

iGrafx[®]2013

Tutorials

iGrafx® 2013 Tutorials

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AIAG Tables 2, 3, and 4 from Chao, L.P., and Ishii, K., (2004), "Challenges and Methods in the Quantification of Design Errors and Solution Elements," Proceedings of the ASME International Mechanical Engineering Congress and Exposition, November 2004, Anaheim, CA. IMECE2004-59190, © 2004 ASME, used with permission by ASME.

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iGrafx Tutorials

These tutorials may help you get started with basic diagramming, modeling, and analysis tasks if you are new to iGrafx. Some tutorials build on the first tutorial, Create a Process Map, so be sure you are familiar with the concepts in that tutorial before you begin another tutorial. If you cannot finish all the tutorials in one session, save your work. On the *File* menu, choose *Save As* and choose a different file name.

In addition to these tutorials, the iGrafx client *Help* menu provides reference and other information. On the *Help* menu, choose *iGrafx Help*. Quick reference guides and other materials are on the **iGrafx web site**.

iGrafx is designed for Microsoft® Windows® and uses Office standard toolbars, icons (tools), and menus to access commands such as Open, Save, Print, Undo, and Spelling.



Tutorials

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Create a Process Map

From the iGrafx QuickStart dialog box, click the Process, and choose Cross-Functional Process. If you have already closed the QuickStart dialog box, on the *File* menu, point to *New*, click on the Process category, click Cross-Functional Process template, and click OK.

If you use this tutorial in electronic form, you can tile the application and Tutorial windows. If you print this tutorial, or have multiple monitors, you can maximize the iGrafx application window for more work space.

Tutorial Tasks

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Place Shapes (Activities)

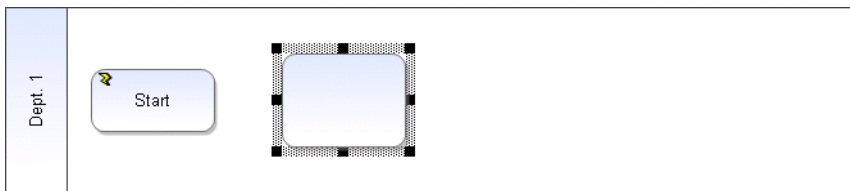
The Cross-Functional Process template includes a Start shape and a Swimlane® (Dept. 1) in the new diagram.

Place a rectangle (activity) in the diagram:

- 1 Click the rectangle (Activity) shape on the Toolbox toolbar.
- 2 Move the cursor into the diagram.
- 3 The cursor changes to the placement cursor:



- 4 Press and hold the left mouse button while you move (a.k.a. Click and drag) the mouse to place the shape to the right of the Start shape in the diagram, then release the mouse button when the shape is where you want it.



If you make a mistake while editing, click the undo tool (Standard toolbar or Edit menu). To delete a shape, select it, then press the Delete key.



The iGrafx auto-sensing feature changes the cursor to the selector and line drawing tool and remembers the shape you were placing so that you can quickly move shapes, draw lines, and select objects, then return to placement mode when you click in empty space.

- 5 Click in empty space, then place the cursor over the existing rectangle shape. The cursor changes to the place and connect cursor:



- 6 Click and drag (press-hold-drag the mouse) from inside the first shape you placed to the right of the department boundary, and release the mouse button.

Leave the shape you just placed selected.



Apply a Color Theme to the Diagram

By default, department name areas, shapes, graphics, and phase name areas apply a color fill from the theme; the department process areas are not filled.

- 1 On the *View* menu, choose *Themes*.
- 2 In the Themes window, click a color theme.

To change the default settings of how themes are applied in your diagram:

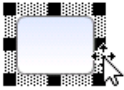
- 1 In the Themes window, click **Setup Diagram Colors**.
- 2 In the Setup Diagram Colors dialog box, select a check box and change the theme color in the drop-down list to apply color settings to diagram objects. If you want to apply colors to one object at a time, you can select the object and from the Format menu, choose Fill.

Objects that have been set to a theme color will be updated with a new color if a different theme is selected. Objects that have been set to Automatic, None, Standard Colors or Custom Colors will retain these settings regardless of the theme.

Move and Grow Shapes

Adjust the placement of shapes by moving them:

- 1 Click the right-most rectangle shape if it is not already selected.
- 2 Place the arrow cursor directly on one of the light gray stippled border areas (but not a corner) of the selected outline of the shape. The cursor changes to indicate it can be used to move a symbol:



- 3 Click and drag the shape to try moving it around, but return it to its position on the second page (to the right of the vertical dashed line).

Grow a shape:

- 1 Click the shape if it is not already selected. If necessary, press the Esc key to temporarily leave another mode.
- 2 Place the cursor on a dark square at the corner of the selected outline. The cursor changes to a double-headed arrow.
- 3 Click and drag the grow handle to a new location.

A shape outline indicates how the shape grows.

Place Decision Shapes

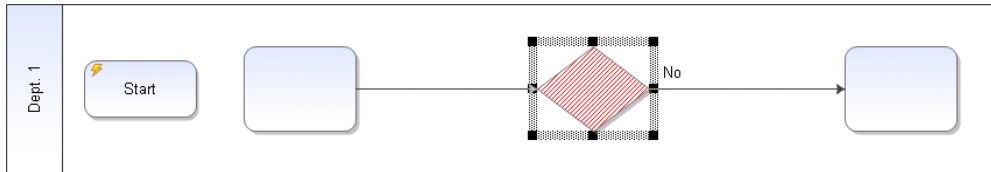
Place a diamond (intelligent decision) shape in the diagram:

- 1 Click the diamond shape in the Toolbox toolbar.
- 2 Move the cursor into the diagram.

The cursor changes to the placement cursor.

- 3 Click and drag the outline of the decision shape to place it on the connector line between the two Activity (rectangle) shapes.

Connector lines are automatically created with decision case labels on decision shapes. By default, the first line drawn from a diamond is labeled No and the second is Yes. You can define your own label text.

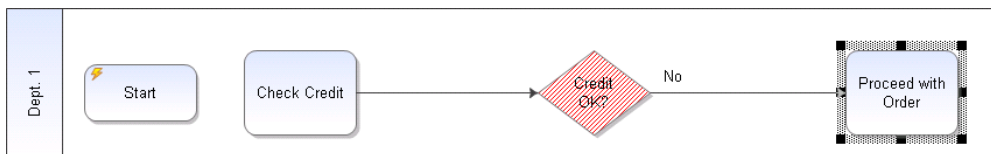


If your lines aren't straight, try moving a shape. You may also select multiple shapes (use the Ctrl or Control key and click) and on the *Arrange* menu, choose *Align*.

Place Text in Shapes

Label the shapes:

- 1 For each shape, click to select the shape and type text as shown below.
- 2 Click the selector tool on the Toolbox toolbar or press the Esc key to leave text entry mode when you are finished.

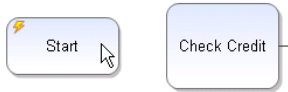


Connect Shapes

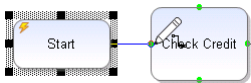
Within a process diagram, shapes represent steps of the process. Connected shapes can show the flow of the process.

Connect the remaining shapes:

- 1 Click the selector tool in the Toolbox toolbar if it is not currently active. If necessary, press the Esc key to temporarily leave another mode.
- 2 Move the cursor inside the Start shape boundary, near the right side.



- 3 Press-and-hold the mouse button and drag to the inside of the left side of the **Check Credit** shape



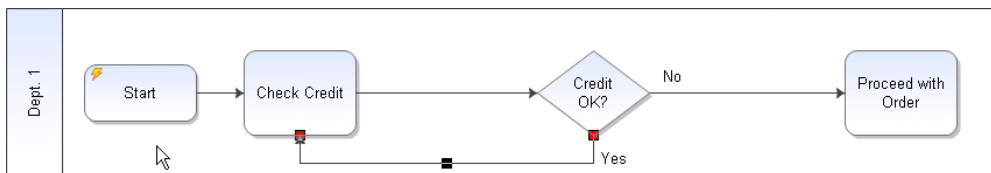
- 4 Then release to draw the connector line. The press-hold-release action is also known as Click and drag.



To delete a connector line, select it and press the Delete key.

Connect the bottom of the decision back to the Check Credit rectangle:

- 1 Move the cursor inside the diamond shape boundary.
- 2 Press-hold-release (Click and drag) slightly inside the bottom of the **Check Credit** shape.



Change Output Labels:

- 1 Right-click over the No text label next to the decision.
- 2 Choose “Yes” on the context menu.

iGrafx automatically changes the other label from Yes to No when you change this label.




To change the connector line text to a label other than Yes or No, right-click the diamond shape and choose *Properties* to get the Properties dialog box, click the Guide page (in the Shape category), and change the text from No and Yes to whatever labels you want. Click the Add button to add more decision paths. You may also edit these properties on the Outputs page of the Properties dialog box.

Add Departments

Departments in iGrafx can represent many things, like resource specialization and cost centers.

Add departments to the diagram:

- 1 Click the selector tool, then click empty space in the diagram to clear object selection.
- 2 Click the Department tool  on the Toolbox toolbar and choose Insert Department.
- 3 Type the department name “Credit” and leave the location as Top Level.
- 4 Click the Apply button. The Credit department (Swimlane) is added below Dept. 1.
- 5 Type the department name “Sales” and click OK.

You now have three departments: Dept. 1, Credit, and Sales.

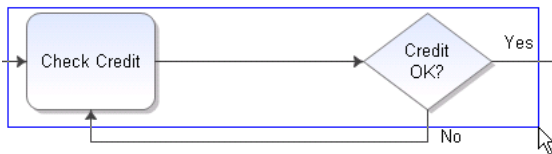
Rename Departments and Move Shapes between Departments

Rename departments:

- 1 Ensure the selector tool is active.
- 2 Click to select the department name area labeled **Dept. 1** and type “Customer.”
- 3 Click in empty space in the diagram to clear object selection.

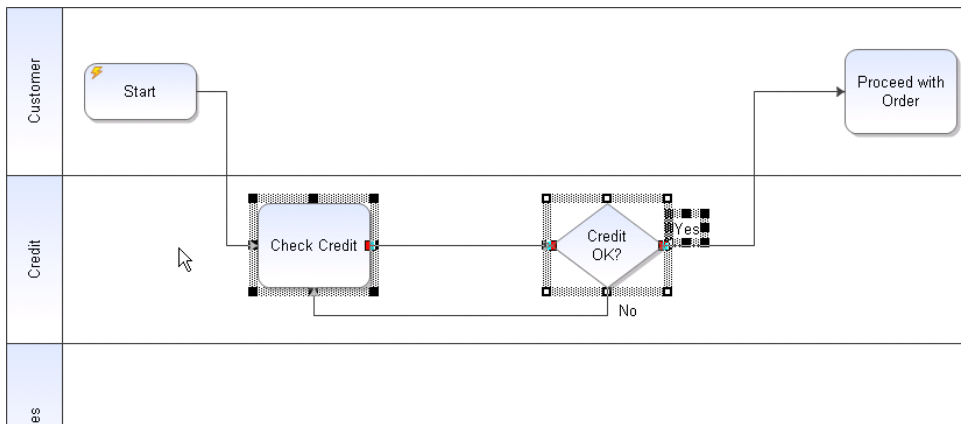
Lasso select shapes:

- 1 Ensure the selector tool is active.
- 2 Place the cursor *above and to the left* of the **Check Credit** shape. Do not click on the shape.
- 3 Press-hold-release (Click and drag) to *below and right* of the **Credit OK?** shape so that the blue selection box is drawn completely around the objects.



Move the selected shapes into the Credit department:

- 1 Place the cursor over the light gray border of one of the shapes.
- 2 Move (drag) the selected shapes into the Credit department.



The department automatically resizes to accommodate shapes.

Create Cross-Department Activities

Normally, departments expand to accommodate shapes, but you can model an activity that spans across (involves) multiple departments.

Create a cross-department activity:

- 1 Select the **Proceed with Order** shape.
- 2 Press and hold the Ctrl (Control) key and place the cursor over a dark square on the bottom of the shape.



The cursor changes to the cross-department cursor.

- 3 Click and drag to expand the shape across *all three* departments *while holding the Ctrl key*. Release the mouse button *before* you let go of the Ctrl key.



Your connection lines may no longer be straight. To straighten a connector line, select it and then move the endpoints by dragging the square at the endpoint to a new location. You can also simply delete and re-draw the line.

Exclude a department from a cross-department activity:

The Credit department is not involved in the activity.

- 1 Double-click the cross-department shape
or
Right-click and choose Properties.
- 2 Click the Task page in the Properties dialog box.
- 3 On the Step tab, click the Exclude Depts. button.
- 4 Click Credit in the Departments list, then click the Yes button to exclude the department.
- 5 Click OK on each dialog box to save changes and dismiss the dialog box.

The excluded department (Credit) displays a dashed outline.

Customize the Shapes on the Toolbox Toolbar


By default, three shapes are available on the Toolbox toolbar. You can add or delete shapes in the toolbar at any time.

- 1 Click the right arrow underneath the decision (diamond) shape in the Toolbox toolbar.
- 2 Click the Shape Library button.
- 3 Click the Add Shapes button in the Shape Library dialog box.
The shape palettes display on the right-hand side of the dialog box.
- 4 Click a shape, and then click the Add button to add it to the Shape Library.
The check mark next to the shape indicates it is visible on the Toolbox toolbar.
- 5 Click the Close button.

Specify Automatic Numbering

iGrafx numbers shapes in the order they were placed in the diagram. You can use the Auto Renumber and Manual Renumber tools to number the shapes in any order. iGrafx does not create duplicate numbers.

Display shape numbers:

Click the Shape Numbering  tool in the Toolbox toolbar and choose Show All Shape Numbers. To renumber shapes, click the Shape Numbering tool, choose Auto Renumber, choose a Renumber Style (e.g. By Flow through Diagram), and click OK.

Create Hierarchy (Links to Diagrams in the Same File)

You can easily capture top-down processes and drill down into successive levels of detail in connected diagrams.

Create a subprocess for the Check Credit activity shape:

- 1 Right-click the **Check Credit** shape and choose *Add Subprocess*.

Note: You may instead use the Properties dialog box. To do so, do the following:

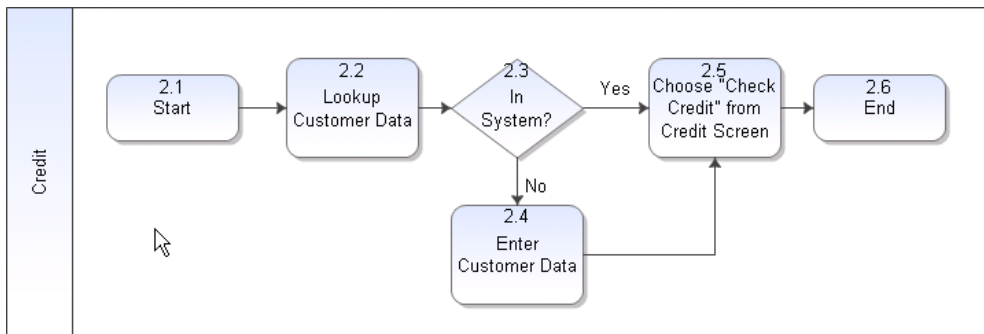
- Double-click the shape (or right-click on it and choose *Properties*).
- In the Properties dialog box, click the Guide page under the Shape category.

- From the Activity Type drop-down list, choose Subprocess.
 - Click the New button.
 - Follow the steps below.
- 2 Type “Check Credit” in the New Component dialog box.
 - 3 Click OK on all open dialog boxes.

The **Check Credit** subprocess displays.

Optional: Create the Subprocess

For more practice, draw the diagram below using the steps in prior sections (you may delete departments you do not need by clicking on them to select them and then clicking the Delete key).



This process is shown in Landscape page layout, which is the default. If you want to change this, on the *File* menu, choose *Page Setup* and click the Page tab to choose another layout.

- 4 Close the Check Credit Subprocess **diagram** window.

You may have multiple diagrams in a single file. You can use the Document Components window (on the *View* menu, point to *More Windows* and choose *Document Components*) to view all of the components of the file, or even the hierarchical structure of the diagrams.

Create Links to External Files

Link to a file created in another application:

- 1 Select the Start shape on your Process1 diagram.
- 2 On the *Insert* menu, choose *Link*.
- 3 In the Add Link dialog box Link to section, click the File or Web Page button in the “Link to” section on the left.
- 4 Click the web page icon. This may display your web browser so you can find a web page. Close the browser when you have displayed the page you want, and the path (URL) to the page will be entered for you. If a path is not entered, type or paste one in. For example, you could type <http://www.igrafx.com/>
- 5 Click in the Key Modifiers box and press the Ctrl key, the Shift key, the Alt key, or a combination of those keys.

This designates a special keystroke that you will use with double-click to view the linked file.

- 6 Click and type a description in the Description box, if necessary, then click OK.

The shape now has a link, indicated by an icon that represents the default browser on your machine. If you create multiple links, a default link icon is used.

Activate (follow) the link:

Right-click on the shape and choose the link you created.

or


Press and hold the key you designated as a key modifier (e.g. the Ctrl key) and double-click the shape to view the linked web page.

If you have iGrafx Process Central, you should add data (such as word processing files and spreadsheets) into the repository, and then link to data in the process central repository, so that links always work, even if the data is moved or renamed.

Add Notes

Make a note of what the linked data is and why it's referenced:

- 1 Select the Start shape, if necessary.
- 2 On the *View* menu, choose *Note*, or press the F6 key.
- 3 In the note window, type "Work Instructions and form for this step."
- 4 Close the Note window.

A default icon  on the shape indicates a note.

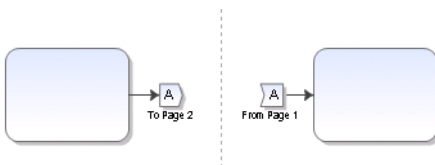
Place your cursor over the shape to see the note text in a ToolTip. (To activate ToolTips display on notes, on the *View* menu, choose *Note Tooltips*.)

View Off-Page Connectors

Add off-page connectors for a process that spans multiple pages:

- 1 On the *Format* menu, choose *Diagram*.
- 2 Click the Off-Page Connectors tab.
- 3 Select the Automatic Connectors check box and the Include Page Number check box.
- 4 Choose the shape you want for your offpage connector (e.g. Directional).
- 5 Click OK.

The off-page connectors now display at every page boundary. The following picture shows a generic example of off-page connectors:



Page boundaries are indicated by the dashed gray page break lines (not to be confused with the dashed phase lines). If necessary, zoom out far enough to see the page boundaries.

Scale a Page for Print Output

Fit the diagram to a certain number of pages of a specific size:

- 1 On the *File* menu, choose *Page Setup*.
- 2 Select the Page tab, if it is not already selected.
- 3 In the Scaling section of the dialog box, click the **Fit to** option and enter 1 page(s) wide by 1 tall, then click OK.

The page connectors automatically disappear because the complete diagram now prints on a single page.

Published Output

You can easily publish diagrams to a web format that any internet browser can view, or to Adobe® Acrobat® PDF or Microsoft® Office Word or PowerPoint® format for viewing without iGrafx. You may also install the iGrafx Viewer® to view iGrafx data.

If you have Process Central, repository items may be viewed with Web Central®.

Publish as PDF:

- 1 On the *File* menu, point to *Publish As* and choose *PDF Document*.
- 2 Change the publishing options if desired (click the Help button if you want help with the features), and click OK.
- 3 Click Yes when iGrafx prompts you to open the new document.

Your PDF reader (e.g. Adobe® Acrobat Reader®) opens and displays one page with a picture of the process, showing the header and footer information defined by Page Setup.

Create Lean Value Stream Map Diagrams

Lean value stream map (VSM) diagrams and data have unique terminology. This tutorial assumes that you are familiar with Lean terms. It is also helpful to review iGrafx Help system documentation on Lean terms and calculated data.

In this tutorial, first you set the overall VSM properties that control options for the map, then you draw the diagram, enter and customize data, and export data.

Tutorial Tasks

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| “Set Lean VSM Properties” on page 16 |
| “Create a Lean VSM” on page 19 |
| “Create Hierarchy in a Lean Value Stream Map” on page 23 |
| “Customize Data Entry” on page 24 |
| “Export VSM Data” on page 25 |

Set Lean VSM Properties

The Lean VSM properties control analysis and display options for the VSM.

The Timeline tab of the Value Stream Map Properties dialog box controls display of calculated values and other analysis information.

Start a new document and set up Lean VSM properties:

- 1 On the *File* menu, point to *New*, choose the Value Stream Mapping category, and then choose *Lean Value Stream Map* template to open a new Lean VSM diagram using the template (starting point) built into iGrafx.
- 2 On the *Lean* menu, choose *Value Stream Map Properties*. The Value Stream Map Properties dialog box appears.

- 3 Click the Setup tab, click the Use Custom option for Available Work Time, and change or choose settings to match those shown here:

The image shows a software dialog box titled "Diagram Properties - Map1". It has a sidebar on the left with a tree view containing "Diagram", "Custom Data", "Risks", "Measurements", "Lean Timelines", "Timeline1" (selected), "Enterprise", and "Describes". The main area has three tabs: "Setup", "Timeline", and "Graph". The "Setup" tab is active and contains the following settings:

- Available Work Time:** ☒ Use Custom
- Hours Per Shift:** 8
- Break Minutes Per Shift:** 20
- Shifts Per Day:** 2
- Days Per Week:** 5
- Days Per Month:** 20 = 4 weeks

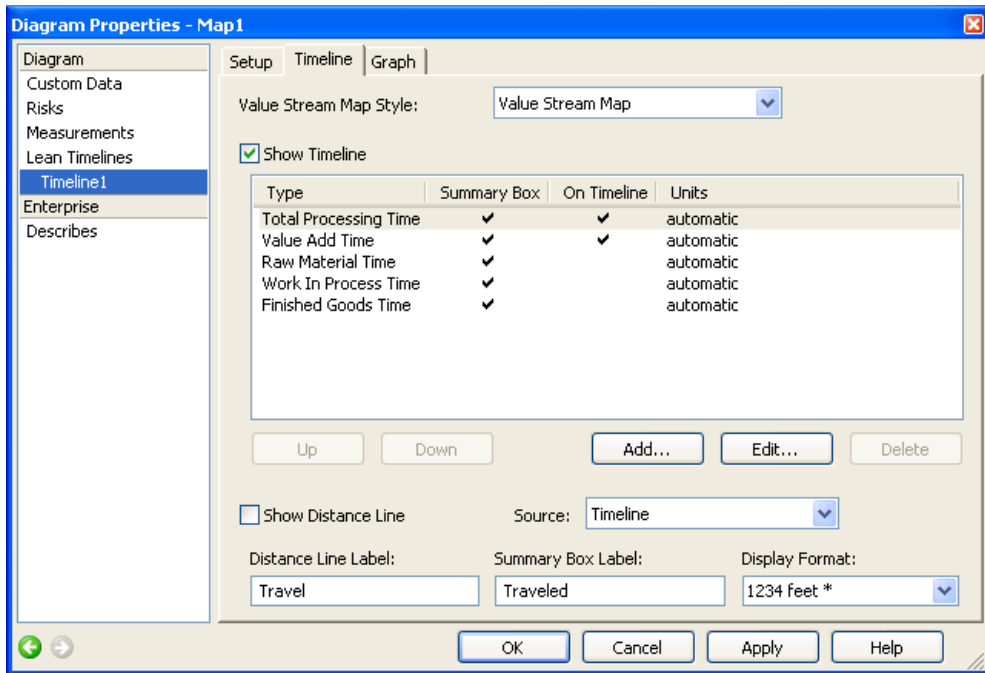
Below these is the **Takt Time** section:

- Customer Demand:** 18400 / Month = 60 seconds / piece
- Display Format:** 60 seconds
- ☐ **Takt Goal:** Percentage 90 %

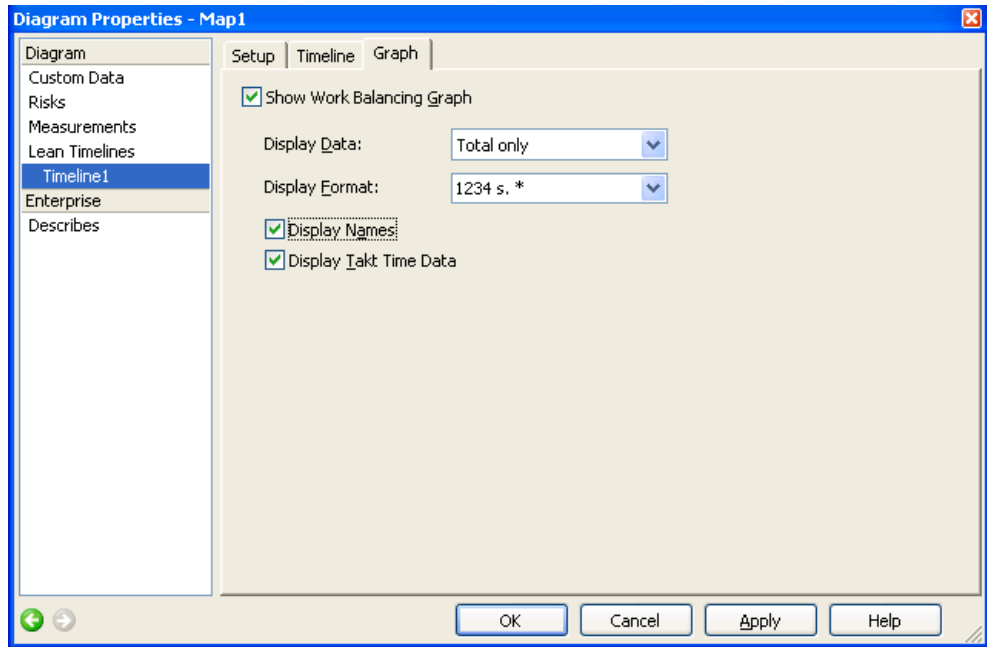
At the bottom, **Inventory Lead Time:** is set to "Based on Takt Time". At the very bottom are buttons for "OK", "Cancel", "Apply", and "Help".

When you set Customer Demand to 18,400 pieces with the given Available Work Time settings, iGrafx calculates a Takt Time of 60 seconds per piece. Takt Time is how often you should produce your product or service, and synchronizes the pace of production with customer demand. Note that you can set the units for Takt Time as well.

- 4 Click the Timeline tab of the Value Stream Map Properties dialog box. Properties shown here display on the Timeline.




- 5 Click the Graph tab and choose properties shown here to display on the Work Balancing Graph.



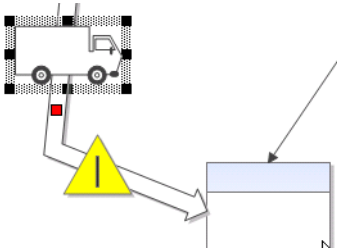
- 6 Click OK to save your choices and close the dialog box.


Create a Lean VSM

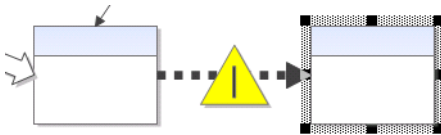
Place shapes and lines, and label shapes:

- 1 Open the VSM Standard shape palette from the Shape Palettes window. If the Shape Palettes window is not visible, press the F9 key or, on the *View* menu, choose *Shape Palettes*.
- 2 Click the Truck  graphic.
- 3 Move your cursor into the diagram space so it changes to the placement cursor.
- 4 Click and drag the outline of the shape, placing it on the line at the left of the diagram, between the Supplier factory shape and the inventory triangle (see picture below).

- 5 Click and drag the attachment point (the red dot in the middle of the truck) onto the line. This section of your diagram may now look like this:



- 6 Click the Process  shape in the Toolbox toolbar.
- 7 Move your cursor over the first Process step, and the cursor changes to the place and connect cursor.
- 8 Click and drag from the first Process step to the right. This section of your diagram may now look like this:

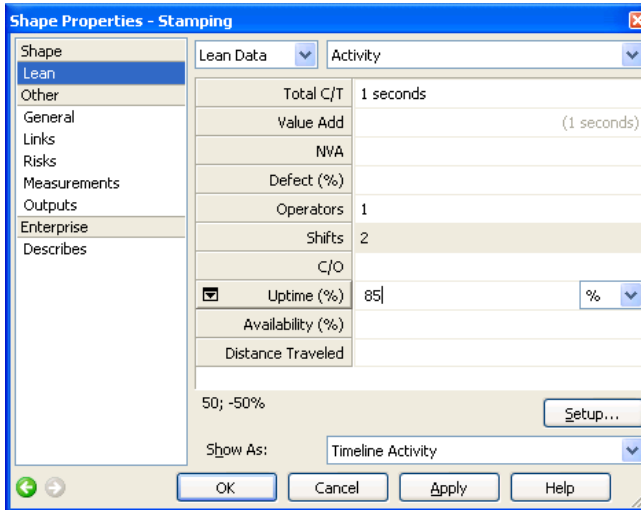


The default push line automatically places an inventory shape on the line. Current state processes usually push product independent of demand and create inventory.

- 9 Click the first Process shape to select it.
- 10 Type “**Stamping**” to rename the Process step (shape).
- 11 Click the next step and name it **Weld 1**.
- 12 Press the Esc key to exit text mode, or simply click in whitespace where there are no objects.

Enter basic process data:

- 1 Right-click and choose *Properties* (or double-click) the **Stamping** shape to display its properties
- 2 In the Properties dialog box, click the Lean Data page and set the values and units of time shown here (you may use the Tab key to move to a new field):



The image shows a software dialog box titled "Shape Properties - Stamping". On the left is a tree view with categories: Shape, Lean (selected), Other, General, Links, Risks, Measurements, Outputs, Enterprise, and Describes. The main area is divided into two panes. The top pane, labeled "Lean Data", contains a table with the following fields: "Total C/T" (1 seconds), "Value Add" ((1 seconds)), "NVA", "Defect (%)", "Operators" (1), "Shifts" (2), "C/O", "Uptime (%)" (85 with a percentage dropdown), "Availability (%)", and "Distance Traveled". Below this table is a status bar showing "50; -50%" and a "Setup..." button. The bottom pane, labeled "Show As:", has a dropdown menu set to "Timeline Activity". At the bottom of the dialog are four buttons: "OK", "Cancel", "Apply", and "Help".

| Lean Data | |
|--|-------------|
| Total C/T | 1 seconds |
| Value Add | (1 seconds) |
| NVA | |
| Defect (%) | |
| Operators | 1 |
| Shifts | 2 |
| C/O | |
| <input checked="" type="checkbox"/> Uptime (%) | 85 % |
| Availability (%) | |
| Distance Traveled | |

50; -50% Setup...

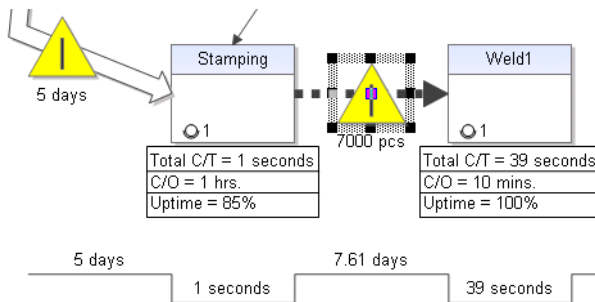
Show As: Timeline Activity

OK Cancel Apply Help

Information such as the number of Shifts is automatically filled in (inherited) from the Value Stream Properties dialog box settings. If you want to customize the data names to match your specific needs, click the Setup button.

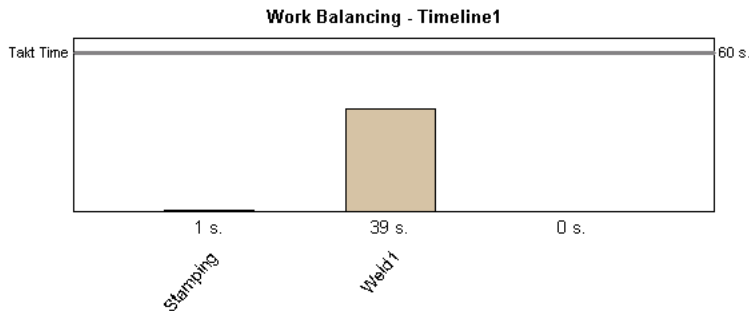
- 3 Click on the Weld 1 step and set the value of Total C/T to 39 seconds, 1 Operators, C/O of 10 minutes, and Uptime (%) of 100.
- 4 Click the inventory triangle to the *left* of the Stamping step, and for Inventory Time type 5 and choose days for the units.
- 5 Click on the inventory triangle between Stamping and Weld 1, and for the Pieces enter 7000.

- 6 Click OK to save your changes and close the dialog box. This section of your diagram may now look like this:



The timeline automatically calculates and displays the lead time (value-added and non-value-added time) data on the timeline!

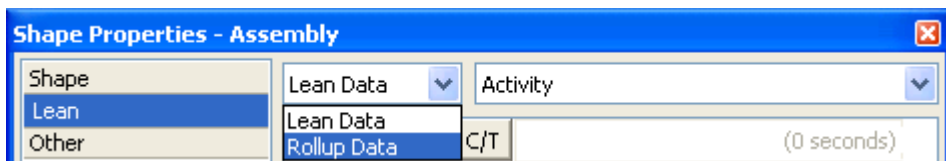
The Work Balancing graph also updates to show the Total C/T of each step and its relationship to Takt Time:



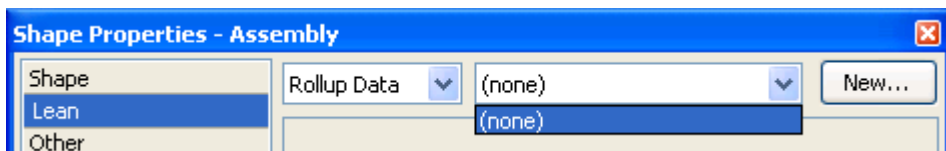
Create Hierarchy in a Lean Value Stream Map

A typical value stream map (VSM) begins with the overall facility, but you can drill down into a step in the overall VSM to create a VSM for a particular area and a parent/child hierarchy between the two VSMs. You can also roll up data to the parent VSM.

- 1 Add a step called Assembly and double-click it. The Properties dialog box appears.
- 2 Click the data mode drop-down menu at the top left, that currently says Lean Data, and change it from Lean Data to Rollup Data.

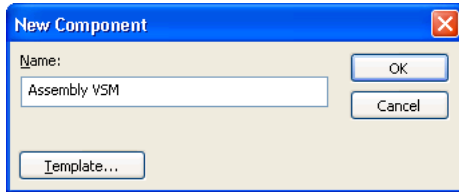


- 3 Now you would have the option to choose other VSMs if they existed already in the document, or you may create a new VSM.

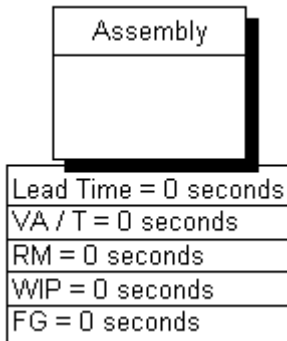


- 4 Click the New button to create a new child VSM.

- 5 In the New Component dialog box, enter “Assembly VSM” for the new VSM name.



- 6 Click OK. The timeline data displays with default values in the Properties dialog box.
- 7 Click OK to close the Properties dialog box. A drop shadow appears on the process step to indicate a hierarchical link to another VSM.



Customize Data Entry

You can customize the data entry fields to meet your needs. For example, you want to track pieces of inventory for left-hand (L) and right-hand (R) configurations of steering columns

Set up and display custom data fields:

- 1 Double-click the inventory triangle between **Stamping** and **Weld 1** to display its Properties.
- 2 On the Lean Data page, click the Setup button in the lower-right corner of the dialog.
- 3 In the Setup Custom Data dialog box, click to select Pieces in the Custom Data list.
- 4 Click the Rename button and type “Left” for the name.
- 5 In the Display As field, select the text that says pcs and change it to L.
- 6 Click the New button and type “Right” for the new custom data name.
- 7 In the Lean Types drop-down list, choose Inventory Amount.
- 8 Change the Display As field to display %v R.
- 9 Click the Up button (in the lower-left corner of the dialog box) enough times to move the new data field named Right to below the Left field.
- 10 Click OK to save your changes and close the Setup Custom Data dialog box.
- 11 In the Properties dialog box, give the Left field a value of 4600 and the Right field a value of 2400, then click OK. The inventory triangle should now look like this:



Export VSM Data

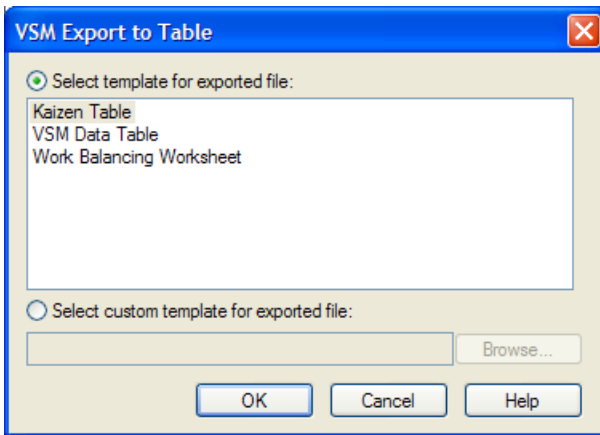
You can export the data you’ve entered into your value stream map to Microsoft® Excel®.

Export all your VSM data to Excel:

We will now export all of the data in our VSM to Excel (this requires Microsoft® Excel® to be installed on your computer):

- 1 On the *Lean* menu, choose *Export VSM Table to Excel*.

The VSM Export to Table dialog box appears:



- 2 Choose the VSM Data Table template and click OK.

Excel starts (if it was not already started), and displays a worksheet with the information you asked iGrafx to export. You may now use Excel functionality to perform calculations or to do other analysis.

Process Behavior Models

During simulation, iGrafx gathers statistics on resource utilization, cycle (lead) time, costs, capacity, and other pre-defined and customizable statistics.

A Process model consists of activities (shapes), resources, and rules that govern process behavior. Transactions arrive at the input of an activity from a generator, or can be generated at a shape directly, and resources may perform a task on each transaction. When the task is completed, the transaction is output (passed on to) the next activity through a connector line.

This tutorial is a review of the behavioral modeling features of iGrafx FlowCharter. See What-If Analysis and Simulation for the what-if capabilities of simulation in iGrafx® clients that have simulation capability (e.g. iGrafx Process for Six Sigma).



The next two tutorials build on the concepts completed in this tutorial. If you want to use the What-If Analysis and Simulation and Six Sigma Analysis: Interface with a Statistical Application tutorials, we recommend you review this Process Behavior Modeling tutorial.

Tutorial Tasks

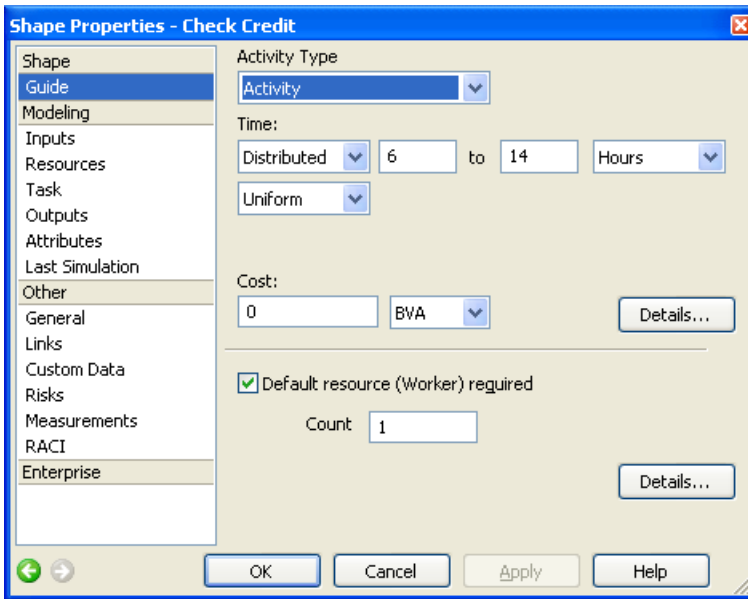
| |
|---|
| “Specify Activity Task Duration” on page 27 |
| “Specify Activity Resources” on page 30 |
| “Specify Department Resources” on page 31 |
| “Choose Generators” on page 32 |
| “Specify Run Setup” on page 32 |

Specify Activity Task Duration

Set a Distributed duration:

- 1 Open the ACME_Order (ACME_Order.igx) Sample file (available on the iGrafx.com website), if not already open.
- 2 Right-click the shape (activity) labeled Check Credit and choose Properties.

- 3 Click the Guide page in the Shape category (if not already selected); this is also known as the Process Guide or the Shape Guide.



The image shows a software dialog box titled "Shape Properties - Check Credit". On the left is a vertical sidebar with a tree view containing the following items: Shape, Guide (highlighted), Modeling, Inputs, Resources, Task, Outputs, Attributes, Last Simulation, Other, General, Links, Custom Data, Risks, Measurements, RACI, and Enterprise. The main area of the dialog is divided into sections. The "Activity Type" section has a dropdown menu set to "Activity". The "Time:" section includes a dropdown set to "Distributed", a text box with "6", the word "to", a text box with "14", and a dropdown set to "Hours". Below this is a dropdown set to "Uniform". The "Cost:" section has a text box with "0", a dropdown set to "BVA", and a "Details..." button. A checkbox labeled "Default resource (Worker) required" is checked. Below it is a "Count" label and a text box with "1", followed by another "Details..." button. At the bottom of the dialog are four buttons: "OK", "Cancel", "Apply", and "Help".

In this page, you enter information about the duration time of the activity, resource usage, additional cost per transaction, and value classification. For example, the duration can be based on an average, and identical for every transaction processed.

Set a Constant duration:

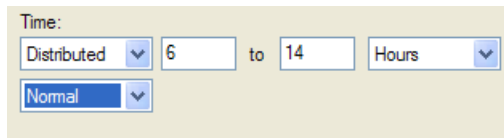
- 1 From the Time drop-down list, choose Constant (instead of Distributed).
- 2 Type the number “10” in the duration field to the right of the Time drop-down.

Maybe the duration time is best defined as distributed between two values. For example, the duration of this activity for each transaction could vary randomly between 6 and 14 Hours, with a Normal or bell-curve distribution. In this case:

- 1 From the Time drop-down list, choose Distributed.



iGrafx remembers that this step had 6 in the first box (minimum), and 14 in the second box (maximum).

- 2 Choose Normal (in the drop-down list that currently says Uniform, under the drop-down that says Distributed).



The duration can be defined as an expression where the time span is defined by one of many built-in functions.

Define powerful durations using statistical functions:

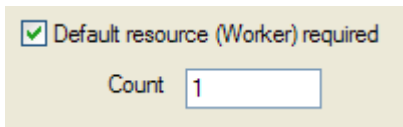
- 1 From the Time drop-down list, choose Expression.
- 2 Click the Expression Builder button , in the text box to the right of the Time drop-down list.
- 3 Click the $f(x)$ button  in the Expression Builder dialog box.
- 4 Scroll the list of possible functions that can be used in the Paste Function dialog.
- 5 Notice that the Normal distribution (NormDist) is one of many functions available.
- 6 Click Cancel (to exit the Paste Function dialog box w/out saving changes).
- 7 Click Cancel (Expression Builder).

Reset the duration time back to **Distributed**:

- 1 From the Time drop-down list, choose **Distributed**. It displays the proper time distribution of 6 to 14 Hours and remembers our last choice of **Normal** vs. **Uniform**.
- 2 Leave the Properties dialog box visible.

Specify Activity Resources

For each activity, you specify the resources the task requires to process a transaction. By default, one resource is assigned for the activity, but you can change the number of resources in the **Default resource (Worker) required** section of the Process Guide. Note that (Worker) is the name of the default resource for this department, and may be different if you have added the department from the resource model.



☒ Default resource (Worker) required


Count

- 3 Click **Cancel**, to cancel your changes (we did not end up making any changes) and close the Properties dialog box.

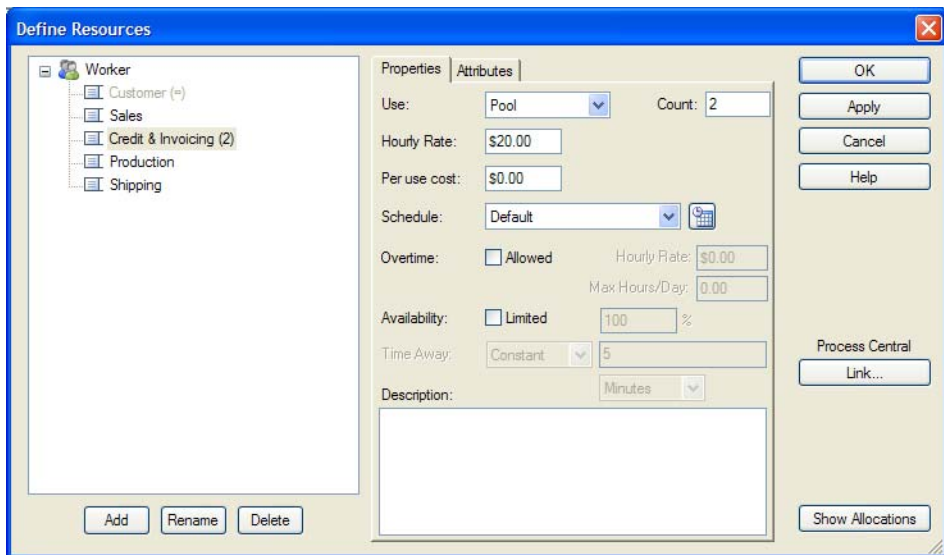
Specify Department Resources

You can view the resources available to the departments within the process.

- 1 On the *Model* menu, choose *Resources*.

You can also click the Resources button  on the Modeling toolbar.

- 2 Click the Credit & Invoicing resource to view cost and count data on the Properties tab of the Define Resources dialog box:



The 'Define Resources' dialog box is shown with the 'Properties' tab selected. On the left, a tree view under 'Worker' lists 'Customer (=)', 'Sales', 'Credit & Invoicing (2)', 'Production', and 'Shipping'. The 'Credit & Invoicing (2)' resource is selected. The right side of the dialog contains the following fields and controls:

- Use:** Pool (dropdown), **Count:** 2 (text box)
- Hourly Rate:** \$20.00 (text box)
- Per use cost:** \$0.00 (text box)
- Schedule:** Default (dropdown), with a calendar icon
- Overtime:** ☐ Allowed, **Hourly Rate:** \$0.00 (text box), **Max Hours/Day:** 0.00 (text box)
- Availability:** ☐ Limited, **100** (text box) %
- Time Away:** Constant (dropdown), **5** (text box) Minutes
- Description:** (empty text area)

At the bottom left are 'Add', 'Rename', and 'Delete' buttons. On the right are 'OK', 'Apply', 'Cancel', and 'Help' buttons. At the bottom right are 'Process Central Link...' and 'Show Allocations' buttons.

Any department containing activities that acquire workers is automatically placed on this list. For example, the resources acquired by any activity in the Credit & Invoicing department come from the pool of 2 workers defined for the Credit & Invoicing.




In the What-If Analysis and Simulation section of this tutorial, you can change the resource levels and see the impact on resource utilization. You can also use this dialog box to apply costs and schedules to your resources.

- 3 Click the Cancel button, since we are not changing resource data at this time.

Choose Generators

During a simulation, a generator creates and sends transactions into the process. In this example, the transactions are purchase orders. The period of time between each new order arriving varies between 4 and 8 hours. To see how this arrival rate is setup:

- 1 On the *Model* menu, choose *Generators*.


You can also click on the Generators button  on the Modeling toolbar.

- 2 Note that the Interarrival Time field is set to Distributed between 4 to 8 Hours, and the Transaction Count Each Generation is 1. This tells the Generator to introduce a transaction into the process with an interval between arrivals (an inter-arrival) of about 4 to 8 hours.
- 3 Click the Cancel button, since we are not changing the Generator.

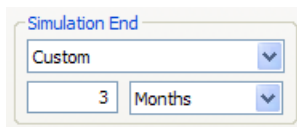
Specify Run Setup

You've reviewed activity behavior, resources available, and the introduction of transactions. Now we will review the length of the simulation.

- 1 From the *Model* menu, choose *Run Setup*.

You may also click the Run Setup button  on the Modeling toolbar.

- 2 Click the Simulation Time tab, and review the Simulation End section.



This setup runs the simulation for 3 months. Run Setup can also control when simulation starts, where to write report results, and other general simulation setup information.

- 3 Click the Cancel button, since we are not changing simulation setup.

What-If Analysis and Simulation

You can use the power of discrete event simulation and analysis to improve your processes with iGrafx Process and iGrafx Process for Six Sigma.

You must have iGrafx Process or a higher license (e.g. iGrafx Process for Six Sigma) installed to use the simulation features of iGrafx.



This tutorial builds on concepts completed in the previous tutorial, Process Behavior Models. You should complete that tutorial first to better understand the concepts introduced and results shown in this What-If Analysis and Simulation tutorial. This tutorial assumes you have the ACME_Order (ACME_Order.igx) file already open.

Example

You are a manager whose goal is to increase throughput, by reducing average lead time through the process. Currently, it is taking too long to ship an order, orders are stacking up unfulfilled, and your competitors are about 10-20% faster. You'd like about a 25-30% increase in production, and corresponding reduction in time to ship an order, to clearly differentiate yourself from your competitors.

Tutorial Tasks

| |
|---|
| "Start the Simulation" on page 34 |
| "Use the Report Window" on page 34 |
| "What-If Analysis #1: Add Parallel Processing" on page 34 |
| "Results of the First What-If Simulation (The Report Window)" on page 37 |
| "What-If Simulation Analysis #2: Improve the Credit Check" on page 38 |
| "Results of the Second What-If Simulation (Report Window)" on page 39 |
| "Change Tables to Report Graphs" on page 39 |
| "What-If Simulation Analysis #3: Resource Utilization and Constraints" on page 40 |
| "Results of the Third What-If Simulation (Report Window)" on page 41 |

Start the Simulation

Click the Start button  on the Modeling toolbar.

A full 3 months of process time simulates in seconds, and a Report window appears.

Use the Report Window

iGrafx provides simulation report statistics categorized by tab: Time, Cost, Resource, Queue, and a Custom tab where you can collect key statistics that are of most interest. On the Custom tab, you can copy and paste report elements from other tabs or, on the *Report* menu, choose *Add Element* to create the Custom tab content.

- 1 Click each of the Report tabs to view the various statistics gathered. Statistics are shown that help you understand the time to perform the process, the costs involved, the resources utilized, and the queueing (lines or bottlenecks) that develops.
- 2 Click the Custom tab.

The first statistic you'll analyze is cycle time, also known as lead time. Cycle time and the count of Orders Shipped are shown in the first table of the Custom tab.

The production department claims that if they received orders sooner, cycle time could be reduced. Before changing the business, you test the idea with iGrafx.

What-If Analysis #1: Add Parallel Processing

Production can work on an order at the same time as the credit department (a parallel path). If the order is stopped due to bad credit, we will use a Discard command to cancel the order in both departments.

- 1 On the *Window* menu, choose the Order Fulfillment process.

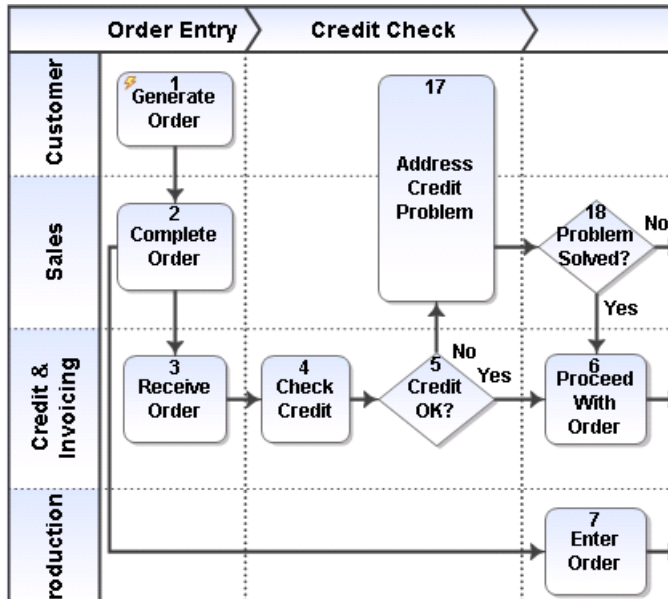
You can also double-click the Order Fulfillment process in the Explorer bar to view it.

- 2 Click the line between Proceed With Order (shape 6) and Enter Order (shape 7) and press the Delete key.

3 Draw a line from Complete Order (Shape 2) to Enter Order (Shape 7).

See Connect Shapes in this tutorial if you need a reminder about how to draw a line.

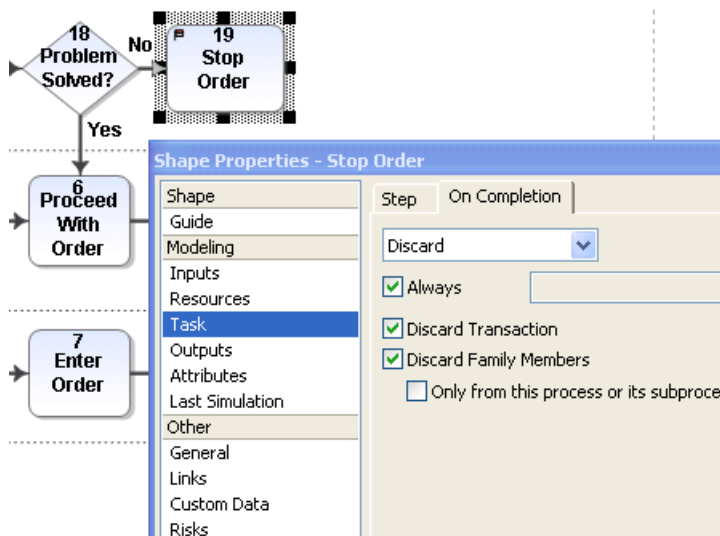
A portion of your diagram may now look like this:



Set the Stop Order shape to discard the transaction in production:

If there is some problem with the Credit Check that we cannot address with the customer, we must stop the order. This means telling the parallel production path to stop all work on this order. We will use the Discard functionality to tell Production to stop work:

- 1 Double-click the Stop Order shape.
- 2 Select the Task page.
- 3 Click the On Completion tab.
- 4 Choose Discard from the drop-down list.
- 5 Select the Discard Family Members check box. Your dialog should now look like the picture below:

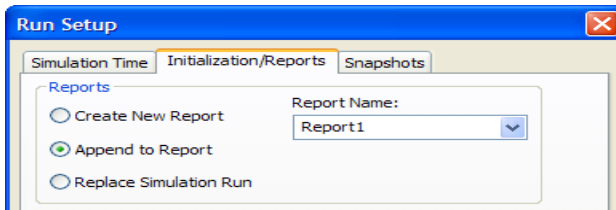


6 Click OK to save your changes

In our modified process, orders duplicate at the Complete Order activity to allow parallel work on an order by two departments. When transactions duplicate in iGrafx, they are considered part of the same family, like twins. The Discard Transaction setting cancels the transaction in the Sales department. The Discard Family Members setting cancels the parallel transaction in the Production department.

Append additional simulation statistics to the existing report:

- 1 Click the Run Setup button  on the Modeling toolbar.
- 2 Click the Initialization/Reports tab.
- 3 Click the Append to Report option.



- 4 Click OK.
- 5 Click the Start button  to simulate again.

Results of the First What-If Simulation (The Report Window)

After you simulate, the Report window appears, and the statistics from the latest simulation are appended to the earlier results because we setup the simulation to Append to Report.

Click the Custom tab, if it is not already shown, and review the statistics for Shipped Orders.

The process cycle time and throughput count has not changed significantly, so the idea from Production won't help much. We should continue our analysis. An employee tells management, "You know, we check the customer's credit on every order, and that keeps the Credit & Invoicing department very busy. What if we only checked the credit of new clients?"

This is the idea we will test next. However, we first want to name our simulations.

Name the latest simulation:

This indicates what improvements were made and gives a more descriptive name to the headings in report elements

- 1 Ensure the Report window is shown.

On the *Window* menu, choose *Report1* if it is not displayed. You can also choose Report1 in the Document Components window.

- 2 On the *Report* menu, choose *Simulation Data*.

- 3 Double-click Sim #2 under Simulation Names (or click on it and then click the Name button).
- 4 Type a new name, such as “Parallel Production”.
- 5 Click OK, to save changes and close the Name Simulation Data dialog box.
- 6 Click the Close button in the Simulation Data dialog box.

All of the headings in the report elements now reflect the new name.

What-If Simulation Analysis #2: Improve the Credit Check

We will now change the process to only check credit on orders from new customers.

- 1 On the *Window* menu, choose the Order Fulfillment process.
- 2 Click the Order Entry phase header at the top of the diagram, then place your cursor over the dark square at the right edge of the phase.
- 3 Click and drag the dark square to near the right edge of the text in the Credit Check phase to extend the phase.
- 4 Place a Decision diamond on the line between Receive Order (shape 3) and Check Credit (shape 4).

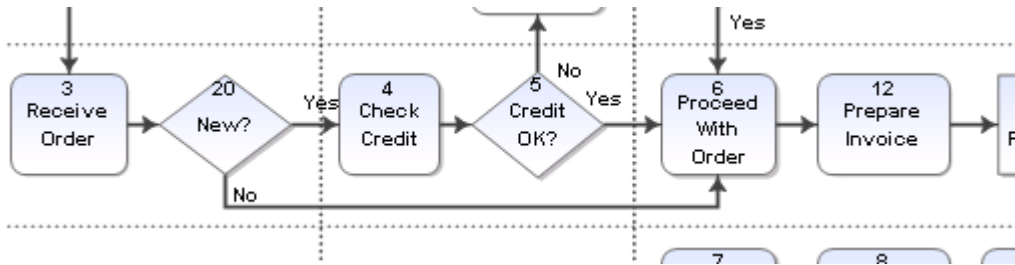
For a reminder about how to place a decision shape, see Place Decision Shapes.


- 5 Type “New?” to label the decision.
- 6 Right-click over the “No” decision line and choose “Yes” to switch the paths.
- 7 Draw a line from the New? decision shape to Proceed With Order (shape 6).
For a reminder on how to draw lines, see Connect Shapes.
- 8 Double-click the New? decision shape.
- 9 In the Properties dialog box, click the Guide page.

The default percentage for a decision is 50% yes or no. Assume that only 50% of the new orders come from new customers. You can always change this later for more what-if analysis.

10 Click OK.

The changed portion of your diagram may look like this:



11 Click the Start button  to simulate.

Results of the Second What-If Simulation (Report Window)

The Report window is visible again after running a complete simulation.

- 1 Click the Custom tab of the Report window, if it is not already shown. Note that a simple change to the process has resulted in decreased cycle time and improved throughput!
- 2 Name the simulation; for example, “Less Credit Check”. (For a quick reminder, see Name the latest simulation: in Results of the First What-If Simulation (The Report Window).

Change Tables to Report Graphs

You can show any of the report elements in the simulation report as a table (the default) or a graph.

- 1 Double-click the Orders Shipped (Days) report element at the top of the Custom report.
- 2 Click the Format tab and change Display As to Graph.
- 3 Click the Graph Style button.
- 4 Click the Line graph button.
- 5 Click OK to save changes and close the Graph Control dialog box.

6 Click OK to save and close the Edit Report Element dialog box.

Your report element is changed to a line graph.

Make a copy to show the data in table format:

- 1 Select the report element (the line graph you created) by clicking on it.
- 2 Press and hold the Ctrl key while you press the C key (Ctrl+C) to copy the Report Element or, on the *Edit* menu, choose *Copy*.
- 3 Press Ctrl+V to paste the element or, on the *Edit* menu, choose *Paste*.
- 4 Double click the bottom graph.
- 5 Click the Format tab and change Display As to Tabular.
- 6 Click OK.

What-If Simulation Analysis #3: Resource Utilization and Constraints


Next you'll review the utilization of resources, where constraints on order flow (bottlenecks) are occurring, and do some what-if analysis with your resource allocations.

Scroll down in the Custom tab of the report until you reach the Resource Utilization graph and table

Giving Credit & Invoicing less work reduced their utilization, and yet you still have departments that are very highly utilized.

Scroll down to the Average Waiting Time for Transactions that Waited graph. How long did orders wait for each department?


The Production department is, by far, the most significant bottleneck. You can hire someone in Production and see if it helps throughput.

- 1 Click the Resources button  on the Modeling toolbar.
- 2 In the Define Resources dialog box, click Production.
- 3 On the Properties tab, change the Resource Use to Pool and the Count to 2.

4 Click OK.



This information is part of a Scenario, the environment where the process is simulated. To view the Scenario window, on the *File* menu, choose *Components* to view the Document Components window, then double-click on the Scenario you want to view. From the Document Components window, you can right-click a Scenario to create a new Scenario, or copy and paste Scenarios. If you view the Scenario, click the X button in the upper-right corner of the window to close it before you do the next step.

5 Click the Start button  to simulate.

Results of the Third What-If Simulation (Report Window)

The performance improves, but the bottleneck has moved! The Shipping department now receives all the work that the Production department was holding up. You have optimized only a portion of the process, and not the overall process. This is a good example of how iGrafx can show the unexpected consequences of changing a process or staffing levels.

Name the latest simulation (Sim #4) “Hire Production”. For a quick reminder, see Name the latest simulation: in Results of the First What-If Simulation (The Report Window).



The next tutorial on Six Sigma analysis builds on this tutorial. If you cannot continue in this session, be sure to save your work as a different file name from this tutorial if you want to continue with the Six Sigma tutorial.

Six Sigma Analysis: Interface with a Statistical Application

iGrafx Process for Six Sigma provides powerful functionality for Six Sigma, including integration with the leading statistical packages MINITAB® & SAS JMP®. You can perform full Design Of Experiments (DOE) analysis, logging statistics for every transaction to the statistical application, and even perform path-walking analysis.



This tutorial builds on work completed in the previous tutorial, What-If Analysis and Simulation. You need to complete that tutorial first to see the same results shown in this Six Sigma tutorial.

Tutorial Tasks

| |
|---|
| “Use Fit Data to Refine the Simulation Model” on page 42 |
| “Using RapiDOE to Perform a Design Of Experiments” on page 46 |

Use Fit Data to Refine the Simulation Model

Up to this point, these tutorials have used Subject Matter Expert (SME) guesses or anecdotal data to guide our simulation analysis. While this data can be accurate enough to perform powerful simulation analysis, you can refine your simulation model further with empirically measured data from the actual process.

The time for the Assemble Packages step in the Production department is one of the longest in the ACME Order Fulfillment Process (ACME_Order.igx in your Sample directory). Maybe the time based on the SME opinion is not as accurate as possible. After a study of 30 different orders at the Assemble Packages step, we have captured those times in the statistical package.

Open the statistical package on captured data:

MINITAB or JMP must be installed on your machine for this feature.

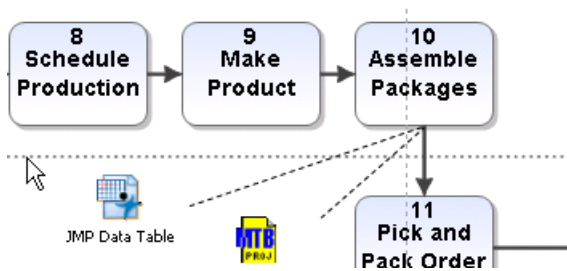
- 1 Ensure the Process diagram is shown.

On the *Window* menu, choose the Order Fulfillment process.

- 2 Double-click the MINITAB or JMP icon near the Assemble Packages step, based on which application you have loaded on your machine.



Important: The following pictures and instructions assume you have chosen MINITAB. In general, the instructions also work for JMP.



- 3 After the statistical package starts, click the Microsoft® Windows® task bar to return to the iGrafx application.

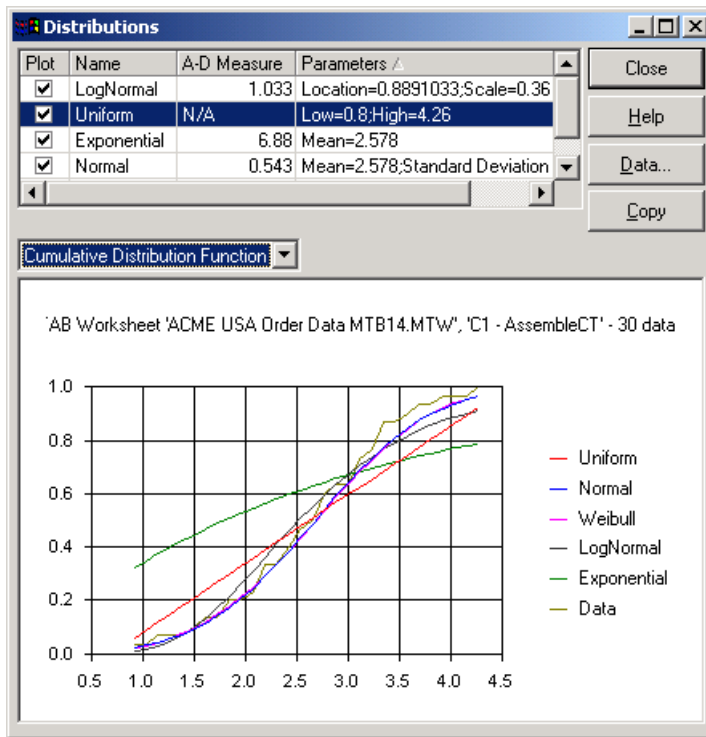
Perform a statistical curve fit on the empirically measured data captured in the statistical application:

- 1 On the *Six Sigma* menu, choose *Fit Data*.

The Distributions dialog box and the Choose Data dialog box appear.

- 2 Ensure the AssembleCT column is chosen in the Choose Data dialog box and click OK.

iGrafx uses the statistical package to perform analysis, and then graphs the resulting analysis for you.



You can click and drag a corner of this dialog box to make it bigger.

Change Cumulative Distribution Function to Residuals to more easily see how well distributions fit the data.

Some distributions are a better fit than others. Look for the closest fit to the actual data (and, if using MINITAB, for the lowest A-D Measure). You can see that the Exponential,

Uniform, and LogNormal functions don't fit very well, so we will remove them from the plot.

Remove functions from the plot:

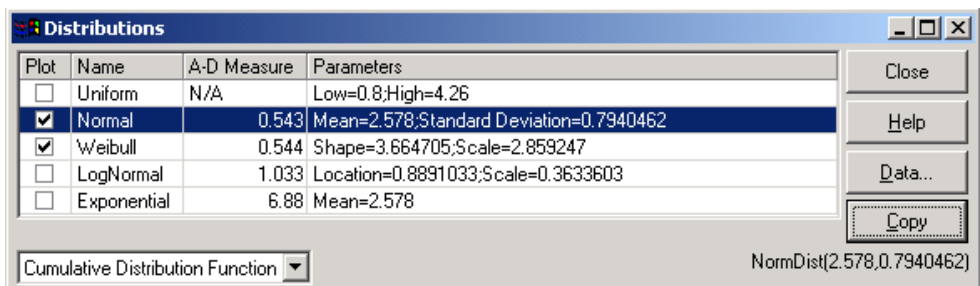
- 1 Clear the Exponential check box in the plot column, and notice it is removed from the plot.
- 2 Clear the check boxes for Uniform and LogNormal.

Normal and Weibull both seem to fit the data very well.

Choose the Normal data distribution:

The Central Limit Theorem says data tends towards normality, and Weibull is capable of adjusting itself to match Normal curves, so we should choose the Normal distribution.

- 1 Click the Normal line in the table to select it.
- 2 Click the Copy button to copy the Normal Distribution shown below the button.



- 3 Click the Close button to close the Distributions dialog box.

Adjust the properties of the Assemble Packages activity with empirically measured data:

- 1 Double-click Assemble Packages (shape 10) to display its Properties.
- 2 Click the Guide page.
- 3 From the Time drop-down list, choose Expression.
- 4 Select (highlight) the text for the current expression ("Between(2,4)").

- 5 Right-click in the expression window and choose *Paste* (near the bottom of the context menu).
- 6 Click OK.

You have refined your simulation model with empirically measured data. You could now run simulation analysis on single factors. However, a more comprehensive and powerful analysis is to perform a Design of Experiments or DOE.

Using RapiDOE to Perform a Design Of Experiments

This section of the Tutorial assumes that you have either been trained on Design of Experiments (DOE), or have a basic understanding of the purpose (and limitations) of doing a DOE. MINITAB or JMP must be installed on your machine for the RapiDOE feature.

The One Factor at A Time (OFAT) simulation analysis you did so far may miss interactions between the factors you have been changing. Instead of changing the resources one at a time by hand, you can perform a DOE analysis on the process and try many different combinations of resource levels automatically. With DOE, you can change several factors at once and easily analyze the results in iGrafx or in the statistical package.

Use the RapiDOE functionality in Process for Six Sigma:

- 1 On the *Six Sigma* menu, choose *RapiDOE*.

The RapiDOE dialog box appears; we are showing it with relevant sections on Available Factors and Responses expanded:

The RapiDOE dialog box is shown with the following sections:

Available Factors:

| | Active | Header | Initial Value | High | Low |
|---------------------------------|-------------------------------------|---------------------|---------------|------|-----|
| + Generator Interarrival | | | | | |
| + Scenario Attribute | | | | | |
| - Resource Count | | | | | |
| - Worker | | | | | |
| Worker - Customer | <input type="checkbox"/> | | 1 | | |
| Worker - Sales | <input checked="" type="checkbox"/> | Worker - Sales | 1 | 2 | 1 |
| Worker - C & I | <input checked="" type="checkbox"/> | Worker - C & I | 2 | 3 | 2 |
| Worker - Production | <input checked="" type="checkbox"/> | Worker - Production | 1 | 2 | 1 |
| Worker - Shipping | <input checked="" type="checkbox"/> | Worker - Shipping | 1 | 2 | 1 |

Responses:

Replications:

| | Active | Header |
|---------------------------------|-------------------------------------|--------|
| - Transaction Statistics | | |
| Count | <input checked="" type="checkbox"/> | Count |
| Average Resource Waiting Time | <input type="checkbox"/> | |
| Total Resource Waiting Time | <input type="checkbox"/> | |
| Average Cost | <input type="checkbox"/> | |
| Total Cost | <input type="checkbox"/> | |
| Average Service Time | <input type="checkbox"/> | |
| Total Service Time | <input type="checkbox"/> | |
| Average Cycle Time | <input type="checkbox"/> | |
| Total Cycle Time | <input type="checkbox"/> | |

Buttons on the right: OK, Cancel, Options..., Reset, Help.

The RapiDOE dialog box displays the Factors and Responses that you can choose for a DOE on a simulation model. Factors can include Generator behavior, Scenario Attributes, and Resource Counts.

In this tutorial on RapiDOE, we have setup the DOE to add one person to the original resource level in each department. Responses can include transaction statistics such as cycle time or count completed, Scenario Attributes, or Custom Statistics that you define. This tutorial guides you to track Transaction (order) Completion Count and resource costs, and look for the total number of orders produced and the resource cost

involved in producing the orders.

Although you can use the Options button fractionalize the design or choose a general factorial experiment with a center point, fractionalizing the design makes results less accurate. Running additional simulations on our model with iGrafx is fast.

Use the Replications number to control how many times each experiment is replicated, to introduce more randomness into the DOE. Choose replications cautiously; replicates help make results more accurate, and they also multiply the number of simulations to run.

- 2 Click OK.

The Run Experiment dialog box appears.

This DOE defines 64 different simulations to run (a 2-level full-factorial design on 4 factors is 2^4 , or 16, and times 4 replicates each, is a total of 64).

- 3 Click Start (to run the 64 different simulations).
- 4 When simulation completes, iGrafx will indicate the data has been stored to the statistical applicaiton (e.g. a MINITAB Worksheet Name is given when using Minitab). Note the name of the sheet, and OK the dialog box.

Sort results within iGrafx:

We will now sort responses so you can see if there is a pattern of factors that have an impact on the responses. This is sometimes known as “Analysis of Good” or ANOG. You may need to make the dialog box bigger to see all columns of data.

- 1 Click once on the Count column to sort in ascending order.
- 2 Click again on the Count column to sort in descending order.



The highest number of orders (transactions) is produced when Production and Shipping both have 2 people working. The Sales department varies between 1 and 2, and Credit & Invoicing varies between 2 & 3. Production and Shipping are solidly at 2 for the higher transaction counts.

The ANOG suggests that if we ensure you have 2 people each in Production and Shipping, you should be able to reach around 80 or more orders per quarter.

- 3 Click Close (to close the Run Experiment dialog box).

Use the simulation to confirm the results of the DOE:

We will now add a resource to the Shipping department to test our theory that we can increase throughput with one additional hire. You already added a resource to Production in previous experiments.

- 1 Click the Resources button  on the Modeling toolbar.
- 2 In the Define Resources dialog box, click Shipping.
- 3 On the Properties tab, change the Resource Use to Pool and the Count to 2.
- 4 Ensure the Production department also has a Pool count of 2.
- 5 Click OK.
- 6 Click the Start button  on the Modeling toolbar to simulate.

Results of Confirming the DOE (Report Window)

The bottleneck has been apparently been removed; resource utilization has gone down, and (more importantly for determining bottlenecks) the Average Waiting Time has also been significantly reduced in all departments.

- 1 Scroll up to the top of the Custom tab of the report, and review overall production in the top report element graph and table.
Cycle time is dramatically reduced, and throughput is significantly increased! Resource constraints and other sources of bottlenecks can have dramatic and hard-to-predict impact on a process.
With simulation, you can build a business case for change, with statistics to back up your proposals, all without impacting the actual production process or incurring excessive costs.
- 2 If you are familiar with DOE analysis in MINITAB or JMP, you can now move to that application and perform further analysis if you want to.
- 3 Close the ACME_Order.igx file, saving your work if you want to. If you want to save changes, on the *File* menu, choose *Save As* and give the file a new name.

Cause and Effect Diagrams

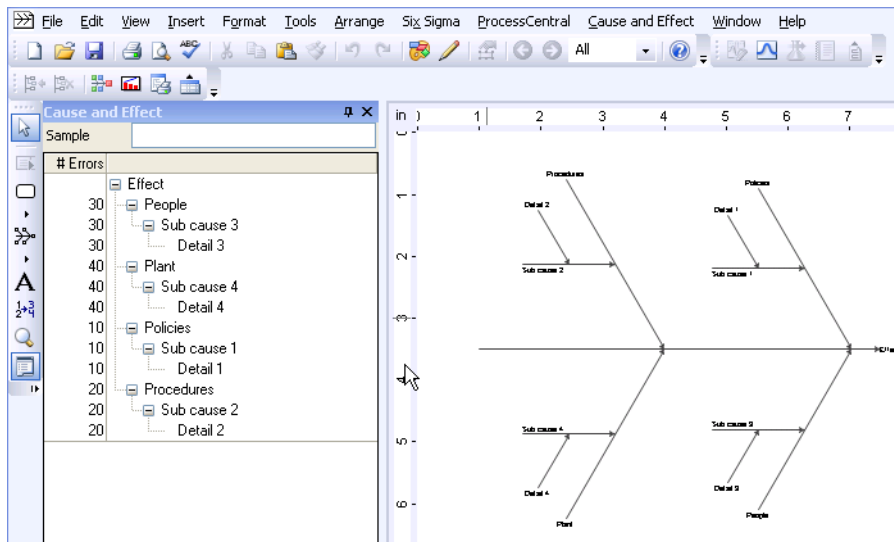
Cause and Effect (CE) diagrams are sometimes referred to as Fishbone or Ishikawa diagrams. The CE diagram methodology represents the relationships between an effect and all possible causes influencing it.

Tutorial Tasks

| |
|---|
| “Create a New CE Diagram” on page 51 |
| “Edit the Default Effect” on page 51 |
| “Edit Causes and Sub Causes” on page 52 |
| “Insert Causes” on page 53 |
| “Adjust Layout” on page 54 |
| “Update the Error Column” on page 55 |
| “Export a CE Diagram to an FMEA” on page 56 |

Create a New CE Diagram

- 1 On the *File* menu, point to *New*, choose the Cause and Effect category, and choose *Cause and Effect (Transactional)*.
- 2 A new CE diagram opens with defaults ready to edit.



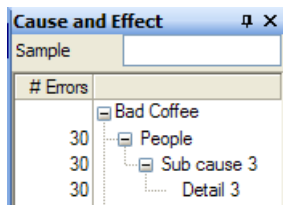
When you open a Cause and Effect diagram type, a hierarchical tree appears in the Cause and Effect window.

Edit the Default Effect

When you change the main effect in the Cause and Effect window, it automatically updates the CE diagram.

- 1 Click the Effect text in the Cause and Effect window.
- 2 Type in a new Effect. For example, type in Bad Coffee.

Your Explorer bar may look like this:

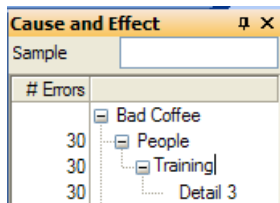


- 3 Press the Enter key to save your changes to the Effect.
- 4 The main effect arrow updates automatically to show the new main effect.

Edit Causes and Sub Causes

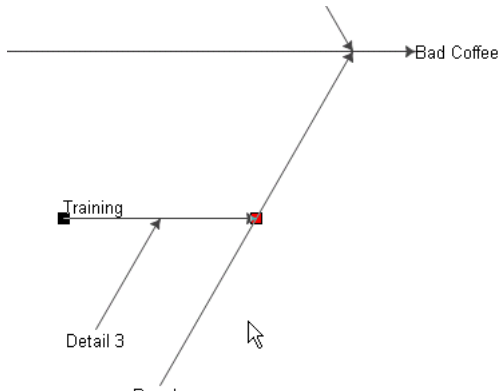
After you have documented the effect, you can detail its primary causes, such as People, and subcauses. (Subcauses are causes of primary causes.)

- 1 Click the Sub cuase 3 under the People cause in the Cause and Effect window and type “Training” for the new value.



2 Press the Enter key when finished.

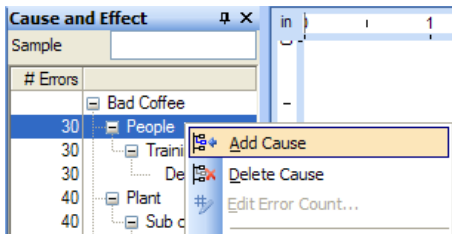
The CE diagram automatically updates to show the new value (hit F4 to zoom in):



Insert Causes

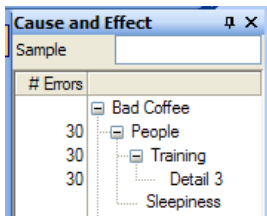
You probably have more than one subcause for any given primary cause for the effect.

1 In the Cause and Effect window, right-click the People cause and choose Add Cause:



The new cause is inserted at the end of the subcause list for the cause you right-clicked on.

- 2 Type “Sleepiness” for the new subcause.



- 3 Press the Enter key to finish your edits.



To delete a cause, right-click the cause and choose *Delete Cause*.

Adjust Layout

If you want to change the look of the current CE diagram, you can automatically layout (redraw) it. Note that if you automatically layout the diagram, you lose any manual layout edits you have made.

- 1 Right-click in the Cause and Effect window and choose *Layout Options*.
- 2 Use the controls in the Layout Options dialog box to modify different aspects of the diagram. For example, you could rotate text to be the same direction as the CE line (branch) they are on.
- 3 Click Apply to try out a layout, or simply click the OK button.

The CE diagram is updated with your new layout.

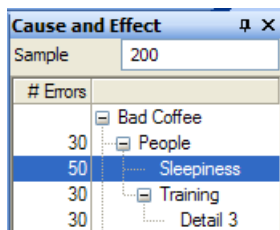


In addition to using the Cause and Effect window to edit the CE diagram elements, you may manually edit the CE diagram. Please note that any manual edits to the CE diagram automatically update the Cause and Effect window.

Update the Error Column

This procedure updates the number of errors for a subcause you've added. Errors appear in the Errors column of the Cause and Effect window. Updates in the Cause and Effect window also appear in the CE diagram.

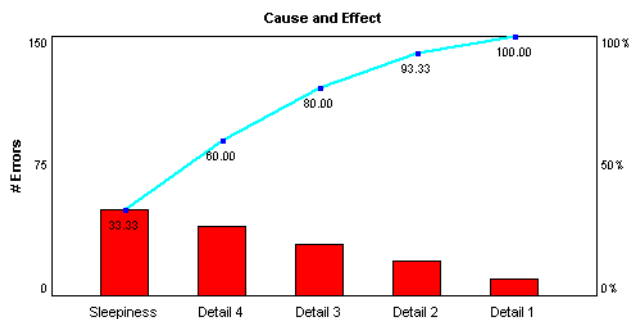
- 1 Click the Error column next to the Sleepiness subcause.
- 2 Type "50" for the number of errors observed, then press the Enter key.
- 3 In the Sample text box, enter "200" for the total number of samples.



| Cause and Effect | |
|------------------|------------|
| Sample | 200 |
| # Errors | |
| 30 | Bad Coffee |
| 30 | People |
| 50 | Sleepiness |
| 30 | Training |
| 30 | Detail 3 |

- 4 Insert a Pareto Chart based on the number of Errors. To do so, on the *Cause and Effect* menu, choose *Insert Pareto*.
- 5 Scroll down the diagram to view the Pareto chart (or hit the F4 key to zoom).

Note: The Pareto chart will automatically update to show the new data:

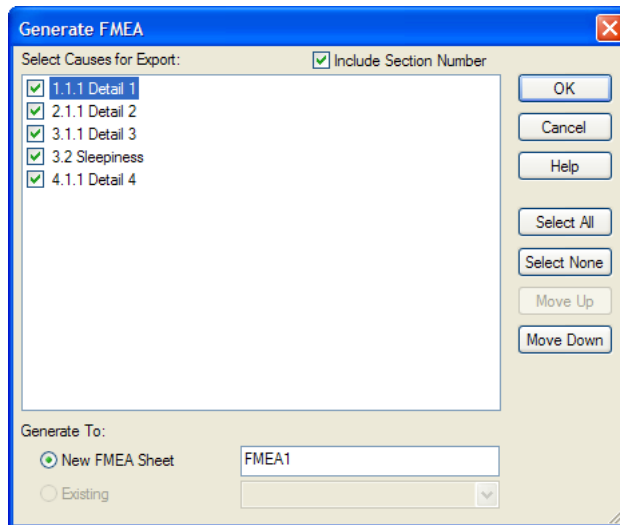


Export a CE Diagram to an FMEA

The information from a CE diagram is often an excellent starting point for doing a Failure Modes and Effects Analysis (FMEA).

- 1 On the *Cause and Effect* menu, choose *Export to FMEA Sheet*.

The Generate FMEA dialog appears:



- 2 Select which of the listed causes you want to export; by default, all causes are selected.
- 3 Enter the name of the new FMEA and click OK.

If you had previously exported to FMEA, the Existing option would also be available.

- 4 Confirm the name of the New Component and click OK.

The FMEA Sheet displays. You can now fill in the sheet, including Severity and Detection numbers (Occurrence is filled in from the Error column using the Sample size you entered). Once you have entered Severity, Occurrence, and Detection numbers, the Risk Priority Number (RPN) is calculated, allowing you to rank the various causes and sub-causes in order of importance. To learn more about FMEA, read the iGrafx Help.

BPMN Diagrams

BPMN diagrams and data have unique terminology. This Tutorial assumes that you are familiar with BPMN terms. It is also helpful to review iGrafx Help system documentation on BPMN terminology. Another source for BPMN information is on the World Wide Web, at <http://www.bpmn.org/>.

Tutorial Tasks

| |
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| “Creating a BPMN Diagram” on page 57 |
| “Place Shapes (BPMN Flow)” on page 57 |
| “Set Shape Behavior” on page 59 |
| “Place, Connect, and Set Shape Behavior” on page 59 |
| “Check a BPMN Diagram” on page 62 |


Creating a BPMN Diagram

On the *File* menu, point to *New*, choose the BPMN category, and choose *BPMN Basic Collaboration*.

A sample BPMN diagram opens.

Place Shapes (BPMN Flow)

For a reminder of how to place shapes, see Place Shapes (Activities) at the beginning of this tutorial.

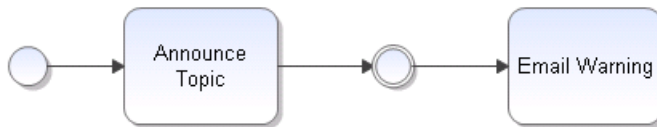
- 1 Click on the activity shape  on the Toolbox toolbar.
- 2 Move the cursor into the diagram, and put it over the circular Event shape on the left side of the diagram.
- 3 Click and drag the outline of the new shape to place it to the right of the Start shape

- 4 Now label the shape “Announce Topic”.

Your map may look like this:



- 5 Add an event shape and another activity, then enter text in the shapes so your diagram looks like this:

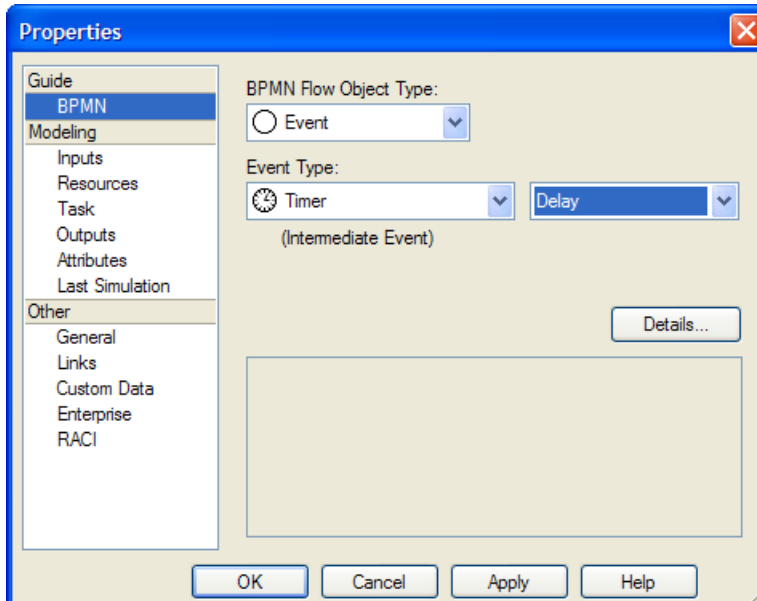


Note that the event automatically formats to be the correct dimension (e.g. an intermediate event) based on which lines you have drawn! iGrafx intelligently adjusts BPMN diagram shapes based on the requirements in the BPMN specification.

Set Shape Behavior

Change the intermediate event type to a delay:

- 1 Double-click the intermediate event, the one after the Announce Topic shape.
- 2 In the Properties dialog box, select the BPMN Guide page and set it to a Delay Timer as shown below:



- 3 Click OK.

The graphical symbol for the event has now updated to reflect the behavior you have specified:

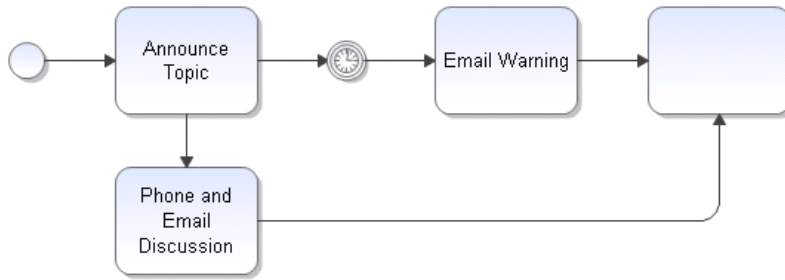


Place, Connect, and Set Shape Behavior

Next, you will add, connect, label, and change activities to match proper BPMN behavior.

Place, connect, and label some new shapes:

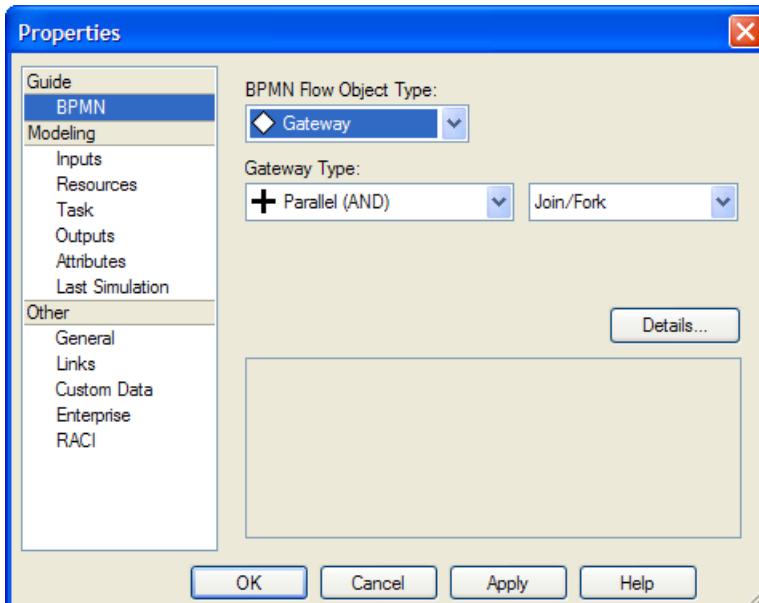
Place two more shapes as shown below:



For a reminder of how to place shapes, see [Place Shapes \(Activities\)](#) at the beginning of this tutorial.

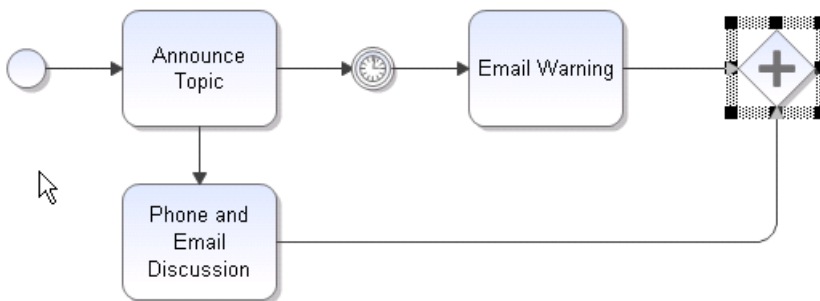
Change the behavior of the unlabeled shape to properly synchronize the parallel paths:

- 1 Double-click the unlabeled activity at the right of the diagram.
- 2 In the Properties dialog box, select the BPMN Guide page and change the Activity to a Parallel Gateway, as shown below:



- 3 Click OK.

Your diagram now updates with the new type of BPMN object you specified:



Check a BPMN Diagram

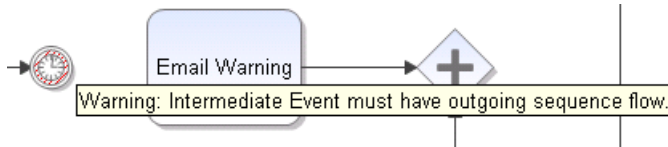
The BPMN diagram type contains dynamic real-time checks to help you draw a correct-by-construction diagram that complies with the BPMN specification.

Try correct-by-construction design features:

- 1 Delete the line between the Timer event and Email Warning.

The Timer indicates a design problem with shaded red lines.

- 2 Place your cursor over the shaded Timer event. A yellow tooltip describes the problem:



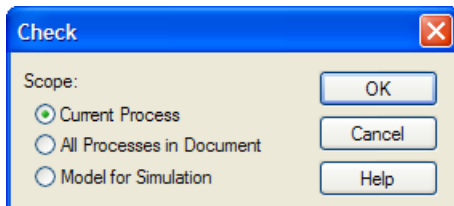
- 3 Press Ctrl+Z on your keyboard to restore the line (undo) or, on the *Edit* menu, choose *Undo Clear*.

We recommend that you leave real-time checking on, even though you can turn it off on the *View* menu.

In some cases, it is not possible or desirable to enforce correct-by-construction modeling. For these situations, BPMN diagrams have extensive static checking features.

Perform a static check on this diagram:

- 1 On the *Model* menu, choose *Check*. The Check dialog box appears:





You may perform a check on this diagram, on all diagrams in this document, or perform a check to ensure this model is ready for simulation with iGrafx clients that allow simulation.

- 2 Click OK to check this diagram. A warning appears in the output window at the bottom of the screen:
Gateway must be followed by an End Event. Containing process must use Start/End Events consistently.
- 3 Double-click the warning message to highlight the source of the warning in the diagram.

In this case, if you place and route an Event type flow object to the right of the gateway, at the end of the sequence flow, it will solve the problem. You can verify this by re-checking the diagram.

Organization Charts

You can quickly create high-quality organizational charts with iGrafx.

Tutorial Tasks

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| "Create a New Organization Chart" on page 64 |
| "Set Name and Title" on page 65 |
| "Add Subordinates" on page 65 |
| "Add Assistants" on page 65 |
| "Add Co-Workers" on page 66 |
| "Re-Order People Within the Team" on page 66 |
| "Show Dotted-Line Relationships" on page 67 |
| "Change Workgroup Layout" on page 68 |

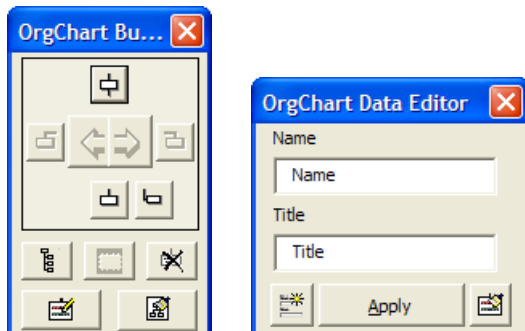
Create a New Organization Chart

On the *File* menu, point to *New*, choose the Business category, and choose *OrgChart*.

A single shape that represents a role in the organization is the starting point for your chart:



The OrgChart also displays the OrgChart Builder and the OrgChart Data Editor to help you rapidly create and modify organization charts:

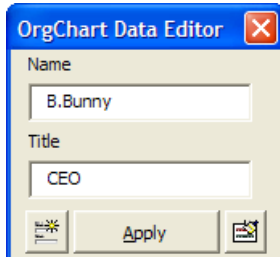


If these dialog boxes are hidden, you can choose them from the *OrgChart* menu.

Most OrgChart Builder commands require you to select a role (shape) before using the command.

Set Name and Title

- 1 Select the shape, then enter the Name and Title text you want in the OrgChart Data Editor.




- 2 Click the Apply button.


The shape updates with the data you entered:



Add Subordinates

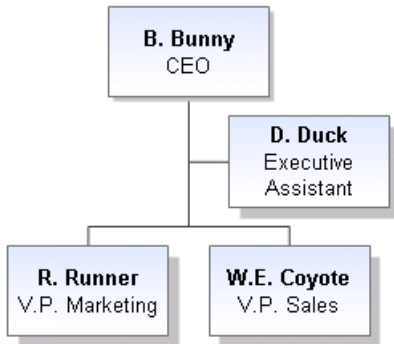
- 1 Select the B.Bunny role.
- 2 In the OrgChart Builder dialog box, click the Add Subordinate tool: 
- 3 Add subordinate shapes and give them the names and titles R. Runner, V.P. Marketing and W.E. Coyote, V.P. Sales.

Add Assistants

- 1 Select the B.Bunny role.
- 2 In the OrgChart Builder dialog box, click the Add Assistant tool: 

3 Name the Assistant D. Duck and type the role Executive Assistant

Your diagram may look like this:

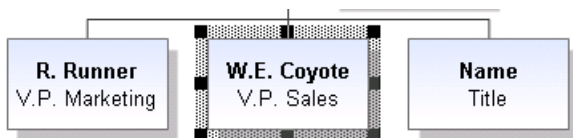


Add Co-Workers

1 Select W.E. Coyote role.

2 In the OrgChart Builder dialog box, click the add co-worker to the right tool: 


The OrgChart updates with the new co-worker shape:



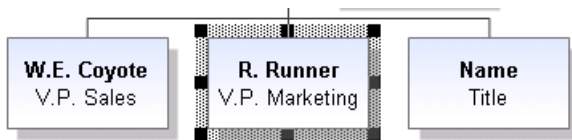
Re-Order People Within the Team

1 Select the R. Runner role.

2 In the OrgChart Builder, click the right-arrow in the Shift Within Team buttons

(arrows): 

The OrgChart updates with the new position of the role:



Show Dotted-Line Relationships

- 1 Place your selector tool cursor inside the W.E. Coyote role.
- 2 Press-hold-release (Click and drag) to the left side of the R. Runner shape.

Your chart now shows this dotted-line relationship:



Change Workgroup Layout

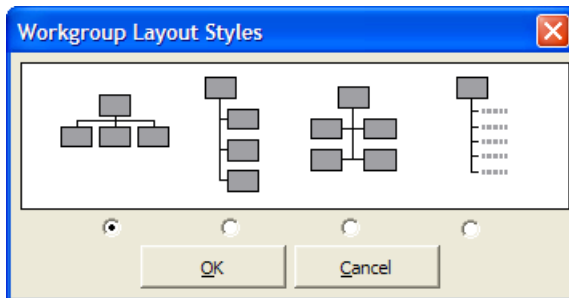
You may set or change the layout style of roles in your workgroup in relation to each other.

1 Select the B. Bunny role.

2 In the OrgChart Builder dialog box, click the Change workgroup layout style tool:



The Workgroup Layout Styles dialog box appears:





3 Click a different layout style option, then click OK to apply the style.

This procedure can also set the style for the subordinates and assistants you have not yet added.

Congratulations! You have reached the end of the tutorial.

Glossary

Browse

Click the  button to find a file and click the Open button to choose it. The  button opens a web browser where you can choose and set a web page.

Click and drag

Press and hold the left mouse button while you move the cursor/mouse, then release the mouse button when the action is complete. This is known as “click and drag.”

Click

Quickly press and release the left mouse button.

Close

To close a window, click the X button in the top corner of the window. Be careful not to click the outer X button, which will close the application.

Double-click

Press down and release the left mouse button twice in rapid succession.

Landscape page layout

A page orientation that prints or displays your work across the wider side of the form.

Right-click

Quickly press and release the right mouse button.

placement cursor



Toolbox toolbar

In a Process diagram, the Toolbox toolbar contains common shapes and tools.



selector tool



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