Microsoft

Microsoft Visio 2016

Step by Step

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PRACTICE FILES

Microsoft

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Introduction

Welcome! This *Step by Step* book has been designed so you can read it from the beginning to learn about Microsoft Visio 2016 and then build your skills as you learn to perform increasingly specialized procedures. Or, if you prefer, you can jump in wherever you need ready guidance for performing tasks. The how-to steps are delivered crisply and concisely—just the facts. You'll also find informative, full-color graphics that support the instructional content.

Who this book is for

Microsoft Visio 2016 Step by Step is designed for use as a learning and reference resource by home and business users of Microsoft Office programs who want to use Visio to create a variety of diagrams for business and personal use. The content of the book is designed to be useful for people who have previously used earlier versions of Visio and for people who are discovering Visio for the first time.

The *Step by Step* approach

The book's coverage is divided into parts representing general Visio skill sets. Each part is divided into chapters representing skill set areas, and each chapter is divided into topics that group related skills. Each topic includes expository information followed by generic procedures. At the end of the chapter, you'll find a series of practice tasks you can complete on your own by using the skills taught in the chapter. You can use the practice files that are available from this book's website to work through the practice tasks, or you can use your own files.

Adapt procedure steps

This book contains many images of user interface elements (such as the ribbon and the app windows) that you'll work with while performing tasks in Visio on a Windows computer. Depending on your screen resolution or app window width, the Visio ribbon on your screen might look different from that shown in this book. (If you turn on Touch mode, the ribbon displays significantly fewer commands than in Mouse mode.) As a result, procedural instructions that involve the ribbon might require a little adaptation.

Simple procedural instructions use this format:

1. On the **Insert** tab, in the **Illustrations** group, click the **Pictures** button.

If the command is in a list, our instructions use this format:

1. On the **Home** tab, in the **Editing** group, click the **Layers** arrow and then, in the **Layers** list, click **Layer Properties**.

If differences between your display settings and ours cause a button to appear differently on your screen than it does in this book, you can easily adapt the steps to locate the command. First click the specified tab, and then locate the specified group. If a group has been collapsed into a group list or under a group button, click the list or button to display the group's commands. If you can't immediately identify the button you want, point to likely candidates to display their names in ScreenTips.

Multistep procedural instructions use this format:

1. Display the Backstage view.
2. In the left pane of the Backstage view, click **New**.
3. On the **New** page, click **Categories**, click the **Business** thumbnail, and then double-click the **Organization Chart** template.

On subsequent instances of instructions that require you to follow the same process, the instructions might be simplified in this format because the working location has already been established:

1. On the **New** page of the Backstage view, click **Categories**, click the **Business** thumbnail, and then double-click the **Organization Chart** template.

The instructions in this book assume that you're interacting with on-screen elements on your computer by clicking (with a mouse, touchpad, or other hardware device). If you're using a different method—for example, if your computer has a touchscreen interface and you're tapping the screen (with your finger or a stylus)—substitute the applicable tapping action when you interact with a user interface element.

Instructions in this book refer to Visio user interface elements that you click or tap on the screen as *buttons*, and to physical buttons that you press on a keyboard as *keys*, to conform to the standard terminology used in documentation for these products.

When the instructions tell you to enter information, you can do so by typing on an external keyboard, tapping an on-screen keyboard, or even speaking aloud, depending on your computer setup and your personal preferences.

Download the practice files

Before you can complete the practice tasks in this book, you need to download the book's practice files to your computer from *http://aka.ms/Visio2016sbs/downloads*. Follow the instructions on the webpage.

IMPORTANT Visio 2016 is not available from the book's website. You should install that app before working through the procedures and practice tasks in this book.

You can open the files that are supplied for the practice tasks and save the finished versions of each file. If you later want to repeat practice tasks, you can download the original practice files again.

The following table lists the practice files for this book.

Chapter	Folder	File
1: Get started with Visio 2016	Visio2016SBS\Ch01	ExploreDrawing.vsdx GetStarted.vsdx ManageShapesWindow.vsdx PanAndZoom.vsdx
2: Create diagrams	Visio2016SBS\Ch02	PositionShapes.vsdx ResizeShapes.vsdx SelectShapes.vsdx UseAutoAddAutoDelete.vsdx UseAutoConnect.vsdx UseDynamicConnectors.vsdx UseLines.vsdx
3: Manage text, shapes, and pages	None	None
4: Create business process diagrams	Visio2016SBS\Ch04	CreateSubprocesses.vsdx
5: Create organization charts	Visio2016SBS\Ch05	AlterLayout.vsdx OrgChartData.xlsx Photos folder with 27 images of people

Chapter	Folder	File
6: Add style, color, and themes	Visio2016SBS\Ch06	AlignSpaceShapes.vsdx
7: Create network and datacenter diagrams	Visio2016SBS\Ch07	ChangeDrawingScale.vsdx CreateRacks.vsdx
8: Work with shape data	Visio2016SBS\Ch08	CreateModifyReports.vsdx EditShapeData.vsdx InsertFields.vsdx ModifyDataAttributes.vsdx RunReports.vsdx Vegetation Report.vrd
9: Visualize your data	Visio2016SBS\Ch09	CreateDataGraphics.vsdx RiskManagementTaskMap.pdf
10: Link to external data	Visio2016SBS\Ch10	Photos\Oleg Anashkin.jpg OrgChartData.xlsx OrgChartData_Supplement1.xlsx UseQuickImport.vsdx UseCustomImport.vsdx
11: Add and use hyperlinks	Visio2016SBS\Ch11	EnhanceDiagrams.vsdx FollowHyperlinks.vsdx Human Resources Policy Manual.docx
12: Print, reuse, and share diagrams	Visio2016SBS\Ch12	CreateGraphics.vsdx CreateTemplates.vsdx PreviewDrawings.vsdx PublishToWeb.vsdx SaveInFormats.vsdx
13: Add structure to your diagrams	Visio2016SBS\Ch13	AnnotateShapes.vsdx OrganizeByContainers.vsdx OrganizeByLists.vsdx

Chapter	Folder	File
14: Validate diagrams	Visio2016SBS\Ch14	ReuseRules.vsd RuleSets--BPMN 2.0.html RuleSets--Cross-Functional Flowchart.html RuleSets--Flowchart.html RuleSets--SharePoint 2010 Workflow.html RuleSets--SharePoint 2016 Workflow.html ValidateBPMN.vsdx ValidateFlowcharts.vsdx ValidateSwimlanes.vsdx
15: Collaborate and publish diagrams	None	None
Appendix A: Look behind the curtain	Visio2016SBS\AppA	ViewShapeSheet.vsdx
Appendix B: Keyboard shortcuts for Visio	None	None

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- Search the full text
- Print
- Copy and paste

You can purchase and download the ebook edition from the Microsoft Press Store at *http://aka.ms/Visio2016sbs/details*.

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Visualize your data

9

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.)

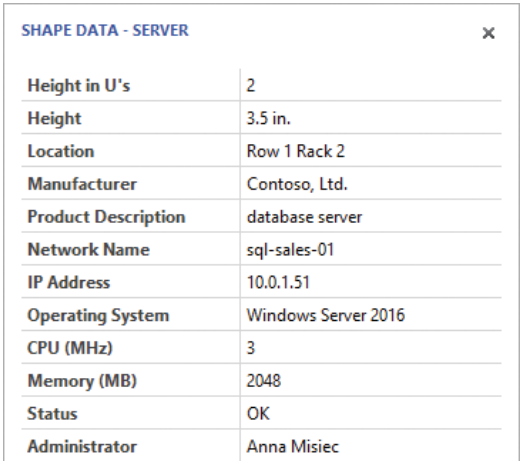

Figure 9-1 *Sample server data*

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)

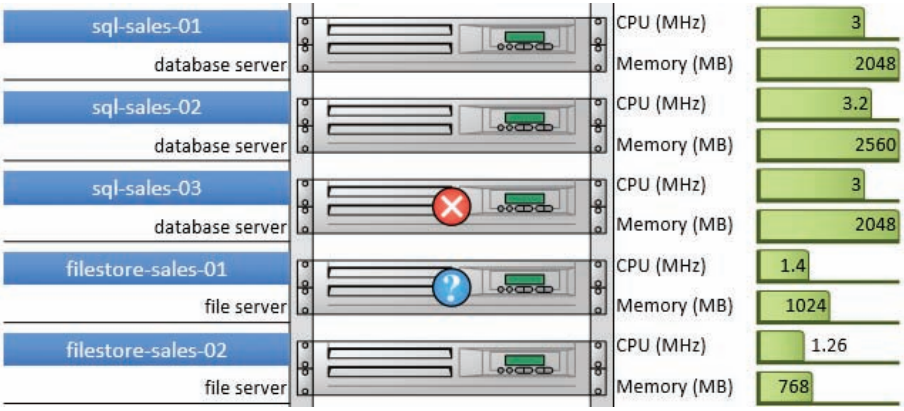

Figure 9-2 *A rack diagram showing server status and vital statistics*

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)

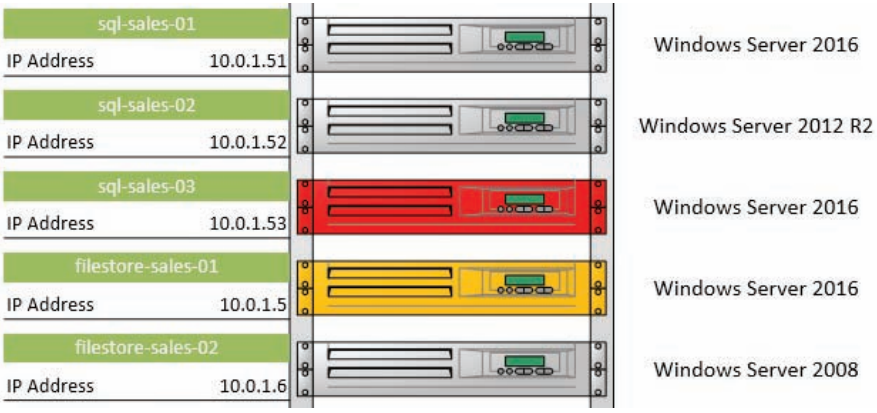

Figure 9-3 *Alternate visualizations provide different information*

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.

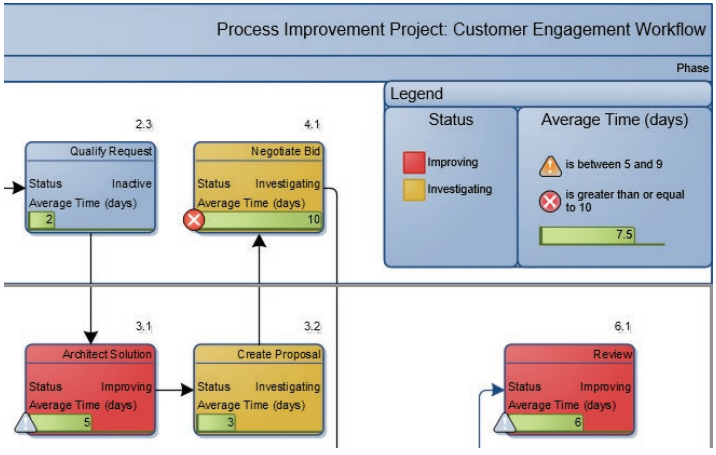

Figure 9-4 *A process diagram that displays data-driven graphics*

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*

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.

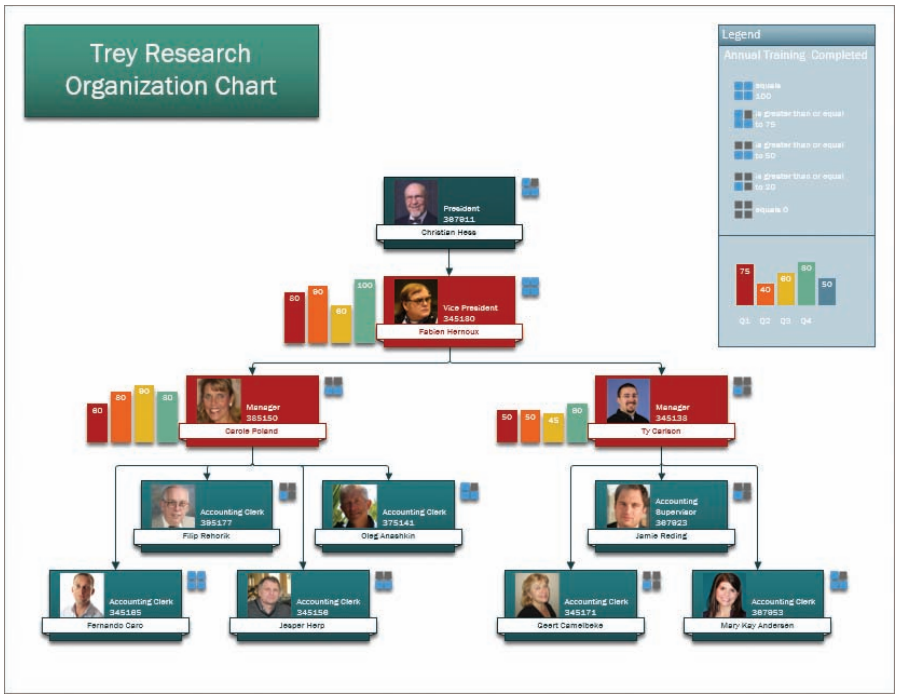

Figure 9-6 *An org chart enhanced with employee performance data*

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*.

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*

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.

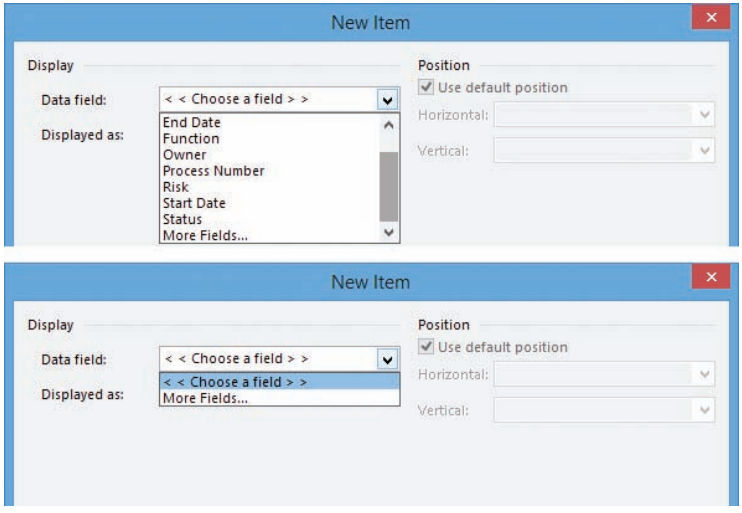

Figure 9-9 *New data graphics can be based on shape data fields or data that resides elsewhere in a diagram*

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.

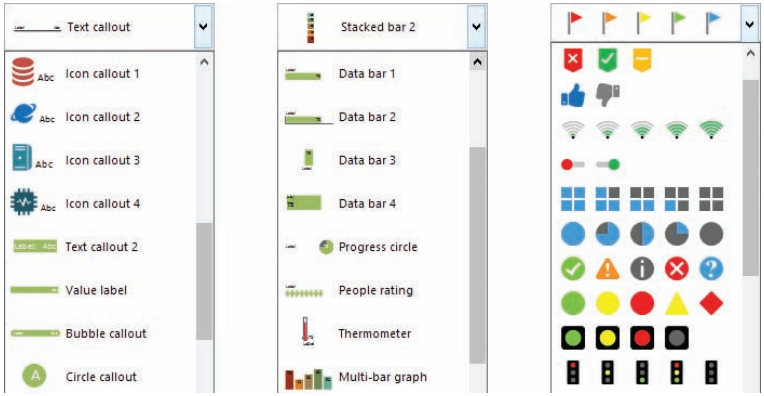

Figure 9-10 *Data graphics offer an impressive range of colorful choices for representing data*

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.

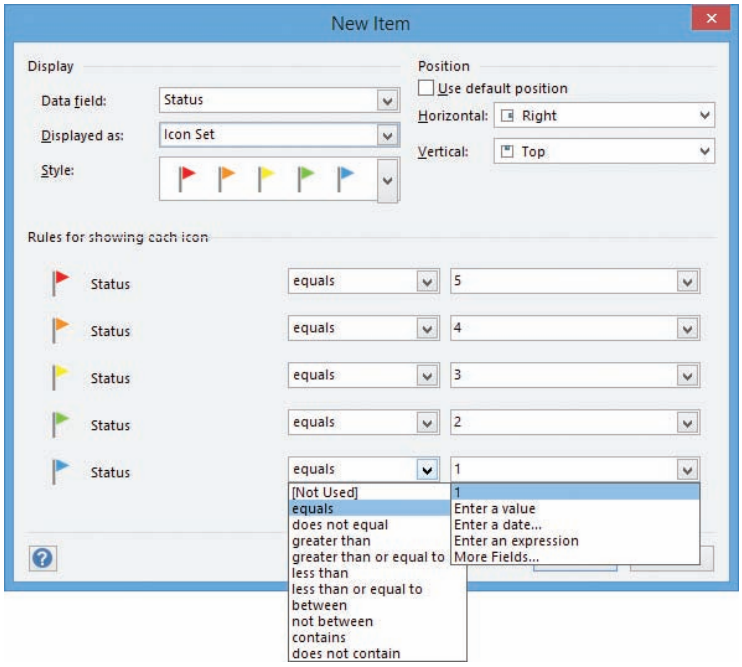

Figure 9-11 *The options for configuring icon set graphics are flexible*

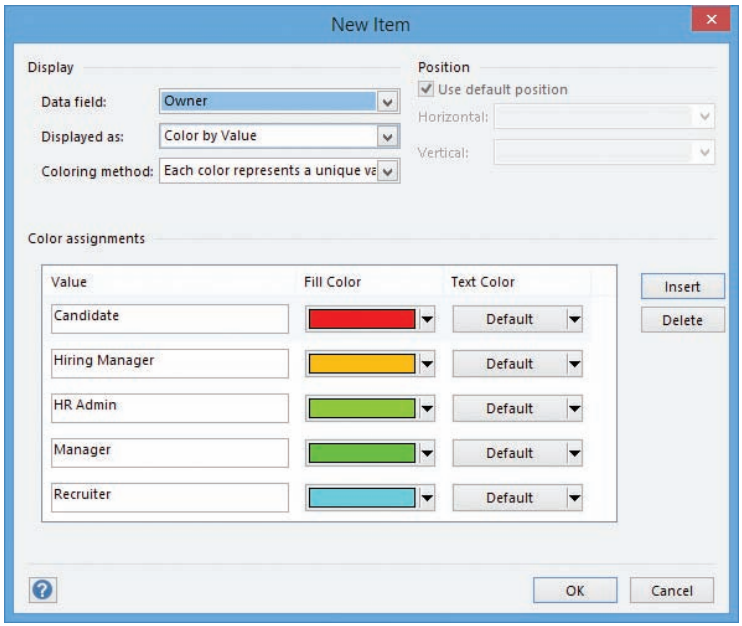

Figure 9-12 *Visio identifies existing data values and selects colors when you create a color-by-value data graphic*

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.

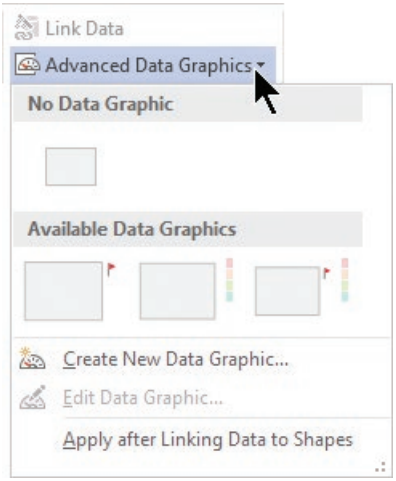

Figure 9-13 *Thumbnails of three data graphics appear in a data graphics gallery*

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.

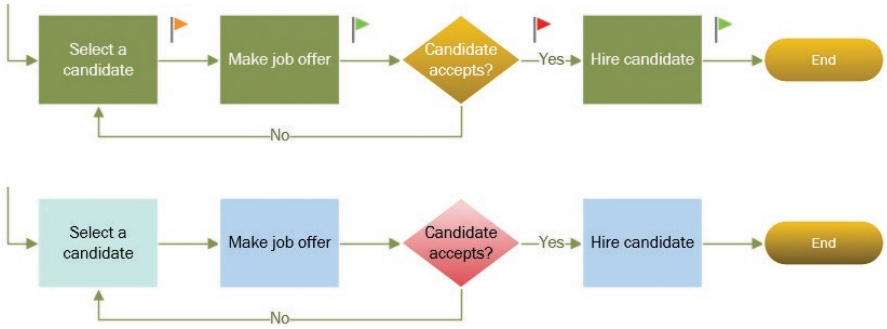

Figure 9-14 *The same set of flowchart shapes can impart dramatically different information by using different data graphics*

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.

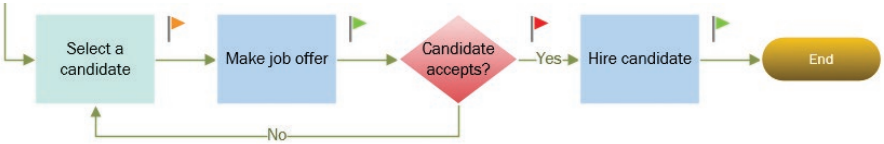

Figure 9-15 *You can create data graphics that have multiple graphic items*

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.

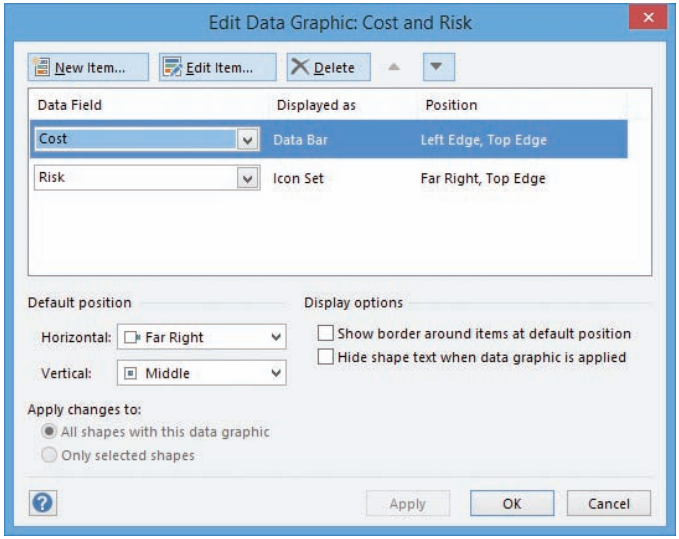

Figure 9-16 *Data graphics can contain multiple graphic items of different types*

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.

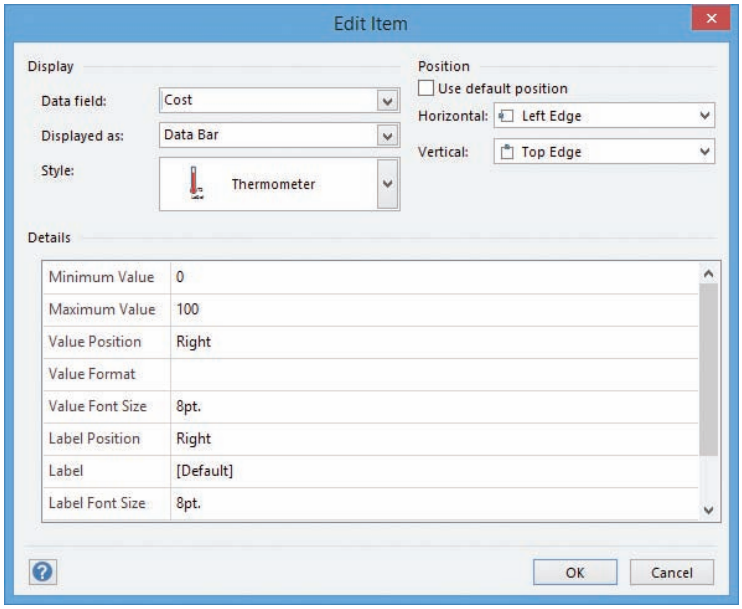

Figure 9-17 *You can accept default values in many situations but can customize data graphics as needed*

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.

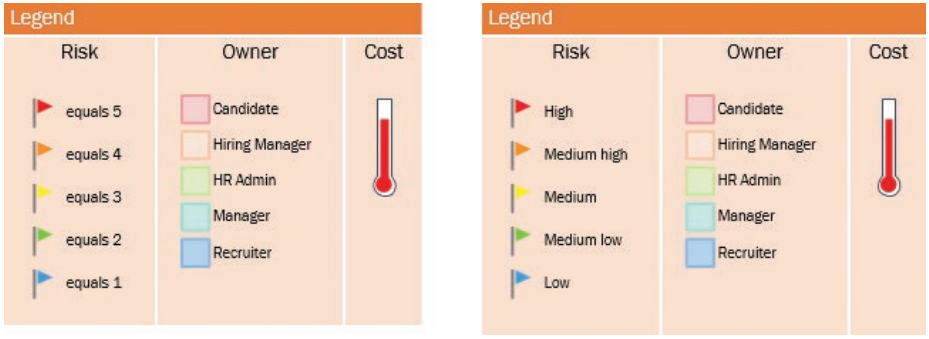

Figure 9-18 *Visio creates legends automatically, but you can customize them*

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.

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13

Add structure to your diagrams

In many types of Visio diagrams, it's useful to create visual or logical relationships among a set of shapes. The traditional technique for doing this in Visio has been to use background shapes and groups. However, Visio 2016 offers three special shape types—containers, lists, and callouts—that can be even more effective when you want to establish relationships and add structure to your diagrams.

Structured diagram shapes are so useful that Visio itself relies on them for a growing number of templates and special uses. For example, you will find lists and containers in swimlane diagrams, wireframes, and data graphic legends; and you will encounter callouts in the Business Process Model and Notation (BPMN) template (Visio Professional only).

This chapter guides you through procedures related to organizing shapes by using containers or lists, finding containers and lists in Visio, and annotating shapes by using callouts.

In this chapter

- Understand containers, lists, and callouts
- Compare groups and containers
- Organize shapes by using containers
- Organize shapes by using lists
- Find containers and lists in Visio
- Annotate shapes by using callouts

Practice files

For this chapter, use the practice files from the Visio2016SBS\Ch13 folder. For practice file download instructions, see the introduction.

Understand containers, lists, and callouts

Visio 2010 introduced three structured diagram shape types:

- **Containers** A container provides a visual boundary around a set of objects, but it also establishes a logical relationship between the container and the objects within it—shapes know when they are members of a container and containers know which shapes they contain.

  The key advantage of a container is that while you can move, copy, or delete it and its members as a unit, each contained shape maintains its independence. Unlike grouped shapes, selecting an object inside a container only requires one click, which makes it simple to access the shape data and other properties of a container member.

  > **TIP** A container can contain shapes, other containers, and lists.

- **Lists** A list is a special type of container that maintains an ordered relationship among its members. Each object in a list knows its ordinal position, and new objects are not merely added to a list but are added to a specific position in a list.

  > **TIP** A list can contain shapes and containers but cannot contain other lists.

- **Callouts** In previous versions of Visio, a callout was merely a shape that you glued to another shape to add a comment. A Visio 2016–style callout still provides a way to add annotation to a shape, but the callout knows the shape to which it is attached, and the shape can identify any attached callouts.

What is the value to you if shapes know where they live and containers and lists know what they contain? Think about a shape that automatically knows whether it's first, second, or third in a list and displays that data (explained in the section "Add shapes to lists" in the "Organize shapes by using lists" topic later in this chapter). Or think about the potential uses for a shape that displays data from its parent container—and the data changes automatically if you move the shape to a different container (covered in the "Explore swimlanes" section in the "Find containers and lists in Visio" topic later in this chapter).

Although it's true that containers, lists, and callouts are just Visio shapes, each includes unique properties and formulas that give it special capabilities.

Compare groups and containers

You can use either groups or containers to visually connect a set of shapes. However, the two have key behavioral differences that are likely to lead you in one direction or the other. The diagrams in this topic contain two sets of shapes that will serve to illustrate the similarities and differences. The green shapes on the left in the diagrams are part of a group; the gold shapes on the right are located inside a container.

In the image on the left in Figure 13-1, the arrows and square are grouped with a gold rectangle by using the traditional Visio technique:

1. Draw a rectangle (or other shape).
2. Send the new shape to the back of the Z-order.
3. Select the rectangle and the shapes you want in the group.
4. Group the selected shapes.

> **TIP** For information about creating and using groups, see Chapter 3, "Manage text, shapes, and pages." The same chapter also describes moving shapes backward and forward in the Z-order of a page.

Prior to the introduction of containers in Visio 2010, this was the only technique for creating a visual association among a set of shapes.

In contrast, the shapes on the right in Figure 13-1 were placed into a container. One difference is immediately apparent: containers are not just plain rectangles; they include both a main section and a heading.

Figure 13-1 *Shapes are grouped or contained*

Three additional differences that are not easily captured in a screenshot become obvious when you work with groups and containers in Visio:

- If you click a shape that is located in a group, you select the group and not the shape. However, if you click a shape in a container, the first click selects the shape. In essence, a group stands between you and its shapes, but a container is invisible as you select shapes.

  

  TIP If you run Visio in developer mode, you can alter the selection characteristics of a group. For more information about developer mode, see Appendix A, "Look behind the curtain."

- To select a container and not a member of the container, you must click the heading or an edge of the container.
- As a result of the click behavior described in the preceding bullets, using a bounding box to select interior shapes in a container is easy—just click inside or outside the container, and then drag. However, to select shapes in a group by using a bounding box, you must start the bounding box outside of the group or you will inadvertently drag the group.

Groups and containers share several behaviors. For example, if you move either one, you move all shapes. If you delete either one, you delete everything. Similarly, you can copy and paste either as a unit.

One difference arises when you want to label the collection, however. When you click a group and start entering text, the text appears in the center of the group shape by default. Sometimes this placement is fine, but other times it's not. The usefulness of the text in a group also depends on the color and style defaults of the theme you're using.

In the group shown on the left in Figure 13-2, for example, the text is illegible because its default color is too similar to the color of the background shape. You can, of course, use the Text Block tool you worked with in Chapter 3, "Manage text, shapes, and pages," to move the text, or you can change its color, but that requires extra steps.

Clicking a container and entering text, on the other hand, automatically places the text in the heading, as shown on the right in Figure 13-2.

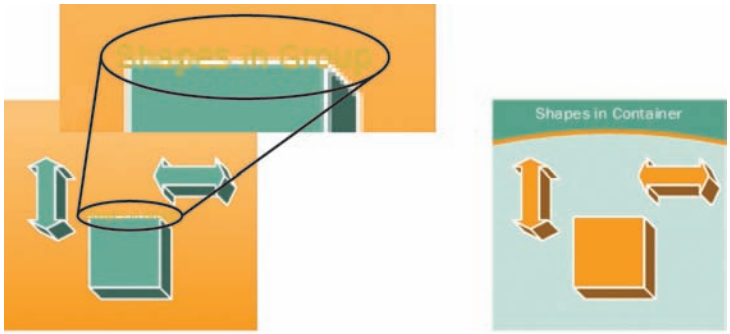

Figure 13-2 *Text in a group can be obscured by the default font color or by the shapes in the group*

If you drag a shape out of a group, is it still part of the group? What if you drag a shape out of a container?

The upper half of Figure 13-3 shows a double-headed arrow that has been dragged out of the group on the left and another that has been removed from the container on the right. In the lower half of the figure, the group and container have been moved to the right.

Notice the following:

- The green arrow moved with the group.
- The gold arrow remained in a fixed location.

From these observations, you can conclude the following:

- Dragging a shape from a group does not remove it from the group.
- Dragging a shape from a container removes it from the container.

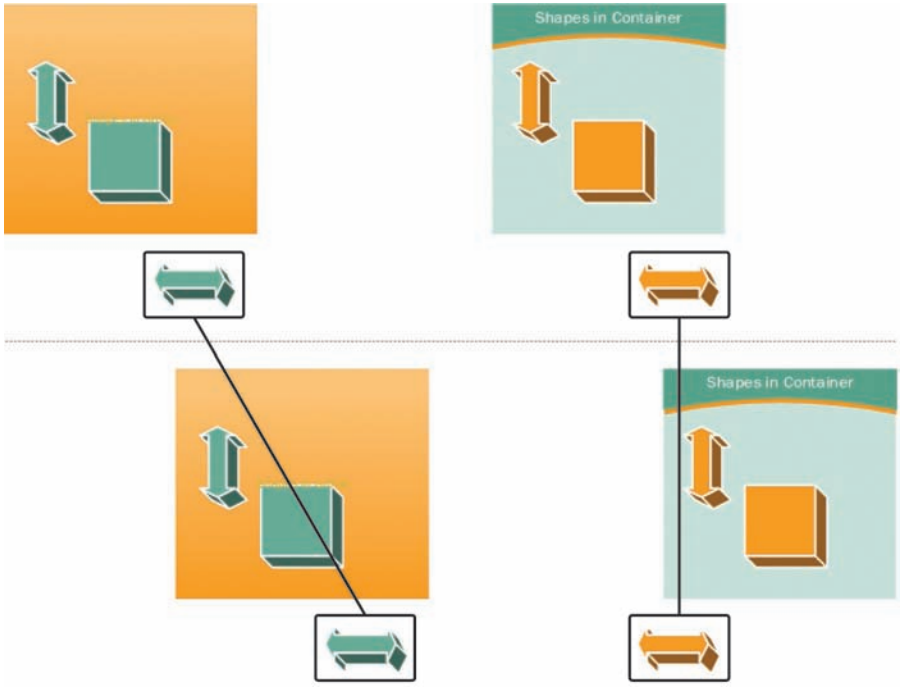

Figure 13-3 *The effects of dragging a shape out of a group and a container*

Attempting to add shapes exposes a similar difference. In the upper half of Figure 13-4, a circle has been placed on top of the group on the left and the container on the right. In the lower half of the figure, the group and the container have been moved to the right.

Here are the conclusions you can draw from this:

- Placing a shape on top of a group does not add it to the group.

> **TIP** If you run Visio in developer mode, you can change the behavior of a group so it will accept dropped shapes. For more information about developer mode, see Appendix A, "Look behind the curtain."

- Placing a shape on top of a container adds it to the container.

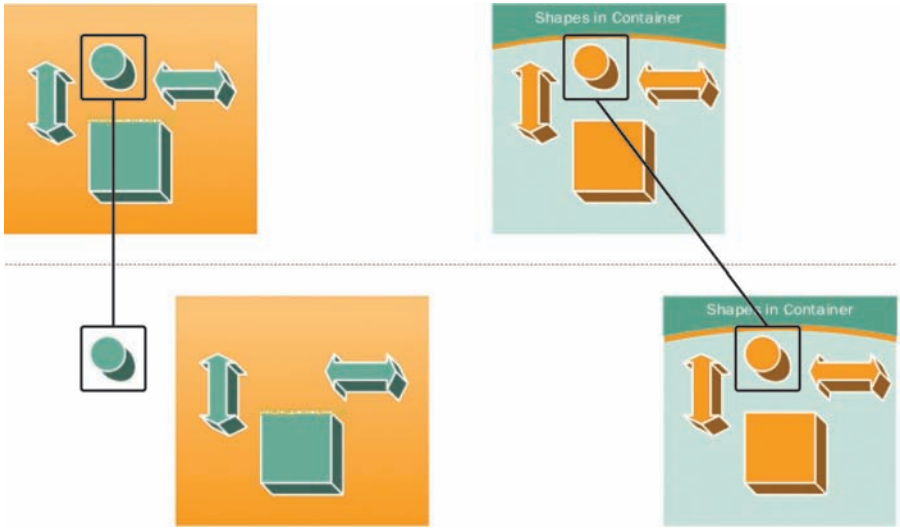

Figure 13-4 *The effects of placing a shape on top of a group and a container*

The primary lesson from Figure 13-3 and Figure 13-4 is that unlike groups, Visio containers behave like physical containers: if you put an object in, it becomes part of the container; if you remove an object, it is no longer associated with the container.

Figure 13-5 illustrates a final behavior difference: resizing groups and containers produces strikingly different results. In the figure, both the group and the container were stretched by dragging the bottom resize handle downward.

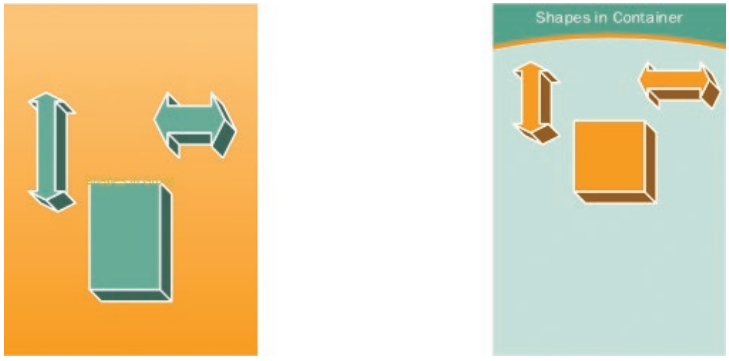

Figure 13-5 *Resizing a group resizes all subshapes; resizing a container does not affect member shapes*

TIP If you run Visio in developer mode, you can change the behavior of a group so the interior shapes do not resize. For more information about developer mode, see Appendix A, "Look behind the curtain."

The following table summarizes the key differences between groups and containers.

Action	Groups	Containers
Resize	Contents are resized with the group	Contents are not changed
Select an interior shape	Requires two clicks (unless default group behavior has been changed)	Requires one click
Select interior shape(s) by using a bounding box	Cannot start a bounding box by clicking inside a group	Can start a bounding box by clicking anywhere
Drop a new shape inside	Dropped shapes are not added to the group (unless default group behavior has been changed)	Dropped shapes are added to the container
Drag a shape out	Shape is physically outside the group but remains part of the group	Shape is removed from the container
Enter text	Text is placed in the center of the group	Text is placed in the container's heading

TIP Containers, lists, and callouts were introduced in Visio 2010 and were described by the Visio development team in a series of blog posts that are summarized at *blogs.msdn.com/b/visio/archive/2010/09/02/new-structured-diagrams-whitepaper-for-visio-2010.aspx*.

Visio 2013 included additional containers and callouts and upgraded the style and appearance of both, as described in a blog post at *blogs.office.com/2012/11/05/containers-and-callouts-in-visio/*.

For the technically inclined, the following article provides details about the inner workings of containers, lists, and callouts and is still relevant for Visio 2016 structured diagrams: *msdn.microsoft.com/en-us/library/ff959245.aspx*.

Organize shapes by using containers

Grouped shapes are still valuable for many purposes, including holding collections of subshapes that are unlikely to change. However, Visio containers offer numerous advantages, especially for dynamically grouping, moving, and managing a set of related shapes.

One regular ribbon tab and one tool tab are vital for working with containers. The Insert tab, shown in Figure 13-6, is home to the Container gallery, which you use to add containers to a page.

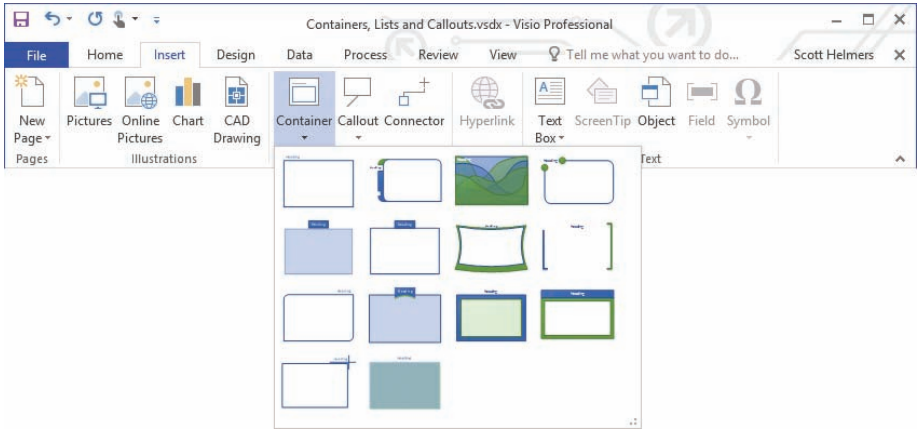

Figure 13-6 *The Container gallery offers 14 container styles*

You use various functions on the Format tool tab in the Container Tools tab group, shown in Figure 13-7, to manage containers in ways you will explore in the sections of this topic.

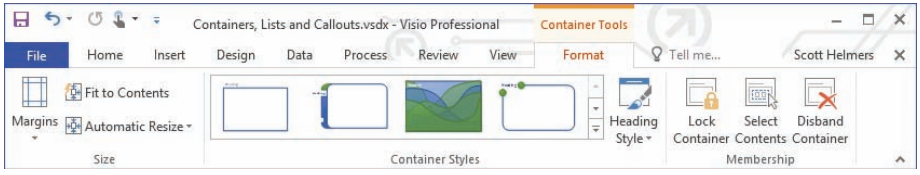

Figure 13-7 *The Format tool tab appears only when you select a container*

Use containers

You can create an empty container and add shapes to it later, or you can create a container around existing shapes. In either case, your containers can appear in a variety of styles. Figure 13-8 shows the same set of network shapes in five different containers to illustrate the range of choices.

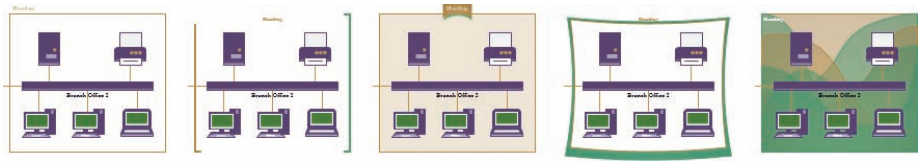

Figure 13-8 *Examples of diverse container styles from simple to highly stylized*

Containers provide visual feedback while you interact with them. As shown on the left in Figure 13-9, dragging a shape into a container causes the border of the container to "light up" in green. This type of feedback is a way to distinguish a container from a group or an ordinary shape.

The container border also lights up when you select any contained shape, as shown on the right in Figure 13-9. This behavior is evidence of the relationship between containers and members that was described in "Understand containers, lists, and callouts" earlier in this chapter.

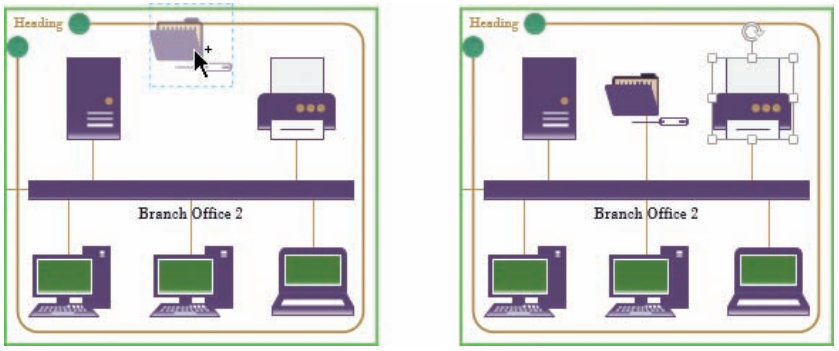

Figure 13-9 *Adding or selecting shapes highlights the surrounding container*

Because containers were designed to remain connected to their members, it's easy to copy or delete both as a unit by selecting the container. The only trick when selecting the container is to remember that the body of a container is invisible to mouse clicks. You must click the header or one of the edges to select it.

If you want to copy or delete just the members but not the container, that's also easy because there are several techniques for selecting all members of a container—then you can just copy or delete the shapes in the usual way.

To delete the container but leave its contents behind, you could drag the contents out and then delete the container. However, Visio provides a Disband Container command for this purpose.

TIP You can lock a container to prevent shapes from being added or deleted. If you attempt to add a shape to a locked container, the border does not light up as you drag the shape onto the container and the new shape sits on top of the container. If you attempt to delete a contained shape, you receive an error message.

To place an empty container on the page

1. On the **Insert** tab, in the **Diagram Parts** group, click **Container**.
2. In the **Container** gallery, click the thumbnail of the container type you want.

To contain existing shapes

1. Select one or more existing shapes, and then do one of the following:
   - Display the **Container** gallery, and then click the thumbnail of the container type you want.
   - Right-click one of the selected shapes, and then click **Add to New Container**.
   - If the shapes are on top of, but are not members of, a container, right-click one of the selected shapes, and then click **Add to Underlying Container**.

To add shapes to a container

1. Drag one or more shapes into the container.

Or

1. Do either of the following:
   - Resize a container until it covers the shapes you want to add.
   - Drag a container until it's on top of the shapes you want to add.
2. Right-click one of the shapes, and then click **Add to Underlying Container**.

To select a container

1. Do either of the following:
   - Click the heading section of the container.
   - Click any edge of the container.

To select all contained shapes

1. Do either of the following:
   - Select the container, and then on the **Format** tool tab, in the **Membership** group, click the **Select Contents** button.
   - Right-click any edge of the container, point to **Container**, and then click **Select Contents**.

To remove shapes from a container

1. Drag the shape you want to remove until it is outside the container.

To delete a container but leave contained shapes

1. Do either of the following:
   - Select the container, and then on the **Format** tool tab, in the **Membership** group, click the **Disband Container** button.
   - Right-click any edge of the container, point to **Container**, and then click **Disband Container**.

To lock or unlock a container

1. Do either of the following:
   - Select the container, and then on the **Format** tool tab, in the **Membership** group, click the **Lock Container** button.
   - Right-click any edge of the container, point to **Container**, and then click **Lock Container**.

Format containers

When you drag a container onto the page, it includes a set of predefined style attributes. You can change some of the most visible container attributes by using the

commands on the Format tool tab that is shown in Figure 13-7. You can alter other container characteristics by using buttons on the other Visio tabs.

Container attributes you can alter include the following:

- You can switch to another of the 14 container styles.
- You can choose alternate heading styles; Visio offers either two or four heading styles per container type. You can also hide the heading.
- You can select different themes, variants, and effects. Because containers respond to those changes, the appearance of the containers on your drawing page (and their thumbnails in the gallery) can be very different from one diagram to the next.
- You can change the fill, line, and shadow attributes of a container as you would any other Visio shape.

To choose a different container style

1. Do any of the following:
   - On the **Format** tool tab, in the **Container Styles** group, display the **Container Styles** gallery.
   - On the **Home** tab, in the **Editing** group, click the **Change Shape** button.
   - Right-click the heading or edge of the container, and then on the mini toolbar, click the **Change Shape** button.
2. Click the container style you want.

To choose a different heading style

1. On the **Format** tool tab, in the **Container Styles** group, click the **Heading Style** button.
2. In the **Heading Styles** gallery, click the thumbnail of the heading style you want.

To hide the heading

1. Display the **Heading Styles** gallery, and then in the **No Heading** section, click the **No Heading** thumbnail.

On the border

When you drag a shape into a container, a green outline appears on the border of the container. This is true even when you drag a shape most of the way, but not fully into the container. In Figure 13-10, the wireless access point is being dragged into a container and will be added to the container when it is released, even though it is not fully within the borders of the container. (Depending on the resize options described just after this sidebar, the container might expand to encompass the new shape.)

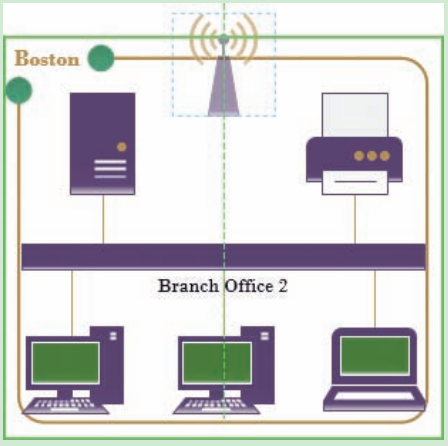

Figure 13-10 *The majority of the wireless access point is within the container*

The pair of images in Figure 13-11 shows a different container behavior that can be useful in some diagrams. In the image on the left, the wireless access point has not been dragged quite as far into the container as it was in Figure 13-10. The container signals the difference by displaying a green outline only on the top border and not all the way around.

When you release the wireless access point in this situation, it becomes a member of the container, but it remains attached to the edge. If you expand the size of this container upwards, the border shape will move along with the top of the container, as shown in the image on the right.

Another example of a shape on the border of a container is included in the "Build wireframes" section of the "Find containers and lists in Visio" topic later in this chapter.

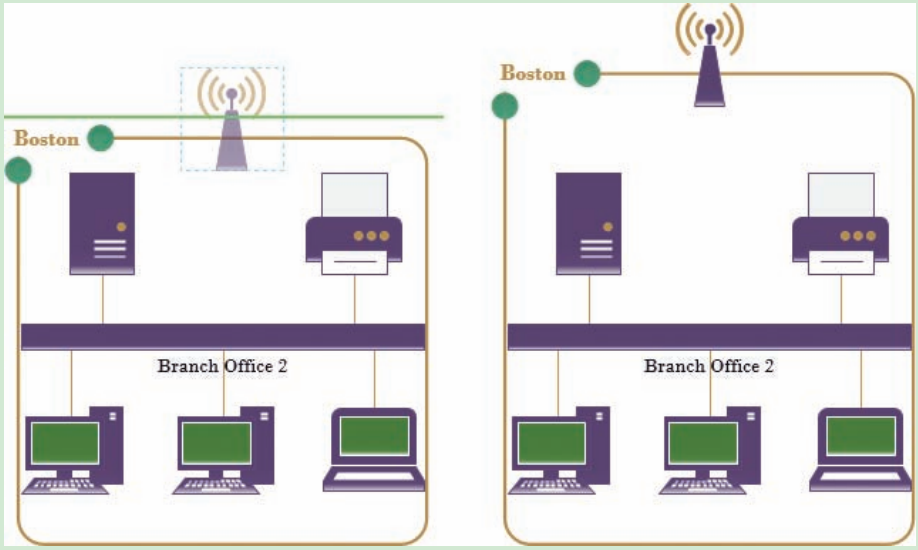

Figure 13-11 *A wireless access point is added to the border because it was dropped on the edge*

Control container size

Visio containers expand automatically when you add shapes near the edge of the container. You can change this default behavior by using the Automatic Resize button located in the Size group on the Format tool tab. Clicking the Automatic Resize button, which is shown in Figure 13-7, reveals three mutually exclusive options:

- **No Automatic Resize** The container does not expand when you drag shapes near the edge.
- **Expand as Needed** The container expands when you drop shapes near the edge. Note that the opposite is not true—the container does not shrink when you remove shapes.
- **Always Fit to Contents** The container expands and contracts automatically when you add or remove shapes.

You can also affect container size by using the other buttons in the Size group:

- **Margins** Sets the spacing between the edges of the container and the contained shapes
- **Fit to Contents** Sets the container size to the minimum required for the contained shapes plus the margin

> **TIP** You can also resize a container to fit its contents by opening the container's shortcut menu and then choosing from the options on the Container submenu.

Organize shapes by using lists

A *list* is a special type of container that maintains its members in ordered sequence. When you drag an object into a list, it takes a specific place before, between, or after existing members. Each list member knows its relative position in the list.

Visio doesn't provide a list gallery on the Insert tab in the same way that it offers a Container gallery. Consequently, creating a list either requires reusing an existing list shape or having enough technical knowledge to make changes to the ShapeSheet.

> **SEE ALSO** For information about modifying the ShapeSheet and creating custom list shapes, see Appendix A, "Look behind the curtain."

This topic explores adding shapes to a list and reordering shapes within a list. The list shape for this hypothetical scenario is called *My New PC*, to which will be added rectangular shapes that represent the software to load onto the PC. The starting point is shown in Figure 13-12, with the list in the center and the software shapes on either side.

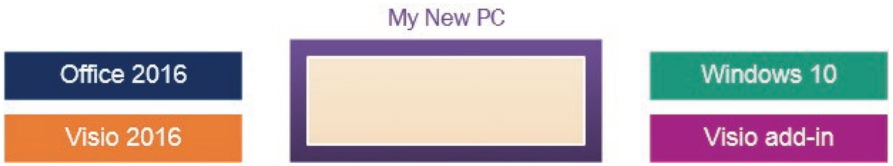

Figure 13-12 *A list shape surrounded by candidate members*

The software shapes for this example were created with two special attributes:

- Each shape displays the name of a software product that is stored as shape data. The shape data value is displayed by using a Visio field.

  SEE ALSO For more information about Visio fields, see Chapter 8, "Work with shape data."

- Each shape displays its relative position in the list when it is in a list. When the shape is not in a list, it doesn't display any number. Display of the list position for each shape was accomplished by using two ShapeSheet formulas.

The goal for the example in this topic is to create a list that shows the installation sequence for a new PC. Although you are unlikely to use a Visio list for this specific purpose, this example might stimulate you to think of your own applications for position-aware shapes.

Add shapes to lists

Dragging a shape into a list triggers the same response shown for a container earlier in this chapter: the list is surrounded by a green rectangle, as shown on the left in Figure 13-13. Also like a container, the list displays the green border when any member shape is selected, as shown on the right.

Figure 13-13 *List borders illuminate when shapes are being added or are contained*

In the real world, it isn't possible to install Visio without installing Windows first, so Figure 13-14 shows the Windows 10 shape being dragged into the list. On the left, as the Windows rectangle first approaches the list, there are three visual responses:

- The list border turns green.
- A ScreenTip appears, displaying the words *Insert Shape*.
- A horizontal, orange insertion bar appears below the Visio 2016 shape.

The insertion bar is Visio's way of telling you that the new shape will be added to the list at that specific location.

The image in the center shows the Windows shape positioned partially above the Visio shape, with the result that the insertion bar is now located above the Visio rectangle.

The result of dragging the Windows rectangle above the Visio shape is shown on the right. Notice that the label *Windows 10* is now preceded by the number 1 and the digit in front of *Visio 2016* has changed from a 1 to a 2.

Figure 13-14 *New shapes are added to a list in specific positions*

You can insert new shapes between existing list shapes. In Figure 13-15, the Office 2016 shape is being added before Visio 2016 and after Windows 10.

Figure 13-15 *You can insert a shape between existing list shapes*

TIP Although the blue triangle that appears at the left end of the orange insertion bar in the image on the left in Figure 13-15 might appear when you drag a shape into a list, it is primarily useful when you are not dragging a shape.

If you pause when pointing to the edge of a list between existing shapes, the Insert Shape triangle appears. Clicking the triangle causes Visio to insert a shape at that location in the list. If the shape designer specified a default list shape, then that shape is inserted. If there isn't a default list shape, the shape adjacent to the insertion bar is added to the list. "Find containers and lists in Visio" later in this chapter includes an example of shape insertion.

The preceding figures illustrate a key behavior difference between Visio lists and containers: container members can be located anywhere within a container, but list members are always in fixed positions.

Figure 13-16 illustrates another important difference: unlike shapes in a container, list members cannot reside on the border of the list. On the left, the Visio Add-In shape is positioned on the border of the list. Only a small percentage of the rectangle is actually touching the list, and yet releasing the shape at this point causes it to "fly" into the list.

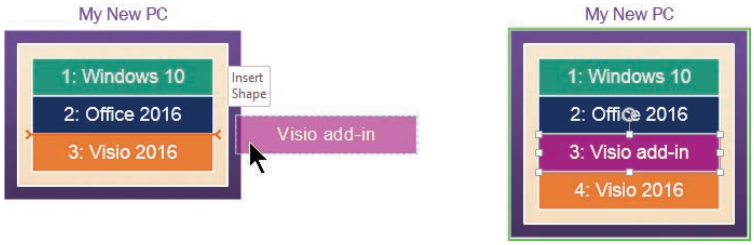

Figure 13-16 *Lists do not allow border shapes*

Not only can shapes be inserted into specific positions in a list, they can be rearranged within the list. On the left in Figure 13-17, the Visio 2016 shape is being relocated so it will appear above the Visio add-in shape. Notice that each shape is renumbered automatically based on its new list position.

Figure 13-17 *List shapes can be dragged to new locations*

The example in this section uses a vertical list in which shapes are automatically placed from top to bottom. A Visio list can be either vertical or horizontal and can sequence shapes in either direction within the list. These attributes are controlled by parameters and don't require writing code, but you can't change them from the Visio ribbon; you must make changes in the ShapeSheet for the list.

To add shapes to a list

1. Do either of the following:
   - Drag one or more shapes into the list.
   - Use the **Insert Shape** arrow to position a shape where you want it.

SEE ALSO For procedures related to selecting a list, selecting all members of a list, locking or unlocking a list, deleting a list, or disbanding a list, see the procedures in the "Use containers" section of the "Organize shapes by using containers" topic earlier in this chapter.

Format and size lists

You can adjust most of the same format and size options for a list that you can for a container, with one notable exception: you cannot change the size of a Visio list shape. Visio controls the size by expanding and contracting a list so it is the exact size of its member shapes plus the margin around the shapes.

The Format tool tab described earlier in this chapter provides the following list-related groups and the functions within them:

- **Size group** You can use the Margins button to adjust the spacing between the edges of the list and the contained shapes. Because Visio controls the size of a list shape, Fit To Container and Automatic Resize are dimmed.
- **Container Styles group** You cannot change the style of a Visio 2016 list. However, you can change the style of a list created in Visio 2010 by using the Container Styles gallery. This is true even if the Visio 2010 list is located in a Visio 2016 diagram. You can use the Heading Style gallery to choose alternate heading placement and style options.
- **Membership group** The Lock Container, Select Contents, and Disband Container buttons provide the same functions for lists that they do for containers.

Find containers and lists in Visio

Several Visio 2016 templates take advantage of the properties of containers and lists to enhance ease of use and to add valuable features. In this section, you will discover three examples.

Explore swimlanes

Cross-functional flowcharts, also known as swimlane diagrams, provide one of the most prominent examples of list and container usage in Visio.

SEE ALSO For more information about swimlane diagrams, see Chapter 4, "Create business process diagrams."

The swimlane add-in was completely redesigned when lists and containers were introduced in Visio 2010. The net effect of the redesign is that a cross-functional flowchart (CFF) is a list of containers: the framework that holds swimlanes is a list, and each swimlane is a container.

IMPORTANT Swimlane diagrams created in Visio 2016, Visio 2013, or Visio 2010 will open directly in Visio 2016 because they share the same underlying container and list structure. However, swimlane diagrams created in earlier versions of Visio must be converted to the new swimlane structure, and, once converted, they can no longer be edited with the older software. To warn about the impending conversion when you open an older diagram, Visio displays a dialog box that gives you an opportunity to save the older version of the diagram before converting it.

Evidence of containers and lists appears as soon as you drag a shape into a swimlane—a green border appears around the lane, as shown in Figure 13-18.

TIP Notice that two Dynamic Grid feedback elements also appear inside the swimlane, informing you that the new shape is at the left margin of the lane and is centered vertically within the lane. For more information about the Dynamic Grid, see Chapter 2, "Create diagrams."

Because the overall swimlane structure is a list, it includes a heading. Similarly, each swimlane has a heading. You can change the text of either, which was done in the image shown in Figure 13-18, by selecting the swimlane structure or a swimlane and then entering text.

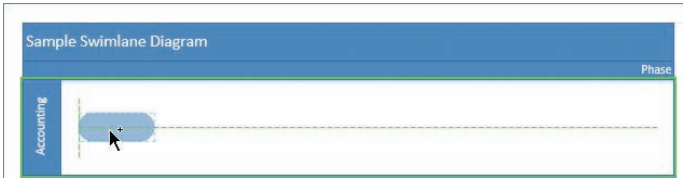

Figure 13-18 *The combination of container feedback and the Dynamic Grid simplify positioning of new shapes in a swimlane*

Further evidence that the swimlane structure is a list is shown in Figure 13-19. With the pointer at the left end of the lanes and positioned on the boundary between two lanes, the Insert Shape triangle appears.

TIP If you compare the Insert Shape triangle in Figure 13-19 with the one shown in Figure 13-12, you'll notice that the one in Figure 13-19 includes the name of a specific shape. The name appears because the swimlane list was preconfigured to insert a specific shape.

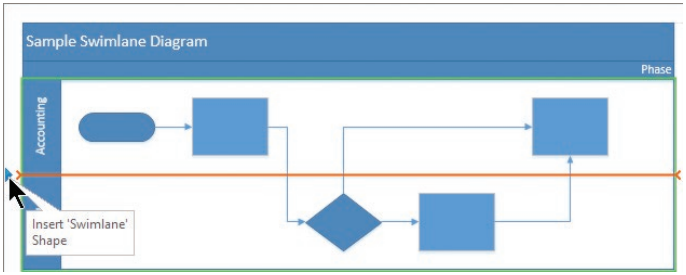

Figure 13-19 *Adding new lanes to a diagram is easy because of the list structure*

Clicking the Insert Shape triangle produces the result shown in Figure 13-20. Notice that Visio extends dynamic connectors, as required, to accommodate the new lane.

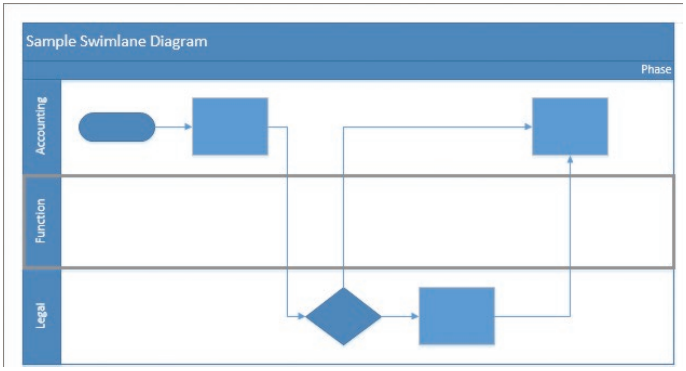

Figure 13-20 *Visio rearranges existing lanes when you add or remove lanes*

Because swimlanes reside in a list, you can rearrange the sequence of swimlanes by dragging the heading of a lane up or down.

Swimlane diagrams derive another benefit from being built by using containers: shapes in a container know where they are contained. To find evidence of this, examine the Function field in the shape data for any flowchart shape in a swimlane.

As an example, data for the process shape in the upper left of Figure 13-20 is shown in the image on the left in Figure 13-21, and the data for the decision diamond is shown on the right. In both cases, the value in the Function field is derived dynamically from the swimlane heading. If you change the value of the swimlane title, the Function field will be updated for all contained shapes. If you move a shape to a new lane, the Function field will reflect the heading of the new lane.

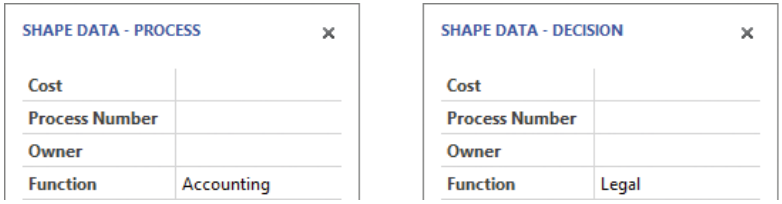

Figure 13-21 *The Function field automatically displays the name of the swimlane that contains each flowchart shape*

Build wireframes

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

Visio 2016 includes a revamped set of user interface (UI) design shapes that were initially introduced in Visio 2010. For this topic, the key point of interest about the redesigned shapes is that many of them are either containers or lists.

Software designers use wireframe shapes to create mockups of dialog boxes and other visual elements that will be displayed by their applications. When you use Visio 2016 to create a mockup of a dialog box, you will find that the Dialog Form shape is a container. Consequently, as you add buttons and controls to your dialog box, those buttons and controls become container members. If you move, copy, or delete your dialog box, all of the contained shapes are automatically included. If you have ever created a UI mockup by using Visio 2007 or earlier, it won't take more than a moment or two of experimentation to realize how significant an improvement this is.

Some Visio 2016 UI shapes are lists, including, not surprisingly, the List Box control. When you drag one into a Dialog Form container, the list is prepopulated with three list members. You can add, delete, and resequence list members by dragging them, as described in "Add shapes to lists" earlier in this chapter.

TIP As a shape designer, you can configure a list to automatically add one or more member shapes when the list is added to a page. Creating a shape with that feature is outside the scope of this book, but you can find information on this subject at *msdn.microsoft.com /en-us/library/ff959245.aspx*.

The following three figures highlight some of the containers and lists in the wireframe template.

Adding a button control to a Dialog Form container lights up the border of the dialog box shape, as shown in Figure 13-22.

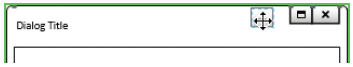

Figure 13-22 *The Dialog Form shape is a container*

On the left in Figure 13-23, a panel is added to the dialog box container. Because the panel shape is, itself, a container, adding a tab to the top edge of the panel causes the top panel border to illuminate.

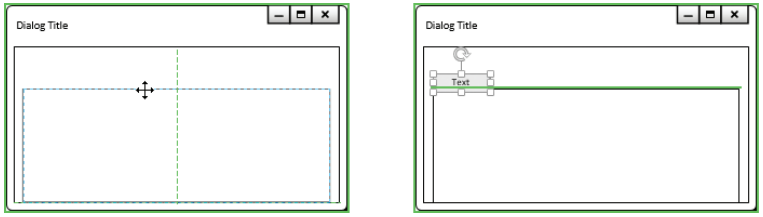

Figure 13-23 *Multiple containers comprise the wireframe shapes*

SEE ALSO For information about border shapes, see the "On the border" sidebar earlier in this chapter.

TIP Because the panel shape is a container but doesn't have a visible heading, you can select it only by clicking its edges.

The list box control exhibits standard list behavior when adding new list elements, as shown in Figure 13-24.

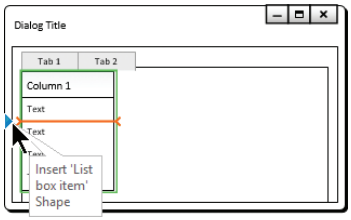

Figure 13-24 *A list inside a container inside a container*

The wireframe shapes provide further evidence that nested containers and lists are practical solutions for creating Visio diagrams.

Insert data graphic legends

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

In Chapter 9, "Visualize your data," you worked with data graphics and then added an automatically generated legend to your diagram. A data graphic legend is actually a structure consisting of an outer list, one or more containers as list members, and lists within those containers.

For example, the same legend is shown in both images in Figure 13-25. The structure is loosely visible on the left. However, after selecting the entire legend, the telltale green borders are apparent on the right. You can identify three containers—Legend, Owner, and Risk—and two vertical lists, one in each of the Owner and Risk containers.

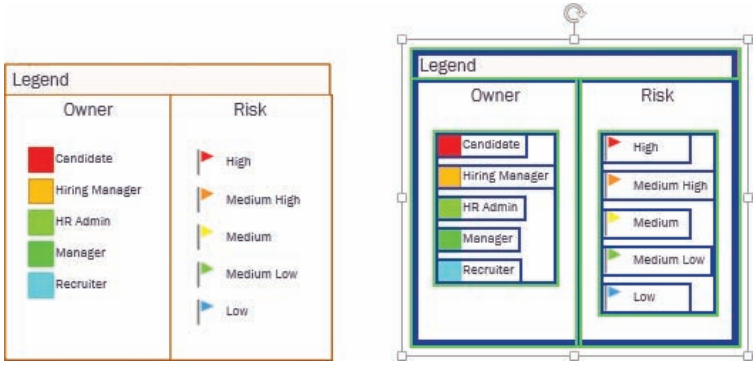

Figure 13-25 *Data graphic legends are created from lists and containers*

When you work with data graphic legends, you will discover that you can add, delete, rename, edit, and move legend components, just as you can with the headings and members of any unlocked containers and lists.

Annotate shapes by using callouts

Many generations of Visio have included more than three dozen callouts that you can use to add comments to any shape on the drawing page. Those callouts still exist in Visio 2016. Figure 13-26 shows some examples.

Figure 13-26 *Six classic callout examples*

TIP To locate the classic callouts, in the Shapes window, click More Shapes, click Visio Extras, and then click Callouts.

However, using classic callouts is often a challenge because fundamentally they are just ordinary shapes. For example, all of the following are common annoyances of the classic callouts:

- Deleting the shape to which a callout is attached does not delete the callout, which can leave orphan callouts throughout your diagram.
- Moving the shape to which a callout is attached does not move the callout.
- Moving a callout disconnects the callout from the shape to which it's attached unless you know exactly which control handle to drag.

Visio 2016 structured callouts behave more logically, primarily because, like containers and their members, there is an active association between a callout and the shape to which it's attached.

Just as there is a Container gallery, there is also a Callout gallery, as shown in Figure 13-27.

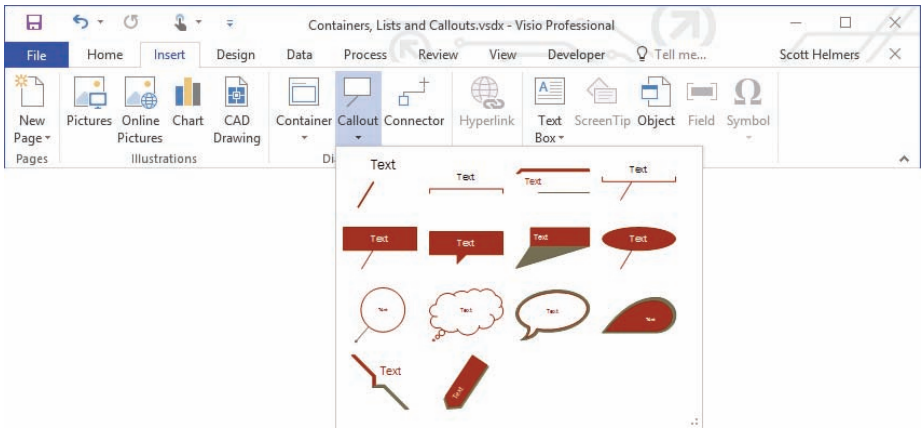

Figure 13-27 *The Callout gallery features 14 callout styles*

Figure 13-28 illustrates the following ways that structured callouts appear and behave more logically than groups:

- In the image on the left, selecting a callout highlights the shape to which it's attached by using a familiar green border. Note that the opposite is not true: selecting the attached shape does not highlight the callout.

> **TIP** The callout in this image is connected to the shape by a visible tail, which might make the green highlight seem redundant. Not all callout styles have visible tails, however. Consequently, this feature is particularly valuable for those styles.

- In the center image, moving a callout by dragging it appears to disconnect it. However, when you release the connector it is still attached, as shown on the right.

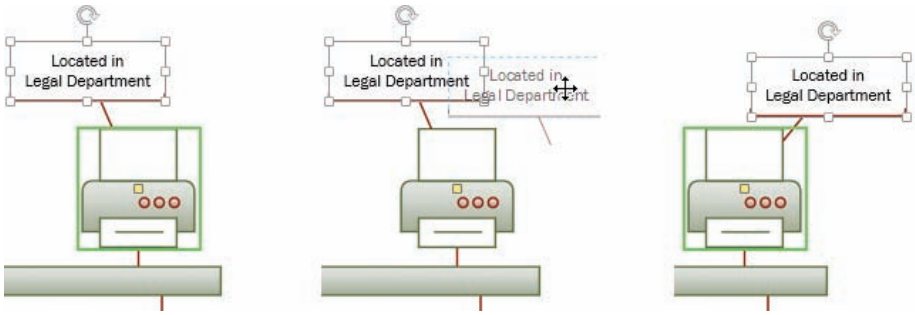

Figure 13-28 *Structured callouts are associated with the attached shape and remain attached even when you move them*

Unlike containers and lists, callouts do not have a tool tab that you can use to switch styles. However, you can take advantage of the Change Shapes feature in Visio to replace any callout style with a different one. Figure 13-29 uses Live Preview and the mini toolbar to show how the callout from Figure 13-28 can be changed to the Word Balloon style.

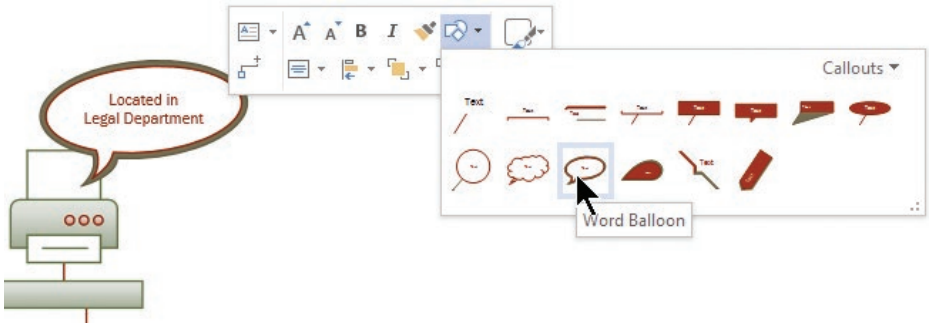

Figure 13-29 *Alternate callout styles are available via the Change Shapes feature*

The following list summarizes the behavior of new style callouts:

- If you delete a callout, it doesn't affect the shape to which it was attached. However, if you delete the shape, the callout is also deleted.
- If you copy a shape that has a callout attached, both the shape and the callout are copied.
- You can attach more than one callout to a shape.
- If you do not have any shapes selected when you insert a callout, Visio inserts the callout in the center of the drawing window.
- If you select more than one shape before inserting a callout, Visio attaches a callout to each selected shape.
- Callouts respond to themes and variants, so their appearance on the page remains consistent with the rest of your diagram.

SEE ALSO For information about configuring callouts to read and display shape data from the shape to which they are attached, go to *blog.bvisual.net/2014/04/08/adding-configure-callout-functionality-to-visio-callouts/*. For more information about callouts, visit the Visio development team blog at *blogs.office.com/b/visio/archive/2012/11/05/containers-and-callouts-in-visio.aspx*.

To attach a callout to a selected shape

1. On the **Insert** tab, in the **Diagram Parts** group, click the **Callout** button, and then click the callout style you want.

To change a callout to a different style

1. Do one of the following:
   - On the **Home** tab, in the **Editing** group, click the **Change Shape** button, and then click the callout style you want.
   - Right-click the callout, and on the mini toolbar, click the **Change Shape** button, and then click the callout style you want.

To relocate a callout

1. Click anywhere on the callout or its tail, and then do one of the following:
   - Drag the callout to a new location.
   - Move the callout by using the arrow keys.

Or

1. Relocate the shape to which the callout is attached.

To detach a callout

1. Select the callout, and then drag the yellow control from the center of the attached shape to anywhere outside the attached shape.

To delete a callout

1. Do one of the following:
   - Click the callout, and then delete it.
   - Click the shape to which the callout is attached, and then delete the attached shape.

Skills review

In this chapter, you learned how to:

- Understand containers, lists, and callouts
- Compare groups and containers
- Organize shapes by using containers
- Organize shapes by using lists
- Find containers and lists in Visio
- Annotate shapes by using callouts

Practice tasks

The practice files for these tasks are located in the Visio2016SBS\Ch13 folder. You can save the results of the tasks in the same folder.

Understand containers, lists, and callouts

There are no practice tasks for this topic.

Compare groups and containers

There are no practice tasks for this topic.

Organize shapes by using containers

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

1. Place an empty container on the page, and then label the container **Datacenter**.
2. Place the **Branch Office 1** shapes into a container, and then label the container **Chicago**.
3. Add several new shapes from the **Servers** stencil to the empty container.
4. Add several new shapes from the **Servers** stencil to the **Chicago** container.
5. Enlarge the **Chicago** container, select all shapes in the **Datacenter** container, and then move them to the **Chicago** container.
6. Drag two network shapes from the **Chicago** container to the **Datacenter** container, and then lock the **Chicago** container.
7. Disband the **Datacenter** container.
8. Place all of the **Branch Office 2** shapes into a new container.
9. Change the style of the **Branch Office 2** container, and then move the heading to a new location.

Organize shapes by using lists

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

1. Drag various software shapes into the **My New PC** list, being sure to add shapes at the top and bottom of the list and between existing list members.
2. Move a shape from the middle of the list to the top.
3. Make a copy of the **My New PC** list, and then lock the copied list.
4. Drag shapes from the **Rack Mounted Servers** stencil to the **Store Shelf** list. Notice that the list grows from left to right and not from top to bottom.
5. Move the **Store Shelf** list to another part of the page.

Find containers and lists in Visio

There are no practice tasks for this topic.

Annotate shapes by using callouts

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

1. Attach a callout to the park shape, and then assign a name to the park.
2. Attach a different style of callout to the airport shape.
3. Move the airport shape and observe the change in its callout.
4. Change the location of the callout attached to the park.
5. Detach the callout from the airport and attach it to the city instead.
6. Delete the city.
7. Delete the callout that is attached to the park.

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About the author

Scott A. Helmers is a Microsoft Most Valuable Professional (MVP) for Microsoft Visio and is the primary Visio expert at *Experts-Exchange.com*. He has helped companies create custom Visio add-ins to enhance organizational efficiency and employee productivity, and has taught thousands of people how to use technology more effectively.

He is Vice President of Product Planning and Support at the Harvard Computing Group, a software and consulting firm that helps clients understand and implement business process solutions. Scott is a co-inventor of TaskMap (*www.taskmap.com*), a Visio add-in that anyone can use to document and improve all of the important aspects of any business process.

Scott has worked with clients in Afghanistan, Egypt, India, Ireland, Jordan, Malaysia, Saudi Arabia, Singapore, Canada, and the United States on projects involving knowledge management, specification of new IT systems, process mapping and redesign, and technology training. In addition, he has been an Adjunct Professor at both Northeastern University and Boston University.

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When not working or spending time with his family in Andover, Massachusetts, Scott can usually be found on his bicycle or working with a local community theater company.