# Chapter at a Glance



Modify and create new data graphics

Link data to shapes on the drawing page

Refresh data in diagrams

Link diagrams to external data sources

# 9 Visualizing Data in Diagrams

**In this chapter, you will learn how to:**

✔ Link diagrams to external data sources.

✔ Link data to shapes on the drawing page.

✔ Modify and create data graphics.

✔ Refresh data in diagrams.

When you see a professional-looking Visio diagram, the advantages of diagramming, rather than just conveying information using words and numbers alone, is evident. Now, with Microsoft Office Visio Professional 2007, you can take the power of diagramming even further by integrating data with diagrams to convey more than words, numbers, and data alone. Visio Professional 2007 includes new Data Link and Data Graphics functionality that enables you to integrate and visualize data with any Visio diagram—flowcharts, value stream maps, network diagrams, block diagrams, timelines, and so on. By integrating data with diagrams, you can convey not only the visual aspects of a system or process, such as the equipment in a network or steps in a process, you can also visualize data trends for each component—all in one Visio diagram.

To visualize data in diagrams, you follow these basic steps:

1. You link a diagram to one or more external data sources, such as a Microsoft Office Excel workbook or Microsoft Office Access database.

2. You link the data to shapes in the diagram to display the data with the shape it's linked to on the drawing page. For example, IP address, Manufacturer, and Model data might appear with computer shapes in a network diagram. Input, output, and completion time data might appear with steps in a process diagram.

3. You create your own *data graphics*—Visio shapes designed specifically for visualizing data—to visually track data trends, flag issues, and identify problems in the diagram. Data graphics are a combination of text, progress bars, icon sets, data flags, and so on that you choose from to effectively track the data you want to track

in your diagram. For example, show the number of people it takes to complete a step by using people shapes, indicate the percentage complete for a step by using a progress bar, or change the color of a shape when the value of a data field changes.

This step is optional, but recommended; after you link data to shapes in a diagram, Visio Professional 2007 creates a few basic data graphics to display the data on the drawing page, so you only need to perform this step if you don't want to use those basic data graphics. However, to create effective diagrams, you'll probably want to create your own data graphics, which is easy. In minutes, you can specify which visual elements to use for each data field, where to position the elements, and so on. Then, Visio Professional creates your custom data graphic for you.

**4.** You refresh the diagram when the data source changes, so you can visually track data changes over time in your diagram.

> **Tip**  Visio Professional 2007 includes sample diagrams that are integrated with data, so you can see professional-looking examples of data graphics and how you can visualize data in your diagrams.

## Using the Various Data Features in Visio 2007

All the new Data Link and Data Graphics features—introduced in this chapter—that enable you to link diagrams to external data sources and visualize data on the drawing page are included in Visio Professional 2007, but not in Visio Standard 2007. These new features don't replace any functionality in previous versions of Visio. Any diagrams and solutions created using previous functionality will continue to work.

Using Visio Standard 2007, you can still generate diagrams from data by using templates that include various data tools and were also included in Visio Standard 2003: Organization Chart template, Organization Chart Wizard template, Timeline template, Calendar template, Gantt Chart template, and Brainstorming Diagram template. Using the data tools included with these templates, Visio generates an entire diagram for you by connecting to data, and creating the diagram from the data. Also, in Visio Professional 2007, you can still reverse-engineer databases by using the Database Model Diagram template—again, in this situation, you are generating a diagram from data; you are not linking an existing diagram to data. You can also generate diagrams using tools in the PivotDiagram template and Web Site Map template included with Visio Professional 2007.

You can still manually enter data for shapes in any existing Visio diagram using either edition of Visio 2007 by using the Shape Data feature. For more information on the Shape Data feature, see Chapter 8, "Creating Network Diagrams."

Which method should you use? If you want to link existing diagrams to data sources, use the new Data Link functionality discussed in this chapter. If you want to generate an entire diagram from data (using templates that support this functionality), use the tools included with those templates. You can also combine methods to create diagrams. For example, you could generate an entire organization chart using the Organization Chart Wizard template, and then link the organization chart to another data source (using the new Data Link functionality) to show other data in the diagram, such as network asset information. You could generate a database model diagram by reverse-engineering a database (using the Database Model Diagram template), and then visualize data in the model by linking an external data source to it using the new Data Link functionality.

In this chapter, you learn how to integrate data with a cross functional flowchart that describes the application and payment process for the Wide World Importer tradeshow, transforming the diagram in to a rich source of information. You link the diagram to a data source, and then link data to shapes in the diagram, which automatically displays the data with the shapes on the drawing page. You learn how to modify and create new data graphics so you can easily visualize data trends and identify issues in your diagram. Finally, you refresh the data in the diagram after the data source changes.

**Important**  Before you can use the practice files in this chapter, you need to install them from the book's companion CD to their default location. See "Using the Book's CD-ROM" on page xix for more information.
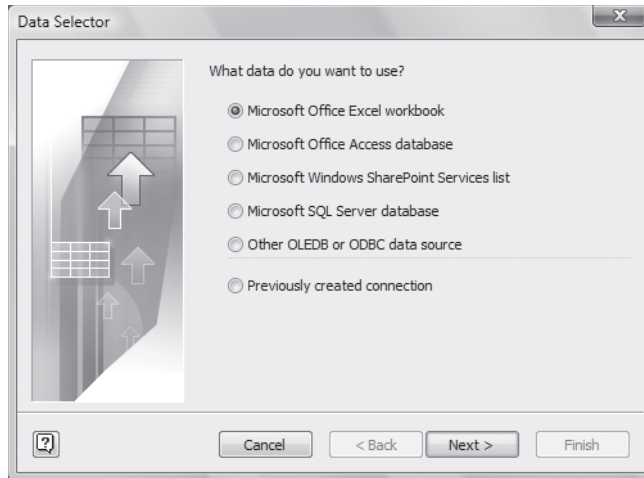
# Linking Diagrams to External Data Sources

Visualizing data in your Visio diagrams begins with linking a diagram to an external data source. With Visio Professional 2007, you can link any Visio diagram to one or more external data sources using the Data Selector wizard. To start the wizard, on the new Data menu, click Link Data To Shapes. Or, on the new Data toolbar, click the Link Data To Shapes button.
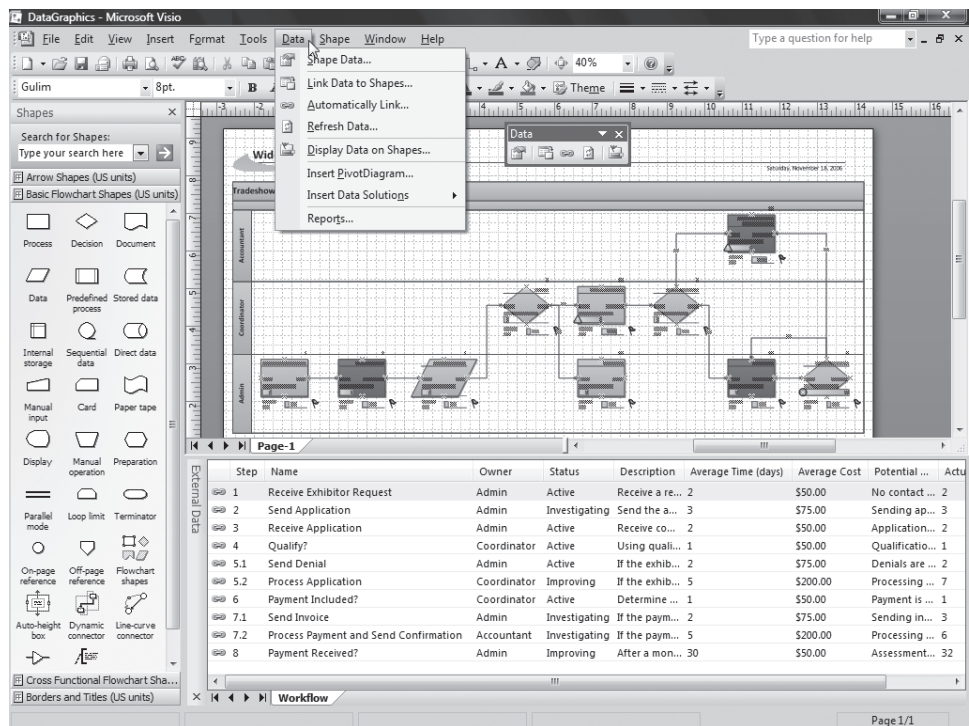
> **Tip**  You can link a diagram to multiple data sources to show different types of data for the shapes in the diagram—one source might include resource information and the other technical information. Or, you can use multiple data sources to show the same data in different ways in a single diagram.

The Data Selector wizard allows you to choose from a wide range of data sources, in addition to specifying the specific data in the source that you want to link to and how to uniquely identify the data if the source changes. The wizard is quite easy to use, even if you're not a database aficionado.

After you link the Visio diagram to the data source, Visio Professional 2007 stores a copy of the data with the diagram, and displays the data in the External Data window.
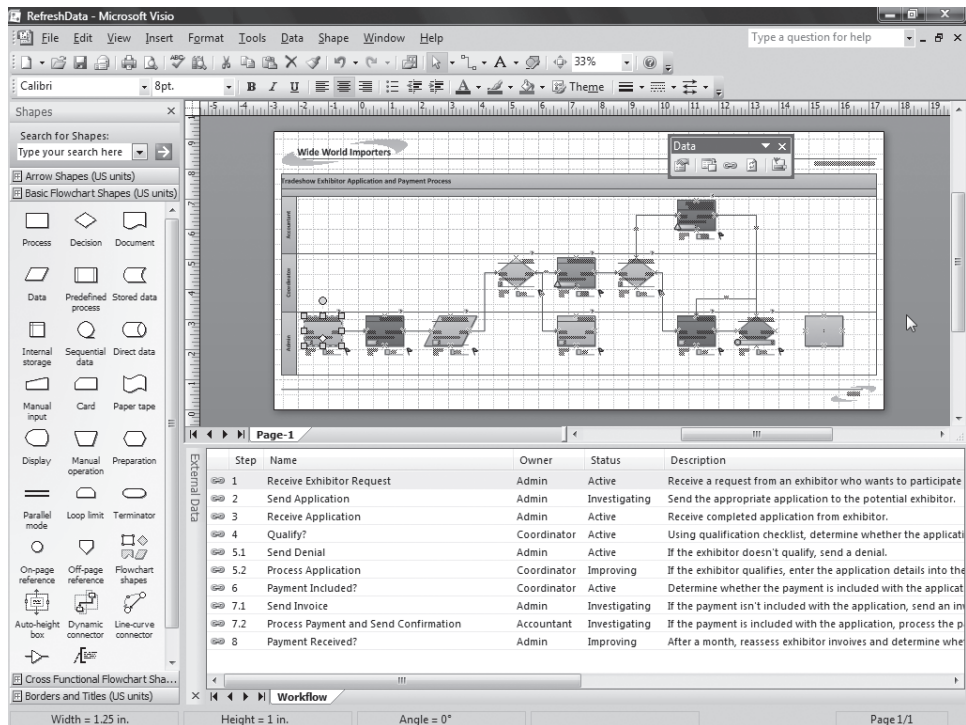
> **Tip** If you link a diagram to more than one data source, the External Data window displays the data from each source on a separate tab. You can also remove a data source from a diagram by right-clicking the External Data window, pointing to Data Source on the shortcut menu that appears, and then clicking Remove. If you forgot which data source a diagram is connected to, right-click the External Data window, point to Data Source, and then click Properties to view the data source's file name and path.

In this exercise, you view a couple of the sample diagrams that are integrated with data and included with Visio Professional 2007. Then, you link a cross functional flowchart to an external data source—an Excel 2007 workbook.

> **USE** the *AppPayWorkflow* file in Documents\Microsoft Press\Visio 2007 SBS\09_Data for this exercise.
>
> **OPEN** the *Process Improvement, Project Timeline,* and *LinkToDiagram* files in the same 09_Data folder for this exercise.
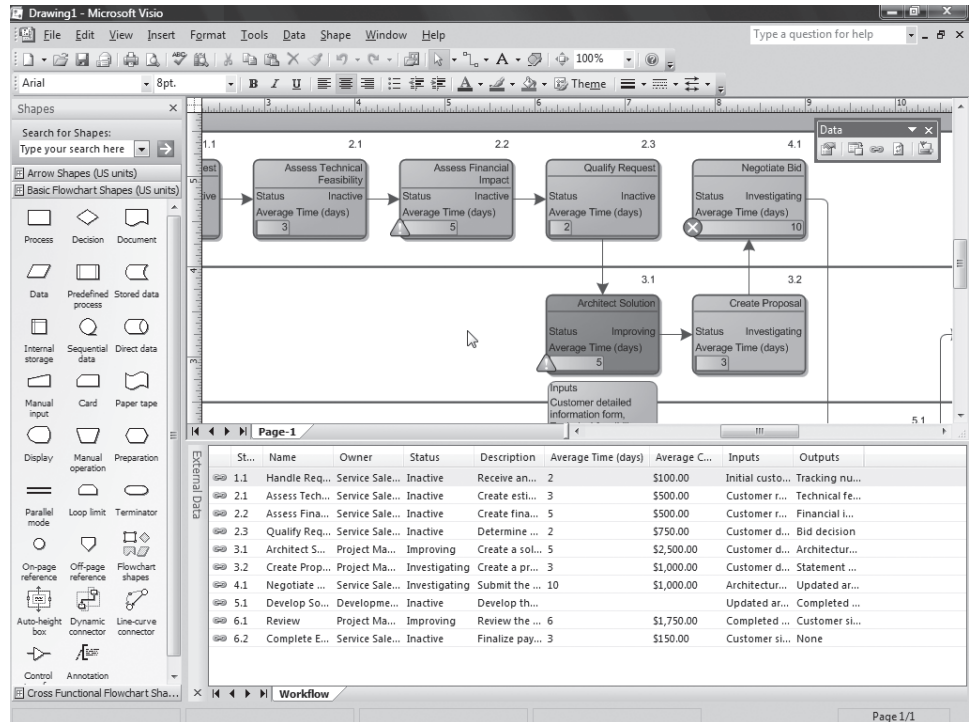
**1.** Start Visio Professional. In the **Template Categories** list, click **Samples**. Under **All Diagrams**, double-click **Process Improvement** to view one of the sample diagrams that's integrated with data.

Visio Professional opens a process improvement sample diagram that's linked to data and three stencils. The External Data window is also open so you can see the data that the diagram is linked to—Workflow—in spreadsheet form.

**2.** On the Standard toolbar, click the **Zoom** down arrow, and then click **100%** to zoom in on the drawing page so you can see some of the shapes and the data displayed with the shapes.
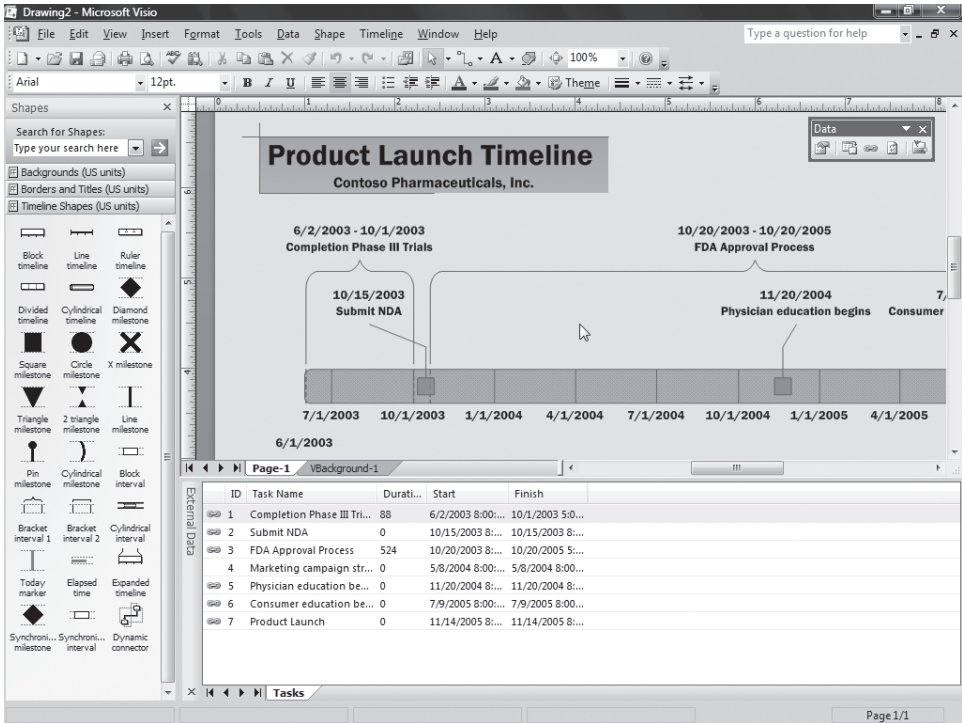
58%
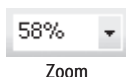
Zoom

**3.** On the **File** menu, click **Close**. If Visio Professional prompts you to save the drawing, click **No**.

Visio Professional closes the drawing without saving the changes.

**4.** On the **File** menu, point to **New**, and then click **Getting Started**.

Visio Professional opens the Getting Started window.

**5.** In the **Template Categories** list, click **Samples**. Under **All Diagrams**, double-click **Project Timeline**.

Visio Professional opens a sample timeline that's linked to data and three stencils. The External Data window is also open so you can see the data that the diagram is linked to—Tasks.

**6.** On the Standard toolbar, click the **Zoom** down arrow, and then click **100%** to zoom in on the drawing page so you can see some of the shapes and the data displayed with the shapes.

**7.** On the **File** menu, click **Close**. If Visio Professional prompts you to save the drawing, click **No**.

Visio Professional closes the drawing without saving the changes.

> **Tip**  You can also open the sample diagrams included with Visio Professional 2007 by clicking Sample Diagrams on the Help menu. If you don't see Sample Diagrams on the Help menu or on the Getting Started menu, you might be using Visio Standard 2007.

**8.** On the **File** menu, click **Open**, and then navigate to the **09_Data** folder to open the **LinkToDiagram** diagram.
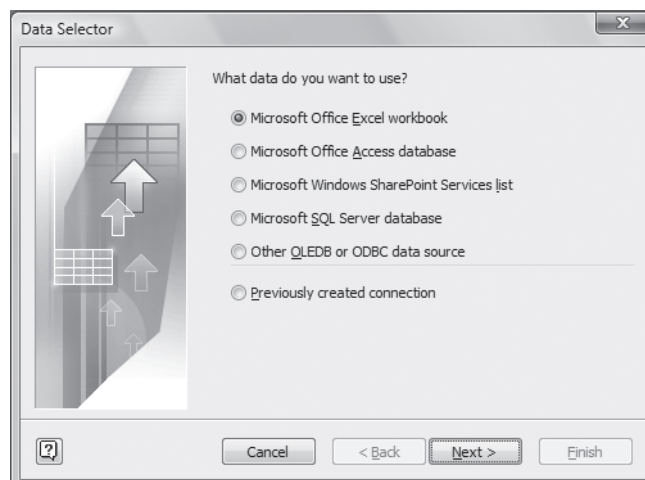
Visio Professional opens a cross functional flowchart and four stencils.
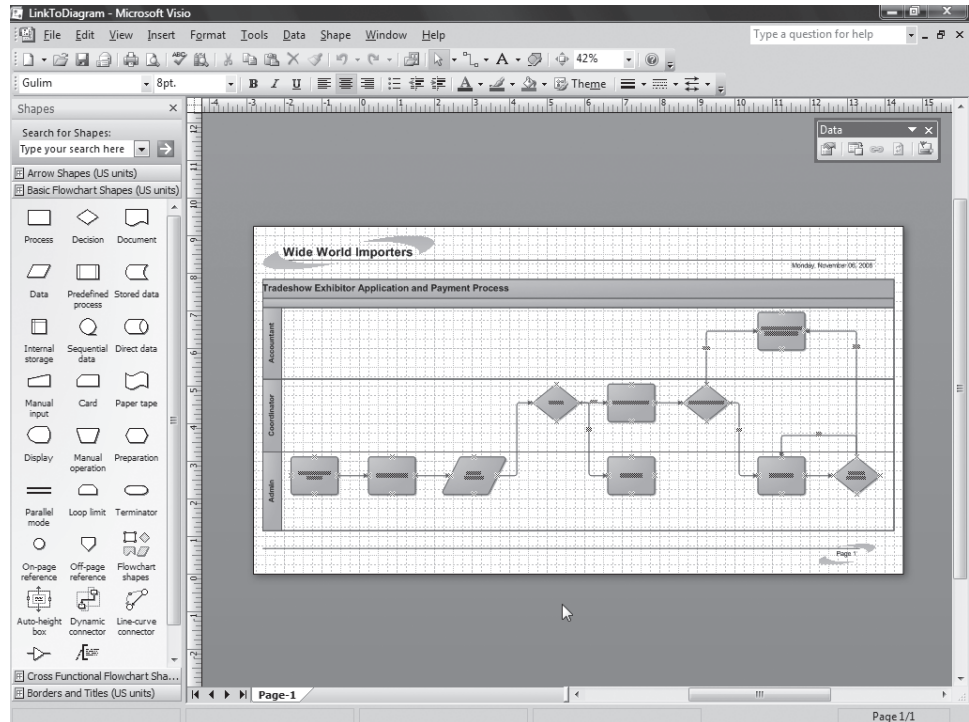
**9.** On the **Data** menu, click **Link Data to Shapes**.

The Data Selector wizard starts.

**10.** On the first page of the **Data Selector** wizard, make sure **Microsoft Office Excel workbook** is selected.
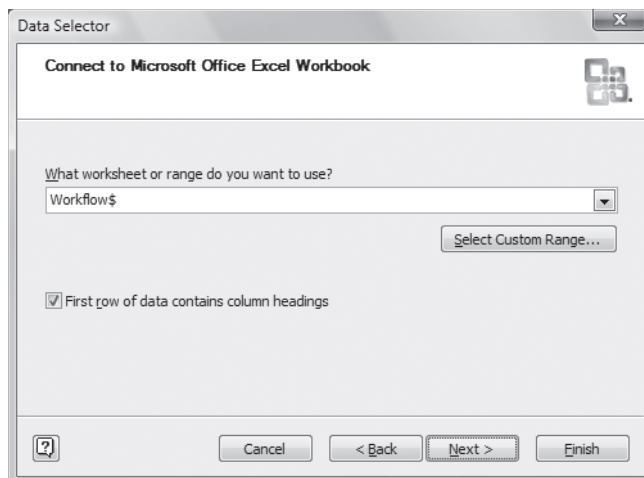


**11.** Click **Next**.

The next page of the wizard appears.

**12.** On the second page of the wizard, click **Browse**, navigate to the **09_Data** folder, double-click **AppPayWorkflow.xlsx**, and then click **Next**.

The next page of the wizard appears.

**13.** On the third page of the wizard, make sure the **What worksheet or range do you want to use?** box shows **Workflow$** and the **First row of data contains column headings** box is checked.
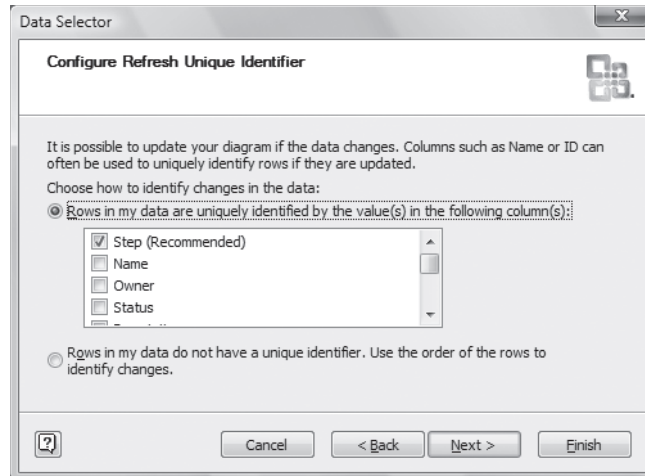


**14.** Click **Next**.

The next page of the wizard appears.

**15.** On the fourth page of the wizard, under **Columns to include**, make sure **All Columns** appears. Under **Data to include**, make sure **All Data** appears. Click **Next**.

The next page of the wizard appears.

**16.** On the fifth page of the wizard, make sure the **Rows in my data are uniquely identified by the value(s) in the following column(s)** option is selected, and under that option, **Step (Recommended)** is checked.
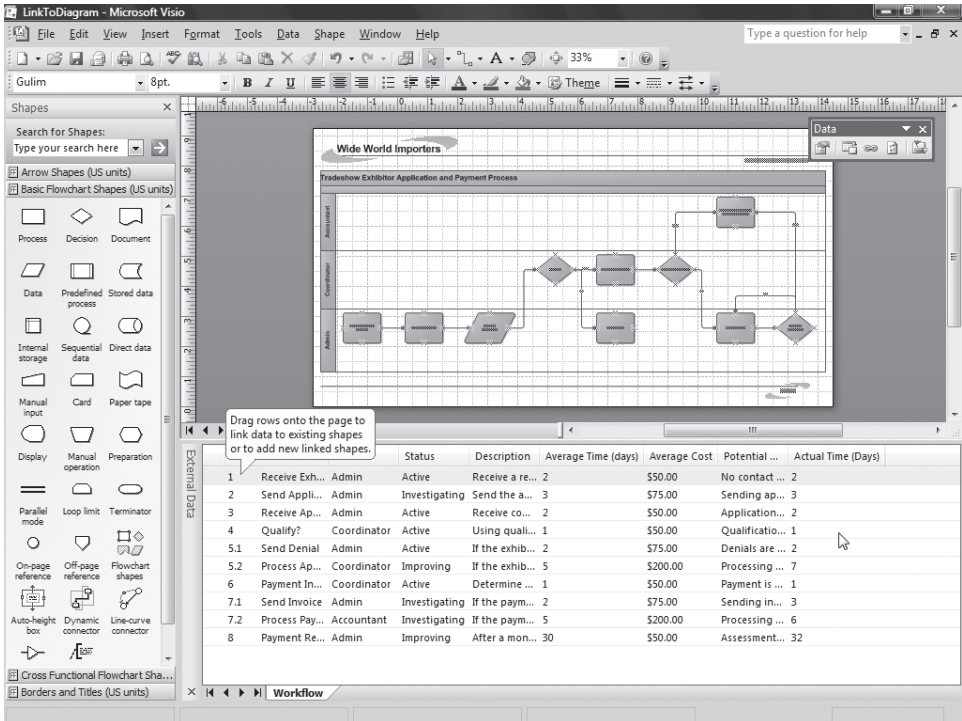
**17.** Click **Next**.

The next page of the wizard appears.

**18.** On the last page of the wizard, click **Finish**.

The Data Selector wizard links the diagram to the data source, and opens the Data toolbar and External Data window, which shows the Workflow data in spreadsheet form.

> **Tip**  To open the Data toolbar yourself, right-click a blank area of the toolbar area, and then click Data on the shortcut menu. To open the External Data window yourself, on the View menu, click External Data Window.

**19.** On the **File** menu, click **Save** to save the changes to the diagram.

> **Tip**  Visio Professional 2007 stores a copy of the data linked to the diagram with the diagram. So, after you link data to a diagram, you don't need to have the data source on your computer or even in the same location on your computer to simply show the data in the diagram. However, if you want to refresh the data in the diagram, Visio Professional needs the data source. You can find more information about refreshing data in your diagrams in this chapter in the Refreshing Data in Diagrams section.

**20.** On the **File** menu, click **Close** to close the diagram.

**CLOSE**  the *LinkToDiagram* file.

# Linking Data to Shapes on the Drawing Page

You've linked your diagram to the data source. Now, the next step toward visualizing data in diagrams is linking the data to shapes in the diagram, and displaying that data with the shapes on the drawing page so you can visually track data for individual shapes. Then, anyone can glance at the diagram and quickly understand the complete picture and even draw conclusions that would be cumbersome, to say the least, with only a database or spreadsheet to decipher.

You can link data to shapes in diagrams using three methods, shown in the table below. The method you choose depends on your preference and the state of the diagram.
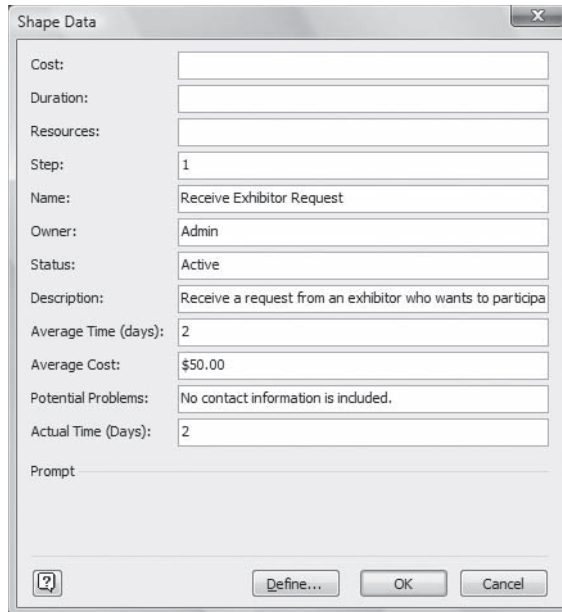
| Linking Method | How-to Use | When to Use |
| --- | --- | --- |
| Automatically link data to all the shapes or only the selected shapes in a diagram at one time. | On the Data menu, click Automatically Link. Follow the instructions in the Automatic Link wizard. | Use this method when your diagram is already done or almost complete and you want to link a lot of data to a lot of shapes on the drawing page. |
| Link rows of data—one at a time—to shapes that are already on the drawing page. | Drag a row of data from the External Data window onto a shape in the diagram. | Use this method when the shapes to which you want to link data are already on the drawing page, and it's easy and fast to just drag a few rows of data onto shapes on the drawing page yourself. |
| Automatically add a shape to the drawing page and link it to a row of data as you drag the row of data onto the drawing page. | Click the shape on the stencil that you want to add to the diagram when you drag a row of data onto the drawing page. Then, drag the row of data from the External Data window onto the drawing page into the location where you want to add the new shape. | Use this method when the shape to which you want to link data isn't on the drawing page yet. |

After you link data to shapes in the diagram, Visio Professional 2007 adds a link icon at the beginning of the linked rows in the External Data window. It opens the Data Graphics task pane and creates some basic data graphics on the fly. Finally, it applies a default data graphic to the data-linked shapes in the diagram to display the data on the drawing page with the shapes.
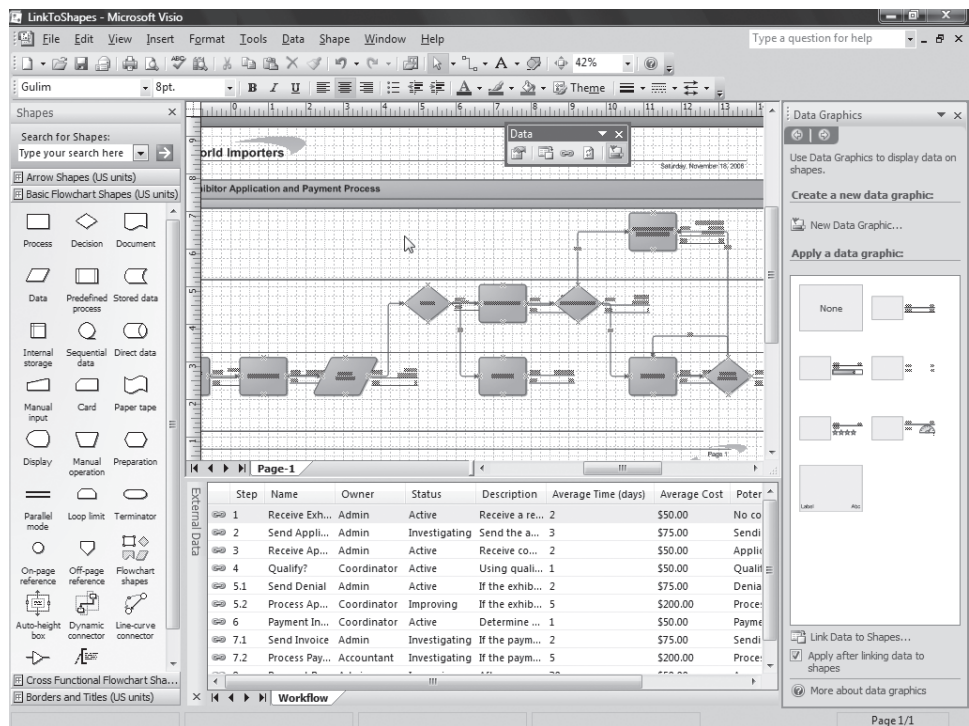
> **Tip** The next section in this chapter discusses data graphics and the Data Graphics task pane in more detail.

Visio Professional 2007 also automatically adds the appropriate shape data fields and values to data-linked shapes.

| Shape Data | | ☒ |
|---|---|---|
| Cost: | | |
| Duration: | | |
| Resources: | | |
| Step: | 1 | |
| Name: | Receive Exhibitor Request | |
| Owner: | Admin | |
| Status: | Active | |
| Description: | Receive a request from an exhibitor who wants to participa | |
| Average Time (days): | 2 | |
| Average Cost: | $50.00 | |
| Potential Problems: | No contact information is included. | |
| Actual Time (Days): | 2 | |

Prompt

[?]                    Define...        OK        Cancel

> **Tip** You can also run reports on diagrams linked to external data sources the same way you did in Chapter 8, "Creating Network Diagrams." On the Data menu, click Reports, and then choose the report you want to run.
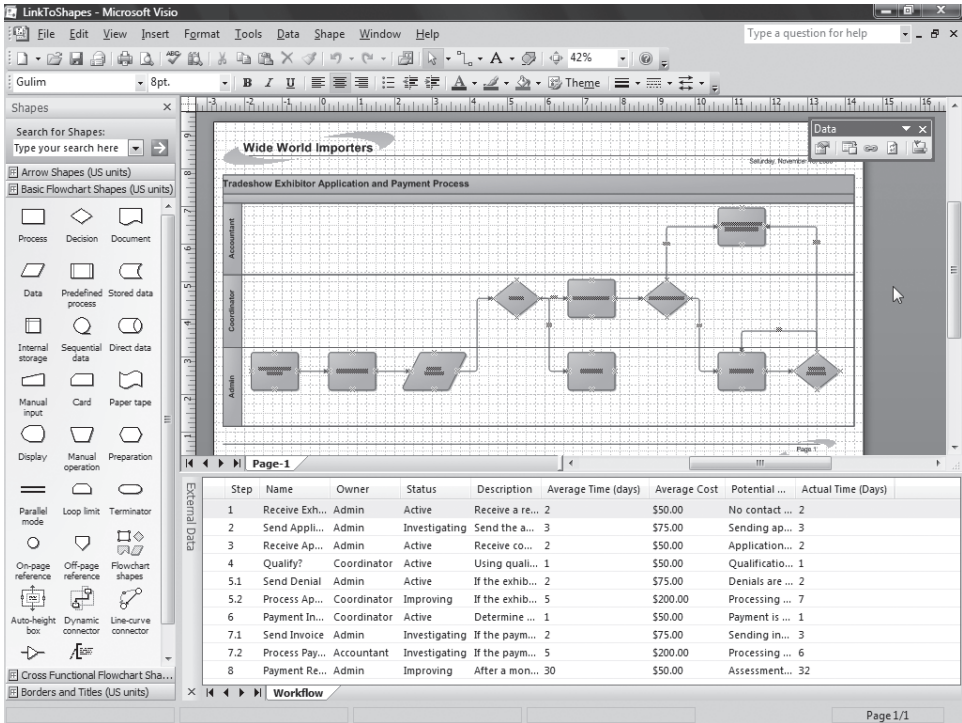
In this exercise, you use the various linking methods to link data to shapes on the drawing page.

> **OPEN** the *LinkToShapes* file in Documents\Microsoft Press\Visio 2007 SBS\09_Data.

**1.** On the **File** menu, click **Open**, navigate to the **09_Data** folder, and then double-click **LinkToShapes**.

Visio Professional opens the cross functional flowchart, four stencils, and the External Data window, which shows the Workflow data linked to the diagram in spreadsheet form.

> **Troubleshooting**  If you have any problems using the data linked to your diagram, you can relink the diagram to the data source. On the Data menu, click Refresh Data. In the Refresh Data dialog box, click Configure. In the Configure Refresh dialog box, click Change Data Source. In the Data Selector wizard that starts, click Next. On the second page of the wizard, click Browse, navigate to the 09_Data folder, double-click AppPayWorkflow.xlsx, and then finish the wizard.

**2.** On the **Data** menu, click **Automatically Link**.

The Automatic Link wizard starts, and shows the name of the data it's linking to shapes in the wizard title bar. In this case, it's linking the Workflow data to shapes.
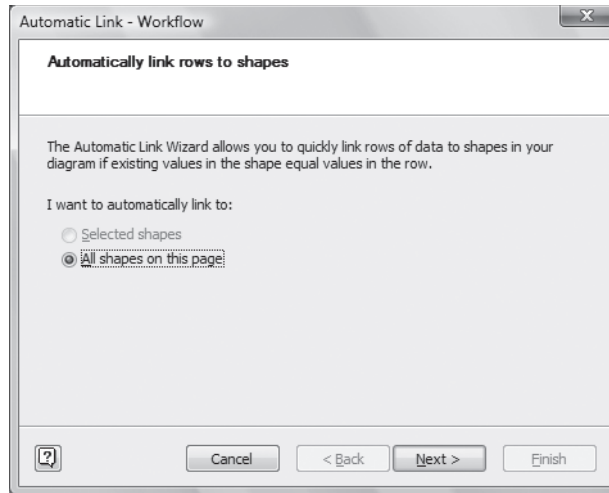
> **Tip** If you linked a diagram to more than one data source, make sure the tab con-
> taining the data that you want to link to shapes is showing in the External Data win-
> dow before you start the Automatic Link wizard.

**3.** On the first page of the **Automatic Link** wizard, make sure the **All shapes on this page** option is selected, and then click **Next**.

The next page of the wizard appears.

**4.** On the second page of the wizard, in the **Data Column** box, make sure **Name** is selected. In the **Shape Field** box, make sure **Shape Text** is selected.
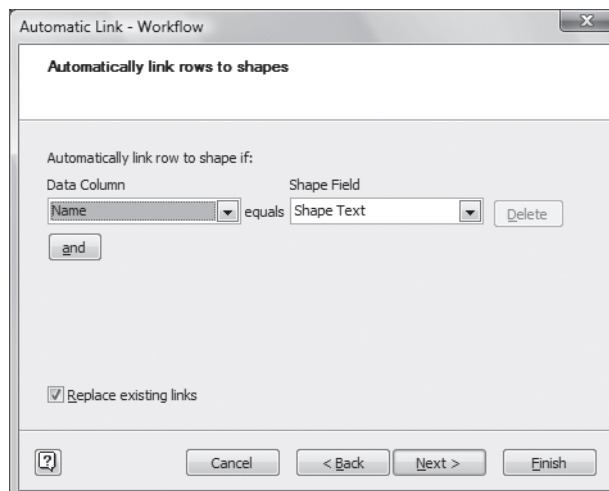
Visio Professional matches the Name values in the data to the shape text in the shapes to link each row of data to its corresponding shape.

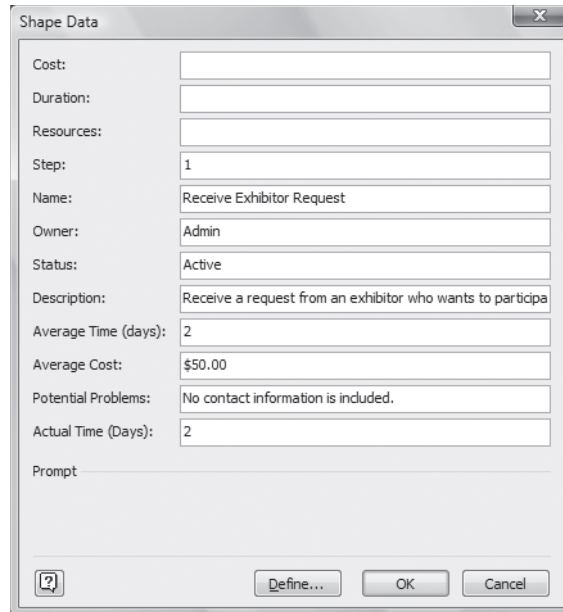**5.** Click **Next**.

The last page of the wizard appears.

**6.** On the last page of the wizard, click **Finish**.

Visio Professional displays the data on the drawing page with a default data graphic and opens the Data Graphics task pane to the right of the drawing page, in which Visio created some new data graphics for this diagram. The first column in the External Data window also shows a link icon in each row, indicating that each row is linked to a shape. Visio has also rerouted some of the connectors in the diagram to accommodate the data graphics.



> **Tip** You might need to zoom in to the default data graphic better. The next section in this chapter discusses data graphics and the Data Graphics task pane.

**7.** Select a shape on the drawing page, and then on the **Data** menu, click **Shape Data** to see the shape data added to the shape.

The new shape data fields match the column names in the Workflow data shown in the External Data window.

**8.** In the **Shape Data** dialog box, click **OK** to close it.

**9.** In the External Data window, position the pointer over the divider between the **Name** and **Owner** columns.

The pointer changes to a vertical line with a two-headed horizontal arrow, notifying you that Visio Professional is ready to reposition the divider.

**10.** Drag the divider to the right so you can see the full name for each step in the process.
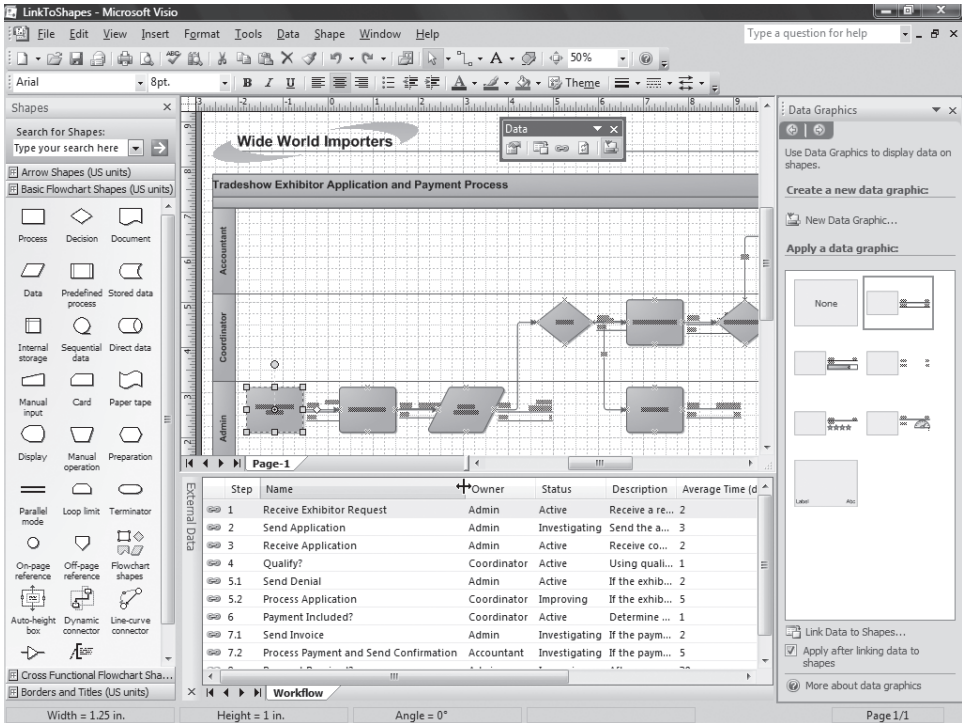
> **Tip** You can customize the appearance of the columns in the External Data window. Right-click the window, and then click Column Settings to specify which columns you want to view. Click Arrange by on the shortcut menu to rearrange the columns in the window.

**11.** In the External Data window, click the **Send Application** data row to select it.

**12.** Right-click the **Send Application** data row to show a shortcut menu.
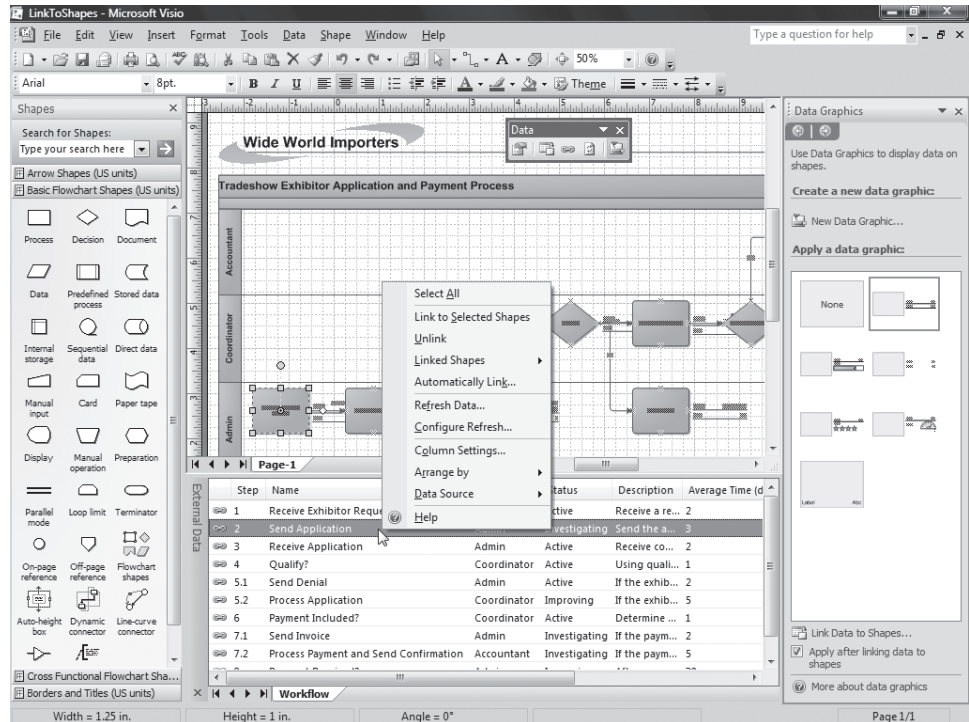
**13.** On the shortcut menu, point to **Linked Shapes**, and then click **Process.15 (Page-1)**.

Visio Professional selects the shape to which this row of data is linked on the draw-ing page—the Process.15 shape on Page 1. And, the default data graphic used to display data next to the shape is selected on the Data Graphics task pane.
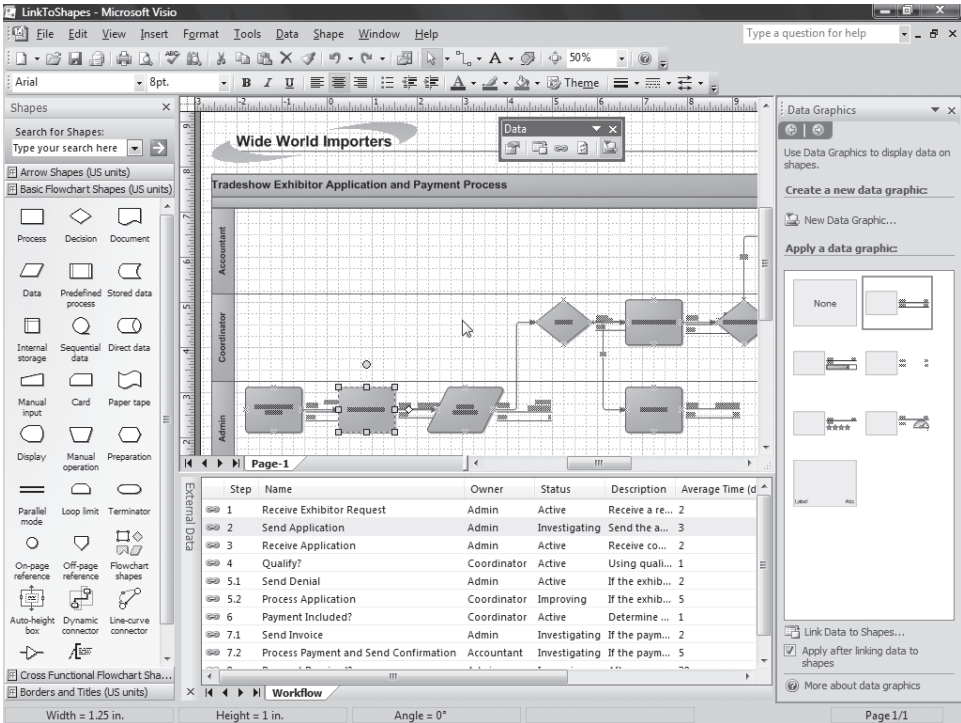
**14.** Right-click the **Send Application** data row, and then click **Unlink**.

Visio Professional unlinks the row of data from the shape, and the link icon disappears from the first cell for this row of data.
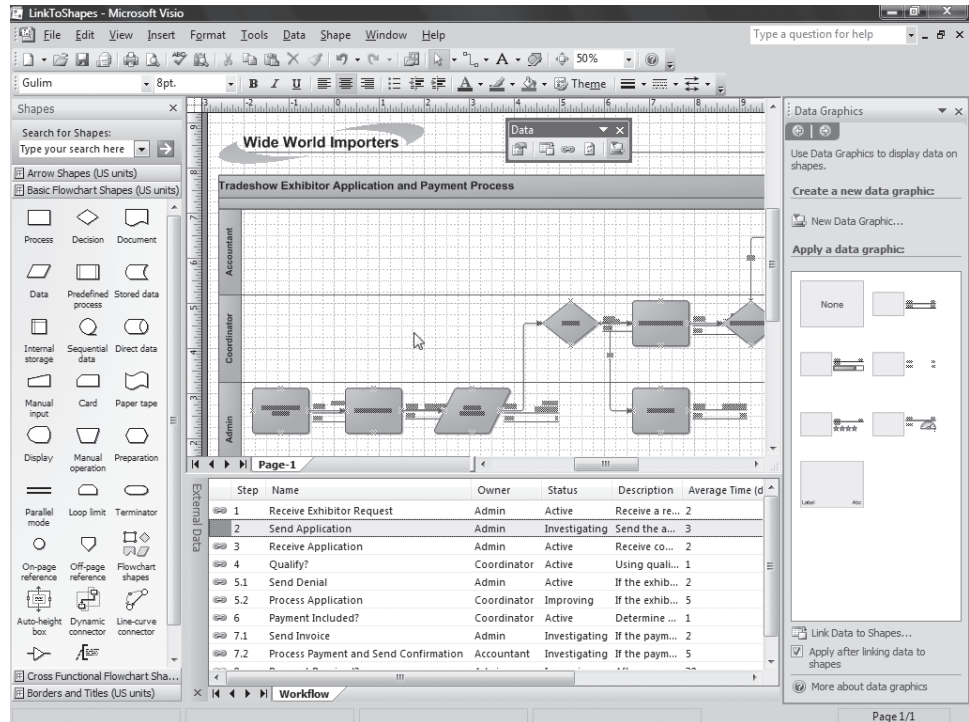
> **Tip**  You can link a row of data to more than one shape on the drawing page; however, you can't link a shape to multiple rows of data in the same data source. You can link a shape in a diagram to more than one row of data if each row of data linked to the shape is from a different data source—in other words, on a different tab in the External Data window.

**15.**  Make sure the **Send Application** data row is selected.

**16.**  Position the pointer over the name value—**Send Application**. Drag the row of data from the External Data window to the drawing window and onto the process shape to which it was previously linked.

Visio Professional highlights the shape on the drawing page with a black border and displays a link pointer when you pause the pointer over the shape—this notifies you that Visio is going to link the row of data to the shape.
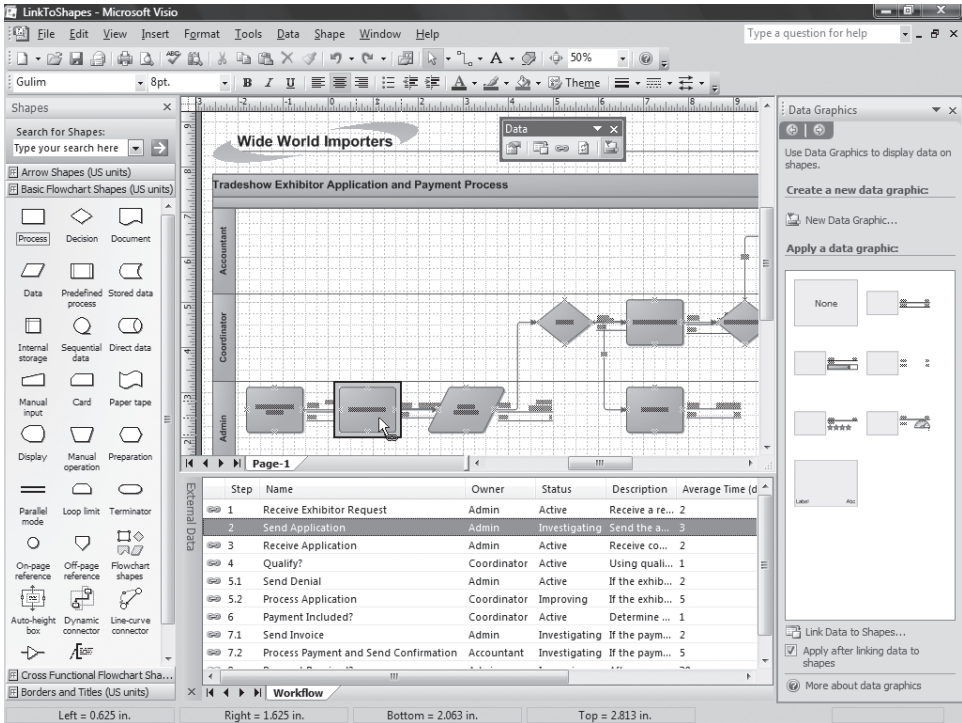
**17.** Release the mouse button to relink the data to the shape.

Visio Professional relinks the row of data to the Process.15 shape on Page 1 and the link icon reappears in the first cell of the Send Application data row.

> **Tip** Visio Professional 2007 stores a copy of the data linked to the diagram with the diagram. So, after you link data to a diagram, you don't need to have the data source on your computer or even in the same location on your computer to relink data to shapes in the diagram. However, if you want to refresh the data in the diagram, Visio Professional needs the data source. You can find more information about refreshing data in your diagrams in this chapter in the "Refreshing Data in Diagrams" section.

**18.** Right-click the **Send Application** data row, and then point to **Linked Shapes** to see that the data is linked to the same shape it was before—**Process.15 (Page-1)**.

> **Tip** You can also determine which data row a shape on the drawing page is linked to by right-clicking the shape, pointing to Data on the shortcut menu that appears, and then clicking Show Linked Row. Visio Professional selects the data row in the External Data window.

**19.** Right-click the **Page-1** tab at the bottom of the drawing window, and then click **Insert Page** on the shortcut menu that appears.

**20.** In the **Page Setup** dialog box, click **OK** to insert the new page.

**21.** In the **Cross-functional Flowchart** dialog box that appears, click **Cancel**.

58%

Zoom

**22.** On the Standard toolbar, click the **Zoom** down arrow, and then click **100%** to zoom in on the drawing page.

**23.** In the Shapes window, click the **Basic Flowchart Shapes** stencil, and then click the **Terminator** shape on the stencil to select the shape.
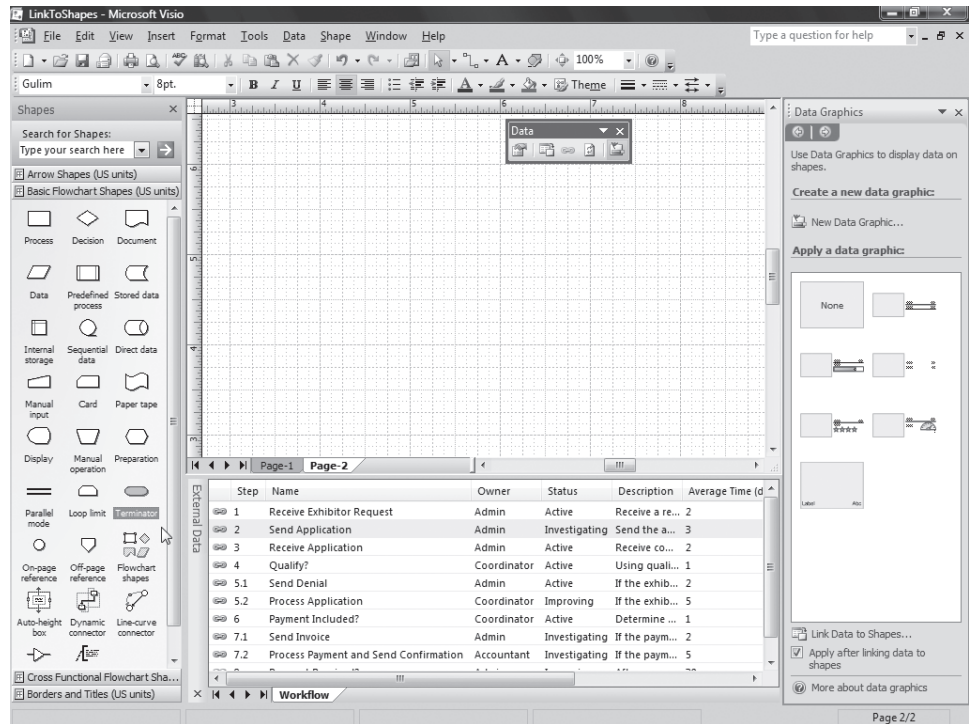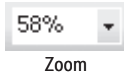


**24.** In the External Data window, select the first row of data—**Receive Exhibitor Request**.

**25.** Position the pointer over the name value— **Receive Exhibitor Request**. Then, drag the data row onto the drawing page.

Visio Professional adds the Terminator shape—the shape selected on the stencil—to the drawing page and automatically links it to the Receive Exhibitor Request data row.
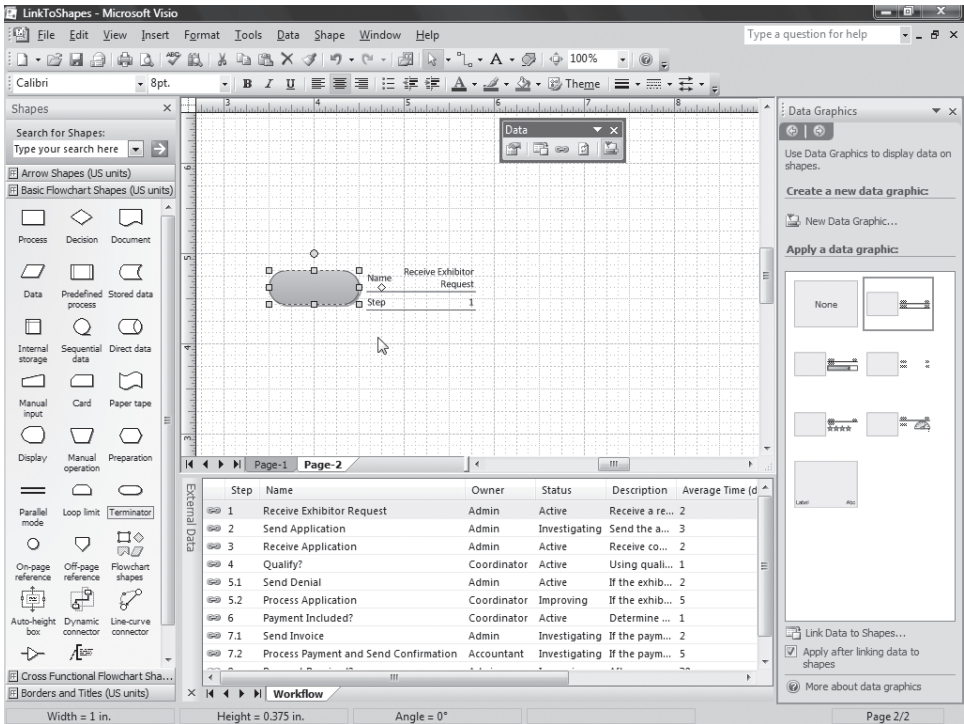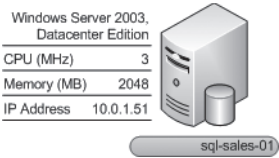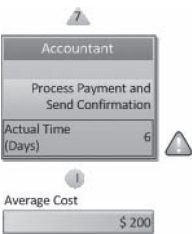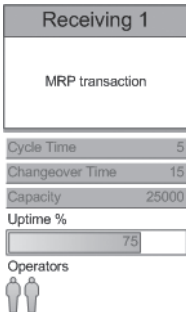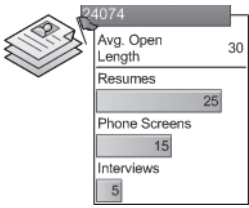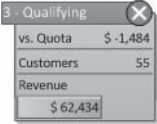
**26.** On the **File** menu, click **Close** and when Visio Professional asks you if you want to save the changes to the diagram, click **No**.

> **CLOSE** the *LinkToShapes* file.

# Modifying and Creating Data Graphics
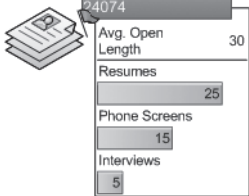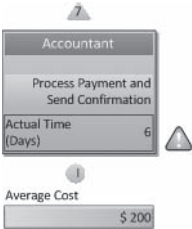
The third step in visualizing data in your diagrams is perhaps the most important—applying data graphics to the shapes that are linked to data on the drawing page to effectively visualize data in the diagram. Data graphics are shapes that Visio Professional uses to display data with data-linked shapes on the drawing page so you can easily visualize data trends, flag issues, and identify problems in your diagrams. Data graphics can include visual elements, such as text, progress bars, icon sets, data flags, and so on, as shown in the table below. Choose a combination of these visual elements to create data graphics that track the data you want to track in your diagram.

| Shape Type | Data Graphic Displayed with Shape | Data Fields and Visual Elements Displayed |
|---|---|---|
| Network equipment shape | Windows Server 2003, Datacenter Edition / CPU (MHz) 3 / Memory (MB) 2048 / IP Address 10.0.1.51 / sql-sales-01 | Network Name, Operating System, CPU, Memory, and IP Address data fields displayed as text. |
| Network equipment shape | web-sales-02 / Administrator / Don Hall | Network Name and Administrator data fields displayed as text. |
| Process shape | 6.1 / Review / Status Improving / Average Time (days) 6 / Inputs Completed job / Outputs Customer sign-off | Step Number, Step Name, Status, Average Time, Inputs, and Outputs data fields displayed as a combination of text, color by value, icon sets, and data bars. |
| Process shape | 7 / Accountant / Process Payment and Send Confirmation / Actual Time (Days) 6 / Average Cost $ 200 | Step Number, Step Name, Status, Owner, Average Cost, Actual Time, and Average Time data fields displayed as a combination of text, icon sets, and data bars. |
| Value stream map shape | Receiving 1 / MRP transaction / Cycle Time 5 / Changeover Time 15 / Capacity 25000 / Uptime % 75 / Operators | Cycle Time, Changeover Time, Capacity, Uptime %, and Operators data fields displayed as a combination of text and data bars. |
| PivotDiagram shape | 24074 / Avg. Open Length 30 / Resumes 25 / Phone Screens 15 / Interviews 5 | Average Open Length, Resumes Submitted, Phone Screens, and Interviews data fields displayed as a combination of text, data bars, and icon sets. |

| Shape Type | Data Graphic Displayed with Shape | Data Fields and Visual Elements Displayed |
|---|---|---|
| PivotDiagram shape |  | Quota, Customers, and Revenue data fields displayed as a combination of text, data bars, and icon sets |

> **Tip** When data is displayed attractively on the drawing page using data graphics, you can see the data when you print a diagram or incorporate a diagram into other documents, such as Microsoft Office PowerPoint presentations. The visual elements in data graphics are designed to work with the new Theme feature in Visio 2007, so when you apply a color or effect theme to your diagram, the data graphics look great.

Not only can you simply display data with data-linked shapes in a diagram, you can also compare data values for a shape to display flags next to the shape when certain conditions have been met. You can also change the color of shape according to a data value, and compare a data value to a fixed number or amount, and so on. The table below shows some examples of data graphics that display visual elements when specific conditions have been met.

| Data Graphic Displayed with Shape | Conditions Met and Visual Element Displayed | Data Fields Comparisons or Values |
|---|---|---|
|  | Display a red warning flag next to a shape in a PivotDiagram if the average amount of time a position is open is greater than 30 days. | The Average Open Length data field is compared to a specified number of days. |
|  | Display an orange exclamation mark warning icon next to shape in a workflow diagram if the number of days it takes to complete a step is greater than the estimated number of days. Display a green checkmark icon if the actual number of days is less than the estimated number of days. | The Actual Time (Days) data field is compared to the Estimated Time (Days) data field. |

| Data Graphic Displayed with Shape | Conditions Met and Visual Element Displayed | Data Fields Comparisons or Values |
| --- | --- | --- |
| 6.1 / Review / Status Improving / Average Time (days) 6 / Inputs Completed job / Outputs Customer sign-off | Change the color of a step in a process diagram to bright red if the step is under investigation, light red if it's being improved, and blue if it's active. | Change the color of a shape according to the Status data field's value. |
| Manufacturing / Risks 42 / Risk Level 3.07 / Process Complexity 3.26 | Display the red, orange, or green light in a traffic signal icon next to a shape in a PivotDiagram according to the process complexity and risk level. And, display differently colored flags for various risk levels. | Compare the Process Complexity/Risk Level data field to a fixed number. Compare the Risk Level data field to a fixed number. |
| Fname Sidney / Employee ID 1002 / Accounting | Change the color of an employee shape in an organization chart according to the employee's department—yellow for the sales department, red for the accounting department, and so on. | Change the color of a shape according to the Department data field's value. |

The Data Graphics task pane shows all the data graphics available for a diagram. If your diagram doesn't include any data graphics when you link data to shapes in the diagram, Visio Professional creates some basic data graphics on the fly for you and applies one of them to the data-linked shapes in your diagram. You can modify the basic data graphics Visio Professional creates for you or create new ones. When you can modify the default data graphic already applied to all the data-linked shapes in your diagram, the changes you make ripple throughout all the shapes in your diagram. Or you can create a new data graphic and apply it to all or select shapes in your diagram.

Click New Data Graphic to
create a new data graphic

Data Graphics
task pane



Data graphic applied to the shape
selected on the drawing page

Data graphics available
for this diagram

**Tip**  To open the Data Graphics task pane yourself, on the Data menu, click Display Data on Shapes. Or, on the View menu, click Task Pane. Click the down-arrow on the task pane title, and then click Data Graphics.

You can create as many data graphics as you need and use multiple data graphics in a diagram. For example, you can create a data graphic that shows employee data and apply it to all the employee shapes in your diagram. You can create another data graphic that shows equipment data and apply it to all of the equipment shapes in your diagram. You can create yet another graphic that flags specific sales data. Create a data graphic by simply clicking New Data Graphic in the Data Graphics task pane and choosing from the visual elements in the New Data Graphic dialog box.

New Data Graphic dialog box

Visual elements that you can use individually or combine to create a data graphic
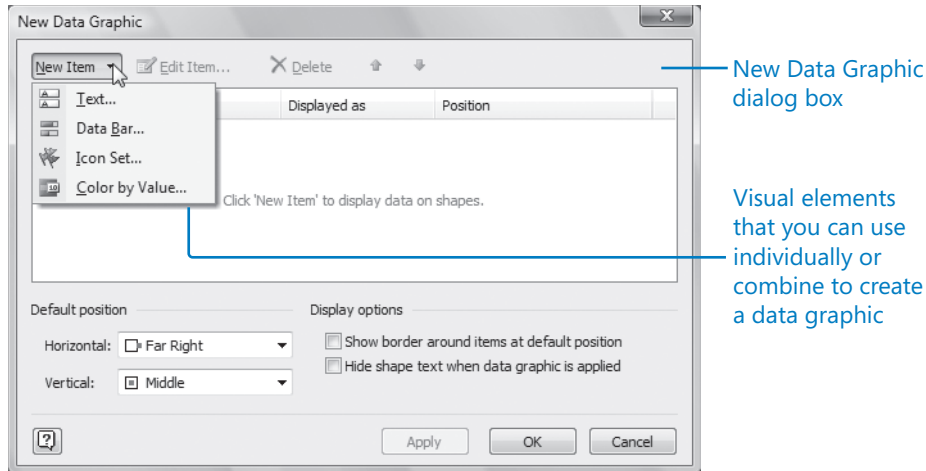
> **Tip** When you create data graphics, they're stored with the diagram in which you created them. So, you might find yourself in a situation where you've created a lot of new data graphics in one diagram and you want to use them in other diagrams. You can copy data graphics from one diagram to another the same way you copy a color or effect theme—copy a shape from the diagram that has the data graphic applied to it and paste the shape into another diagram. After you copy the shape, the data graphic appears in the Data Graphics task pane for the other diagram. Then, you can delete the shape from the diagram. The data graphic remains in the Data Graphics task pane even after the shape has been deleted from the diagram.

To modify an existing data graphic, pause the pointer over the data graphic in the Data Graphics task pane until a down arrow appears, click the down arrow, and then click Edit Data Graphic on the shortcut menu. Or, instead of pausing the pointer over the data graphic until a down arrow appears, you can right-click the data graphic to see the shortcut menu. Then, edit any of the visual elements in or add visual elements to the data graphic.

After you've created or modified the data graphic you want to use in your diagram, simply select the shapes to which you want to apply the new data graphic, and then click the data graphic on the Data Graphics task pane.

> **Tip** For more information about creating data graphics, click "More About Data Graphics" next to the Help icon at the bottom of the Data Graphics task pane.

In this exercise, you apply various data graphics to different shapes in the diagram to see how they look, and then you modify the data graphic applied to all the shapes in the diagram to track various data trends in the diagram.

> **OPEN** the *DataGraphics* file in Documents\Microsoft Press\Visio 2007 SBS\09_Data.

**1.** On the **File** menu, click **Open**, navigate to the **09_Data** folder, and then double-click **DataGraphics**.

Visio Professional opens the cross functional flowchart, four stencils, and the External Data window, which shows the Workflow data that's linked to shapes in the diagram.
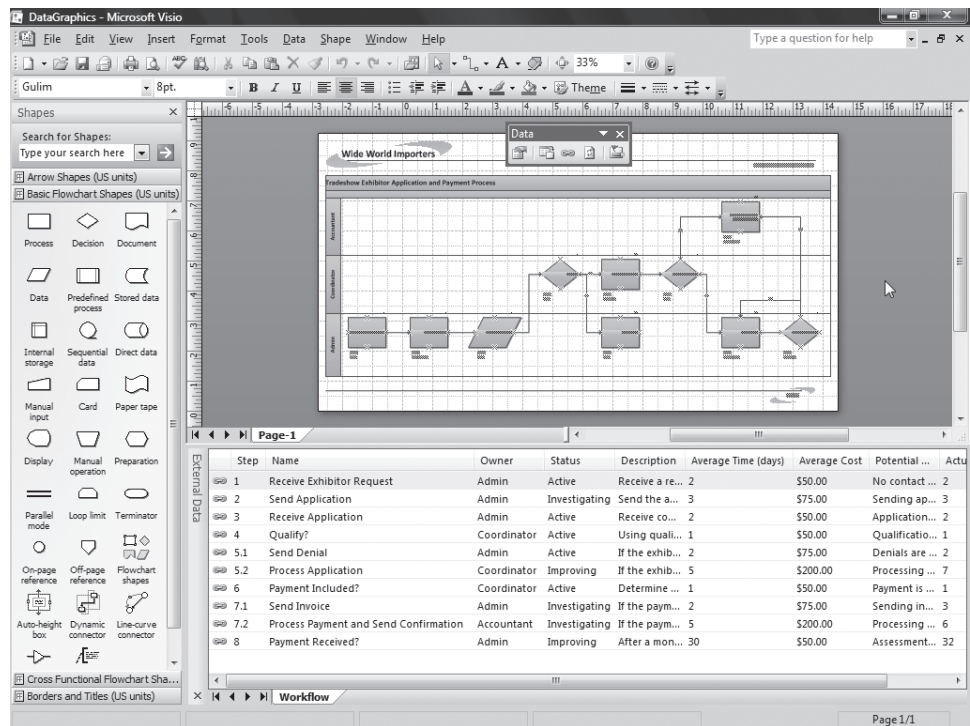


> **Troubleshooting** If you have any problems using the data linked to your diagram, you can relink the diagram to the data source. On the Data menu, click Refresh Data. In the Refresh Data dialog box, click Configure. In the Configure Refresh dialog box, click Change Data Source. In the Data Selector wizard that starts, click Next. On the second page of the wizard, click Browse, navigate to the 09_Data folder, double-click AppPayWorkflow.xlsx, and then finish the wizard.

**2.** Press <kbd>Shift</kbd>+<kbd>Ctrl</kbd> while you drag a selection box around the top **Process Payment and Send Confirmation** shape on the drawing page to zoom in on the shape so you can see it better.

The data graphic applied to the shape displays the process Name, Step, and Status data. The Name data field is displayed as text inside the shape. The Step data field is displayed as text above the shape, and the Status data field is displayed as text below the shape.
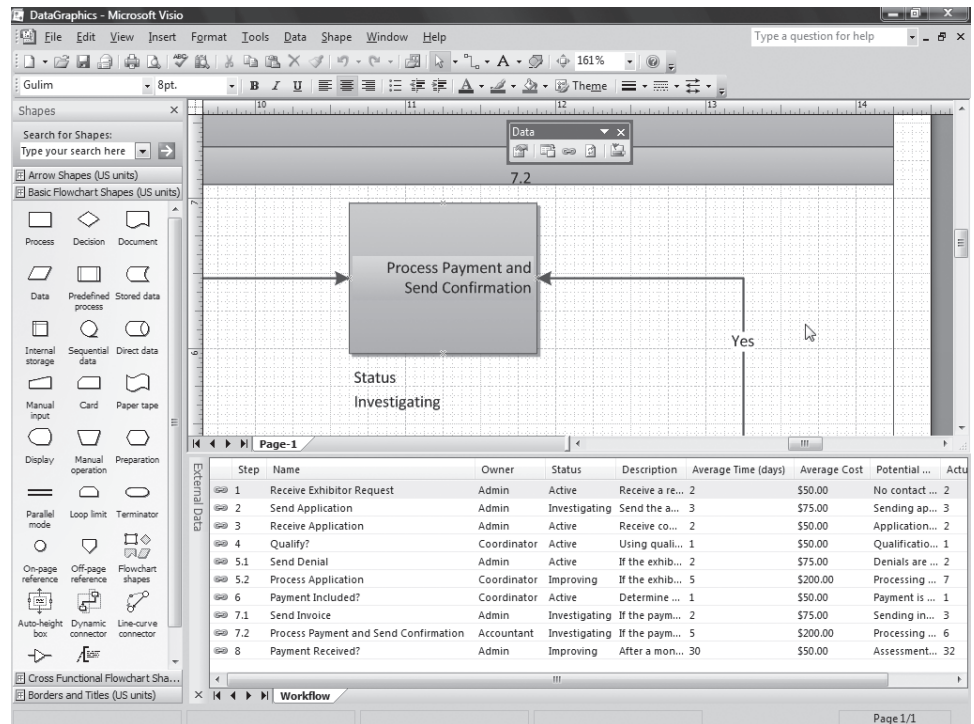


**3.** On the **Data** menu, click **Display Data on Shapes** to open the Data Graphics task pane.

The Data Graphics task pane contains the data graphics previously created for this diagram.

**4.** Select the **Process Payment and Send Confirmation** shape on the drawing page.

Visio Professional selects the data graphic on the Data Graphics task pane that's applied to the selected shape.

**5.** On the **Data Graphics** task pane, pause the pointer over the selected data graphic preview until a ScreenTip appears, which contains the name of the data graphic—**Process 1**.
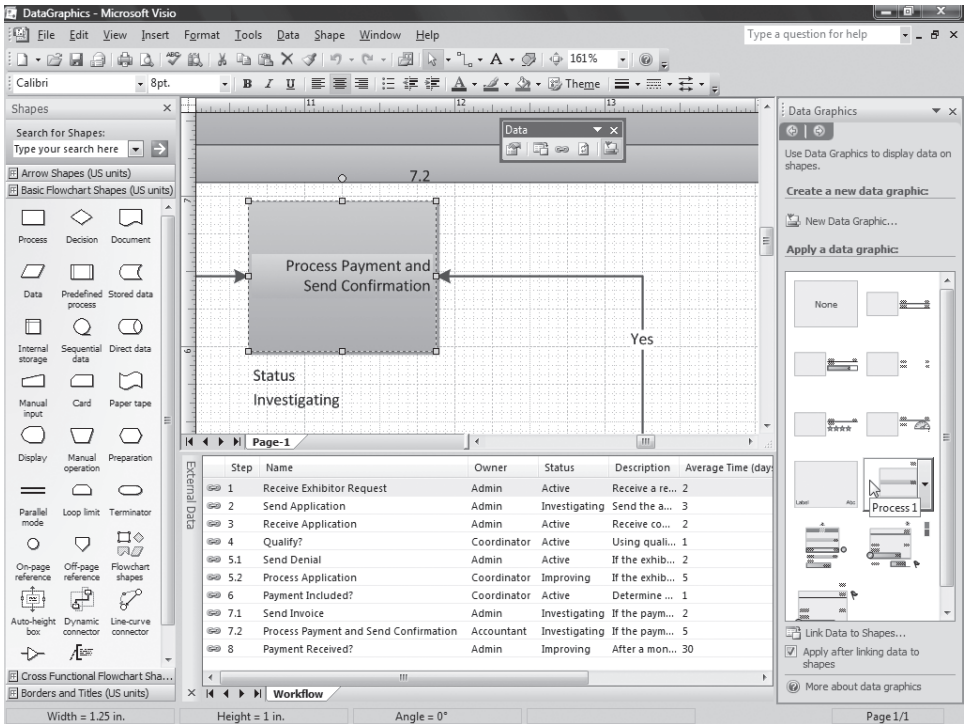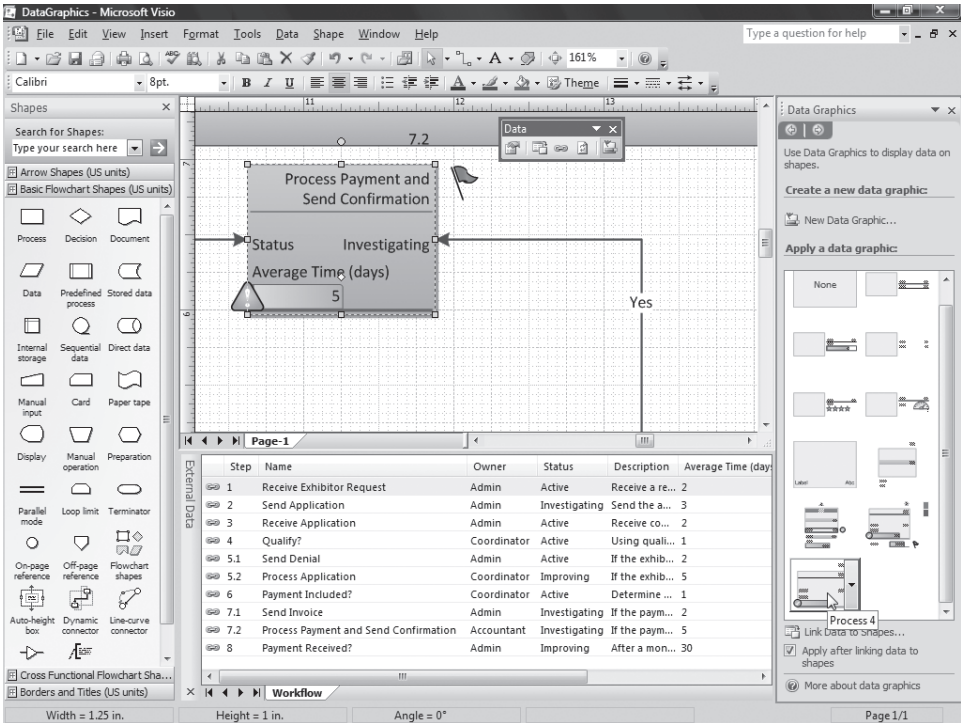
**6.** On the **Data Graphics** task pane, click the **Process 2** data graphic (first column, fifth data graphic) to apply it to the shape.

The Process 2 data graphic displays the Name, Owner, Step, Actual Time, Status, and Average Cost data fields as a combination of text and data bars inside and around the shape. This data graphic also compares the values in the Actual Time and Average Time data fields and displays a warning icon if the Actual Time value exceeds the Average Time value. It displays a checkmark icon, indicating everything is OK, if the Actual Time value is less than or equal to the Average Time value.
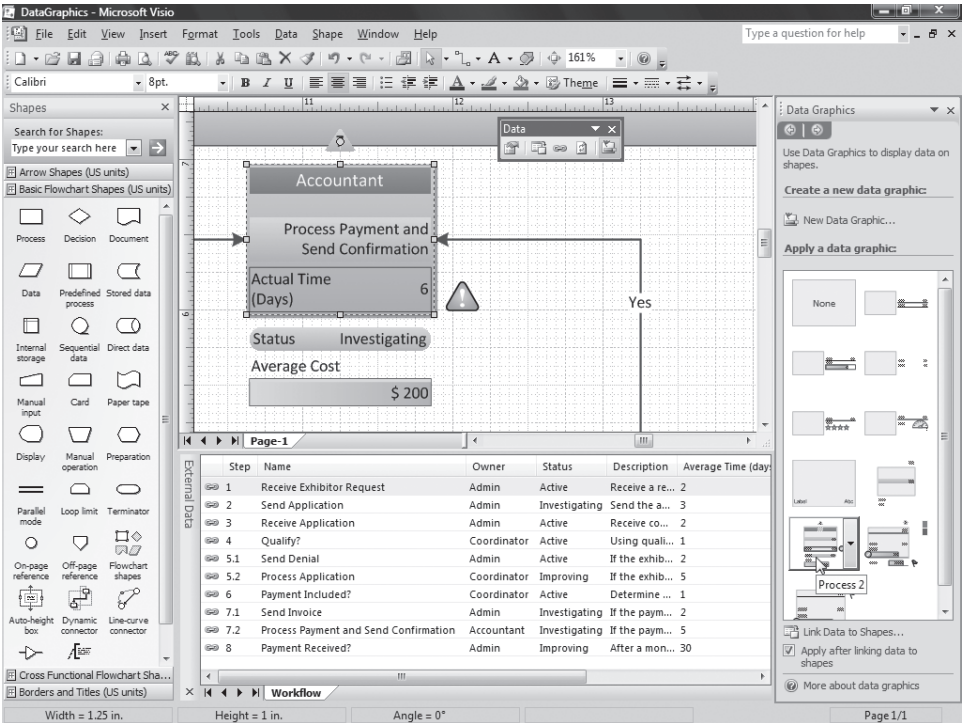
**7.** On the **Data Graphics** task pane, click the **Process 4** data graphic (first column, sixth data graphic) to apply it to the shape.

The Process 4 data graphic displays the Name, Step, Status, and Average Time data fields as a combination of text and data bars inside and around the shape. This data graphic also compares the values in the Actual Time and Average Time data fields as the previous Process 2 data graphic does. In addition, it displays a red warning flag when the Average Cost value is greater than $100, and it displays an orange flag when the value is greater than or equal to $50.

**8.** On the **Data Graphics** task pane, pause the pointer over the **Process 4** data graphic until a down arrow appears, click the down arrow, and then click **Edit Data Graphic** on the shortcut menu.

The Edit Data Graphic dialog box appears and shows the data fields included with the data graphic, how they're displayed, and their position relative to the data-linked shape.
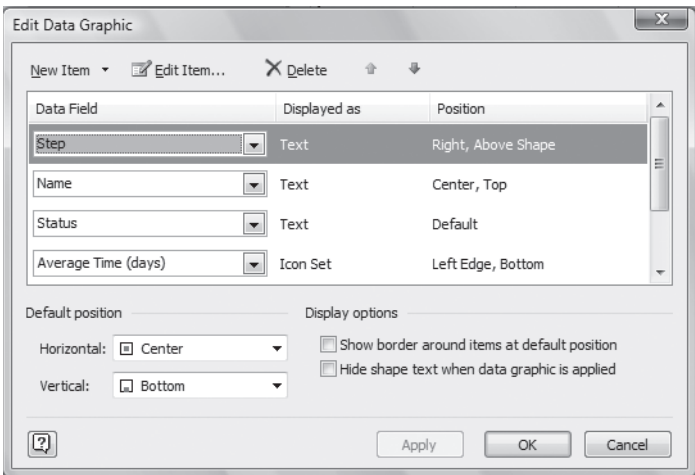
> **Tip**  If you want to hide the shape text when a data graphic is applied to a shape, in the Edit Data Graphic dialog box or New Data Graphic dialog box, select the Hide Shape Text When Data Graphic Is Applied option.

**9.**  In the **Edit Data Graphic** dialog box, click **New Item**.

On the New Item menu, you can see the categories of visual elements you can use in data graphics: Text, Data Bar, Icon Set, and Color by Value.
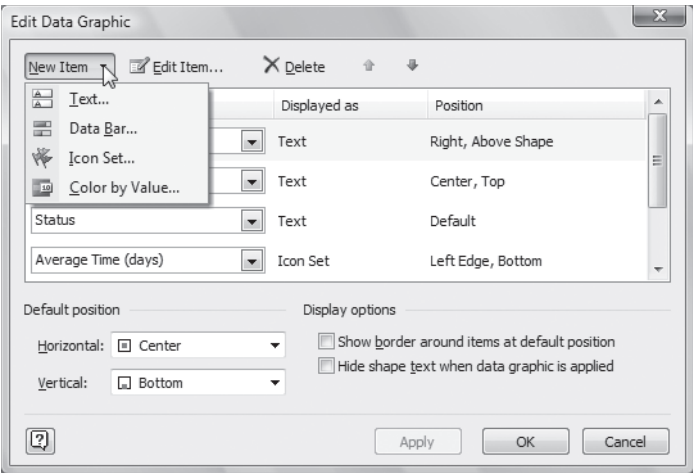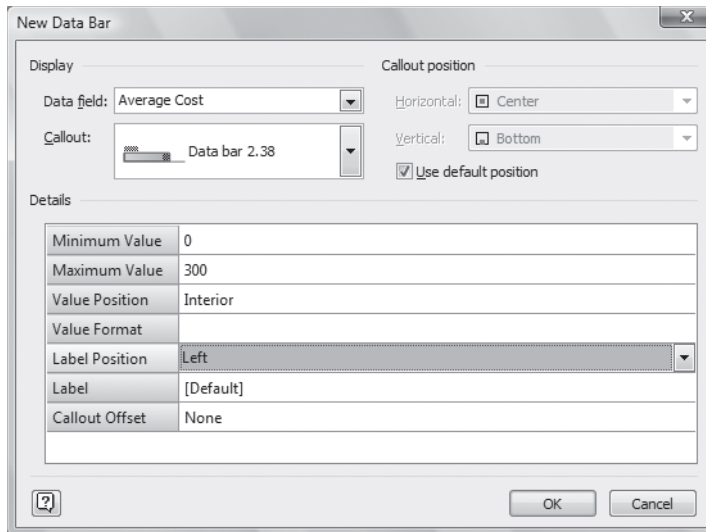


**10.**  Click **Data Bar** to add a data field that's displayed as a data bar.

Visio Professional opens the New Data Bar dialog box.
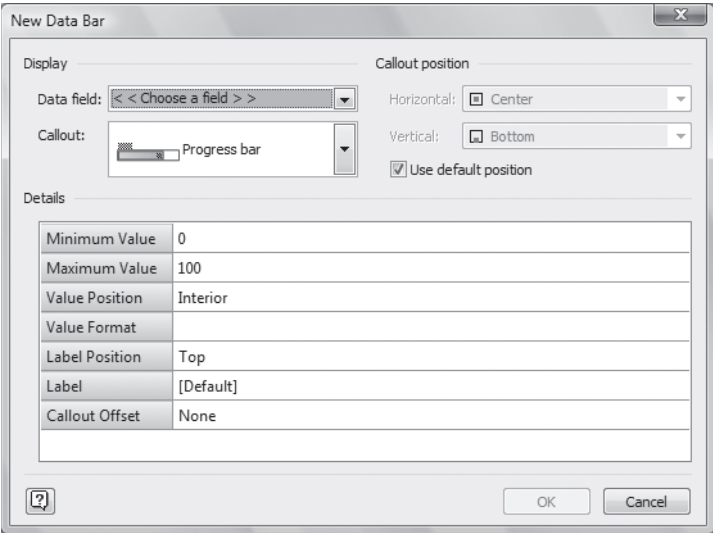
**11.** In the **New Data Bar** dialog box, in the **Data field** box, click the down arrow, and then click **Average Cost** to add the data field to the data graphic.

**12.** In the **Callout** box, click the down arrow, and then click **Data bar 2.38** to display the **Average Cost** data field as a data bar in the data graphic.

**13.** Under **Details**, in the **Maximum Value** field, click **100**, and then type **300**.

**14.** Under **Details**, in the **Label Position** field, click **Top**, and then click the down arrow that appears and click **Left** so the label appears to the left of the data bar.
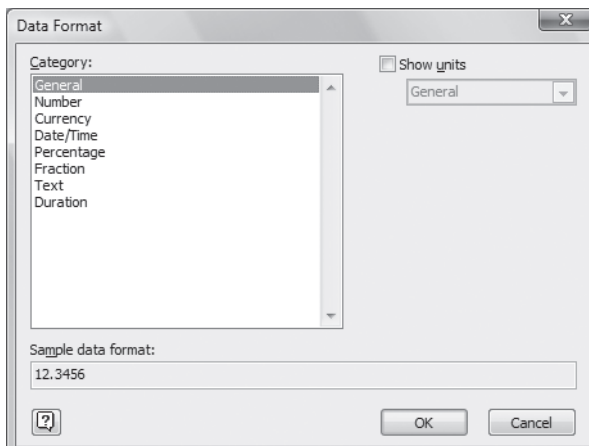


Ellipse

**15.** Under **Details**, in the **Value Format** field, click the blank box, and then click the el-lipse button that appears at the end of the box.
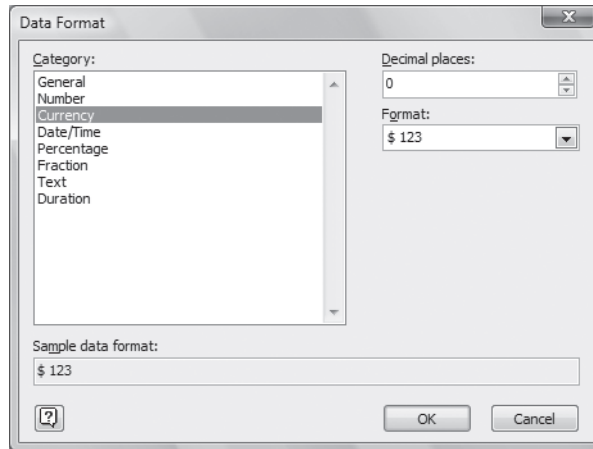
The Data Format dialog box appears.

**16.** In the **Data Format** dialog box, under **Category**, click **Currency**. In the **Decimal places** box, highlight **2**, and then type **0** to replace it.



**17.** In the **Data Format** dialog box, click **OK**.

**18.** In the **New Data Bar** dialog box, in the **Callout position** area, uncheck the **Use default position** checkbox to specify the position of the data bar yourself.

**19.** In the **Horizontal** box, click the down arrow, and then click **Center** to display the data bar horizontally centered with the data-linked shape.

**20.** In the **Vertical** box, click the down arrow, and then click **Below Shape** to display the data bar below the data-linked shape.
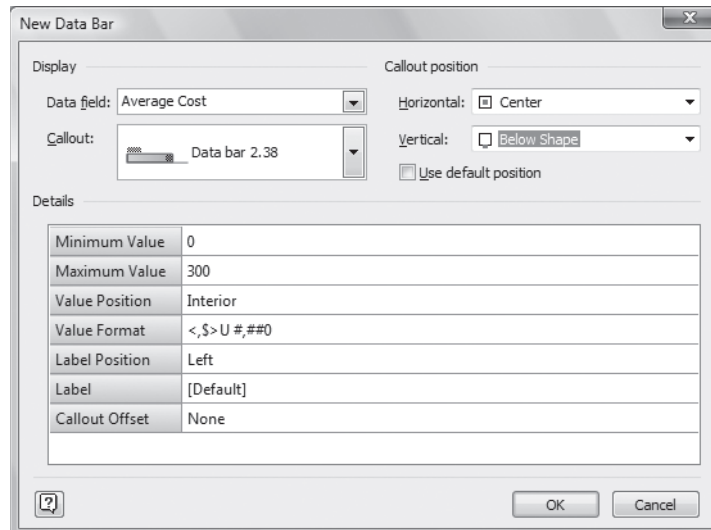
> **Tip** The icons that represent the positioning options in the Horizontal and Vertical boxes include little red squares that show you the position of the visual element on the data-linked shape.

**21.** In the **New Data Bar** dialog box, click **OK**.

Visio Professional adds the Average Cost data field's display specifications in the Edit Data Graphic dialog box.

**22.** In the **Edit Data Graphic** dialog box, click **OK** to see the changes you made to the data graphic.

The data graphic updates to show the Average Cost data below the shape in a data bar.
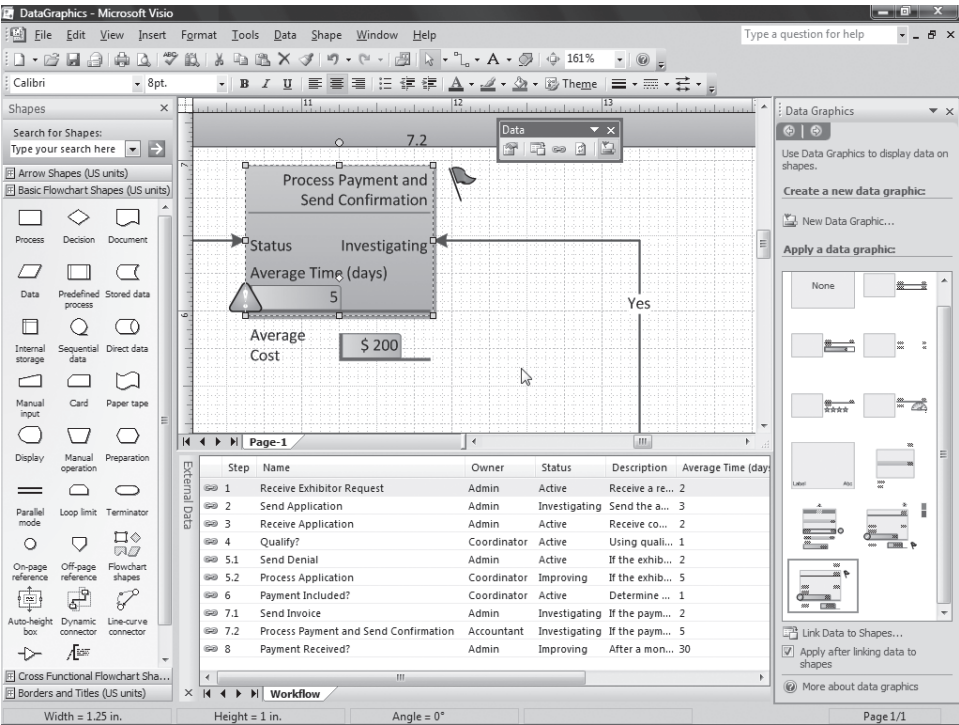


**23.** Right-click the **Process Payment and Send Confirmation** shape, point to **Data** on the shortcut menu, and then click **Edit Data Graphic** to make more changes to the data graphic applied to the shape.
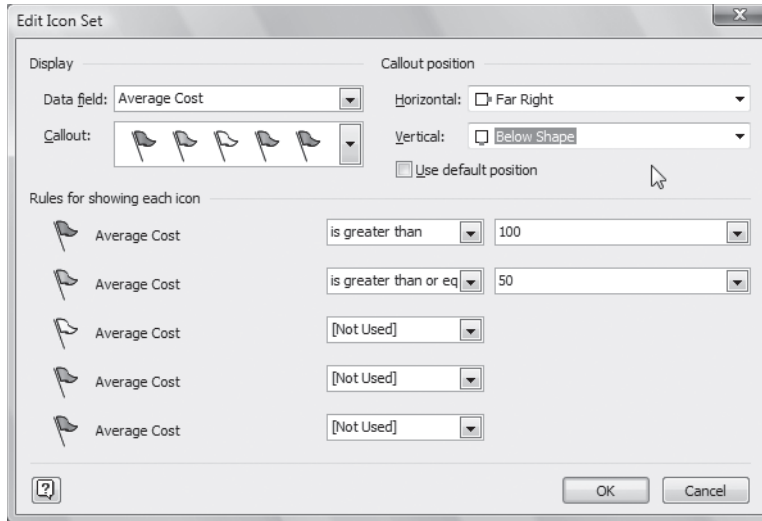
The Edit Data Graphic dialog box appears.

**24.** In the **Edit Data Graphic** dialog box, scroll down until you see the **Average Cost** data field item that's displayed as an **Icon Set**, and then click it to select it.
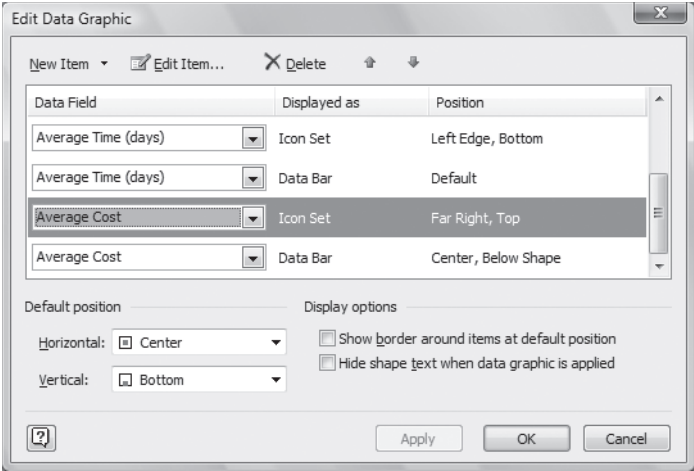
**25.** In the **Edit Data Graphic** dialog box, click **Edit Item**.
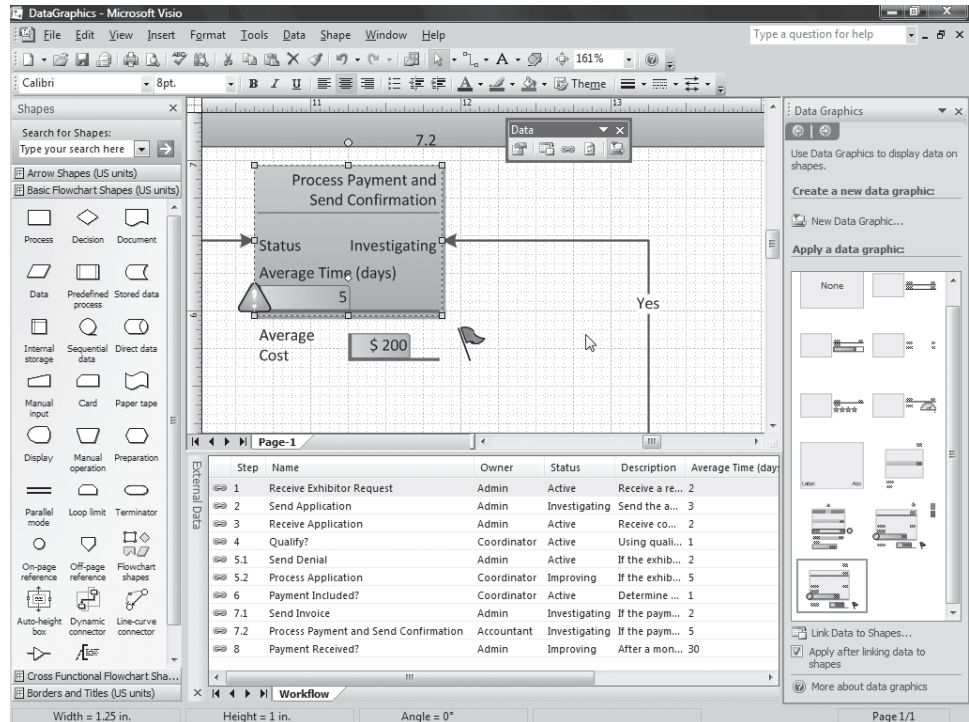
The Edit Icon Set dialog box appears.
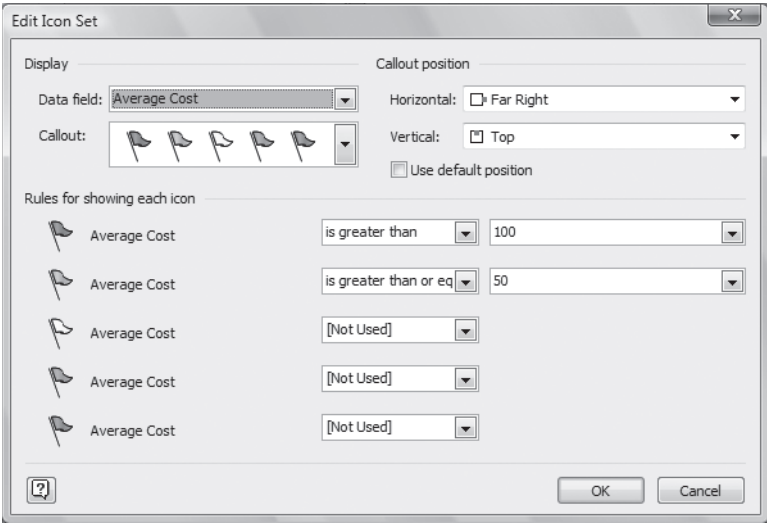


**26.** In the **Edit Icon Set** dialog box, in the **Callout position** area, in the **Vertical** box, click the down arrow, and then click **Below Shape** to display the icon below the data-linked shape.

The Edit Icon Set dialog box shows the condition under which flags are displayed with the data-linked shape. If the value of the Average Cost data field is greater than 100, a red flag is displayed. If the value of the Average Cost data field is greater than or equal to 50, an orange flag is displayed.

**27.** In the **Edit Icon Set** dialog box, click **OK**. In the **Edit Data Graphic** dialog box, click **OK** to see the changes to the data graphic.

The data graphic updates to the show the new position of the flag icon below the data-linked shape, next to the other visual elements for the Average Cost data field. This data graphic now tells you the average cost of the step, and it warns you that the cost of the step might be getting too expensive.

**28.** Right-click the **Process Payment and Send Confirmation** shape, point to **Data** on the shortcut menu, and then click **Edit Data Graphic** to make one more change to the data graphic applied to the shape.

The Edit Data Graphic dialog box appears.

**29.** In the **Edit Data Graphic** dialog box, click **New Item**, and then click **Color by Value**.

The New Color by Value dialog box appears.
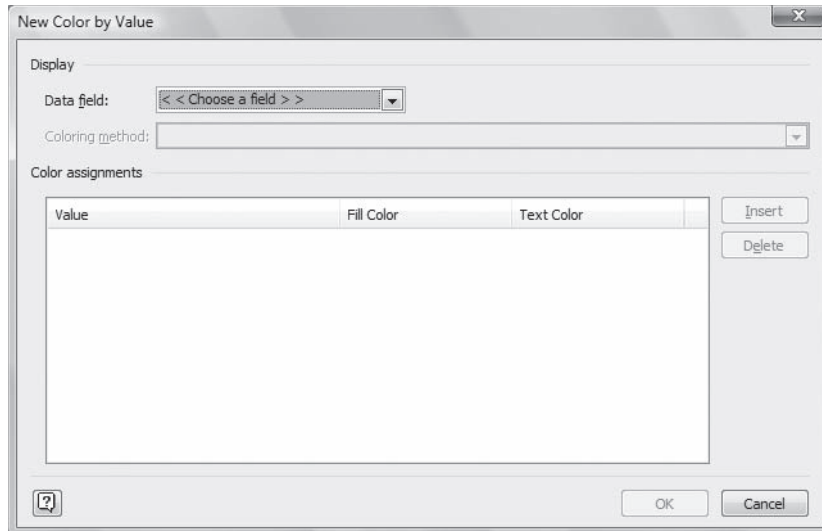
30. In the **New Color by Value** dialog box, in the **Data field** box, click the down arrow, and then click **Status** to change the color of the data-linked shape according to the value of the **Status** data field.

31. Under **Color assignments**, in the **Value** column, click the **Active** box, and then click the **Delete** button located to the right of the color assignments.

32. In the **Value** column, click the **Improving** box, click the down arrow on the fill color, and then under **Theme Colors**, in the green color column (seventh column), click the first green color (**Accent 2**).

33. Under **Value**, click the **Investigating** box, click the down arrow on the fill color, and then under **Theme Colors**, in the red color column (sixth column), click the last red color (**Shade 20%**).

**34.** In the **New Color by Value** dialog box, click **OK**. In the **Edit Data Graphic** dialog box, click **OK** to see the changes to the data graphic.

The data graphic colors the data-linked shape red because the value of the Status data field for the shape is Investigating.
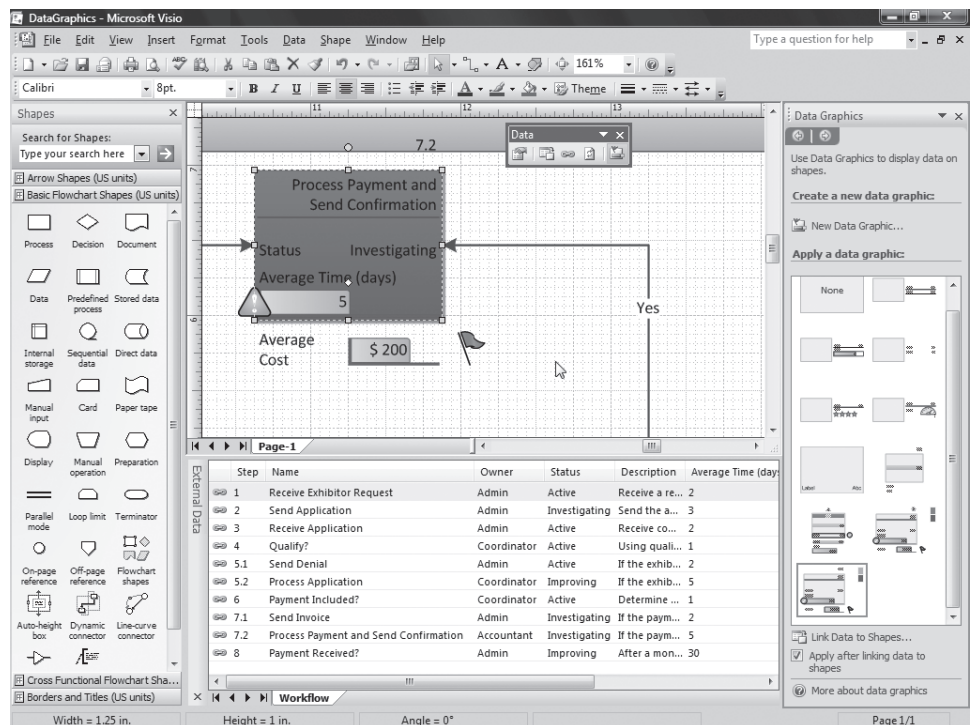
> **Tip** You can also duplicate a data graphic to use its formatting as the foundation for a new data graphic. To duplicate a data graphic, on the Data Graphics task pane, right-click the data graphic you want to copy, and then click Duplicate on the shortcut menu. Visio Professional places the copy on the Data Graphics task pane. To rename a data graphic, right-click it, and then click Rename on the shortcut menu.

**35.** Press `Ctrl`+`W` to zoom out to fit the whole page in the drawing window.

**36.** Hold down the `Shift` key while you click the rest of the data-linked Process, Data, and Decision shapes in the diagram to select them.

> **Note** Don't select any connectors, titles, or borders in the diagram because they're not connected to data so it's unnecessary to apply data graphics to them.

**37.** In the **Data Graphics** task pane, click the **Process 4** data graphic to apply it to all the selected, data-linked shapes in the diagram.

> **Tip** You can use more than one data graphic in your diagram; however, you can apply only one data graphic to a shape.

**38.** Click the pasteboard to deselect the shapes on the drawing page.

**39.** Press `Shift`+`Ctrl` while you drag a selection box around some of the shapes on the drawing page to zoom in on the shapes so you can see the data graphics applied to the shapes better.
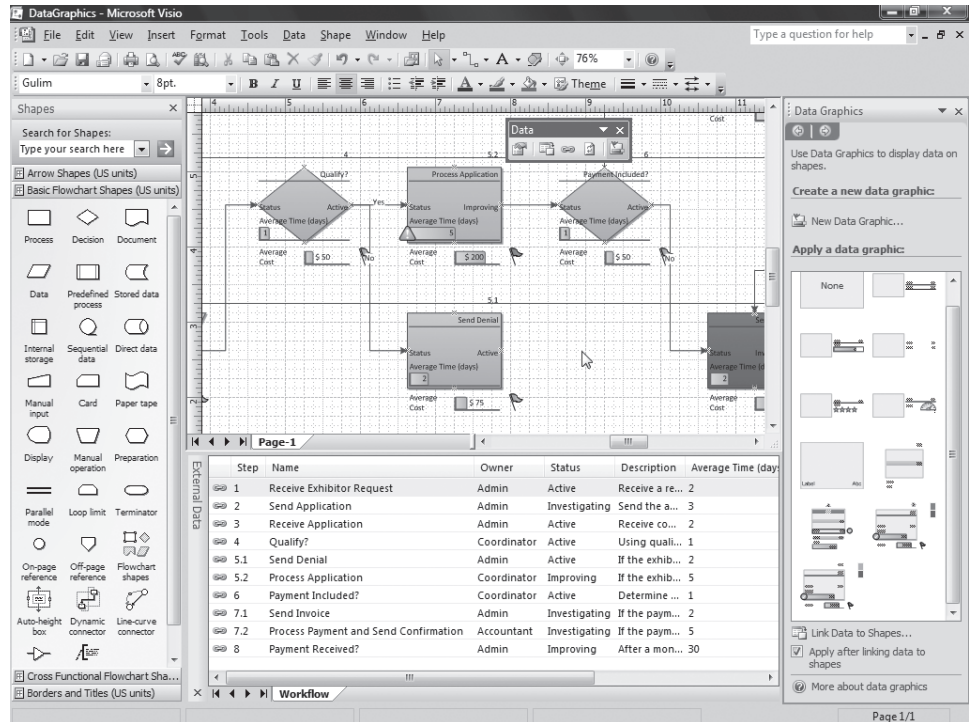
**40.** On the **File** menu, click **Save**.

**41.** On the **File** menu, click **Close**.

**CLOSE** the *DataGraphics* file.

# Refreshing Data in Diagrams

The final step in visualizing data in your diagram involves using the diagram to track data changes over time. With the new Data Refresh feature in Visio Professional 2007, you can automatically refresh the data linked to and shown in a Visio diagram and easily resolve simple data conflicts when the data in the data source changes. On the Data menu, just choose Refresh Data.

Refresh Data dialog box

Click Refresh to refresh the data in your diagram
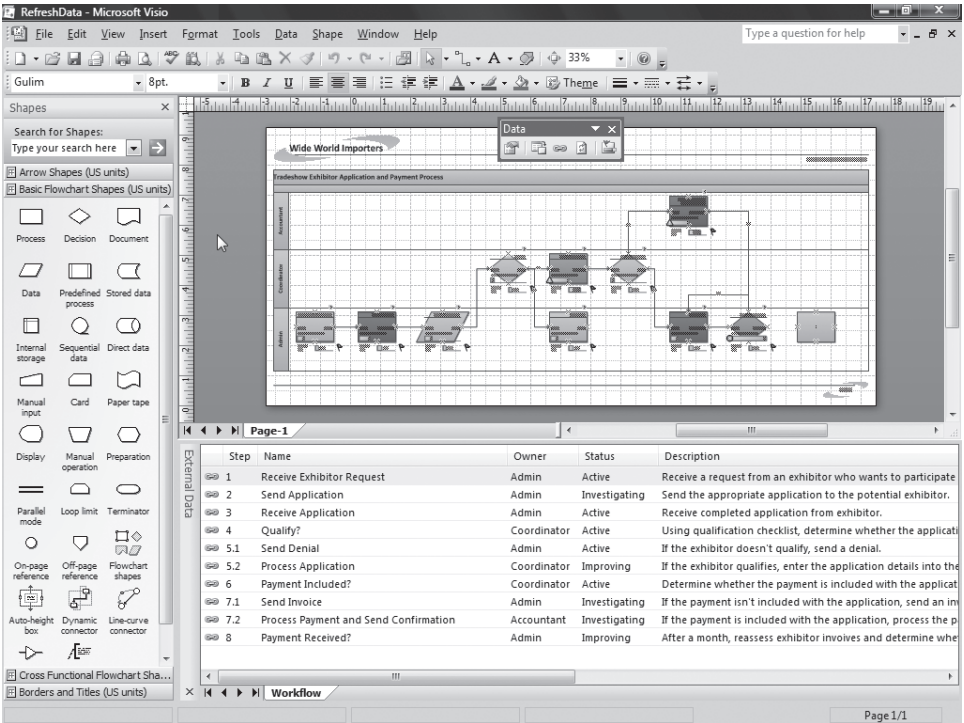
Data linked to the diagram
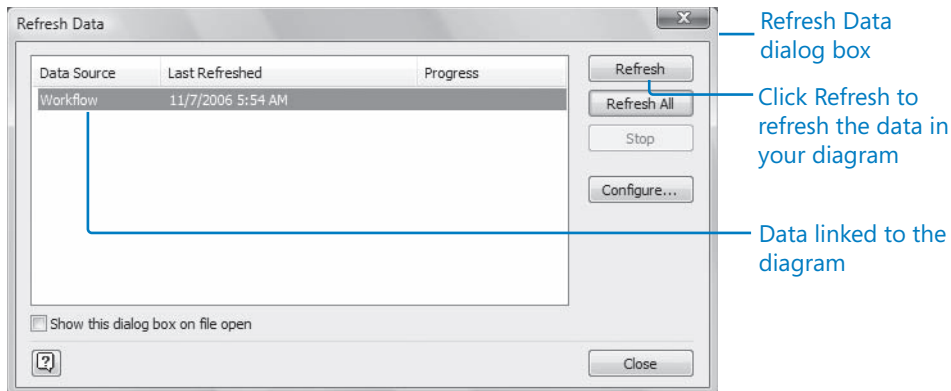
> **Tip** If data conflicts arise, resolve them using the Refresh Conflicts task pane. Data conflicts are usually caused by rows that were added or deleted in the data source since your diagram was created. You can't update the data source to which a Visio diagram is linked by making changes in the Visio diagram.

In this exercise, you refresh the data in the diagram, which is made necessary due to changes in the data source.

> **OPEN** the *RefreshData* file in Documents\Microsoft Press\Visio 2007 SBS\09_Data for this exercise.

1. On the **File** menu, click **Open**, navigate to the **09_Data** folder, and then double-click **RefreshData**.

   Visio Professional opens the cross functional flowchart, four stencils, and the External Data window, which shows the Workflow data linked to the diagram in spreadsheet form.

**2.** On the **Data** menu, click **Refresh Data**.

The Refresh Data dialog box appears and lists the data linked to the diagram.
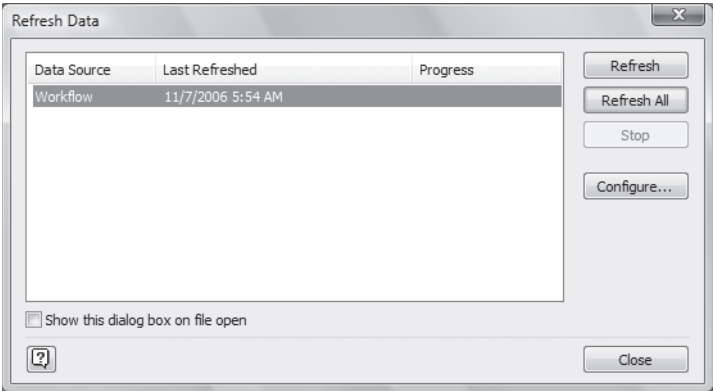
> **Tip** Visio Professional 2007 stores a copy of the data linked to the diagram with the diagram. So, after you link data to a diagram, you don't need to have the data source on your computer or even in the same location on your computer to simply show the data in a diagram or relink data to shapes in a diagram. However, if you want to re-fresh the data in the diagram, Visio Professional needs to connect to the data source. If you changed the location of the data source since you linked it to a diagram, you can reset the connection in the Refresh Data dialog box by clicking Configure. Then, in the Configure Refresh dialog box, click the Change Data Source button to change or reset the location of the data source.

**3.** In the **Refresh Data** dialog box, click **Refresh**.

> **Tip** To let Visio Professional determine whether the data source changed every time you open your diagram, check the Show This Dialog Box On File Open checkbox. You can also schedule data refresh to occur at fixed intervals. To schedule data refresh intervals, change the data source, or change the unique identifier for your data, in the Refresh Data dialog box, click Configure.

**4.** In the **Microsoft Office Visio Security Notice** dialog box, check the **Don't show this message again** checkbox if you don't want to see the message again, and then click **OK**.

Visio Professional updates the data in the diagram, and enters the Last Refreshed date and time and Progress information in the Refresh Data dialog box.
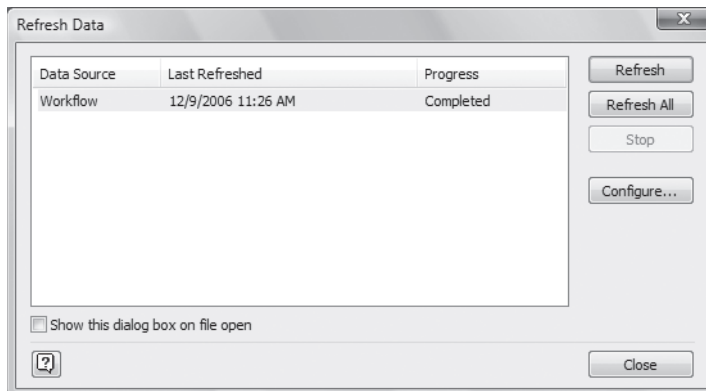


> **Troubleshooting** If you have any problems refreshing the data linked to your diagram, you can relink the diagram to the data source. On the Data menu, click Refresh Data. In the Refresh Data dialog box, click Configure. In the Configure Refresh dialog box, click Change Data Source. In the Data Selector wizard that starts, click Next. On the second page of the wizard, click Browse, navigate to the 09_Data folder, double-click AppPayWorkflow_Refresh.xlsx, and finish the wizard. Then, begin this procedure again.

**5.** In the **Refresh Data** dialog box, click **Close**.

Notice all the data graphic changes in the diagram due to refreshed data. Also, a new data row was added to the External Data window to reflect the current data in the data source. A link icon isn't displayed at the beginning of this new data row because the data row hasn't been linked to a shape yet.



**6.** Drag the new **Call Exhibitor** data row onto the last shape in the process.

Visio Professional links the Call Exhibitor data row to the shape, displays a data graphic with the shape, and adds a link icon to the beginning of the data row in the External Data window.
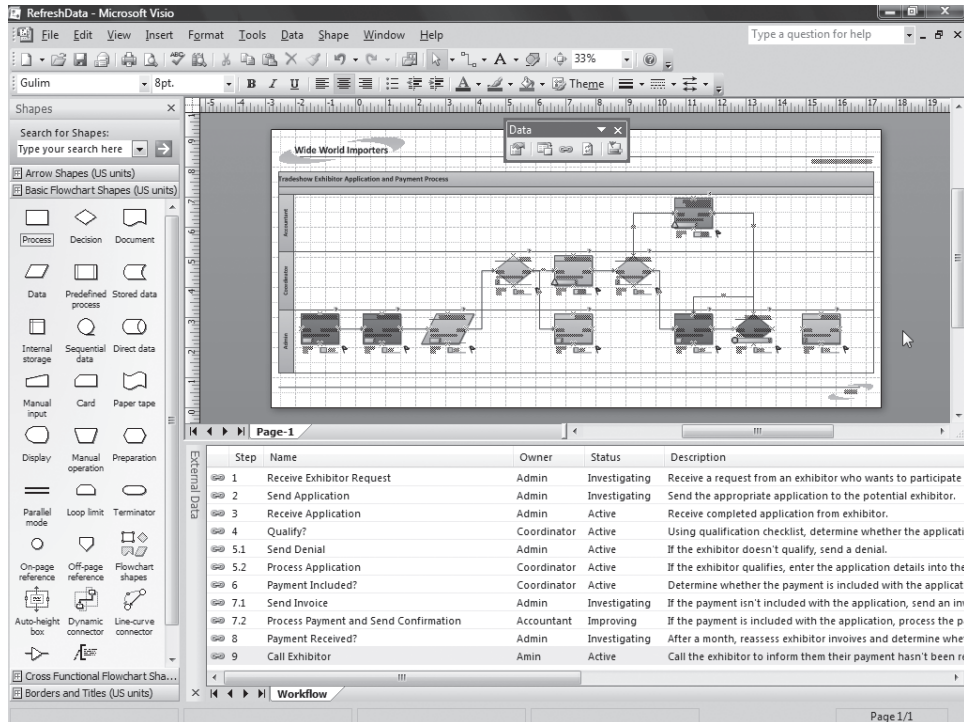
7. On the **File** menu, click **Save**.

8. On the **File** menu, click **Close**.

**CLOSE** the *DataRefresh* file.

# Key Points

- Visualize data in diagrams to provide a more complete picture of system, process, and so on.

- Visualize data in diagrams by first linking an existing diagram to a data source, and then linking data to shapes on the drawing page. And, if you prefer, you can modify the data graphic used to display the data to suit your needs.

- Link a diagram to one or more external data sources using the Data Selector wizard. On the Data menu, click Link Data to Shapes.

- View the data sources linked to the diagram in the External Data window. To open the External Data window, on the View menu, click External Data Window.

● To automatically link data to all the shapes or only the selected shapes in a dia-gram, on the Data menu, choose Automatically Link.

● Link rows of data—one at a time—to shapes that are already on the drawing page by dragging a row of data from the External Data window onto a shape in the diagram.

● Automatically place a shape on the drawing page and link it to a row of data by first clicking the shape—the one that you want to add to the diagram when you drag a row of data onto the drawing page—on the stencil in the Shapes window. Then, drag a row of data from the External Data window onto the drawing page. Visio Professional automatically adds the shape to the drawing page and links the shape to the row of data that you dragged onto the drawing page.

● View, modify, and create new data graphics on the Data Graphics task pane. To open the Data Graphics task pane, on the Data menu, click Display Data on Shapes.

● Modify a data graphic by right-clicking it on the Data Graphics task pane, and then clicking Edit Data Graphic on the shortcut menu.

● Create a new data graphic by clicking New Data Graphic on the Data Graphics task pane.

● Apply a data graphic to one or more shapes by selecting the shapes you want to apply the data graphic to, and then clicking the data graphic on the Data Graphic task pane.

● Refresh data in your diagram by clicking Refresh Data on the Data menu.