item dialog box, and then click OK to close the New Data Graphic dialog box.

To create a Color By Value data graphic

1. Select a field to visualize, click the Displayed as arrow, and then click Color by Value.
2. (Optional) Click the Coloring Method arrow, and then click either Each color represents a unique value or Each color represents a range of values.
3. Either leave the entries in the Value, Fill Color, and Text Color fields in the Color assignments section as is, or make the changes you want.
4. Click OK to close the New Item dialog box, and then click OK to close the New Data Graphic dialog box.

Apply data graphics

You must select one or more shapes before opening the Data Graphics gallery because you can apply or remove data graphics only on preselected shapes. After selecting shapes, you can point to the options in the Available Data Graphics section of the gallery, shown in Figure 9-13, to provide a live preview so you can sample various graphics before choosing one.
The examples shown in the next two figures use shape data fields called Risk and Owner. The Risk field was added to the shapes in this diagram, whereas Owner is a predefined field in all Visio flowchart shapes.

Figure 9-14 shows the result of assigning two different data graphics to the same set of process steps. The upper section of the figure uses an icon set to represent the level of risk associated with each step. The lower section employs a color-by-value graphic that is based on the Owner data field, essentially creating a map that is color-coded to show who does what within the process.
TIP Visio data graphics are automatically assigned to a special layer in a diagram. (See “Understand and use layers” in Chapter 3, “Manage text, shapes, and pages.”) If you want to hide data graphics without removing them, you can change the view properties for the data graphics layer.

You can assign only one data graphic at a time to any given shape. However, you can include multiple graphic items within one data graphic. The diagram in Figure 9-15 features a single data graphic that includes both of the graphic items that are shown separately in Figure 9-14.

![Figure 9-15](image)

**Figure 9-15** You can create data graphics that have multiple graphic items

TIP Data graphics are applied to a single page at a time. If you want to apply the same data graphic to multiple pages, you must either apply it to each page separately, or write a Visio macro to do that for you.

If you want to apply the same data graphic automatically to a shape regardless of the page on which the shape resides, you can apply the data graphic to the shape and save the shape as a master in a custom stencil. Then, whenever you drag the master onto the drawing page, it will automatically display the data graphic. You will learn about macros and creating custom stencils in Appendix A, “Look behind the curtain.”

To apply a data graphic to one or more selected shapes

1. On the Data tab, in the Advanced Data Linking group, click the Advanced Data Graphics button to display a gallery of data graphic options and thumbnails.

2. In the Advanced Data Graphics gallery, click the thumbnail for the data graphic you want to apply.

To remove a data graphic from one or more selected shapes

1. Display the Advanced Data Graphics gallery, and then click the None thumbnail in the No Data Graphic section.
TIP In Chapter 10, “Link to external data,” you will discover additional techniques for applying data graphics in diagrams that have been linked to external data sources.

Edit data graphics

The placement and appearance of data graphics are controlled by an editable set of parameters. Although you can’t control every attribute of a data graphic without resorting to writing code, the Visio 2016 user interface provides tools to implement a surprising number of changes by using the Edit Data Graphic dialog box, shown in Figure 9-16.

![Edit Data Graphic: Cost and Risk](image)

**Figure 9-16** Data graphics can contain multiple graphic items of different types

The upper half of the Edit Data Graphic dialog box lists all of the graphic items that are part of the selected data graphic. You can add, edit, or delete each graphic item. In the lower half of the dialog box, you can modify the characteristics of the data graphic as a whole.

IMPORTANT You establish the default position for a data graphic by selecting from the Horizontal and Vertical lists in the Default Position of the Edit Data Graphic dialog box. (Both the horizontal and vertical positions are relative to the shape to which the graphic will be attached.) Data graphic items in the upper half of the dialog box whose Position is set to Default will appear at this location.
You use the Edit Item dialog box to change display properties. The specific properties in the dialog box vary based on the selected graphic item.

For the Thermometer graphic shown in Figure 9-17, you can specify the minimum and maximum values so Visio can properly scale the height of the red inside the thermometer. You can also adjust labels and other icon attributes.

**IMPORTANT** The Minimum Value and Maximum Value fields are critical for all Data Bar graphic items, not just the Thermometer icon. If these values are set incorrectly, the height or width, depending on the graphic item, will be incorrect.

In the upper-right corner of the dialog box, you can select the check box to position a graphic item at the default position for the data graphic that contains it. You can also clear that check box and select from the options in the Horizontal and Vertical lists to set your own location relative to the underlying shape.
To edit a data graphic

1. Display the Advanced Data Graphics gallery, right-click the thumbnail of the data graphic you want to change, and then click Edit.

   Or

   Right-click any shape that contains the data graphic you want to change, click Data, and then click Edit Data Graphic.

2. In the Edit Data Graphic dialog box, click the graphic item you want to edit, and then click the Edit Item button.

   Or

   Double-click the graphic item you want to edit.

3. Make your changes in the Edit Item dialog box, and then click OK.

4. (Optional) Change the settings in the Default position, Display options, or Apply changes to sections of the Edit Data Graphic dialog box.

   TIP The next step is useful if you are still experimenting with how you want the data graphic to look on the page.

5. (Optional) Click the Apply button to see the changes in the diagram without closing the Edit Data Graphic dialog box.

6. Click OK.

To rename a data graphic

1. Display the Advanced Data Graphics gallery, right-click the thumbnail of the data graphic you want to rename, and then click Rename.

2. Enter a new name, and then click OK.

To duplicate a data graphic

1. Display the Advanced Data Graphics gallery, right-click the thumbnail of the data graphic you want to duplicate, and then click Duplicate.

To select all shapes that use a particular data graphic

1. Display the Advanced Data Graphics gallery, right-click the thumbnail of a data graphic, and then click Select Shapes that use this Graphic.
To delete a data graphic

1. Display the Advanced Data Graphics gallery, right-click the thumbnail of the data graphic you want to delete, and then click **Delete**.

**TIP** In Chapter 10, “Link to external data,” you will discover additional techniques for editing data graphics in diagrams that have been linked to external data sources.

Create data graphic legends

Data graphics like the one shown in Figure 9-15 earlier in this chapter are easier to use and understand with a key. With Visio 2016, a data graphic legend is just a click away. You can create either a vertical legend, or, as shown in Figure 9-18, a horizontal legend.

**TIP** Visio always places the legend in the upper-right corner of the page.

![Legend](image)

**Figure 9-18** *Visio creates legends automatically, but you can customize them*

After Visio creates the legend, you can edit the elements within the legend. For example, the legend on the left in Figure 9-18 is the original version. In the legend on the right, the descriptions for the flag icons have been changed to be more meaningful for users of the diagram.

**IMPORTANT** After placing a data graphic legend on the page, Visio never updates it. Consequently, if you add or delete a data graphic or change the attributes of a graphic in a way that affects the legend, you must delete the existing legend and insert a new one.
**TIP** Visio constructs data graphic legends from a combination of containers and lists. For details about containers and lists, see Chapter 13, “Add structure to your diagrams.”

To insert a data graphic legend
1. On the **Data** tab, in the **Display Data** group, click the **Insert Legend** button.
2. Click either **Horizontal** or **Vertical**.

To edit a data graphic legend
1. Click an entry inside the legend and enter new text.
2. Click an entry inside the legend and drag it to a new location.

To move a data graphic legend
1. Click the word **Legend** in the header of the data graphic legend, and then drag the legend to a new location.

To delete a data graphic legend
1. Do any of the following:
   - Click the word **Legend** in the header of the data graphic legend, and then press the **Delete** key.
   - Right-click the word **Legend**, and then click **Cut** on the shortcut menu.
   - Right-click the word **Legend**, and then on the **Home** tab, in the **Clipboard** group, click **Cut**.

Skills review
In this chapter, you learned how to:

- Enhance diagram effectiveness
- Create data graphics
- Apply data graphics
- Edit data graphics
- Create data graphic legends
Practice tasks

The practice files for these tasks are located in the Visio2016SBS\Ch09 folder. You can save the results of the tasks in the same folder.

Enhance diagram effectiveness
There are no practice tasks for this topic.

Create data graphics
Open the CreateDataGraphics diagram in Visio, and then perform the following tasks:

1. Create a **Text** data graphic with the following characteristics:
   - **Data field**: Owner
   - **Style**: Heading 1
   - **Horizontal**: Center
   - **Vertical**: Top Edge
   - **Horizontal Offset**: None

2. Create a **Data Bar** graphic for the **Cost** field with the following characteristics:
   - Located at the default position
   - **Style**: Thermometer
   - **Maximum Value**: 150

3. Create an **Icon Set** data graphic for the **Status** field and apply the settings shown in Figure 9-11.

4. Create a **Color by Value** data graphic for the **Owner** field, ensuring that there is not a color assigned to a blank value.

5. Save the diagram as **DataGraphicsFlowchart** for use in the next tasks.

Apply data graphics
Open the DataGraphicsFlowchart diagram in Visio, and then perform the following tasks:

1. Apply the **Text** data graphic to all process steps except **Start** and **End**.

2. Apply the **Data Bar** data graphic to all process steps except **Start** and **End**. Change the **Cost** value in several shapes and observe the results.
3. Apply the **Icon Set** data graphic to all process steps except **Start** and **End**. Change the **Status** value in several shapes and observe the results.

4. Apply the **Color by Value** data graphic to all process steps except **Start** and **End**. Change the **Owner** value in several shapes and observe the results.

5. Save your changes, and leave the diagram open if you’ll be continuing to the next tasks.

**Edit data graphics**

Open the DataGraphicsFlowchart diagram in Visio, and then perform the following tasks:

1. Apply the **Data Bar** (**Thermometer**) data graphic to the process shapes in the top row, and then edit the data graphic by changing the **Vertical** position to **Top Edge**, and **Value Position** and **Label Position** to **Not Shown**.

2. Apply the **Icon Set** data graphic to any three-process steps, and then edit the data graphic by selecting a different set of icons.

3. Assign the **Color by Value** data graphic to the process steps in the lower row, and then edit the data graphic by assigning different fill colors and text colors to one or more data values.

4. Assign a more meaningful name to the data bar data graphic.

5. Create a duplicate copy of the **Icon Set** data graphic, and then change the visualization type to **Color by Value**.

6. Assign the duplicated data graphic to some of the process steps.

7. Select all shapes that currently use the **Data Bar** graphic and assign the duplicated data graphic to them.

8. Delete the duplicated data graphic.

9. Save your changes, and leave the diagram open if you’ll be continuing to the next tasks.
Create data graphic legends

Open the DataGraphicsFlowchart diagram in Visio, and then perform the following tasks:

1. Apply the **Icon Set** data graphic to all process steps in the upper row.
2. Apply the **Data Bar** data graphic to all process steps in the lower row.
3. Add a **Vertical** legend to the page.
4. Move the legend to a new location.
5. Delete the legend, and then insert a **Horizontal** legend.
6. Change the text of one or more explanations in the **Status** column of the legend.