Mix Time Maps

Learn the basic concepts of eVSM Mix with the Quick Mix Time application. Learn how to build a value stream model from scratch, and then how to use it to add visuals and extend the model to investigate what-if analysis scenarios.

Course version: 038
Date Published: 4 April 2025

How to Use this File

This file contains the reading materials and the exercise pages from the course (title on previous page). While the course can only be taken on a computer, this booklet can be useful for note taking and later for refresher training.

This booklet is designed for on screen and print use. For on screen use, we recommend Acrobat Reader with the page display set to "Single Page View". If you are using this booklet on-screen while going through the exercises in eVSM, a second monitor is very helpful.

For hardcopy use, print the file on 8.5x11 or A4, and bind along the long edge.

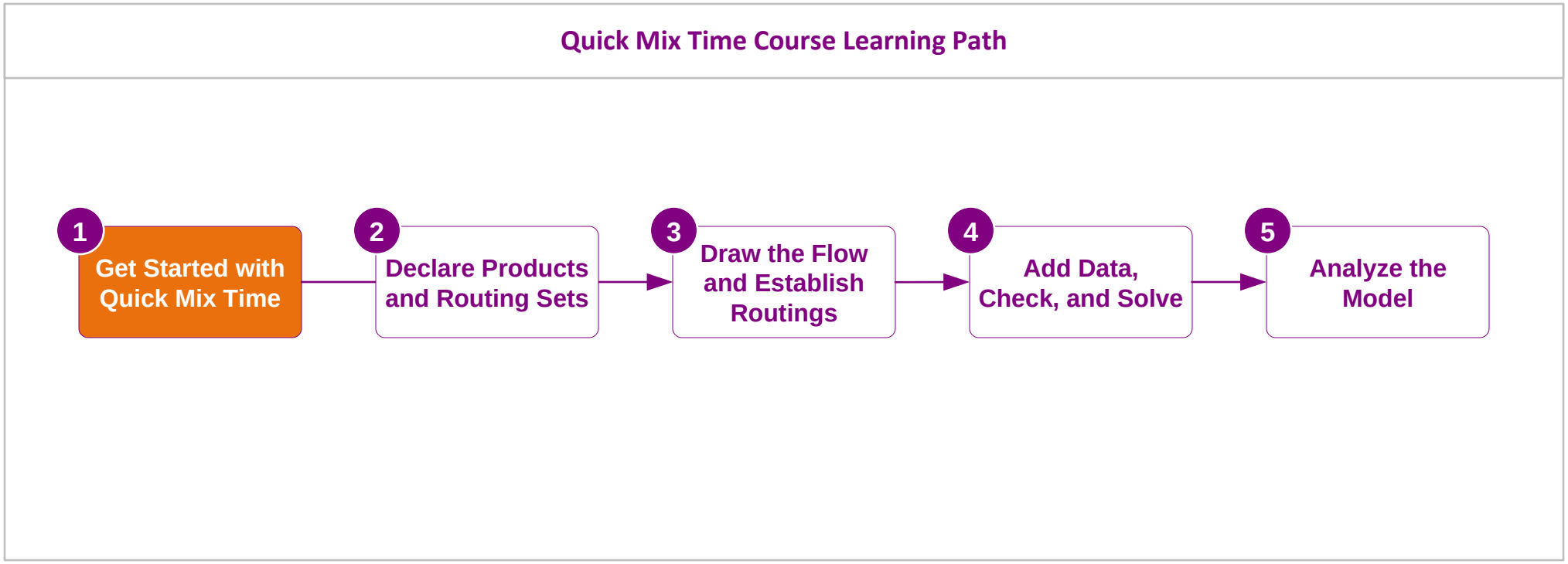
Table of Contents

Getting Started with Mix Time Mapping

This course uses the Quick Mix Time stencil to introduce the eVSM Mix mapping concepts, and process for building the value stream model.

Important Notes:

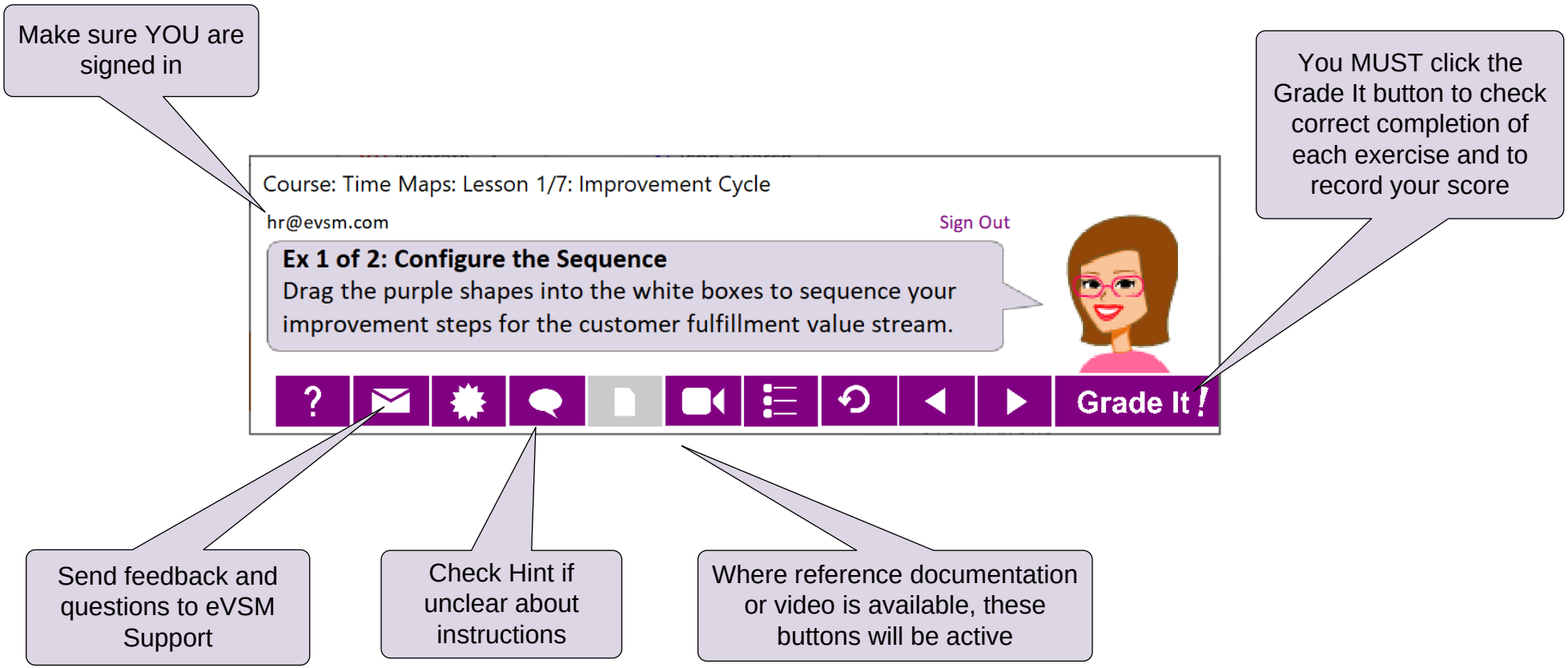
1. Quick Mix Time stencil is intended for training purposes and is not recommended for production work.
2. The Fast Draw course is a pre-requisite and must be completed before starting this course.



Getting Started with Mix Time Mapping

Working with eLeanor

The eLeanor learning system includes a range of useful functions:



Important Notes

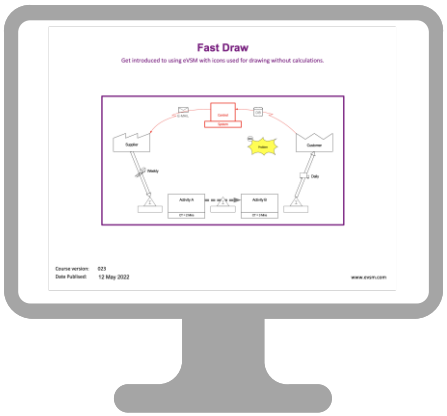
1. When you complete an exercise, you **MUST** click the “Grade It” button.
2. Points are deducted for incorrect attempts.
3. If you are stuck on an exercise, check the Hint. If that does not help, go back and review the preceding Readme pages. If you are still unsure, click the Feedback button and ask your question.

Ideal Setup to work with eLeanor

To run eLeanor, you must have Visio, Excel, eVSM, and an internet connection. See full checklist at https://evsm.com/eLeanorSetup

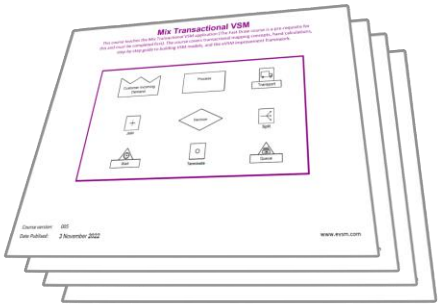
Your PC screen must have a minimum of 1280x720 pixel resolution.

Additionally, you must have a second monitor or a printed copy of the course notes.



Second Monitor to view the course notes

OR



Printed hardcopy of course notes

Note

The course notes are included in the downloaded course ZIP file. You can also download a fresh copy by clicking the “See Reference Materials” button in the eLeanor control panel.

Value Stream Types

There are different value stream map types (plant, supply chain, etc.) and as you would expect, they differ a little in the metrics they use to visualize the waste. eVSM has separate applications for the different map types.

The applications for the different map types are organized in the following groups. Each application within the groups has one or more stencils.

Quick Applications

Manufacturing

Plant level value stream maps for discrete parts and assemblies

Supply Network

Supply chain and distribution network maps

Services and Healthcare VSM

Office, services, and healthcare maps

Time Mapping

Simplest stencil, primarily for learning purposes

Lean Design Tools

Spaghetti diagraming, quick changeover, milk run design, Kanban calculator and project planning

eVSM Extras

EPEI, Event Circle, POLCA, ...

Quick Stencil Components

Each value stream type has automation and standardized components built-in. These include:

VSM Icons

Complete Icon Set: The most comprehensive icon set for value stream mapping.

Variables

Standard Variables: Standardized variable names and meaning for each value stream type.

Macro Shapes

Macro shapes: Shapes with attached variables specific to each value stream type.

Equations

Built-In Equations: Equations to compute aspects of lead time, capacity, and cost.

Charts

Built-In Charts: Charts to visualize some of the data on the map

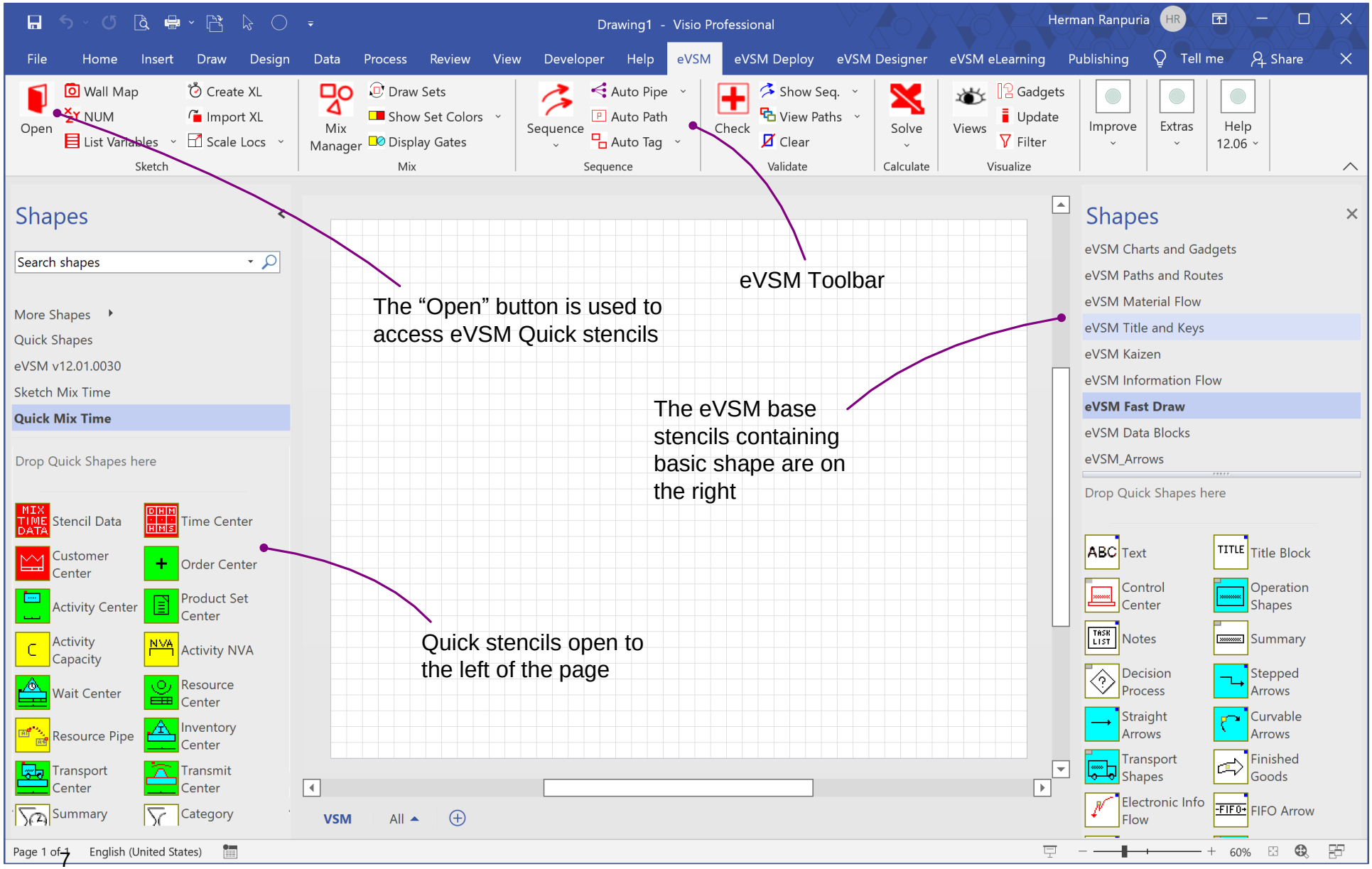
Q. Which one of these Quick Stencil benefit statements is NOT true?

- ◎ Includes a standardized set of variable names.
- ◎ Includes built-in equations for automated calculations.
- ◎ Provides expert guidance on selecting and prioritizing improvements.
- ◎ Includes pre-formatted charts to summarize calculation results for quick insights.
- ◎ Includes intelligent "macro" shapes come with integrated data blocks for efficient map capture..

For Online Course Only

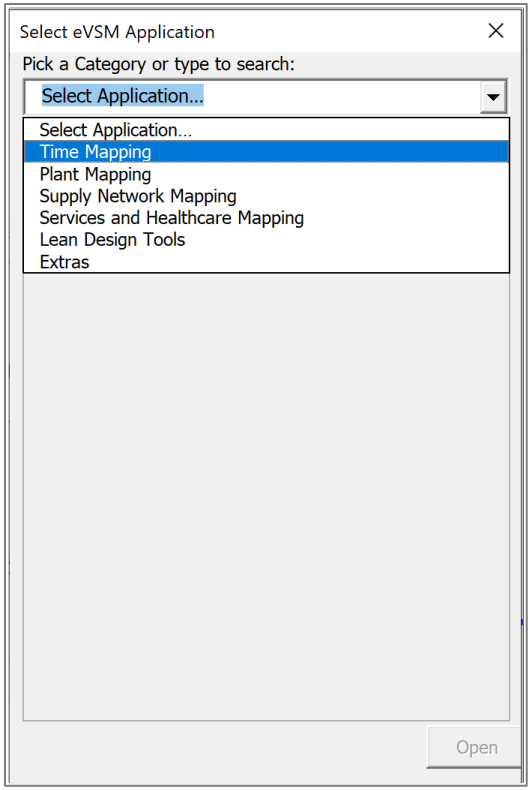
eVSM Layout in Visio

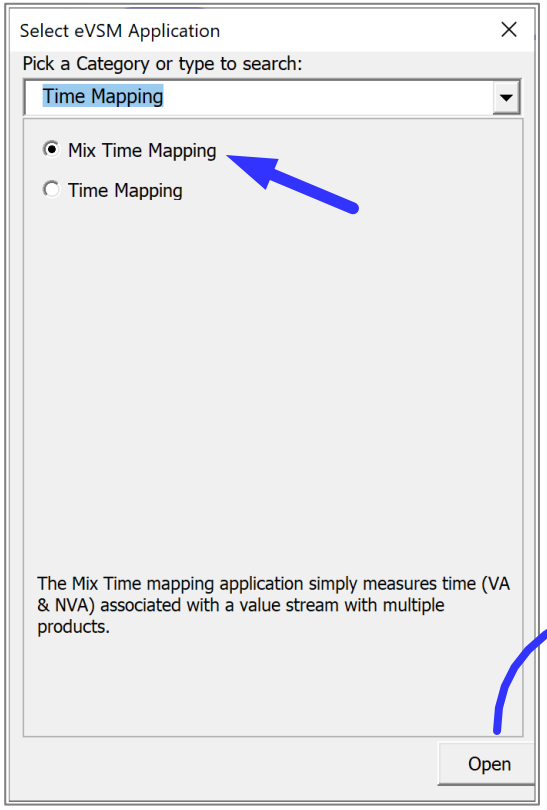
This is how the eVSM toolbar and stencils are laid out in Visio. If the toolbar is missing, then eVSM has not started properly. To resolve, see: https://evsm.com/evsm-toolbar-missing

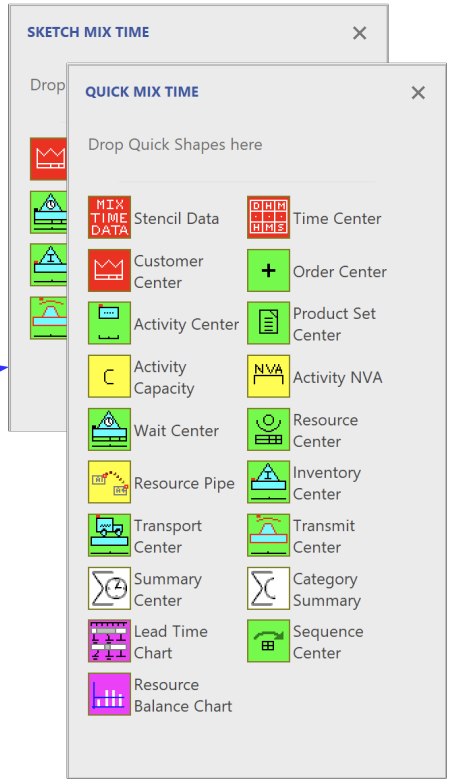


Opening the Quick Mix Time Stencil

Open







Start an eVSM Mix Time Map

Use the “Open” button in the toolbar to open the “Quick Mix Time” stencils and drop the “Stencil Data” icon on the page.

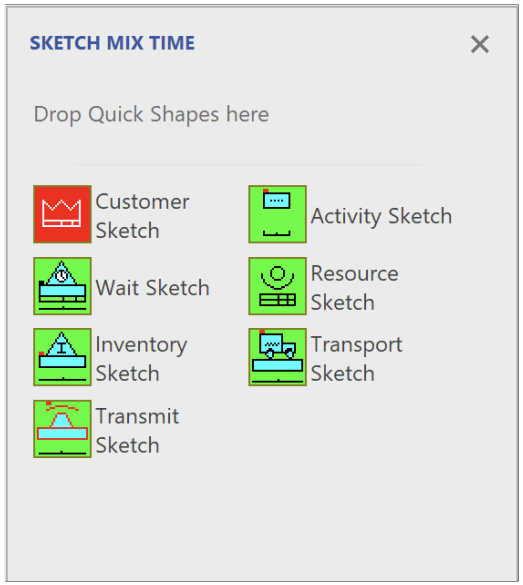
For Online Course Only

Quick Mix Time Stencils

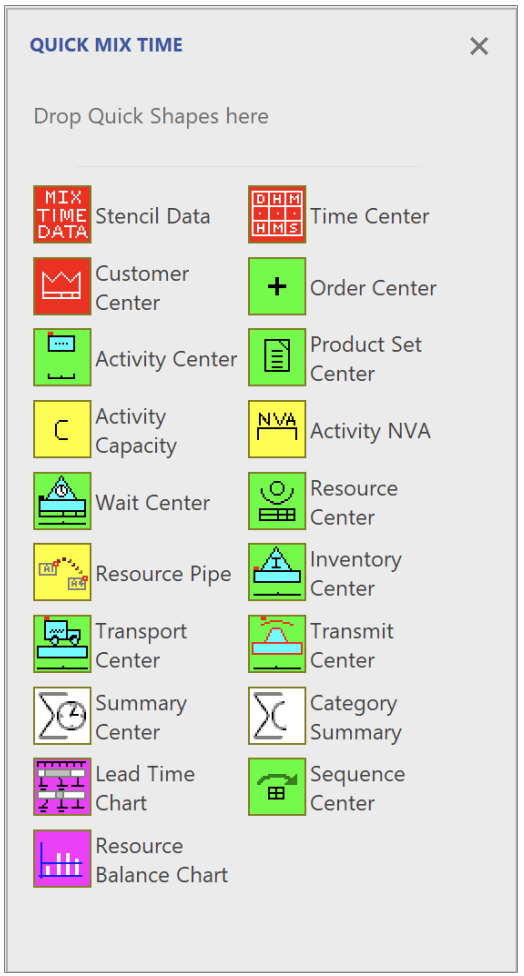
Quick Mix Time includes two stencils:

1. The **Sketch Mix Time** stencil includes only the shapes required to draw flowcharts of value streams. Theses shapes are wired so later, through a single mouse click, the program can automatically add all the data shapes required for use with the Quick Mix Time stencil.

   This allows for rapid flow chart capture of value streams which can later be converted to value stream models with data.

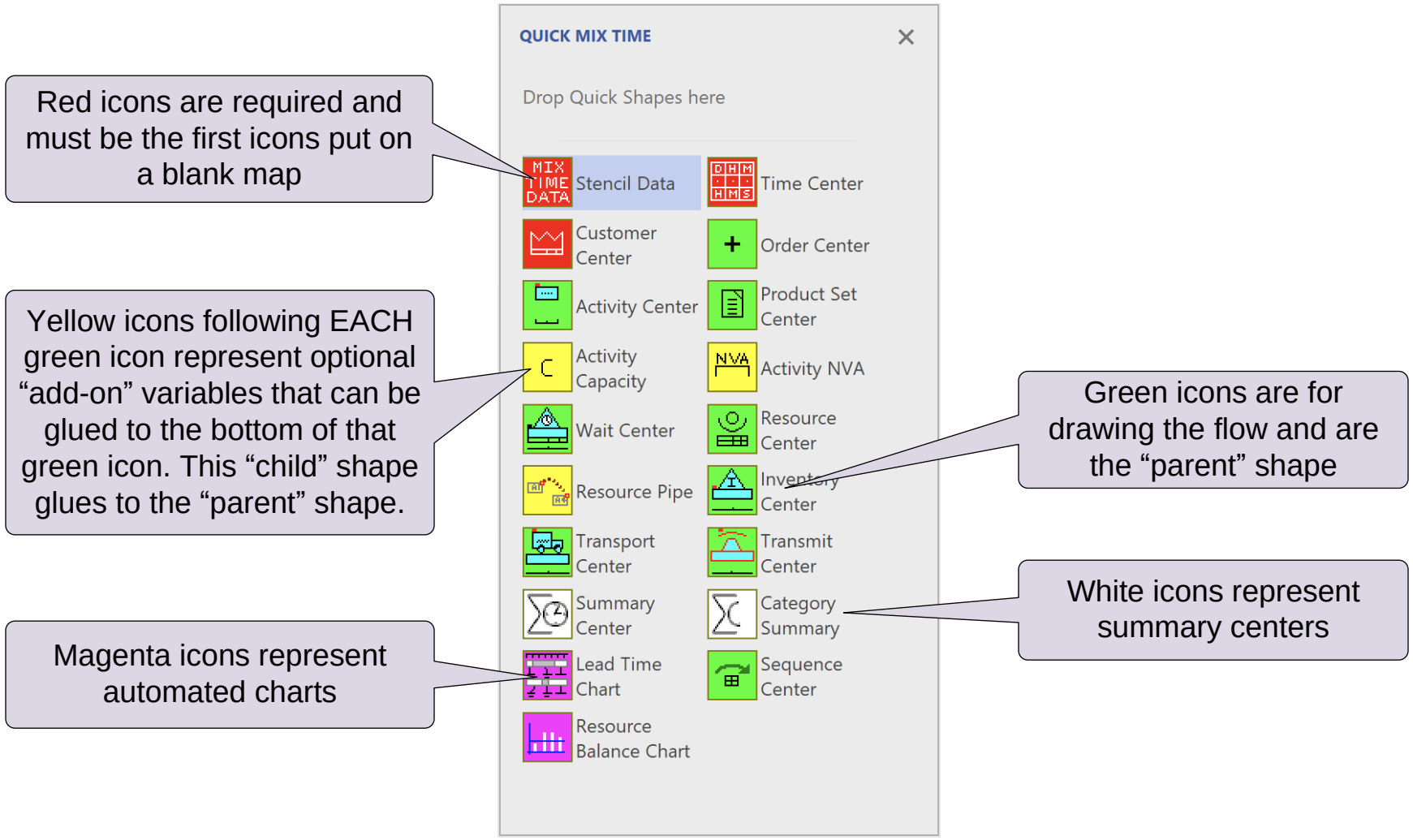


2. The **Quick Mix Time** stencil has all the icons for this application (including all the ones in the Sketch stencil).



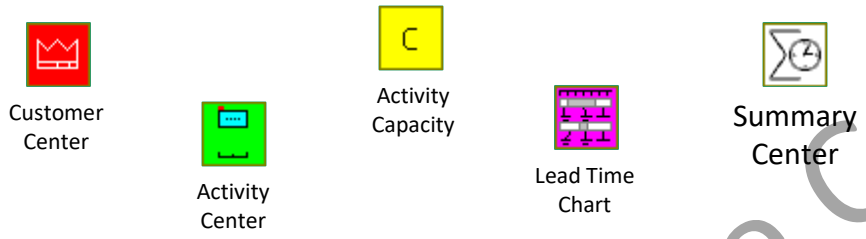
Icon Color Codes in Quick Stencils

Icons in the Quick Mix Time stencils are color coded as described below. This same color standard is used throughout all eVSM applications.



Q. Quick Stencil Icon Colors: Tick ALL of the following that are true.

- ☐ Magenta icons represent charts
- ☐ Red icons are the first mandatory quick stencil shapes on a map
- ☐ Green icons represent parent shapes for drawing the flow
- ☐ Yellow icons can be used instead of green icons

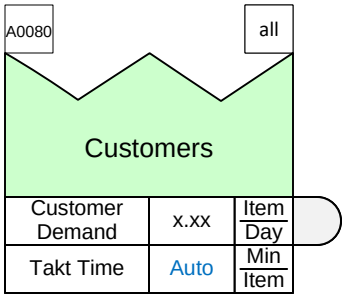


For Online Course Only

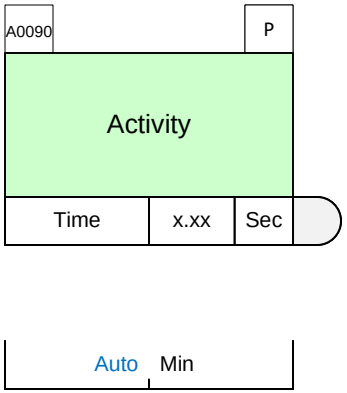
Quick Mix Time Centers

Below are the macros shapes (centers) in the Quick Mix Time stencil used to represent the customer along with the material and information flow.

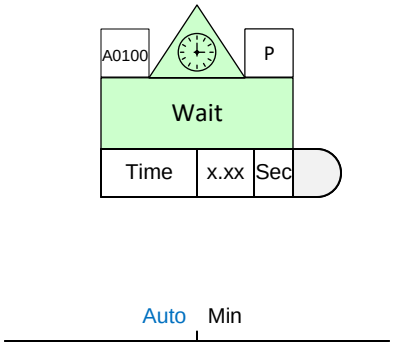
Customer Center



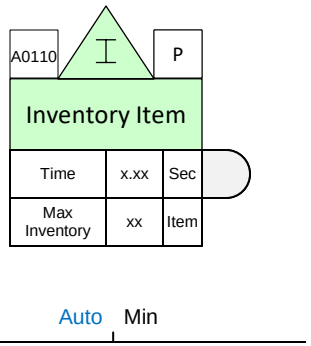
Activity Center



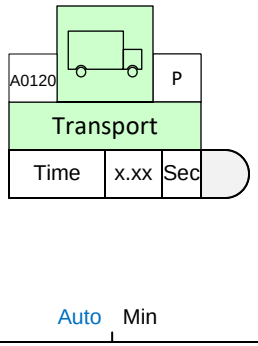
Wait Center



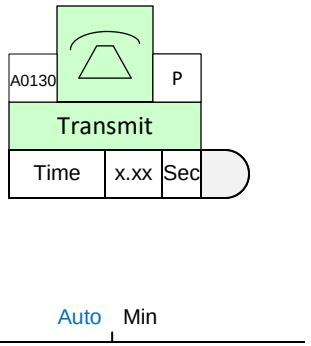
Inventory Center



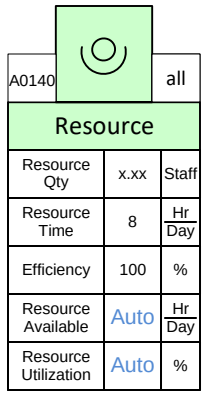
Transport Center



Transmit Center

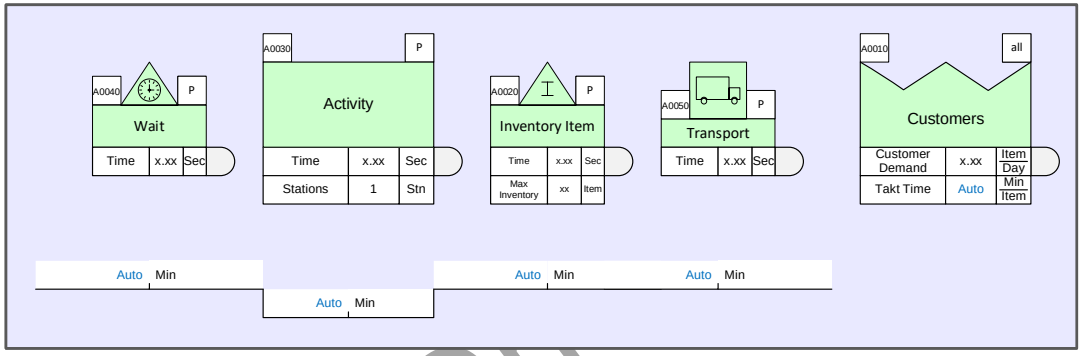


Resource Center



Quick Mix Time Centers

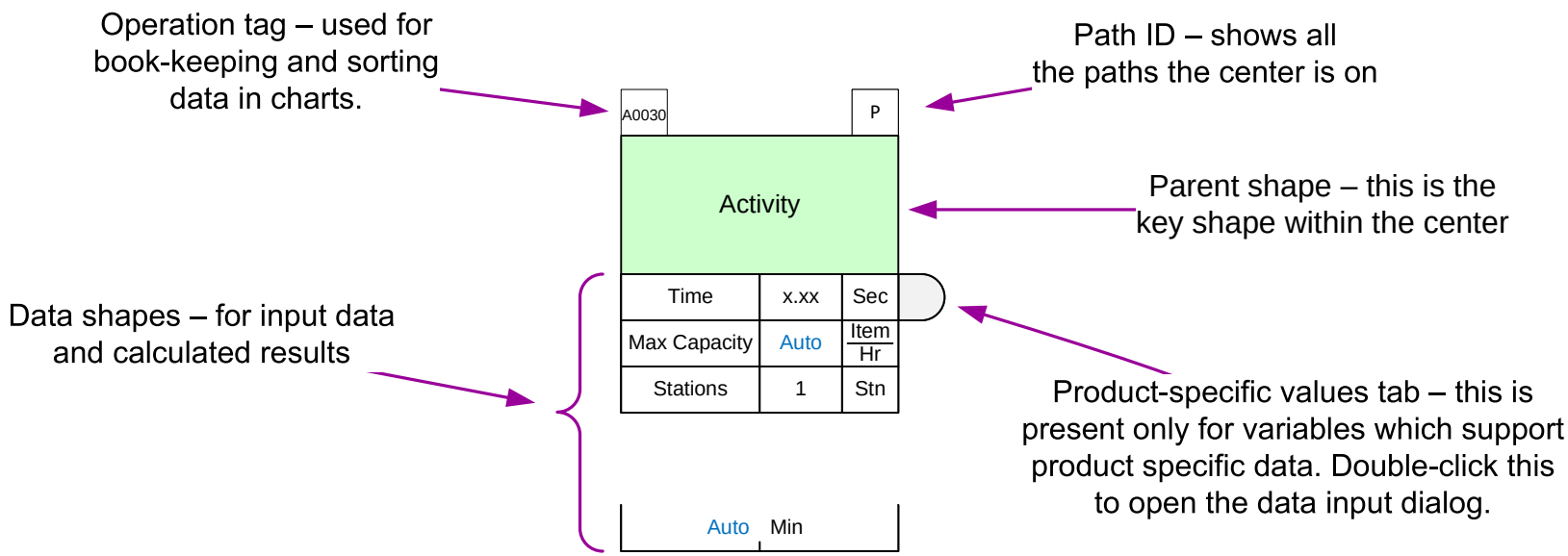
1. Initialize the page for Mix Time Mapping
2. Drag out the shapes shown in the image from the Quick Mix Time stencil



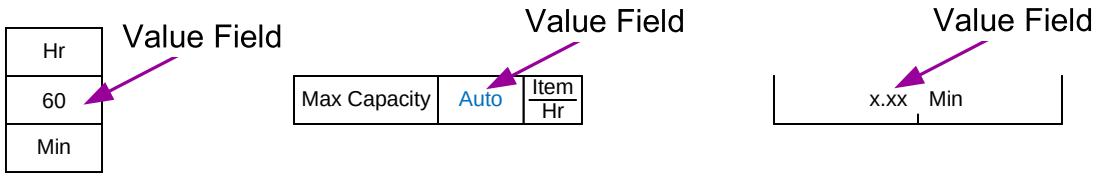
For Online Course Only

Working with Macro Shapes on the Map

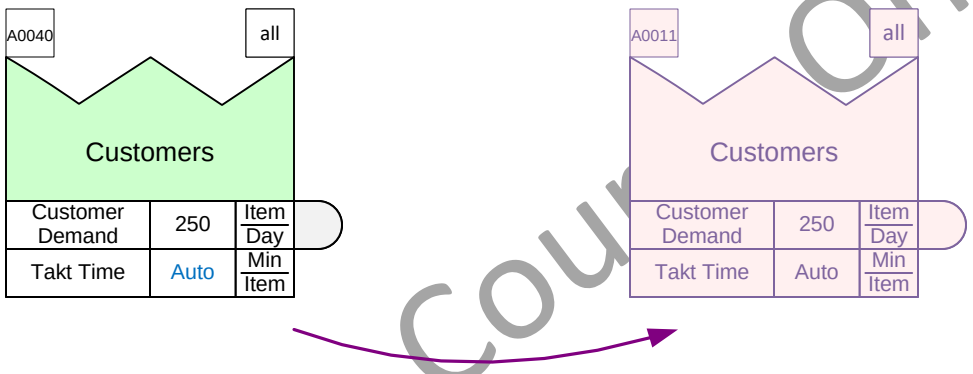
Macro shapes from the Quick stencils on the left consist of several components as shown here.



To move or delete a whole center, click on the parent shape. To move or delete a data shape, click on the value field.



Move a Macro Shape



For Online Course Only

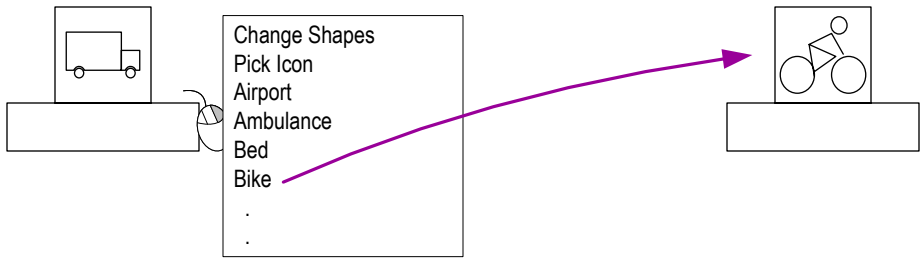
How are the eVSM Base Stencils Organized?

The eVSM base shapes are simply visual icons with no automation built in. They can be used to draw flowcharts of value streams and for annotating value stream models. They are organized on the right side of the Visio window and divided into several stencils.

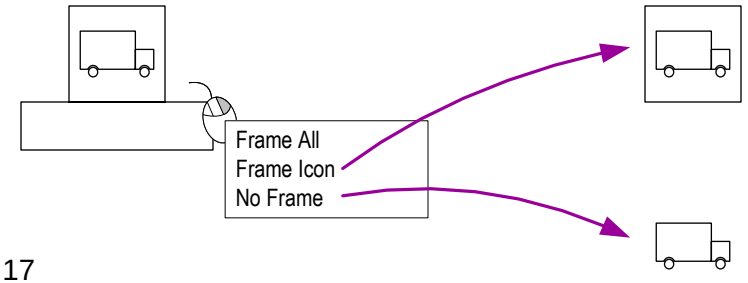
The eVSM Fast Draw stencil (covered in the Fast Draw course) includes only the most frequently used sub-set of the icons. The rest of the stencils are organized by material flow, arrows, data blocks, etc. By design, some icons appear in more than one stencil.

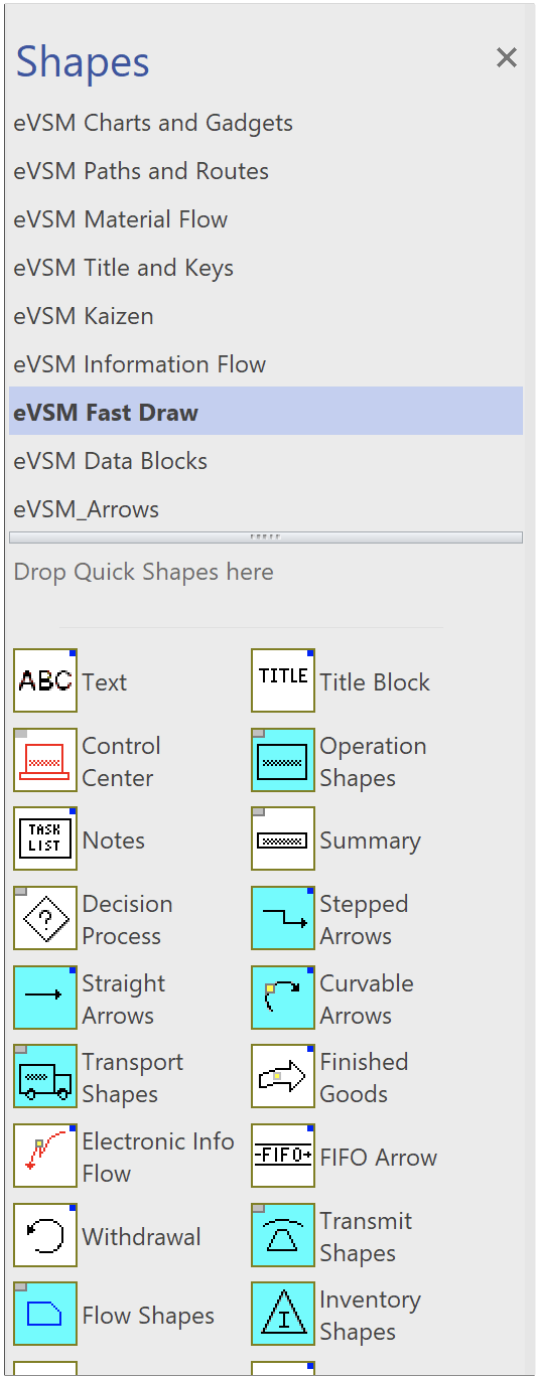
Base stencils have blue and white icons. The white icons are single shapes, while the blue icons represent FAMILIES of shapes. To access members of the family, you:

- Drag out the icon
- Right-click the shape on the page
- Use “Change Shape” to select a different member



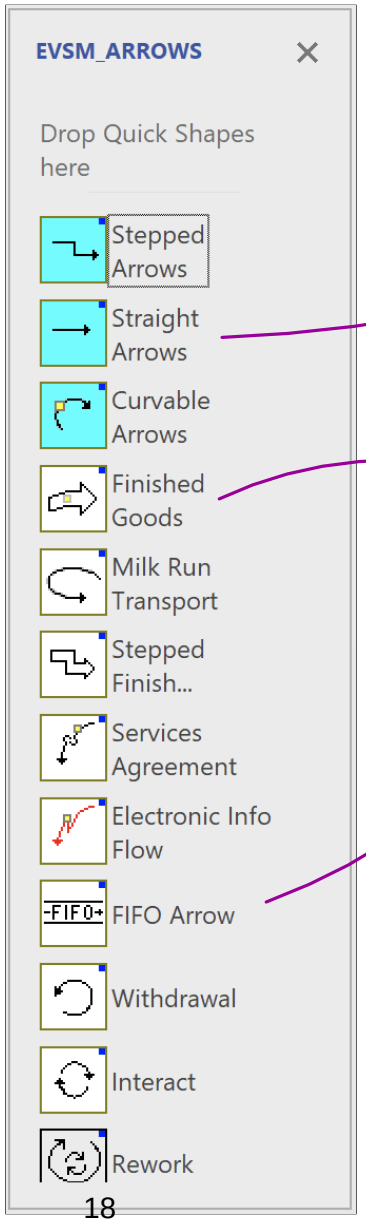
There are also right-click options to change the framing around the shape. Example:



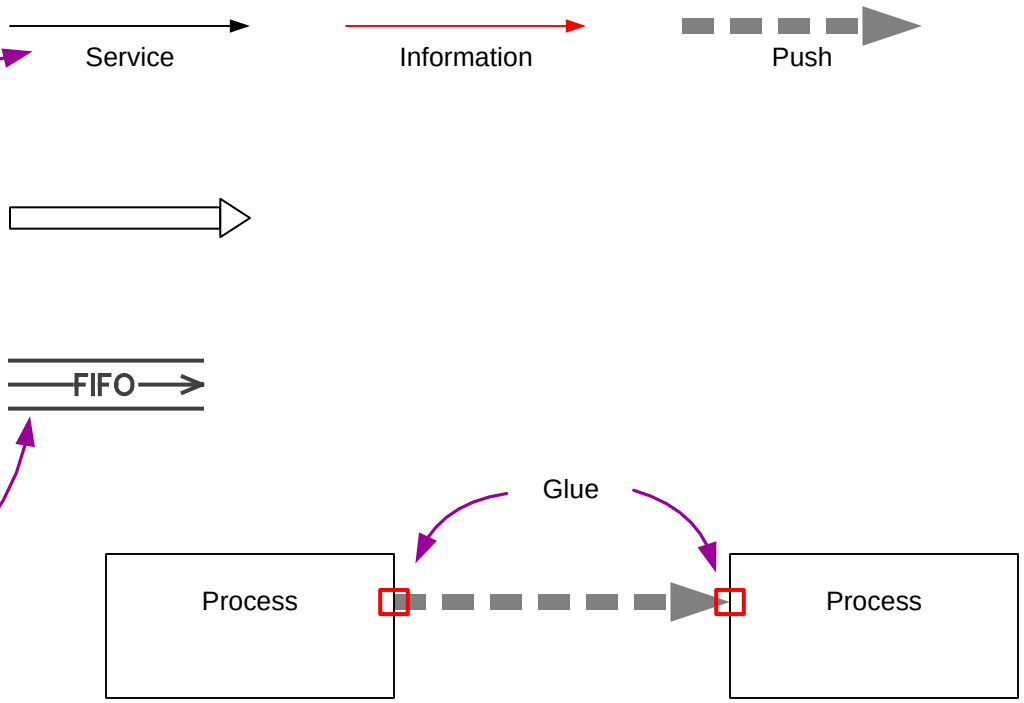


Arrows on Value Stream Maps

You remember that the arrows between the VSM shapes have specific meaning on a map. For example, push arrow, information arrow, etc.



The blue stacks of arrows found in the eVSM Arrows stencil (also in eVSM Fast Draw) have a variety of arrows in their families. The “Straight Arrows” stack below has been dragged out and changed to Information and Push arrows.

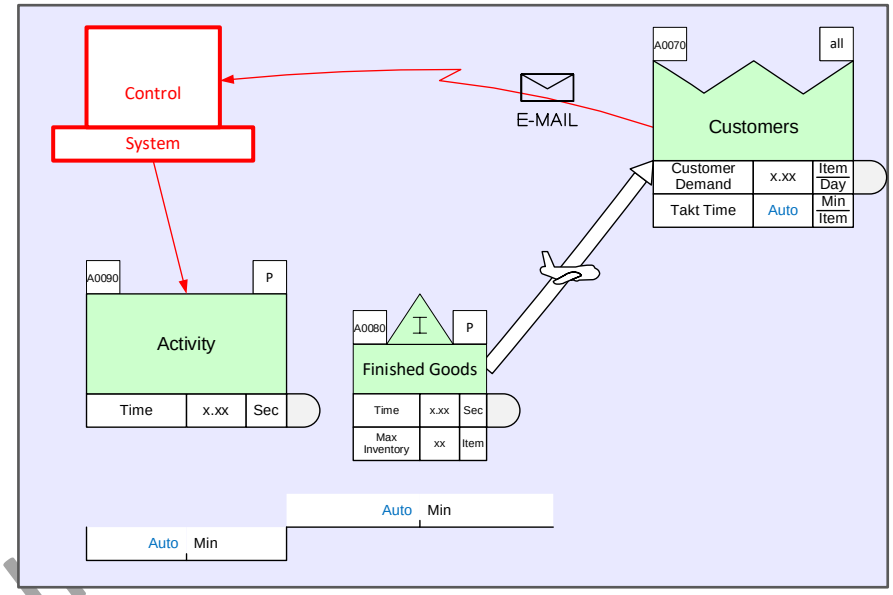


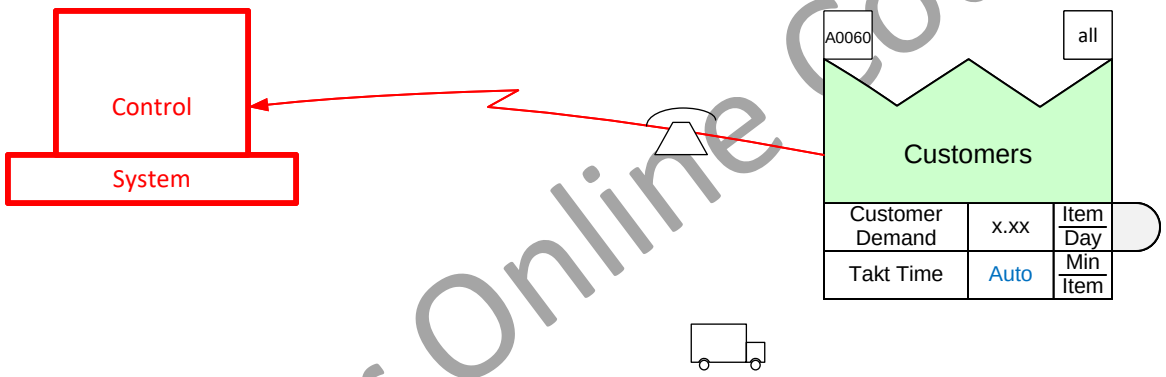
When using arrows, try and glue them to shapes. This will make later maintenance/updating of the maps a lot easier.

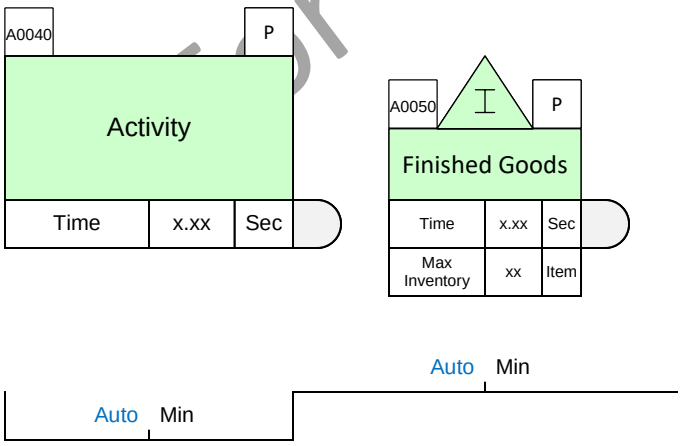
Add Base Stencil Shapes to a Map

Add the following shapes to the map below to match the image on the right.

1. Finished goods arrow
2. Plane icon
3. Email icon





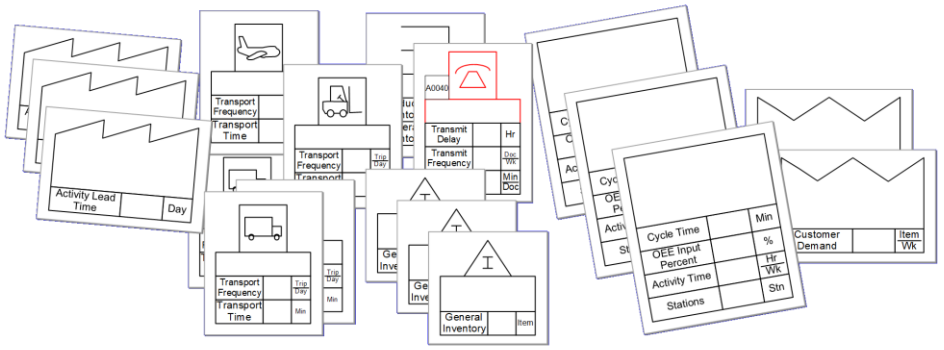


For Online Cou

Working with Wall Maps

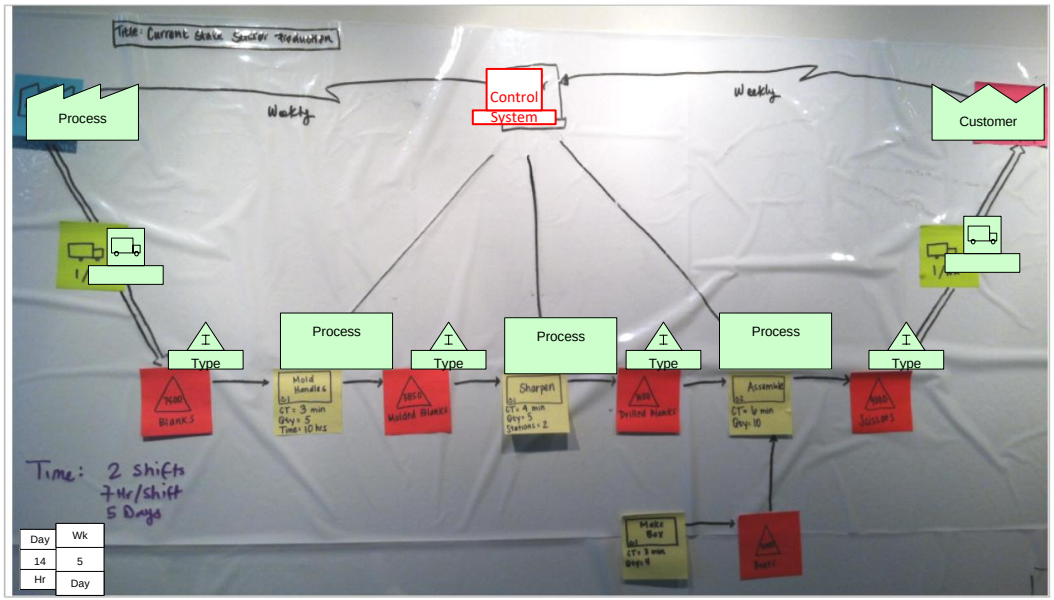
Often, value stream maps are started on a wall or on paper. eVSM provides a simple way to create templates for a wall map. See how at:

https://evsm.com/toolbarguide



When you are ready to create an eVSM model of the wall map, you can import a picture of the wall map on the drawing page and then draw your eVSM map directly on top of the wall map. See how at:

https://evsm.com/toolbarguide



Convert a wall map into an eVSM Model

For this exercise, a picture of a wall map has already been imported and sized on the page. You need to:

1. Initiate the page for a Quick Mix Time map.
2. Drag out the appropriate centers from the Sketch Mix Time stencil, name them, and overlay them on the picture. No need to enter any data values.
3. There is no need to add arrows. Click Grade It.

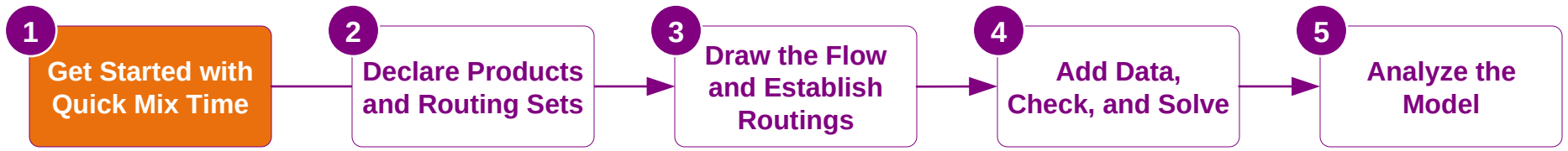
Only

Lesson 1: Summary

You learned that:

- How stencils are organized in eVSM
- How to start a new Quick Mix Time map
- How to convert a wall map into an electronic sketch

Quick Mix Time Course Learning Path

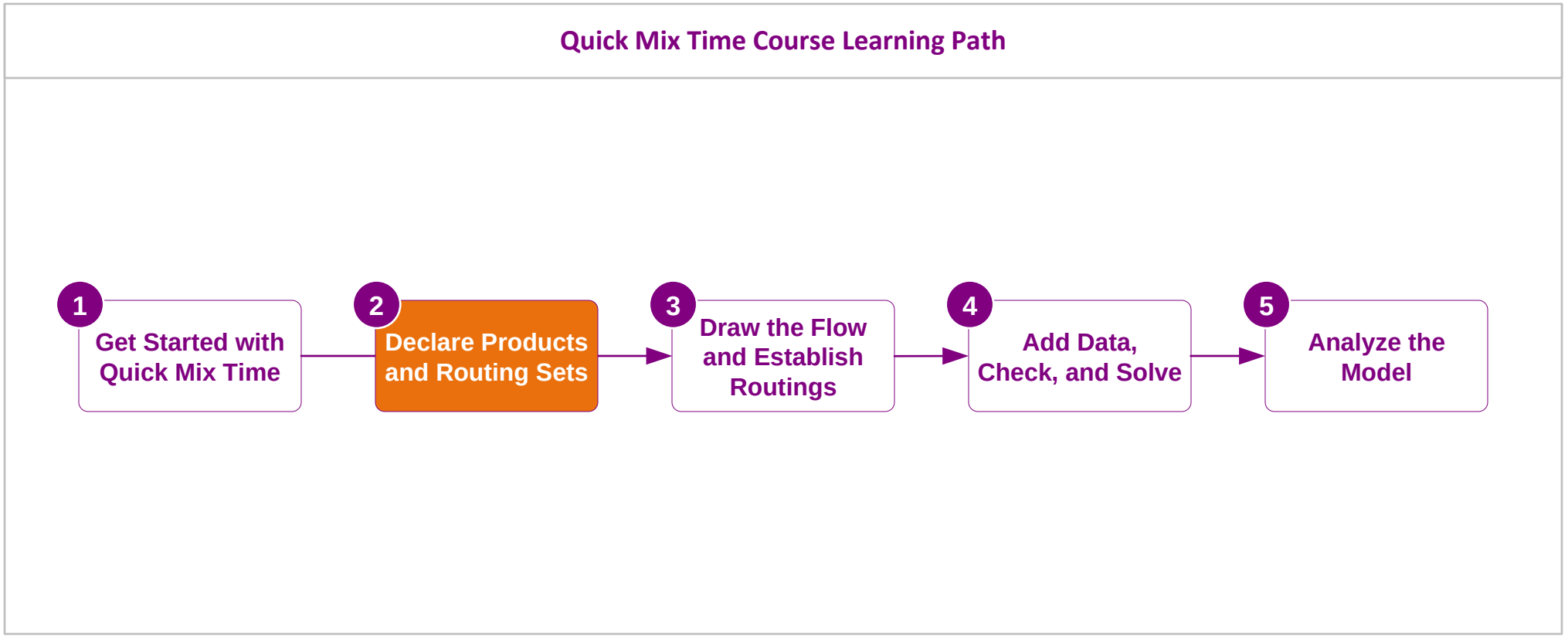


What's next:

- Learn the eVSM Mix mapping process
- How to declare products and organize them into routing sets

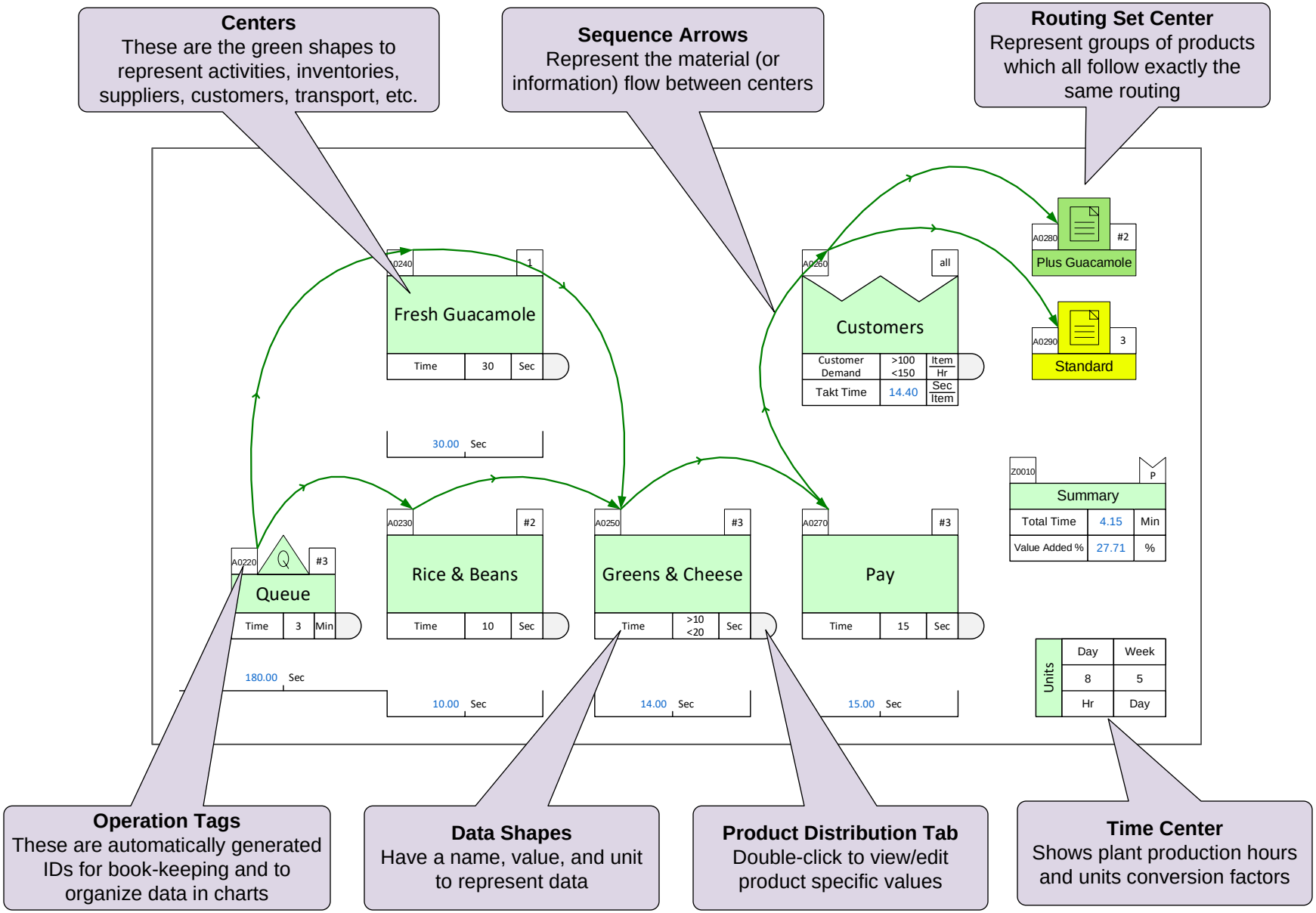
Declare Products and Routing Sets

This lesson introduces mix modeling terminology and gives an overview of the eVSM Mix model building process followed by a step by step guide to declaring products and routing sets for the value stream.



Declare Products and Routing Sets

Essential Terminology for eVSM Mix...



Q. What does a “Routing Set” mean in eVSM Mix?

- ◎ All products which have similar cycle times
- ◎ All products which go through exactly the same sequence of steps
- ◎ All products included in the same shipment to customer
- ◎ All products that are packaged together

For Online Course Only

Overview of steps to build an eVSM Mix model

This lesson will cover item 1.

1. Declare Products and Routing Sets

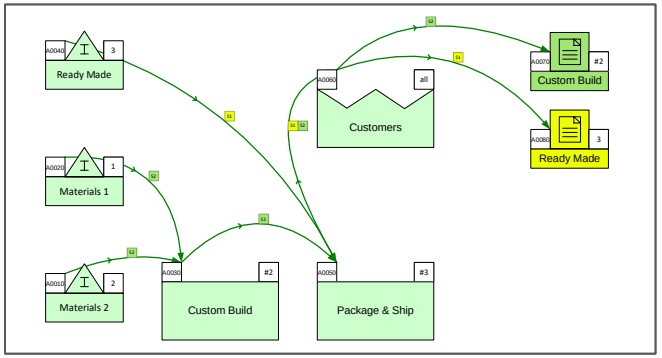
- List the products for the value stream.
- Group the products into Routing Sets. A Routing Set is all the products that go through exactly the same sequence of activities.
- If the list of products is long or if the process is complex, then it is a good idea to create a simple grid/matrix as shown here.

	Process1	Process2	Process3	Process4	Process5
Product 1	X	X	X	X	X
Product 2	X	X		X	X
Product 3	X	X		X	X
Product 4	X		X	X	X

- A minimalist product list is recommended (ideally less than 10) to ensure good software performance. One way to do this is to restrict the model to the high-volume products. The remaining low volume products can be represented as a single product with weighted averages for operation parameters.

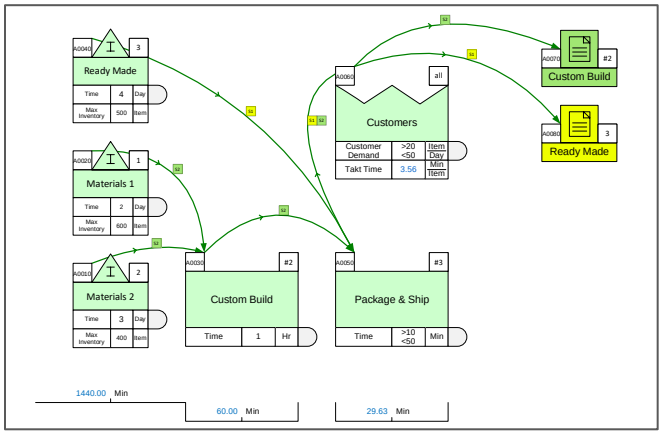
2. Draw the Flow and Establish the Routings

- Draw the activities, inventories, etc. from the Sketch Mix Time stencil.
- Connect with sequence arrows.
- Use “Set Gates” to specify the routings



3. Enter Data and Solve

- Add data shapes to the sketch
- Enter the data values for customer demand, production time, and operational parameters.
- Solve the model and check the results.

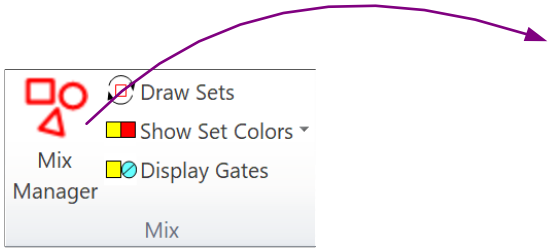


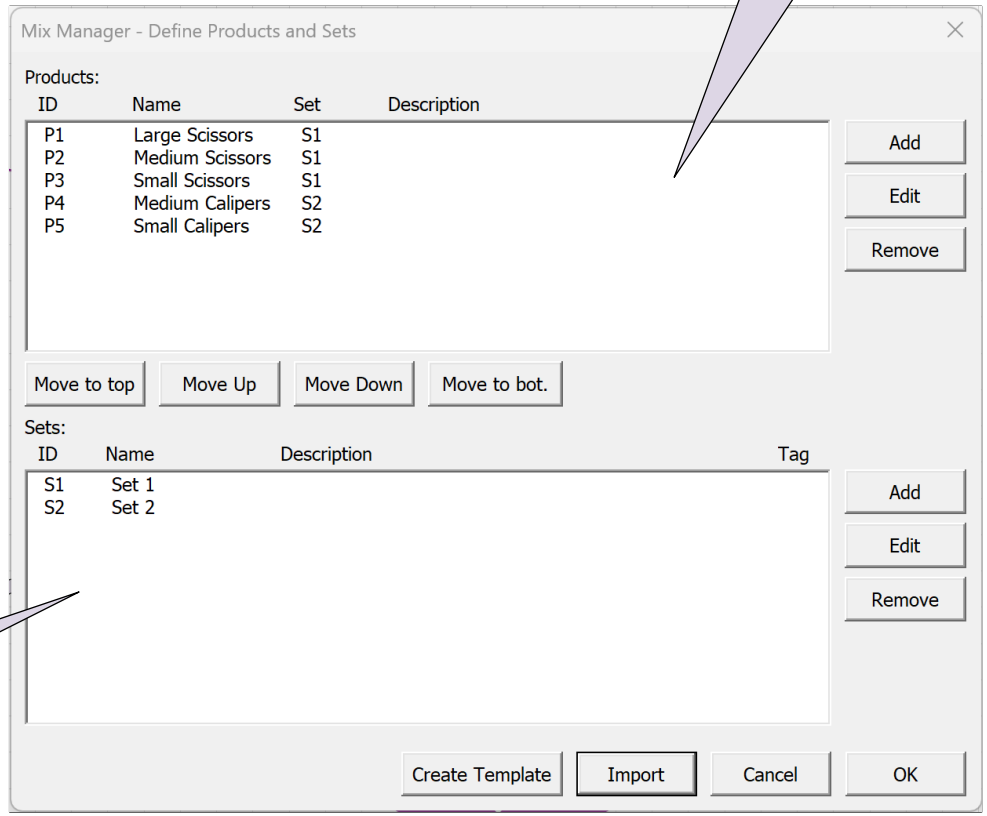
Products and Routing Sets

An eVSM Mix model must have at least one product, one routing set, one customer, etc.

A Routing Set is a group of products which go through exactly the same sequence of steps, i.e.. Exactly the same routing.

Products and Routing Sets are declared through the Mix Manager dialog box.



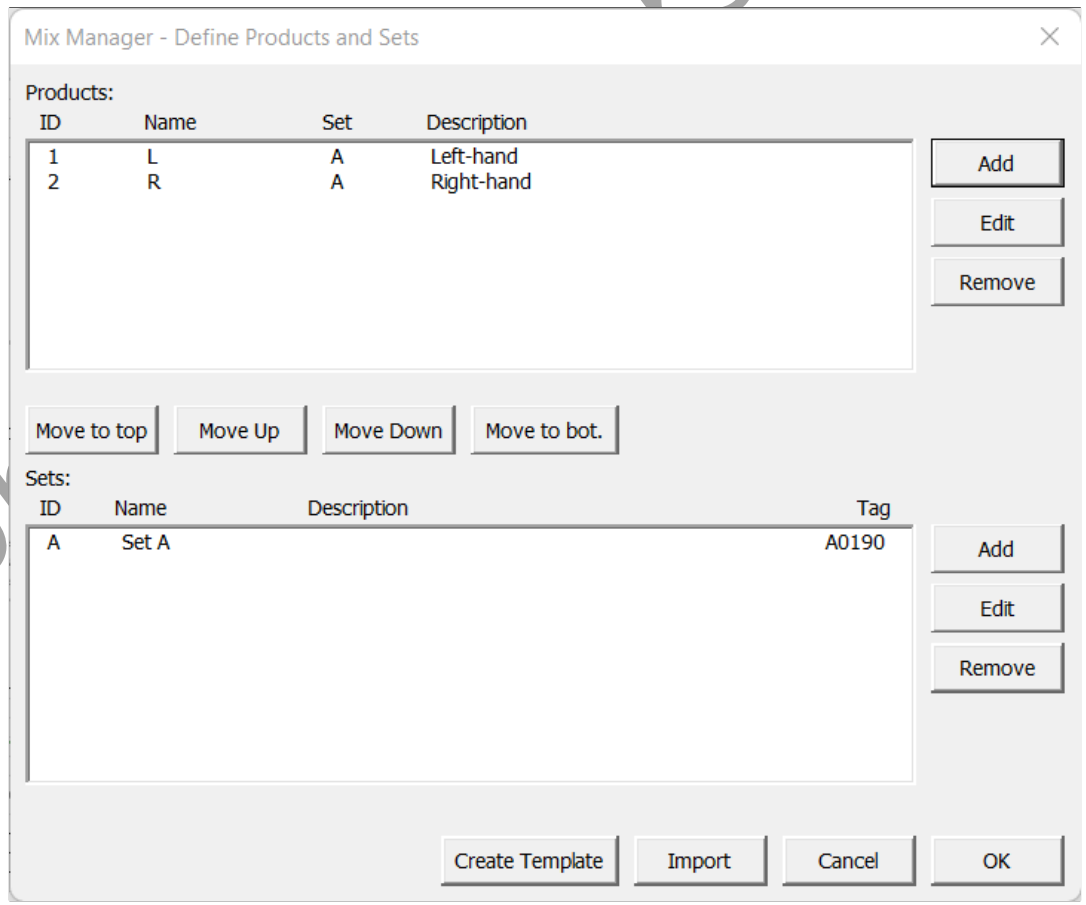


Products and Routing Sets may be imported from Excel. Useful when you have a long list of products and a complex value stream.

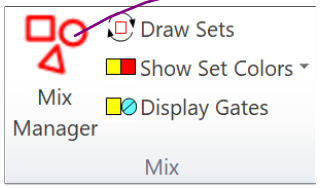
What are some of the functions of the Mix Manager dialog? Select ALL 3 that are TRUE.

- ☐ It shows all the products for the current page
- ☐ It allows adding/removing Products from Routing Sets
- ☐ It shows the customer demand for each product
- ☐ It allows importing of Products, Routing Sets, and Centers from Excel

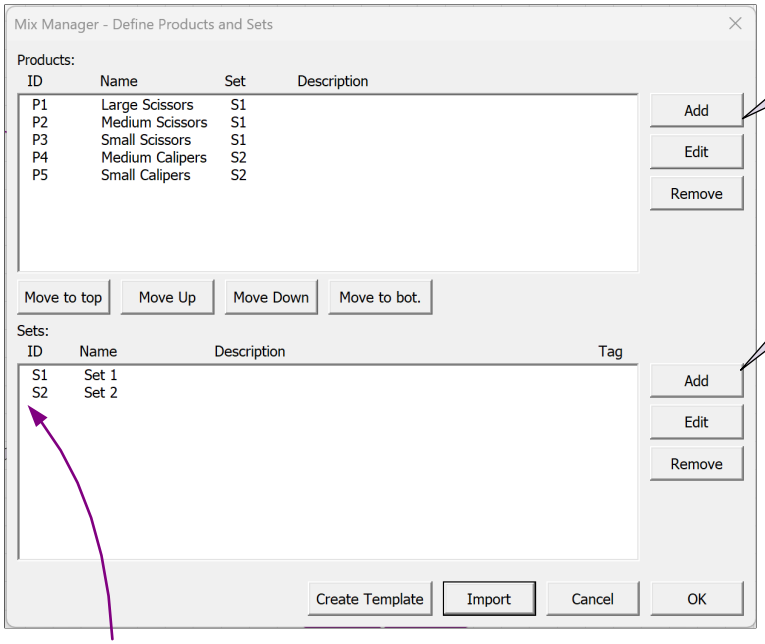
For Course Only



Steps to Declare Products and Routing Sets



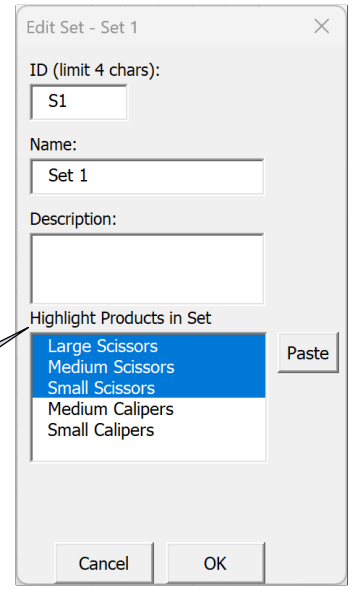
eVSM Toolbar



1 Add and edit products here

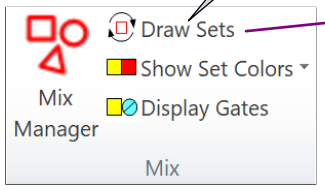
2 Add and edit Sets here

Product and Set ID's should be restricted to no more than 2 characters, 3 maximum.

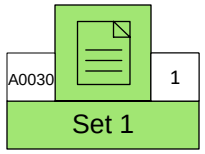


3 Assign products to exclusive sets. Note, each product exists only in one set.

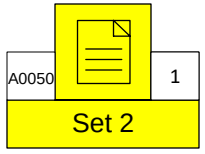
4 Click Draw Sets. This will draw the Set centers on the right side of the page.



eVSM Toolbar



S1 – Set 1
P1 – Large Scissors
P2 – Medium Scissors
P3 – Small Scissors



S2 – Set 2
P4 – Medium Calipers
P5 – Large Calipers

Enter Products and Routing Sets in the Mix Manager dialog

1. Enter the products and sets displayed here into the Mix Manager by following the steps outlined on the previous page.
2. Close the Mix Manager dialog and click the **Draw Sets** button in the toolbar. Note the Set centers will be drawn beyond the right edge of the drawing page.
3. Click Grade It!

Set ID	Set Name	Product ID	Product Name
S1	Set 1	P1	Part 1
S1	Set 1	P3	Part 3
S2	Set 2	P2	Part 2

For Online Course Only

Product Matrix

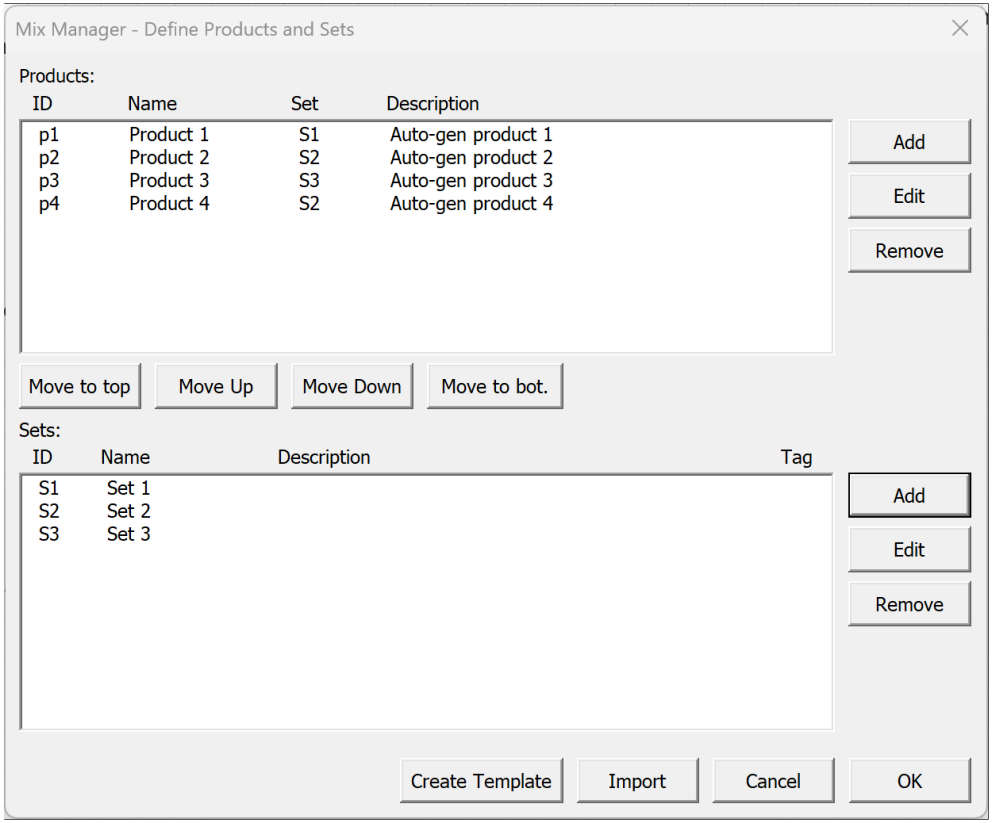
A product matrix is simple way to show which products go through which processes and then to group them into identical routing groups (Sets). This example shows 4 products and 5 processes.

Products	Process1	Process2	Process3	Process4	Process5
Product 1	X	X	X	X	X
Product 2	X	X		X	X
Product 3	X		X	X	X
Product 4	X	X		X	X

After grouping into identical routing sets:

Sets	Products	Process1	Process2	Process3	Process4	Process5
Set 1	Product 1	X	X	X	X	X
Set 2	Product 2	X	X		X	X
Set 2	Product 4	X	X		X	X
Set 3	Product 3	X		X	X	X

In the Mix Manager dialog, this would be entered as:



Specify Products and Sets

1. Group these products into Sets. You can do this on paper or in Excel.
2. Enter the Products and Sets into the Mix Manager.
3. Click Draw Sets and then click Grade It!

Products	Clean	Machine	Make Springs	Sharpen	Assemble
Foreceps - Small	X	X			X
Foreceps - Medium	X	X			X
Cutters - 10cm	X	X		X	X
Cutters - 14cm	X	X	X	X	X
Scissors	X	X		X	X

For Online Only

Edit Products & Sets

The Mix Manager on this page is currently Populated with these products and sets:

Products	Clean	Machine	Make Springs	Sharpen	Assemble
Foreceps - Small	X	X			X
Foreceps - Medium	X	X			X
Cutters - 10cm	X	X		X	X
Cutters - 14cm	X	X	X	X	X
Scissors	X	X		X	X

We need to replace the “Cutters – 14cm” with “Cutters – 12cm”. Also, the scissors no longer need to go through the “Clean” process. Here is the updated product matrix:

Products	Clean	Machine	Make Springs	Sharpen	Assemble
Foreceps - Small	X	X			X
Foreceps - Medium	X	X			X
Cutters - 10cm	X	X		X	X
Cutters - 12cm	X	X	X	X	X
Scissors		X		X	X

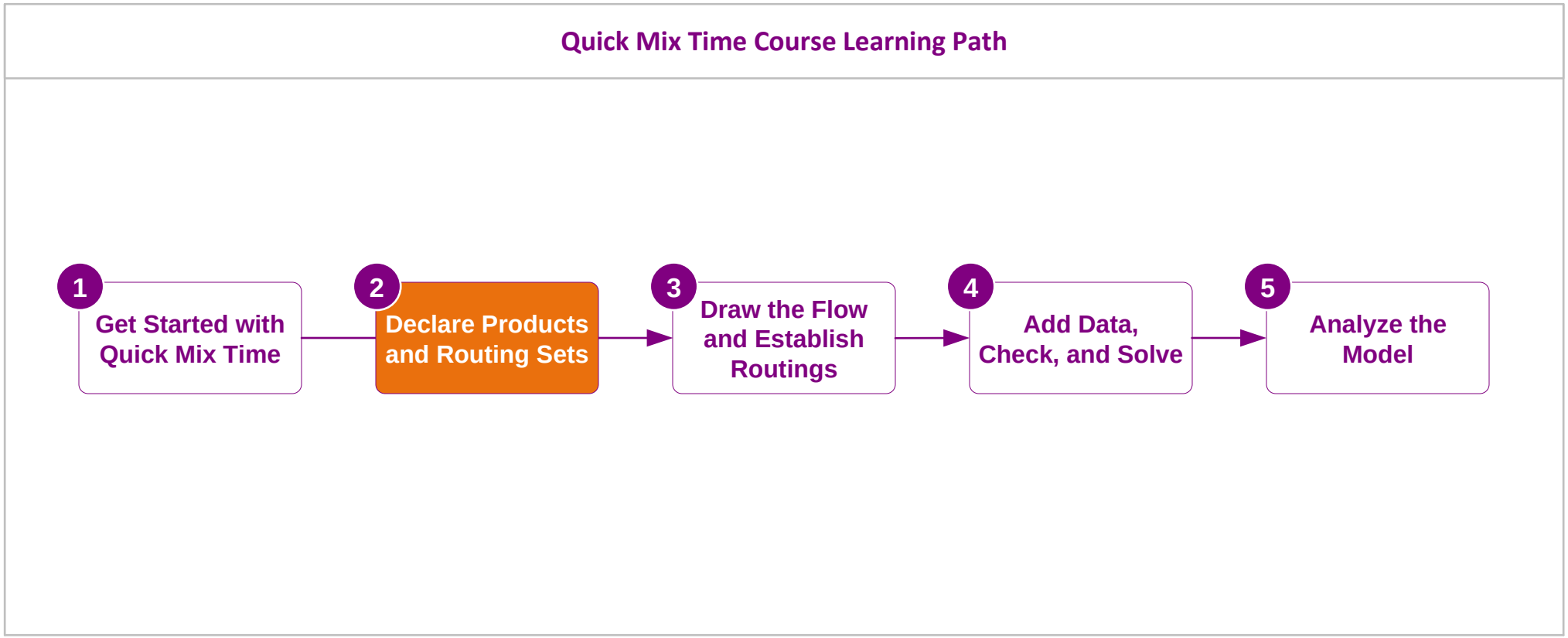
For Online Course

You need to:

1. Make these changes in the Mix Manager dialog
2. Draw Sets and then click Grade It!

You learned:

- eVSM Mix terminology
- Overview of process to build an eVSM Mix model
- How to declare products and routing sets in the Mix Manager



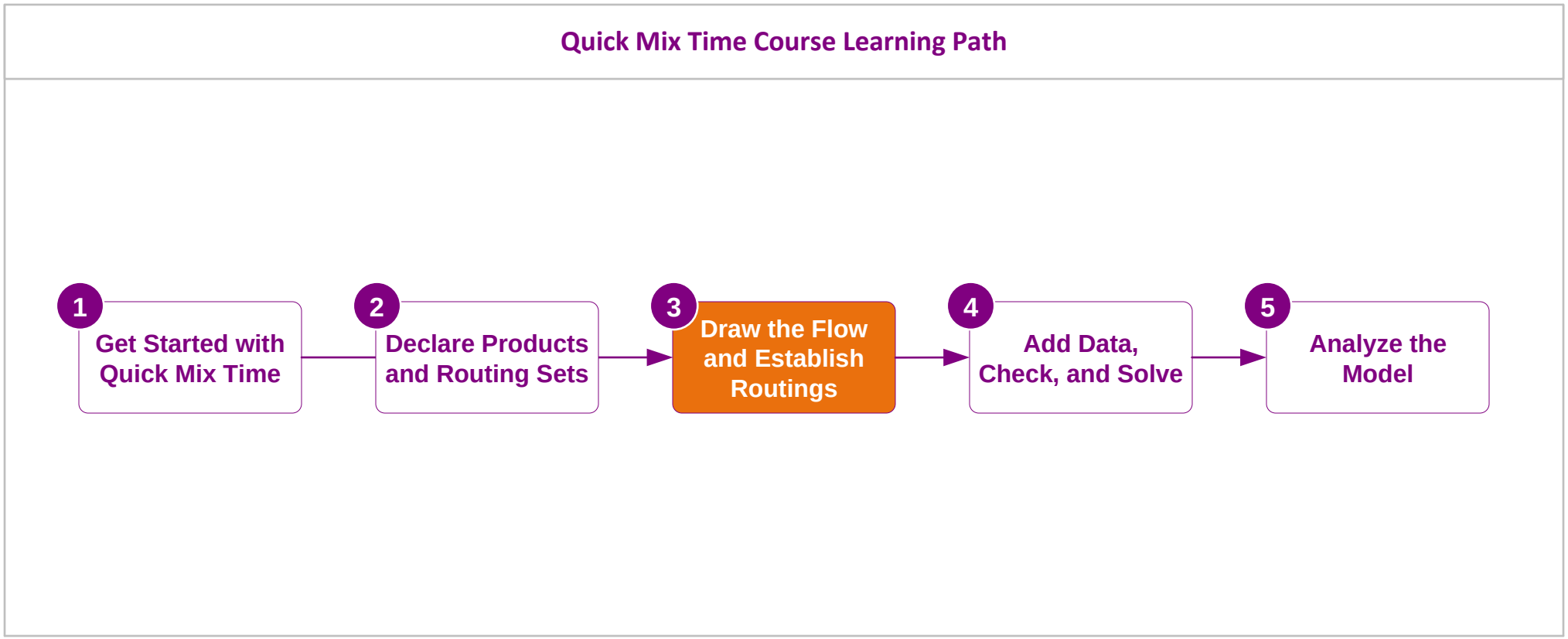
What's next:

You will learn how to draw and sequence the flow, and how to establish the routings.

Draw the Flow and Establish Routings

You learned how to declare the products for the value stream and organize them into Routing Set groups of identical routings in the last lesson. You saw that you can declare products directly in Visio or through Excel.

This lesson will teach you how to draw the flow for the VSM and how to set up the routings.



Draw the Flow and Establish Routings

Overview of steps to build an eVSM Mix model

This lesson covers item 2 below.

1. Declare Products and Routing Sets

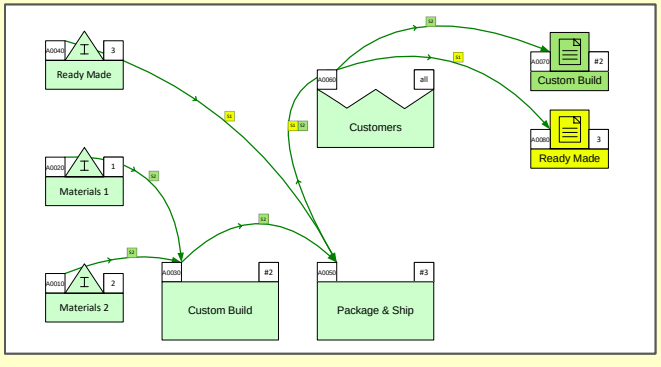
- List the products for the value stream.
- Group the products into Routing Sets. A Routing Set is all the products that go through exactly the same sequence of activities.
- If the list of products is long or if the process is complex, then it is a good idea to create a simple grid/matrix as shown here.

	Process1	Process2	Process3	Process4	Process5
Product 1	X	X	X	X	X
Product 2	X	X		X	X
Product 3	X	X		X	X
Product 4	X		X	X	X

- A minimalist product list is recommended (ideally less than 10) to ensure good software performance. One way to do this is to restrict the model to the high-volume products. The remaining low volume products can be represented as a single product with weighted averages for operation parameters.

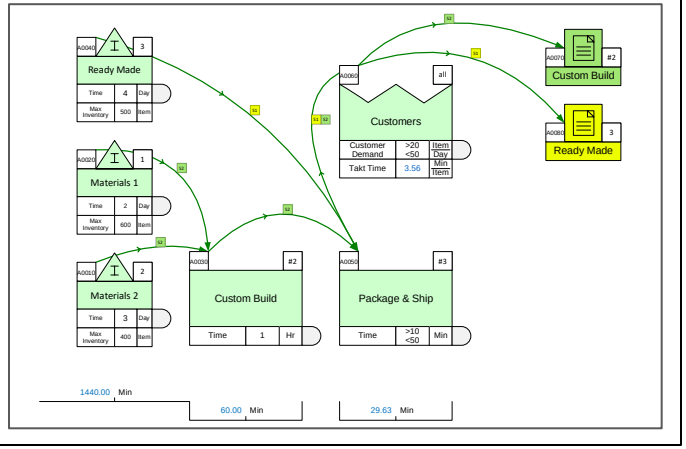
2. Draw the Flow and Establish the Routings

- Draw the activities, inventories, etc. from the Sketch Mix Time stencil.
- Connect with sequence arrows.
- Use “Set Gates” to specify the routings

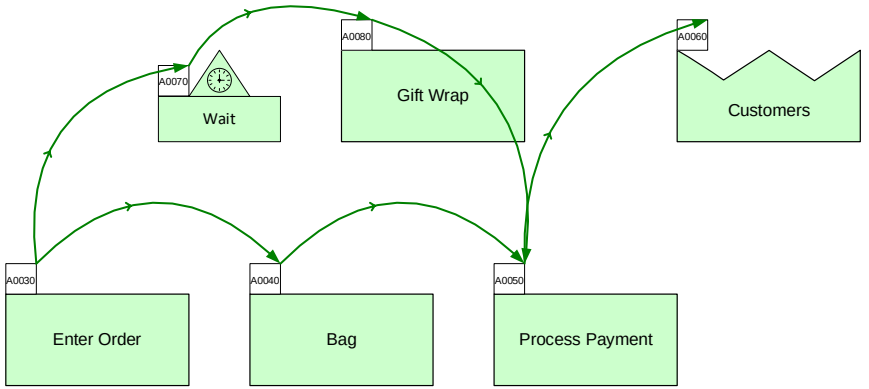


3. Enter Data and Solve

- Add data shapes to the sketch
- Enter the data values for customer demand, production time, and operational parameters.
- Solve the model and check the results.



Sketch the Flow

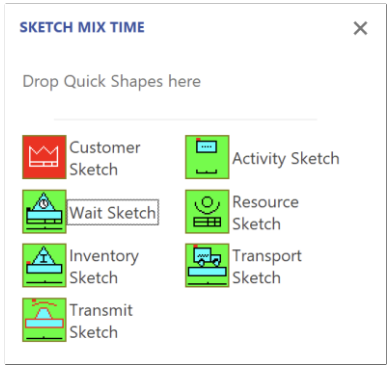


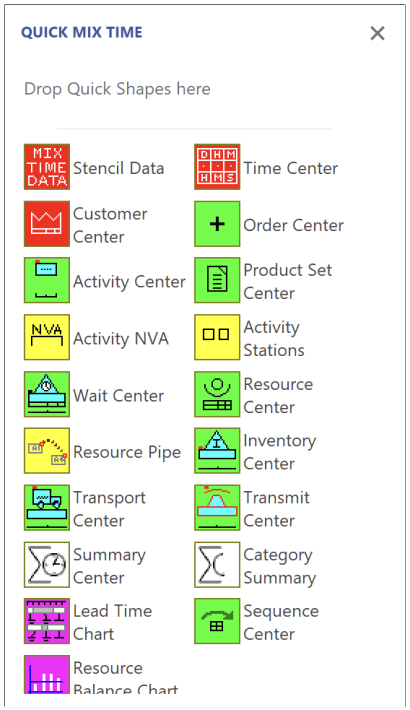
It is best to begin with a sketch (no data) of the material/information flow. The primary applications in eVSM include a sketch version of the application stencil to facilitate this. The sketch stencils only provide the parent shapes for each center; no data shapes are included. When the sketch for the map is complete, a single command click will add all of the default data shapes to the parent shapes.

Here are the steps for a new mixed model map:

1. Initialize the new page for the application you wish to use.
2. Declare products and sets
3. Drop the appropriate centers on the page from the sketch stencil for selected application.
4. Add sequence arrows
5. Use set gates to specify the routings
6. Use right-mouse commands to add datashapes to the map (this is covered in the next lesson)

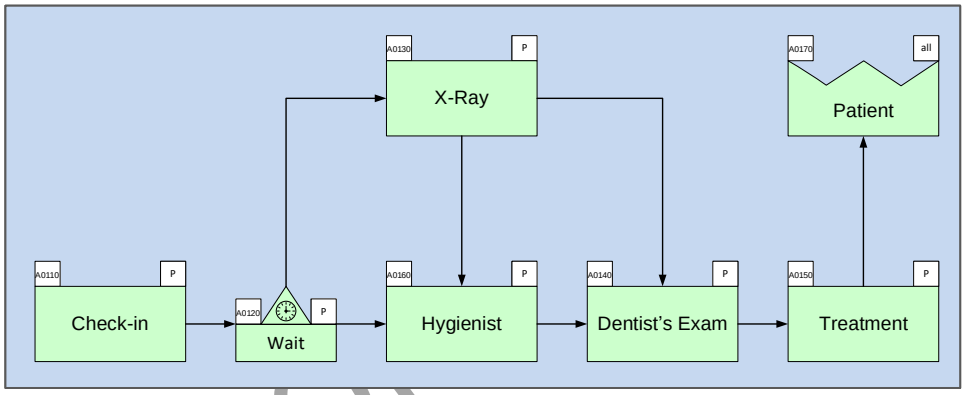
The Mix Time application has the full content in the QUICK MIX TIME stencil and the "sketch" shapes in the SKETCH MIX TIME stencil.





Sketch the Flow

This page has already been initialized for a Mix Time map. You need to draw the flow chart shown in the image with the Sketch Mix Time stencil. Get the arrows from the eVSM Fast Draw stencil.



For Online Course O

Sketch a VSM

- Draw this map shown in the above image with the Sketch Mix Time stencil.
- Get arrows and any other missing shapes from the eVSM Fast Draw stencil.
- Follow the drawing rules you learned in the Fast Draw course: Align to grid, glue the arrows, make the page bigger if needed, use the right mouse button menus to find related shapes.

An image of the map you need to sketch is up here.

For Online Course Only

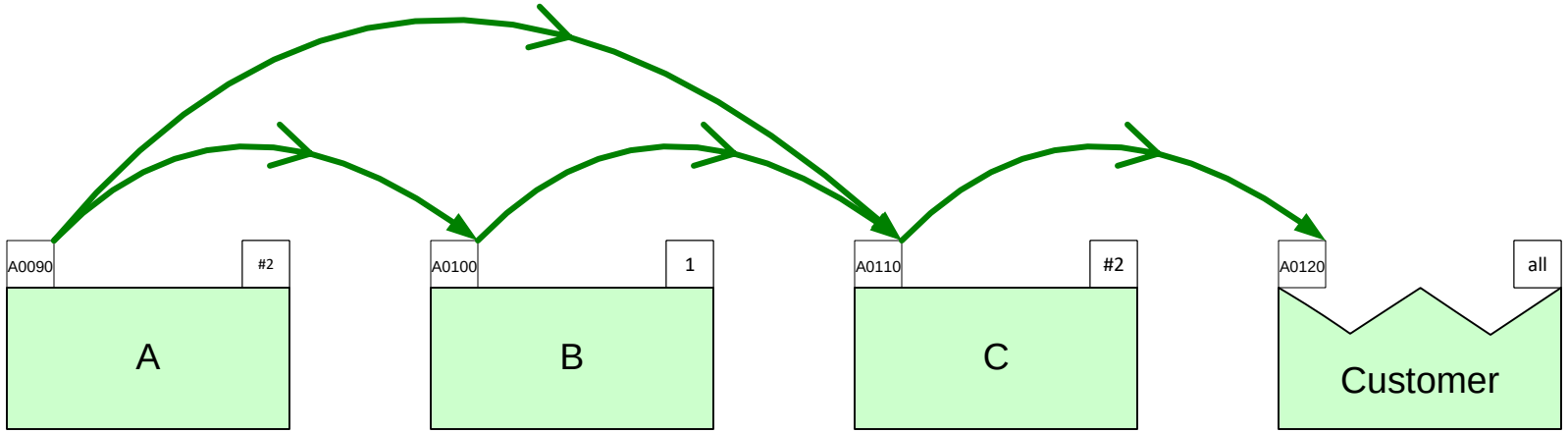
Specifying material flow sequence on the map

Sequence arrows are used to indicate the material (and/or information) flow. This is mandatory. eVSM needs these sequence arrows to:

1. Calculate demand at any point working back from customer demand
2. Establish unique product routings
3. Label activities from upstream to downstream (used for charting)

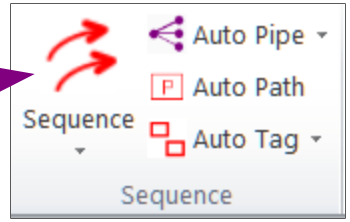
How do you specify material flow sequence?

Let's say material is moving from stations A to B to C (diagram below). Some material is also moving from directly A to C. We would specify the sequence as shown here.



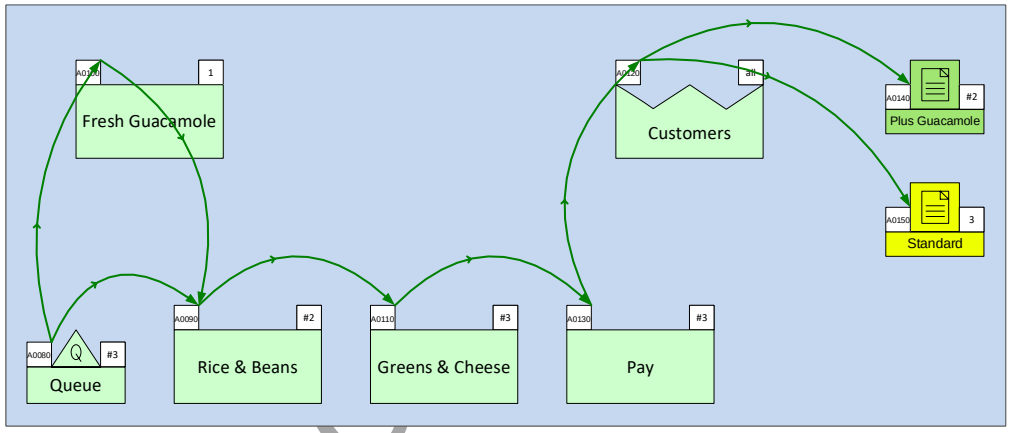
How do you create the sequence arrows?

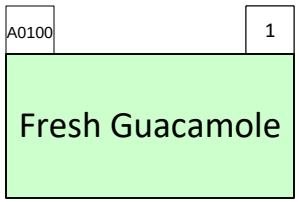
Pick two or more centers in the correct sequence (holding down the shift key). Then click the "Sequence" button in the eVSM toolbar

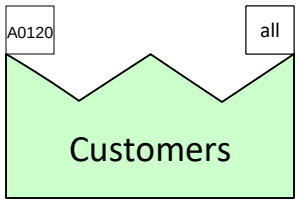


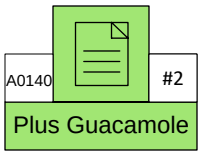
Sequence the flow as shown in the image

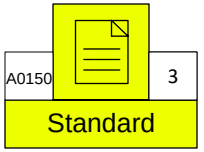
The shapes below are from the Sketch Mix Time stencil. You need to add sequence arrows to this as shown in the image.

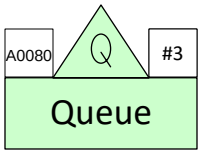


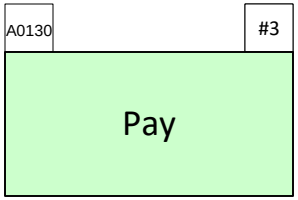












For Online Course

Add Sequence arrows to show all three routings

Routing 1:

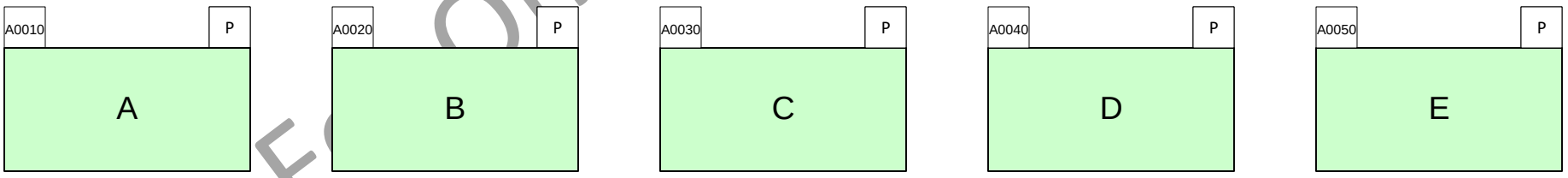
A > B > C > D > E

Routing 2:

A > B > E

Routing 3:

A > C > D > E

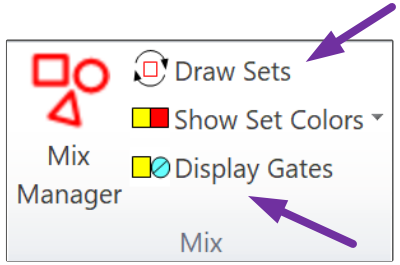


For Online Course Only

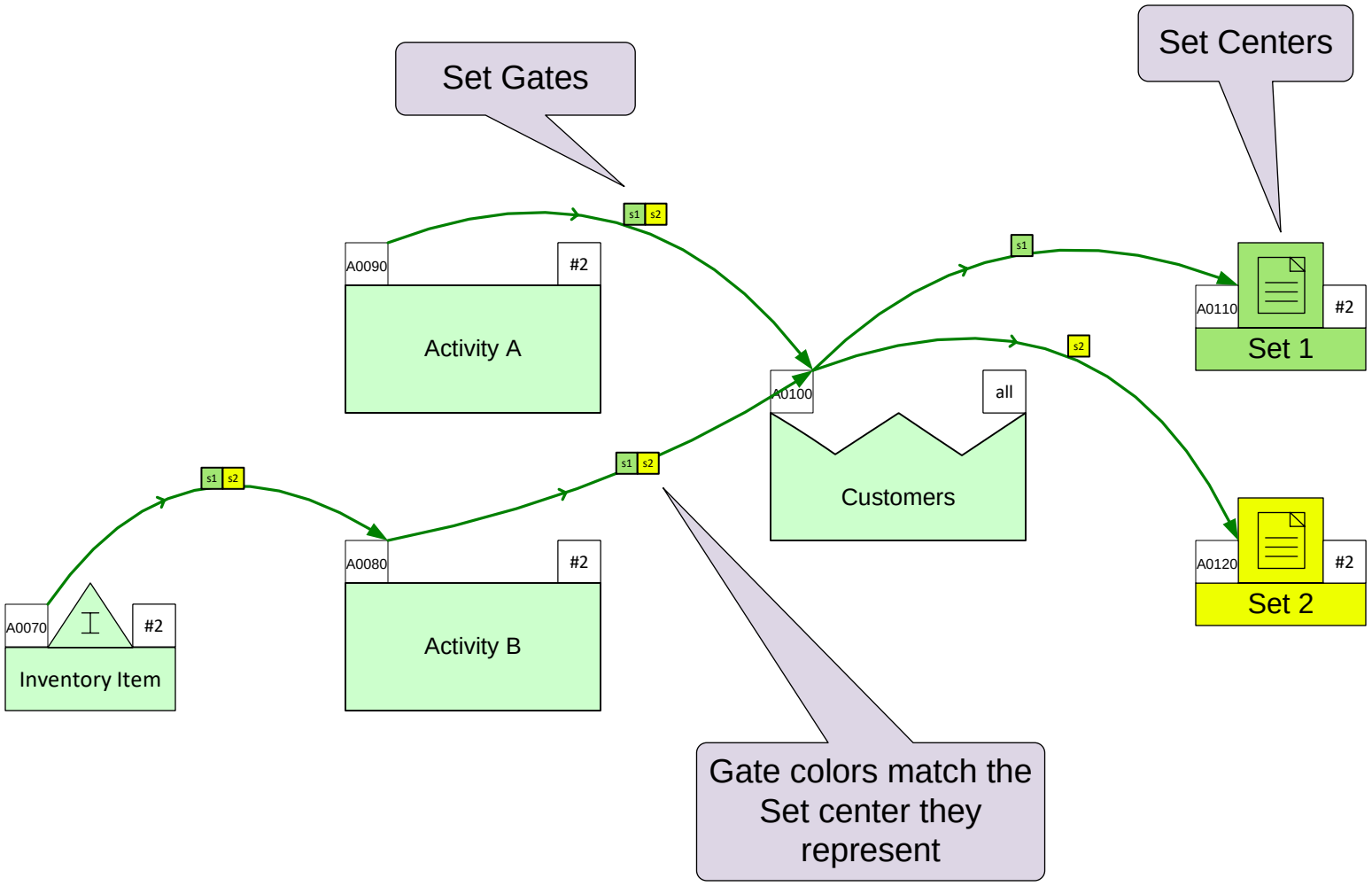
Set Centers and Set Gates

Set Centers – A set represents all the products that go through exactly the same routing through the value stream. Once the products and sets are entered in the Mix Manager, click the Draw Sets button to represent these on the drawing page.

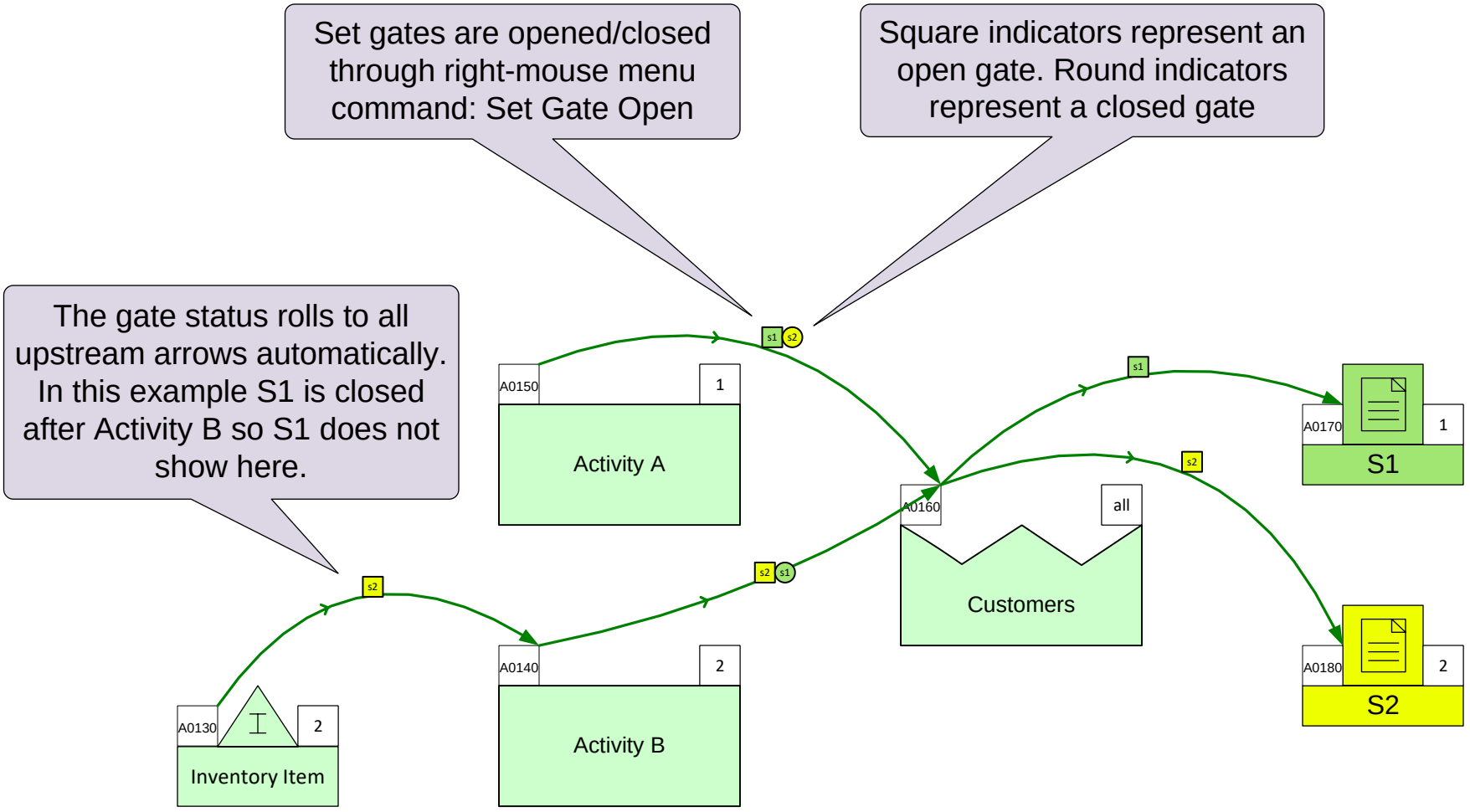
Set Gates – Used to control routings. Set gates are displayed on the sequence arrows with the Display Gates button. A right-mouse command on the gate indicators allow you to open/close a gate to control which set of products can go through which sequence arrow.



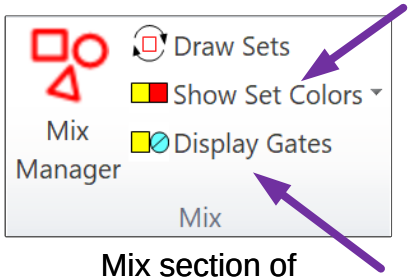
Mix section of eVSM Toolbar



Working with Set Gates

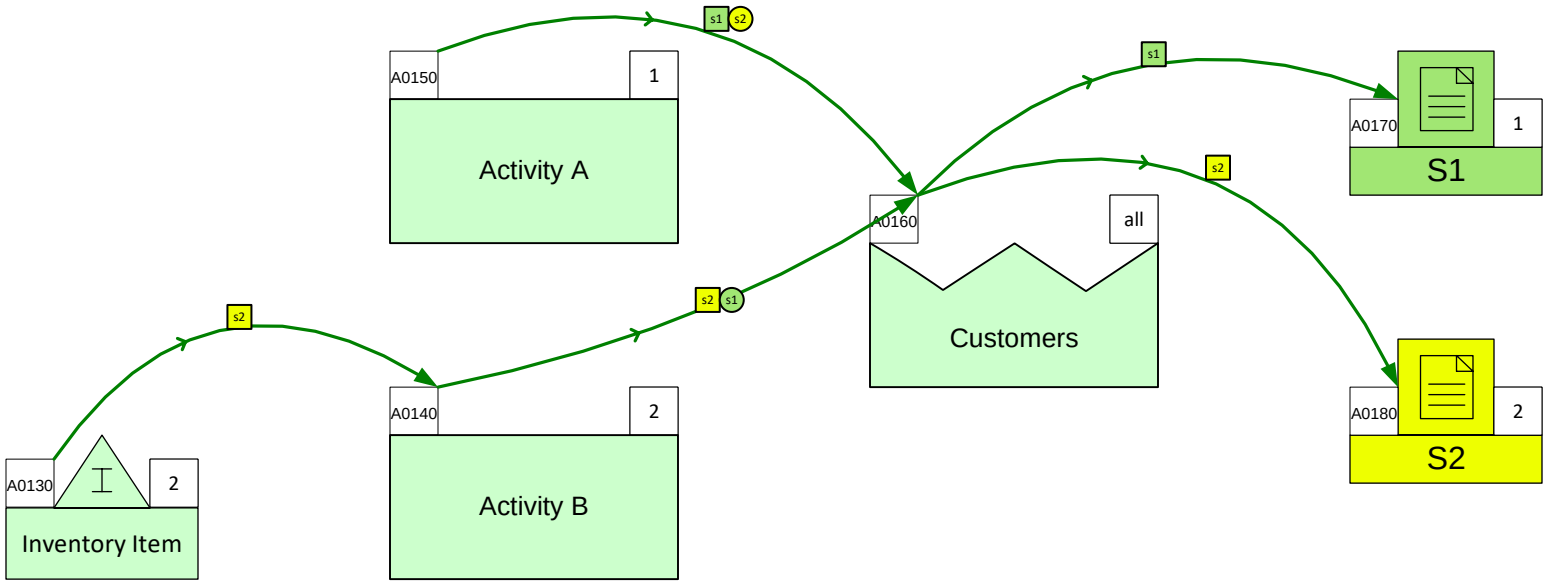


Steps to establish Set Routings



Mix section of eVSM Toolbar

1. First make sure the products and sets have been declared in the Mix Manager dialog, the set centers have been drawn on the page, and sequence arrows connected to support all the possible routings.
2. Click the “Display Gates” button in the eVSM toolbar to show the Set gates on the sequence arrows.
3. The Set gates can be closed/opened with a right-mouse menu “Set Gate Open” command on gate indicators.
4. Once you have adjusted the status of the gates, use the “Show Set Colors” button to clearly show which product set goes through which sequence arrow.



Routing Example 1

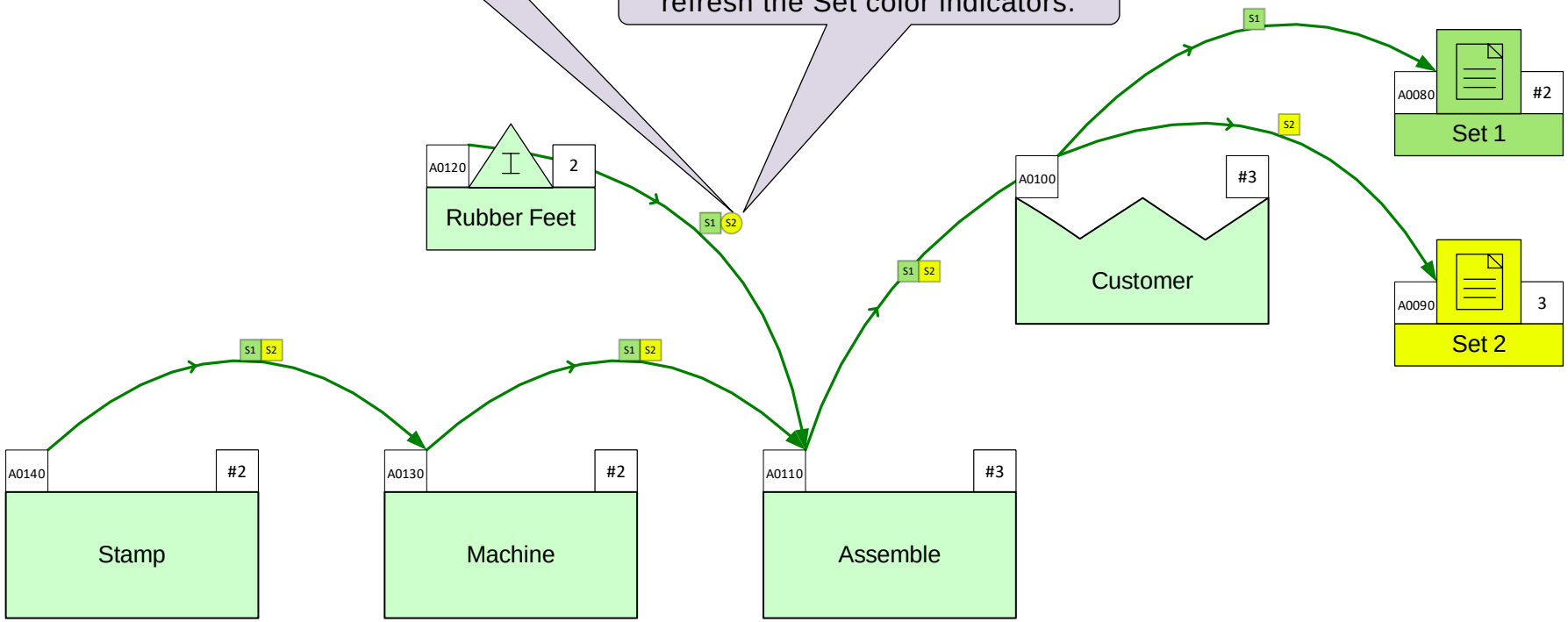
Products in routing set S1 need rubber feet. Products in routing set S2 do not.

Solution:

Close the Set gate for S2 here.

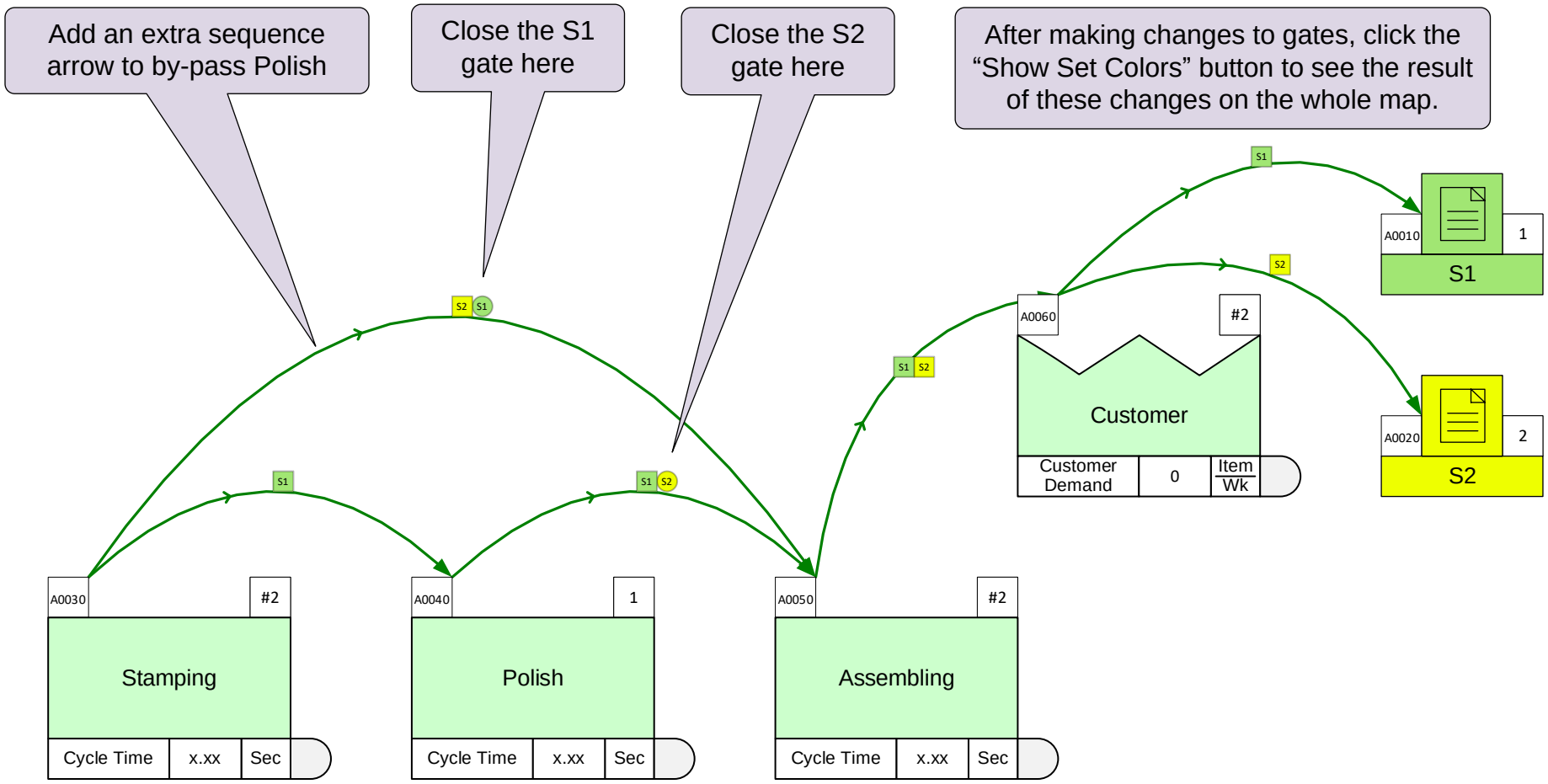
How?

Right-click on the S2 gate, close the gate with the “Set Gate Open” command. Then click “Display Gates” button in the toolbar to refresh the Set color indicators.



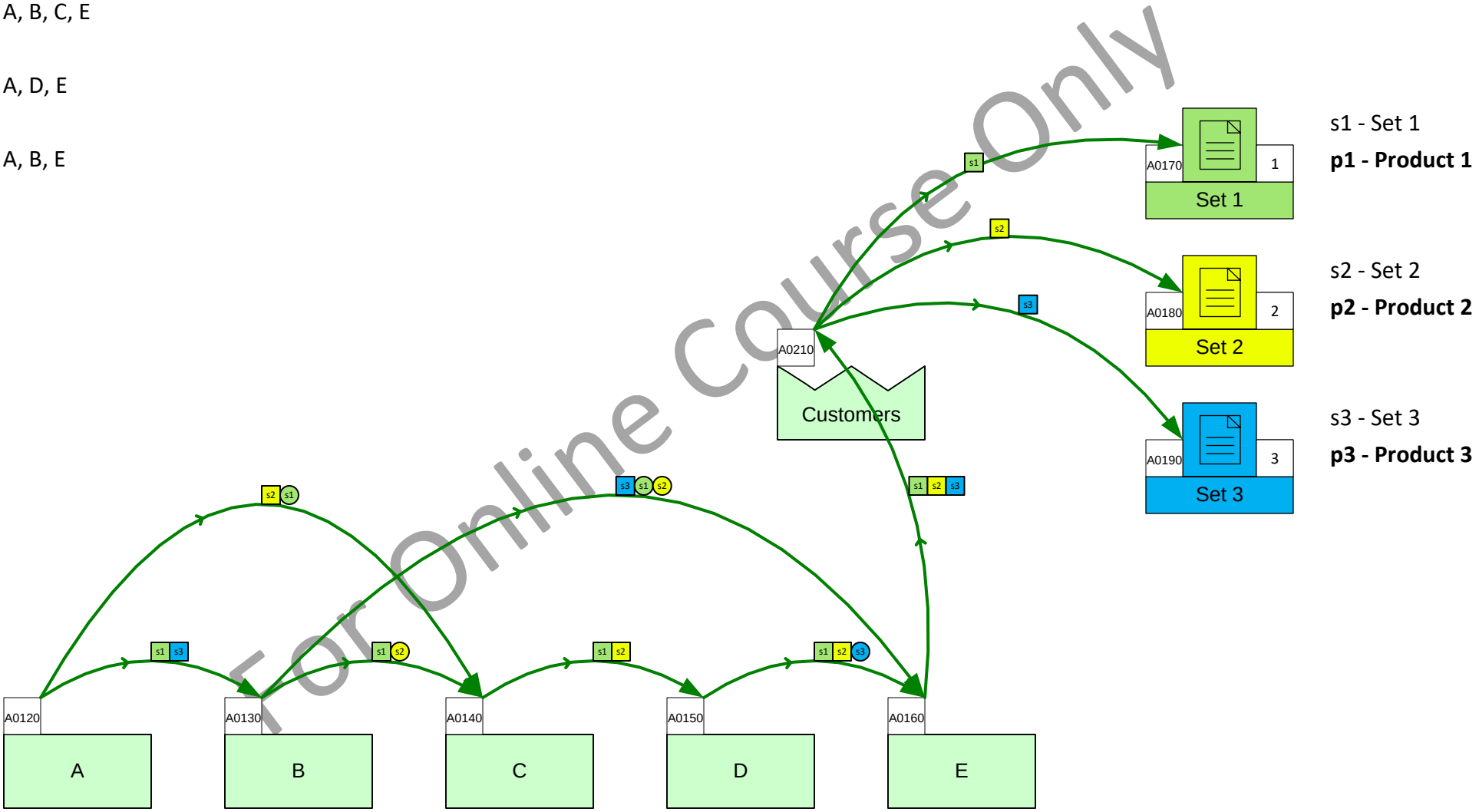
Routing Example 2

Set S1 requires polishing, S2 does not.



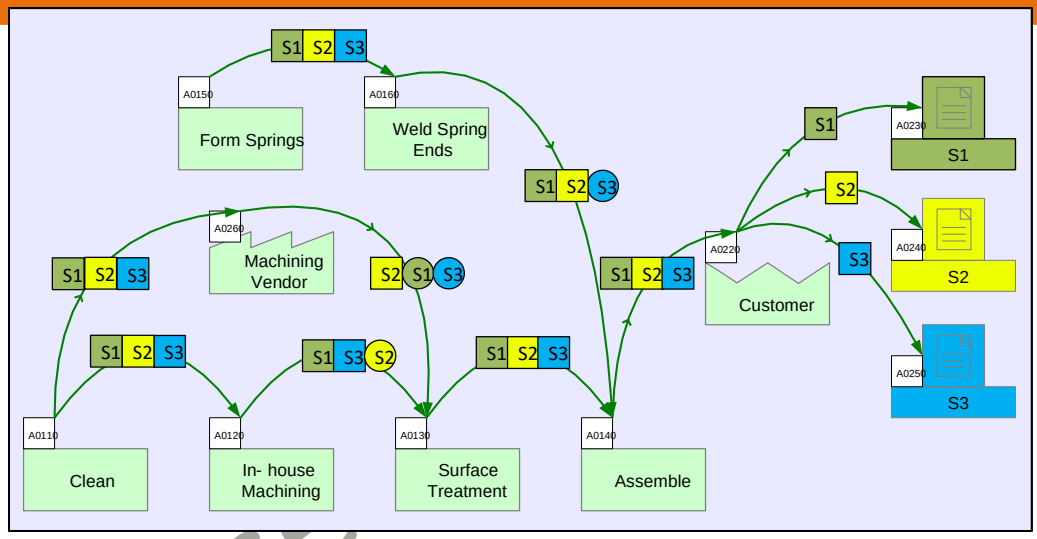
Which operations does Routing Set 3 go through?

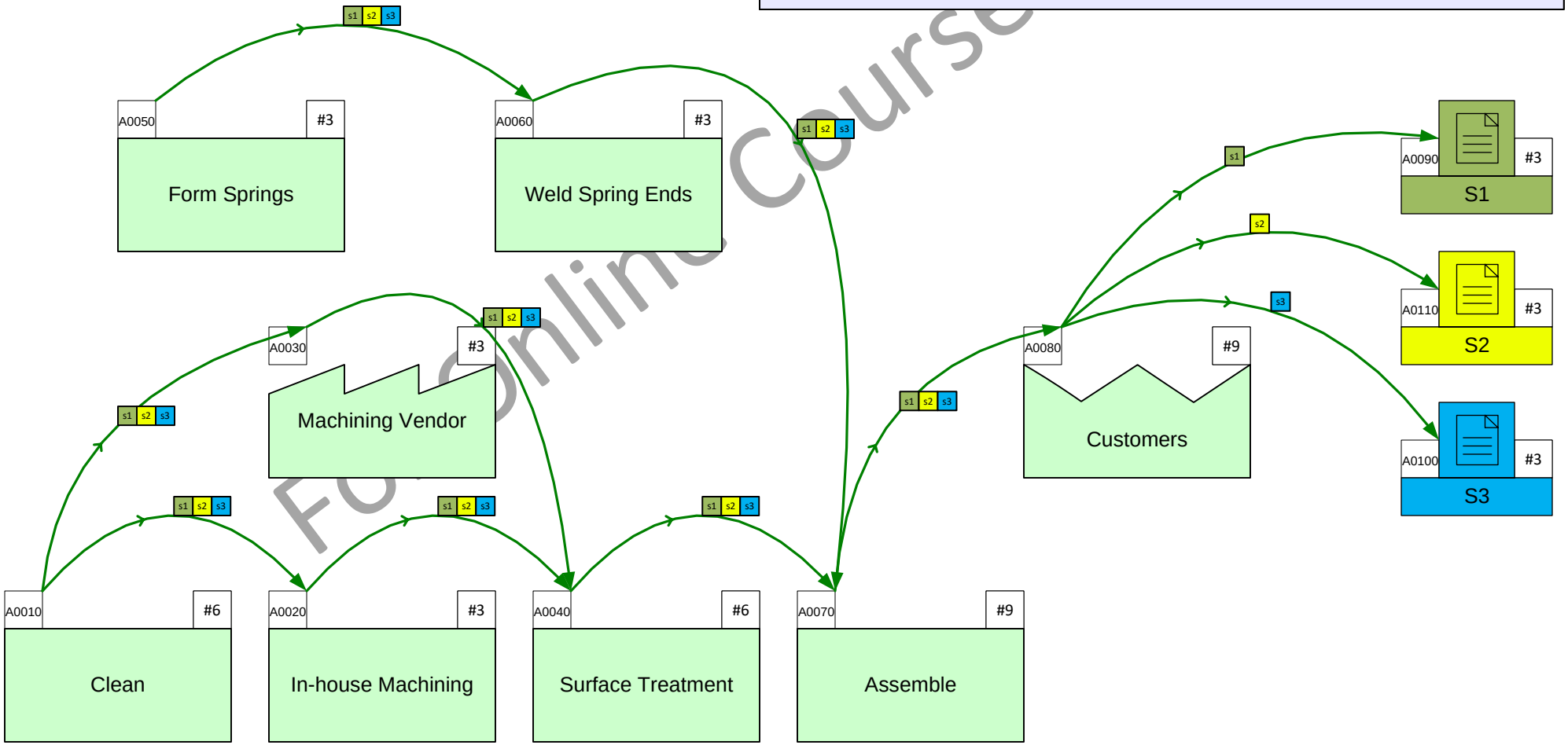
- A, E
- A, B, C, E
- A, D, E
- A, B, E



For Online Course Only

Routings Exercise 2



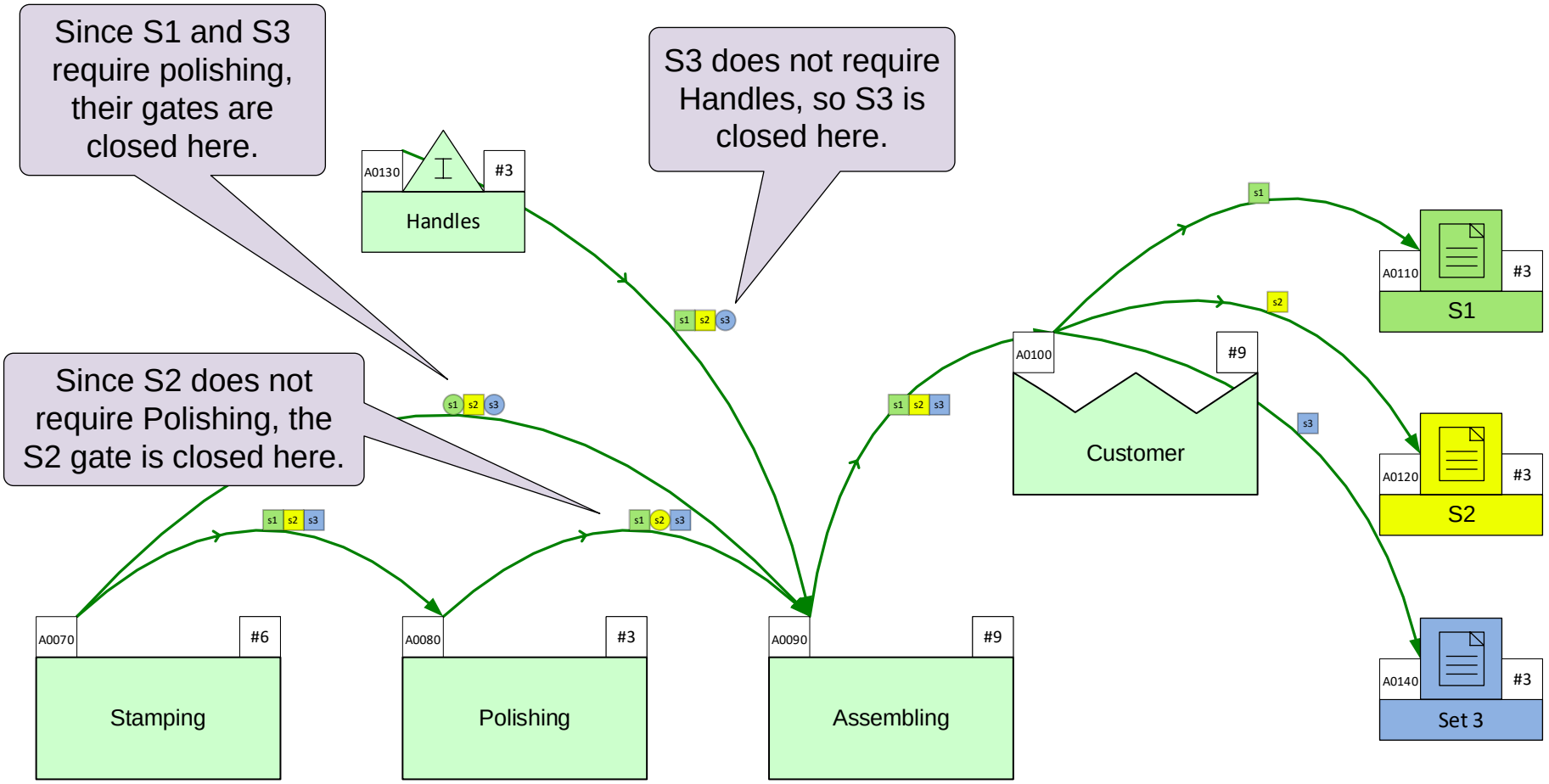


For Online Course

Routing Example 3

In the example below, the routings are specified as shown in the matrix

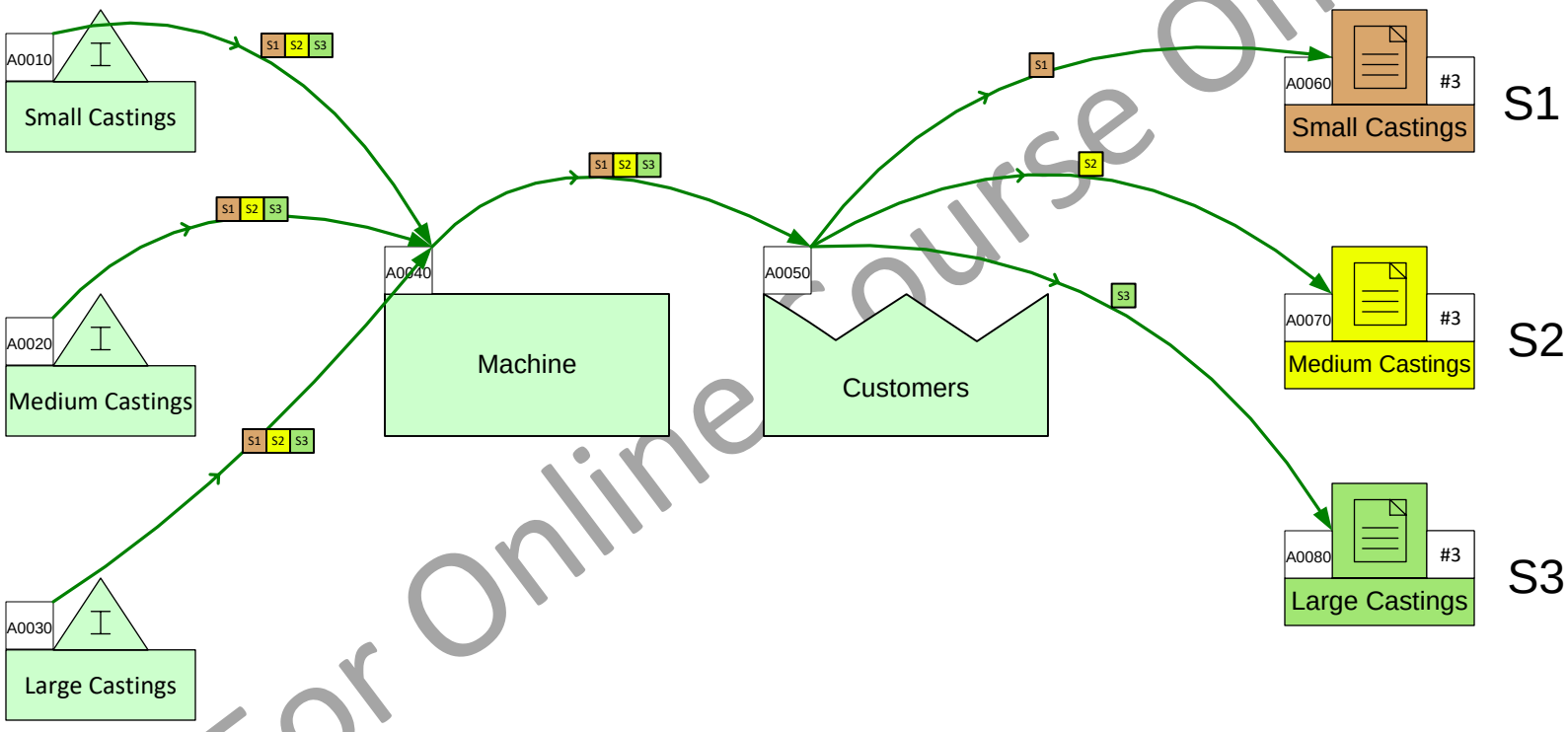
Set ID	Stamp	Polish	Handles	Assemble
S1	X	X	X	X
S2	X		X	X
S3	X	X		X



Note: The demand is specified by the customer and flows upstream. So, if an activity is not required for a set, the set gate must be closed downstream of that activity.

Routings Exercise 3

Adjust the Set gates on the map to ensure the correct castings are supplied to the machine operation.

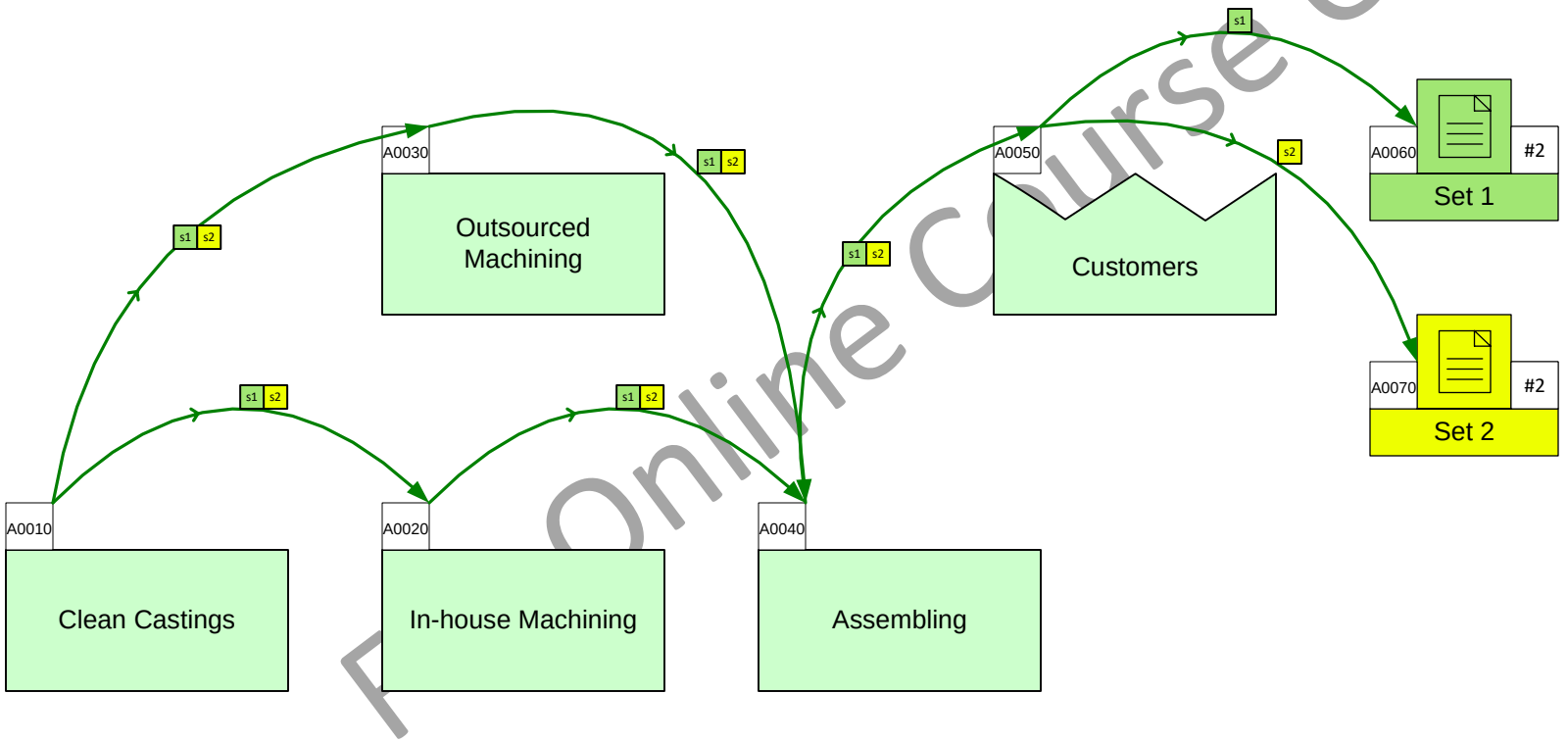


For Online Course Only

Routings Exercise 4

Adjust the Set gates on the map to reflect the product grid.

Set	Clean Castings	In-house Machining	Outsourced Machining	Assembling	Customer
S1	X	X		X	X
S2	X		X	X	X



s1 - Set 1

p1 - Product 1 (Qty 0)

s2 - Set 2

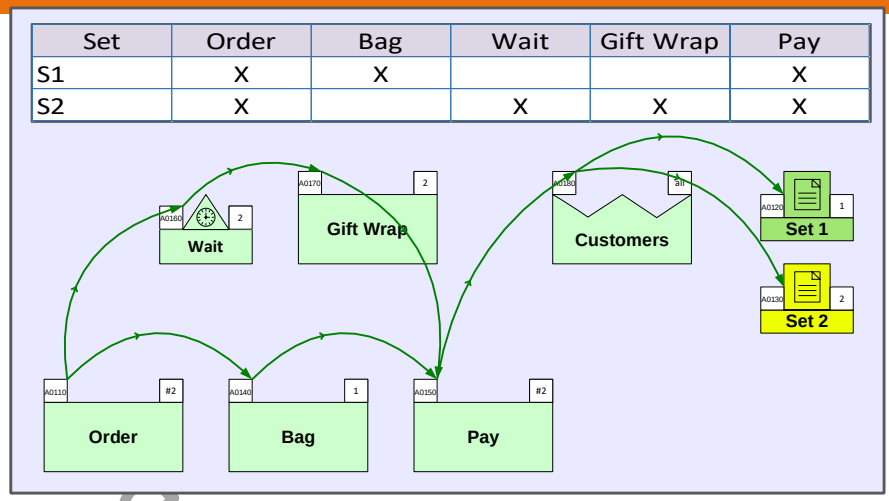
p2 - Product 2 (Qty 0)

For Online Course Only

Build this value stream model

Build the model shown in the image from scratch with the Sketch Mix Time stencil. The model needs to represent the two sets (each set has one product), and the Set gates need to be adjusted to reflect the routings shown in the product matrix.

Set	Order	Bag	Wait	Gift Wrap	Pay
S1	X	X			X
S2	X	X	X	X	X



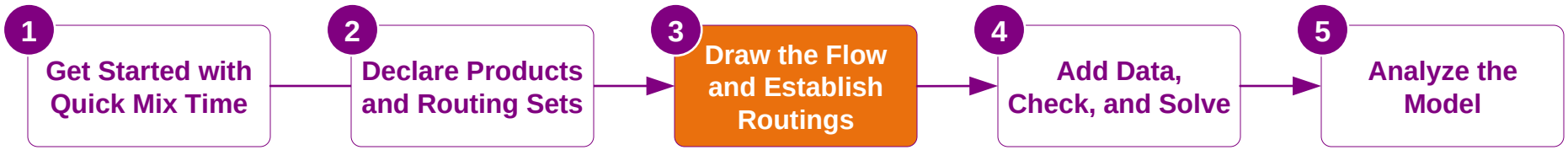
For Online Course

Lesson 3: Summary

You learned:

- How to represent material flow with Quick Mix Time centers and Sequence arrows
- How to establish routings on the map with Set Gates

Quick Mix Time Course Learning Path



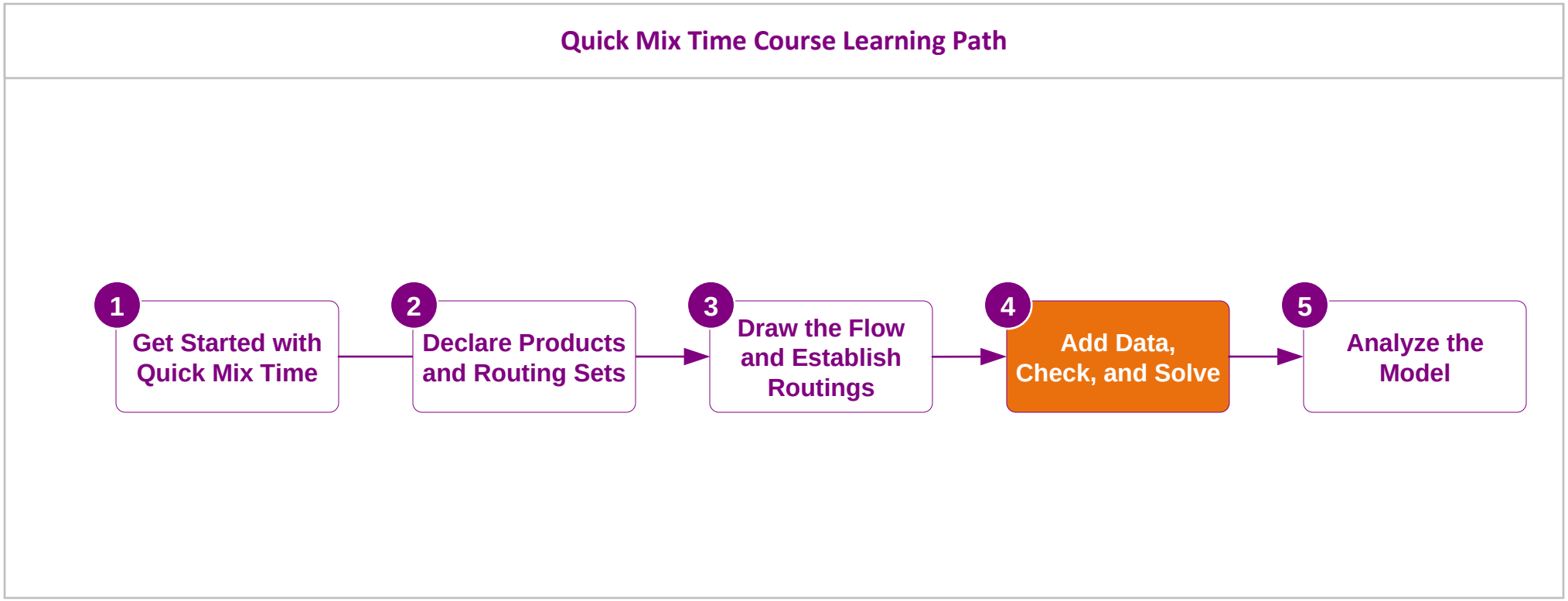
What's next:

You will learn how to add data to the map, and how to set up the map for automatic calculations.

Add Data and Solve

In the previous lessons you learnt how to declare products, group the products into routing sets, how to sketch the flow, and how to specify the routings on the map.

In this lesson, you will learn how to add data shapes to the sketch, specify units, enter data values, and then solve to perform the automated calculations.



Overview of steps to build an eVSM Mix model

This lesson covers item 3.

1. Declare Products and Routing Sets

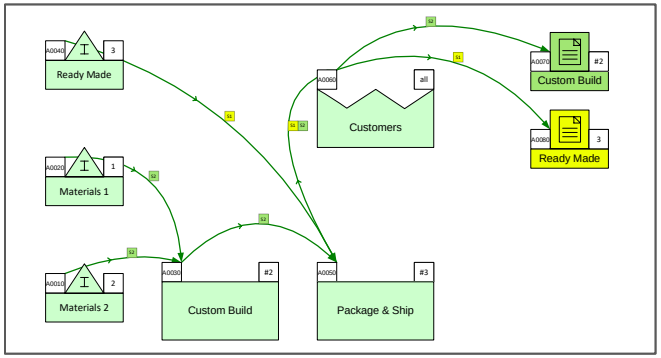
- List the products for the value stream.
- Group the products into Routing Sets. A Routing Set is all the products that go through exactly the same sequence of activities.
- If the list of products is long or if the process is complex, then it is a good idea to create a simple grid/matrix as shown here.

	Process1	Process2	Process3	Process4	Process5
Product 1	X	X	X	X	X
Product 2	X	X		X	X
Product 3	X	X		X	X
Product 4	X		X	X	X

- A minimalist product list is recommended (ideally less than 10) to ensure good software performance. One way to do this is to restrict the model to the high-volume products. The remaining low volume products can be represented as a single product with weighted averages for operation parameters.

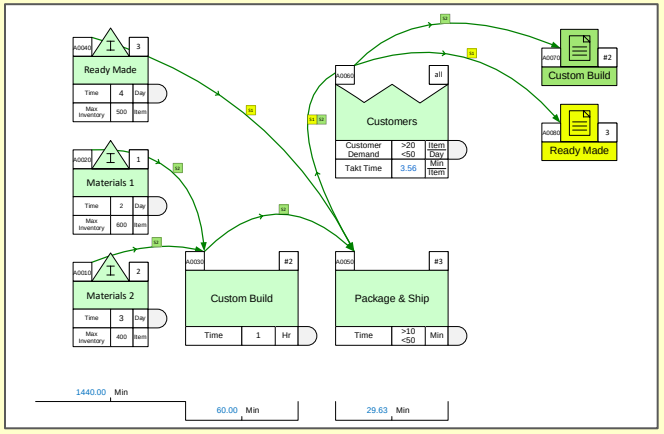
2. Draw the Flow and Establish the Routings

- Draw the activities, inventories, etc. from the Sketch Mix Time stencil.
- Connect with sequence arrows.
- Use “Set Gates” to specify the routings



3. Enter Data and Solve

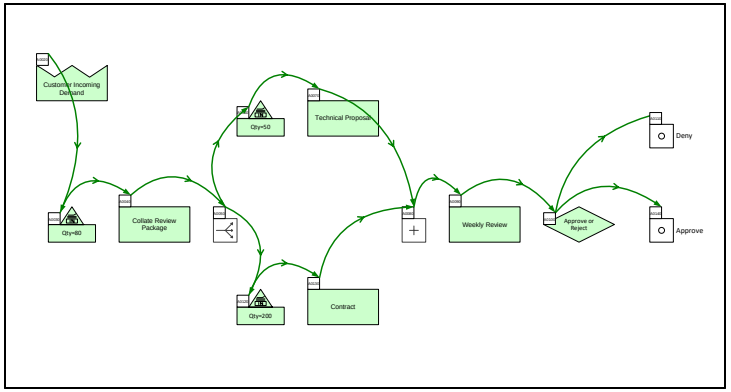
- Add data shapes to the sketch
- Enter the data values for customer demand, production time, and operational parameters.
- Solve the model and check the results.



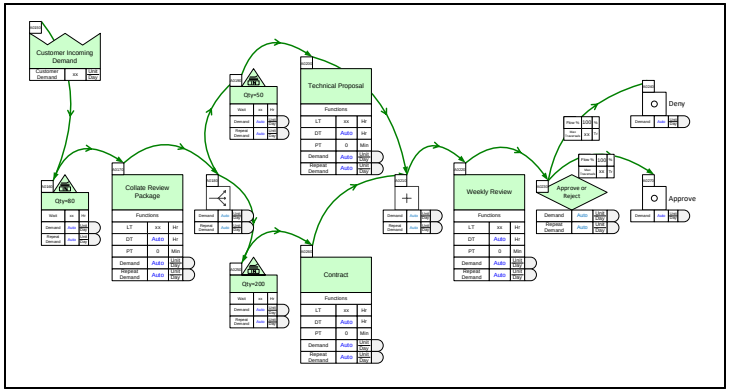
Data on Sketch Centers

If the flow has been drawn with one of the eVSM Sketch stencils, then you can automatically turn the flowchart into a data based value stream model. Just right-mouse click on any Sketch Mix Transactional shape on the page and use the Add All Data commands.

Sketch Map



After "Add all data"



Right-mouse menu, available on all the center's parent shapes (green shapes)

. . . .

Add all data (shape)
Add all data (page)

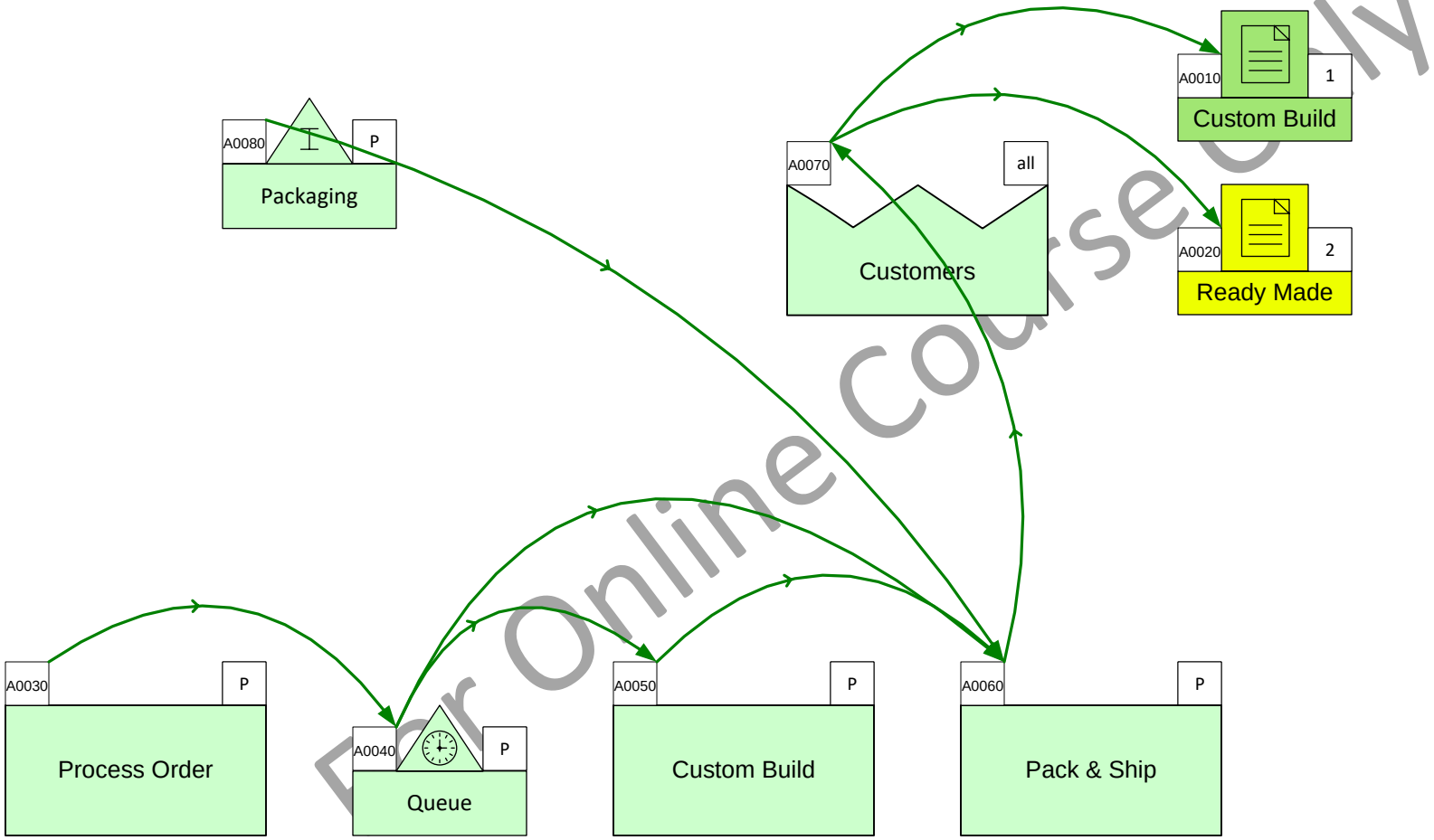
Remove all data (shape)
Remove all data (page)

Click this command to automatically add data shapes to all centers on the page.

Data shapes can be removed too. Note that this will delete any entered and calculated values.

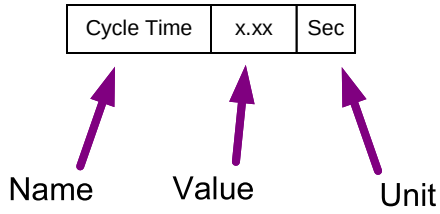
Add Data shapes to this Sketch

This sketch was drawn with the Sketch Mix Time stencil. Use the “Add all data (page)” command to automatically add the default data shapes.

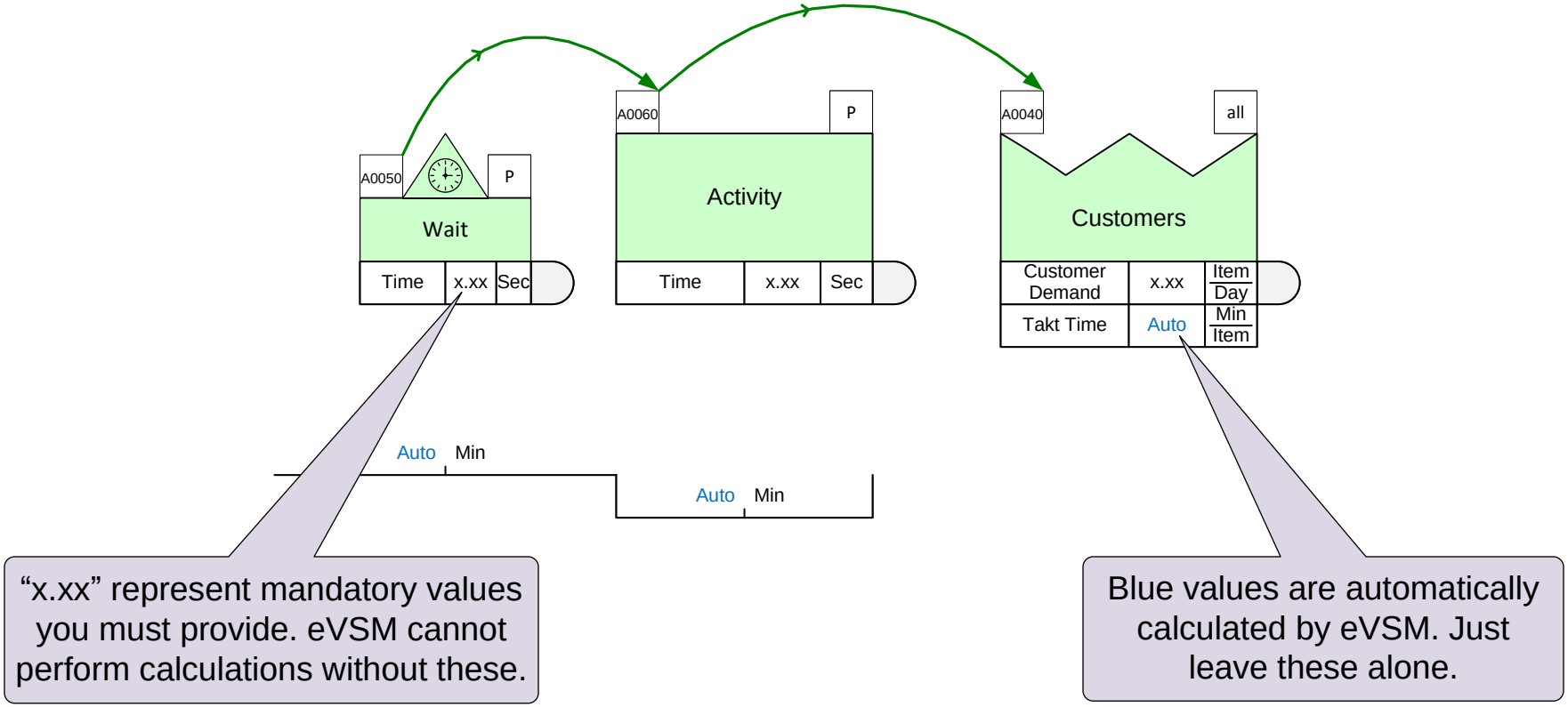


For Online Course Only

Working with Data on a Map

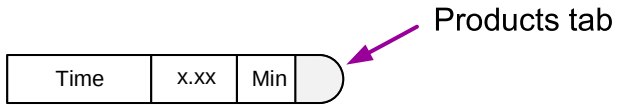


- Map data is stored in special data shapes. These data shapes consist of a name, value, and units. They are called NVU's.
- To change any field in an NVU, double-click the field and then follow the on-screen instructions.
- To move or delete an NVU, you must click on the value field.
- NVUs contain data for the center (inventory, activity, customer, etc.) they are glued to.
- eVSM comes with a long list of variable names and units. New names and units can be added through "Name and Unit Manager" form which is accessed with the NUM button.
- The default eVSM variable names and units should NOT be modified since they are used in the automated calculations.

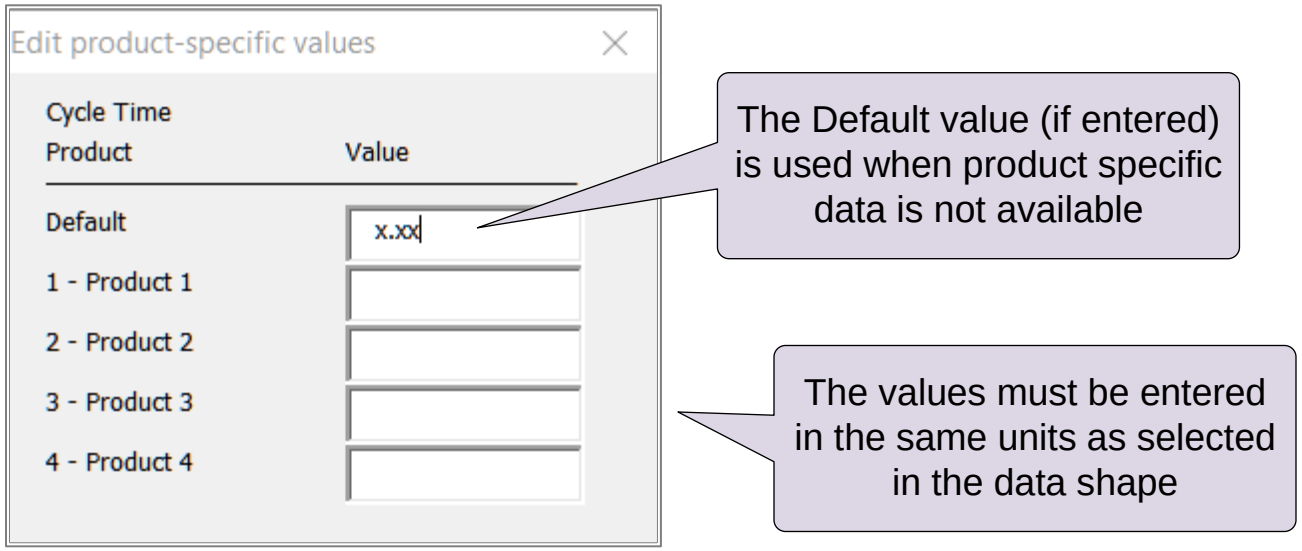


Entering Product Specific Data

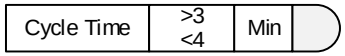
A “products tab” attached to the right side of a data shape means the variable can have product specific values.



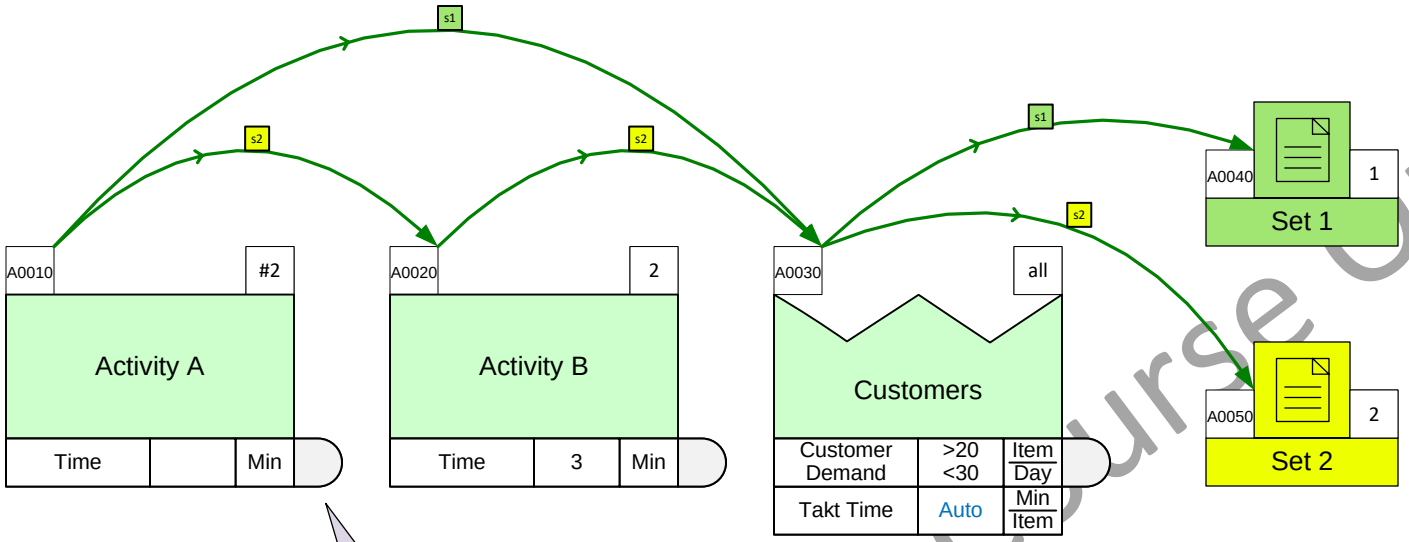
Double-click the products tab to open the product specific values dialog.



Once the values are entered, the center field will show the range of values as shown here.



Enter the Time values for the Activity A as shown in the callout.



s1 - Set 1

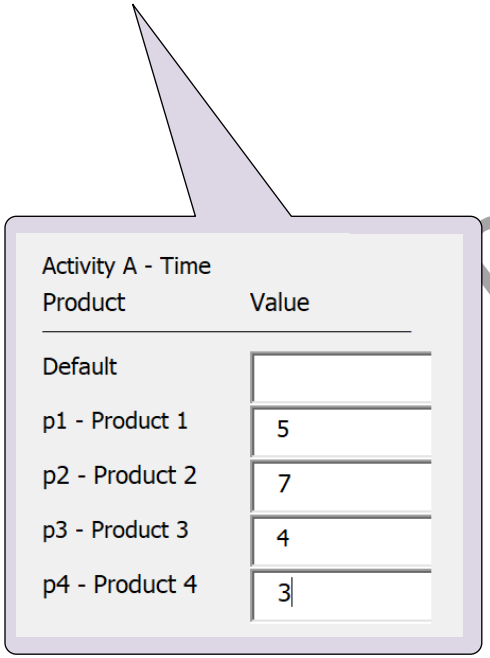
p1 - Product 1 (Qty 0) Demand %: 0%

p2 - Product 2 (Qty 0) Demand %: 0%

s2 - Set 2

p3 - Product 3 (Qty 0) Demand %: 0%

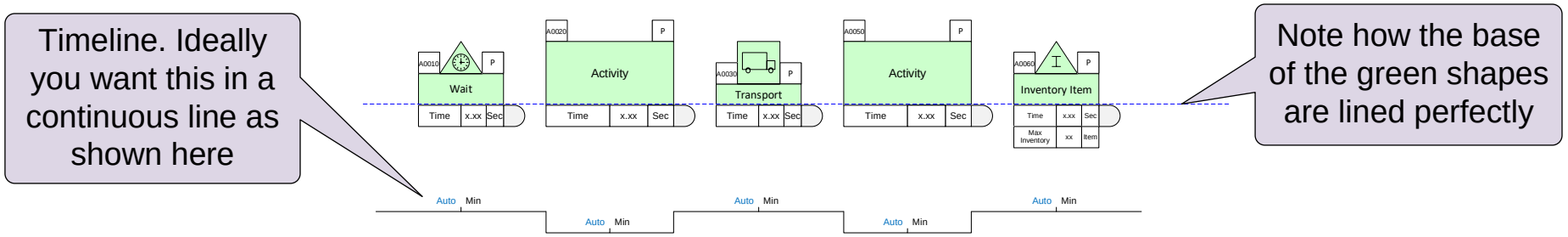
p4 - Product 4 (Qty 0) Demand %: 0%



Online Course Only

Working with the Timeline

The VA/NVA shapes below the centers is called the timeline. This often gets out of alignment as you make changes to the map. Bringing that back into alignment can get very tedious.

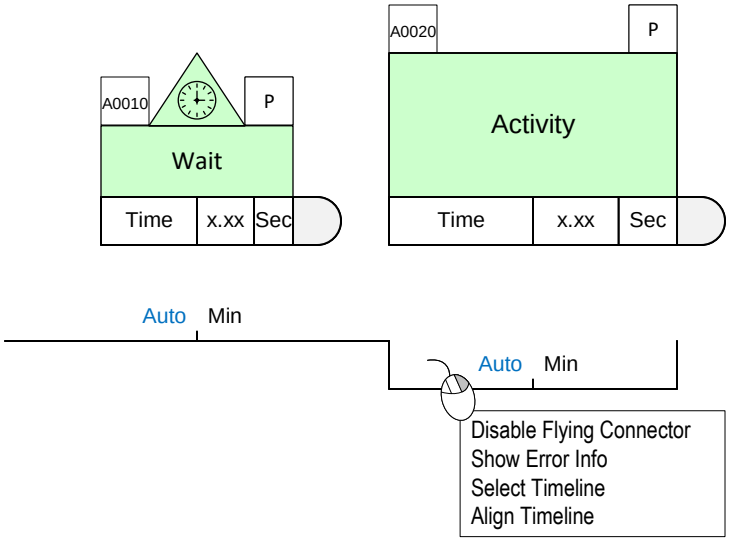


Tips to minimize clean-up effort

1. Always use the grid to align the green shapes.
2. Line up the base of the green shapes exactly with their neighbors.
3. Space out the green shapes evenly.

Right-click Commands on the Timeline

1. If you want to align a timeline because the shapes are misaligned, then select any one of the timeline shapes, and right-click to access the “Align Timeline” function.
2. If you want to move a whole timeline, then select any one of the timeline shapes and right-click to access the “Select Timeline” function. Once you have selected the whole timeline, just drag it down to move it (typically to make space for additional data blocks for the centers).



Which of the following statements are true? Tick ALL 3 that are true.

☐ Always align the green shapes to the grid where possible.

☐ If the timeline color is changed to red, it will line up automatically.

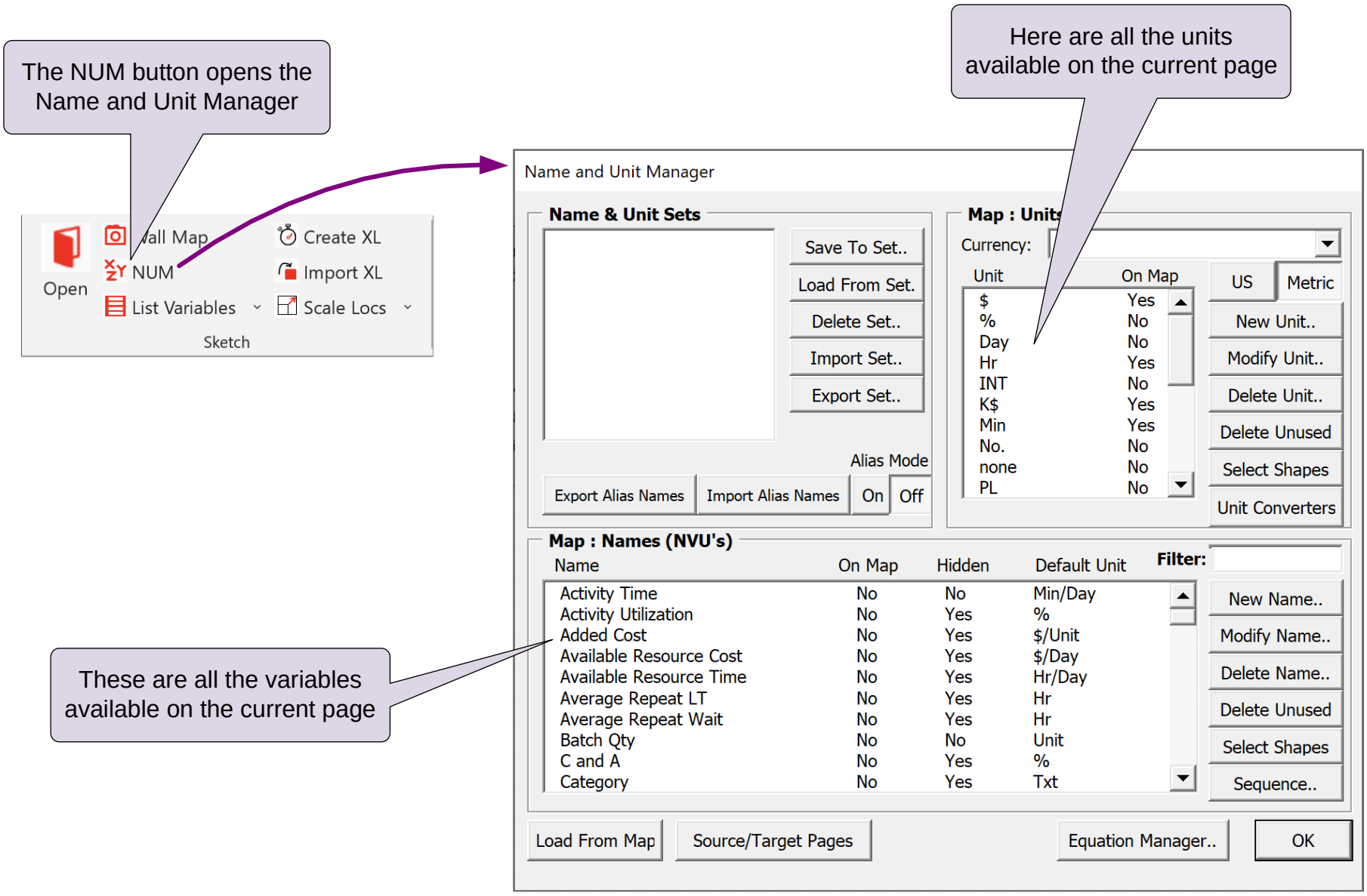
☐ Use the right-mouse menu commands to clean-up when the timeline is out of alignment.

☐ Always space out the green shapes evenly

For Online Course Only

Working with Units

Consistent use of names and units is essential for standardization and for the automated analysis to work. So, these are stored in a single vault called the Name Unit Manager (NUM). The NUM form is accessed with the NUM button in the toolbar.



For details on all NUM functionality see https://evsm.com/toolbarguide

Units Converters

eVSM includes many standard built-in units such as minutes, meters, etc. It also allows you to add your own units in local terminology such as totes, trays, palettes…

Units are organized in families such as weight, time, length, etc. Units Converter shapes are used to designate the family and conversion factors.

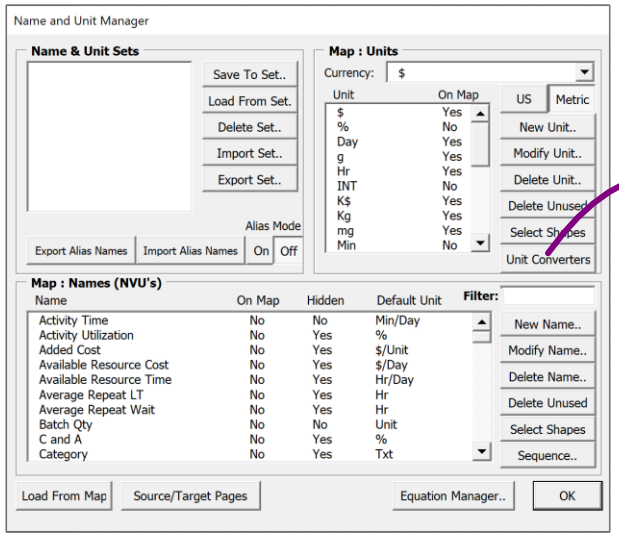
Units			
	Year	Wk	Day
	52	5	8
	Wk	Day	Hr

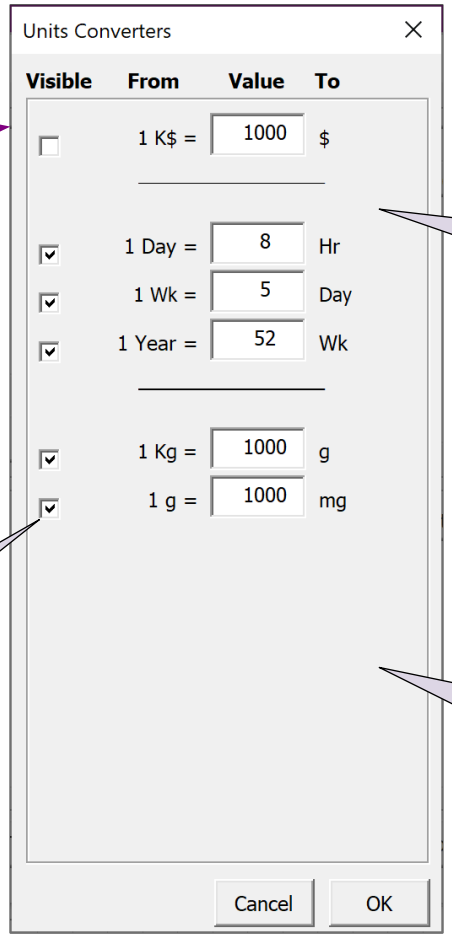
g
1000
mg

Bigger unit is always at the top

Kg
1000
g

Conversion factor



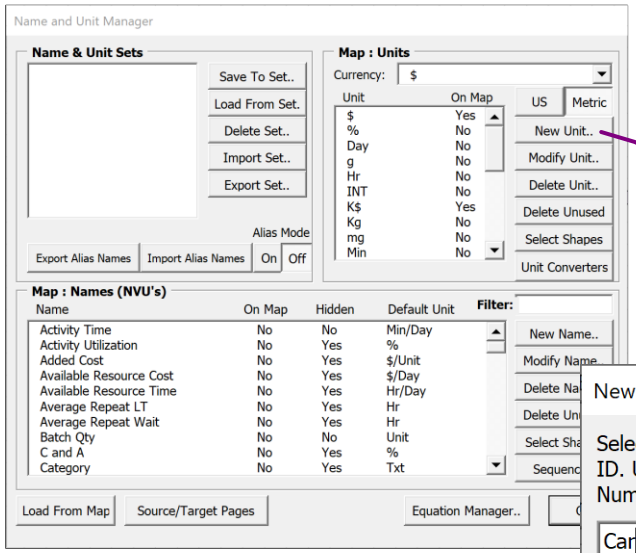


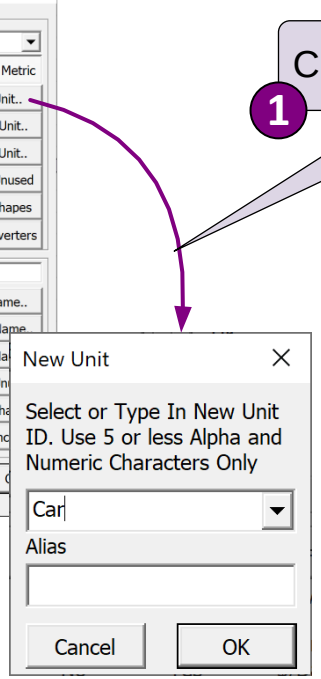
All current Units Converters can be viewed here.

You can control what converters are visible on the page with these switches

When new units converters are added to the page, they will appear in this dialog.

Steps to Add New Units and Units Converters

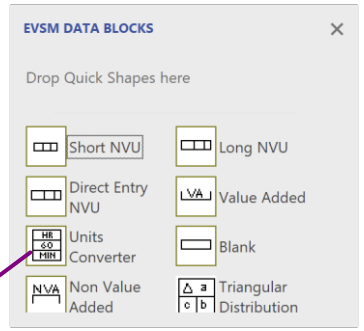




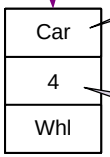
Abbreviate units names to 3-4 characters since they have to display in very tight spaces on the map.

1 Create new units

2 Add new Units Converter to the page



3 Double-click to select units



4 Enter conversion factor

This example shows there are 4 wheels (Whl) per Car.

Create New Units and Specify Conversion Value

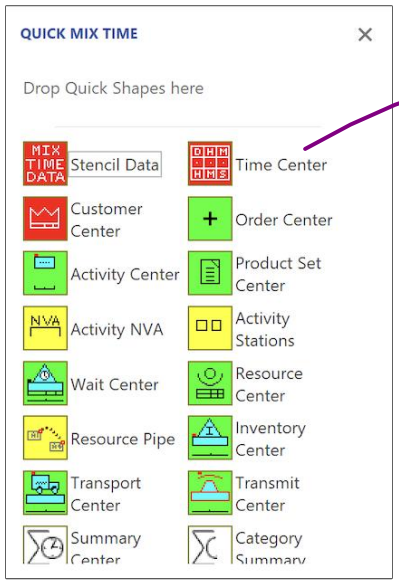
Create two new units in the NUM: “Box” and “File”

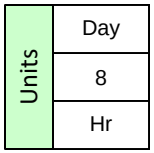
Then with a units converter show that there are 12 Files per Box.

For Online Course Only

Units Converters to Show Work Time

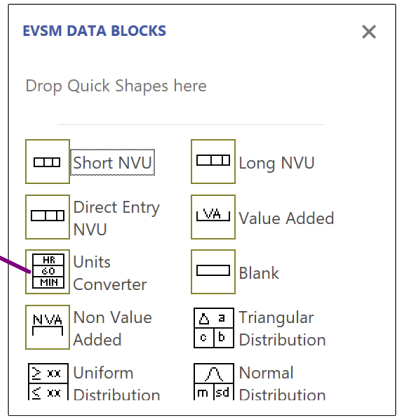
Work time (or production hours) for the value stream is shown with a Time Center.





This shows that there are 8 hours of work time per day.

This additional units converter shows there are 5 days per week.

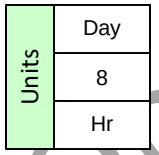


Note that if the “Wk” unit does not exist in the NUM, then a new “Wk” unit must be created first.

Create New Units and Specify Conversion Value

Add the Units “Wk” for weeks and “Yr” for years.

Then use Units Converters from the eVSM Data Blocks stencil to show that there are 6 work days per week and 50 work weeks per year.



For Online Course Only

Units Converters for Assembly Parts

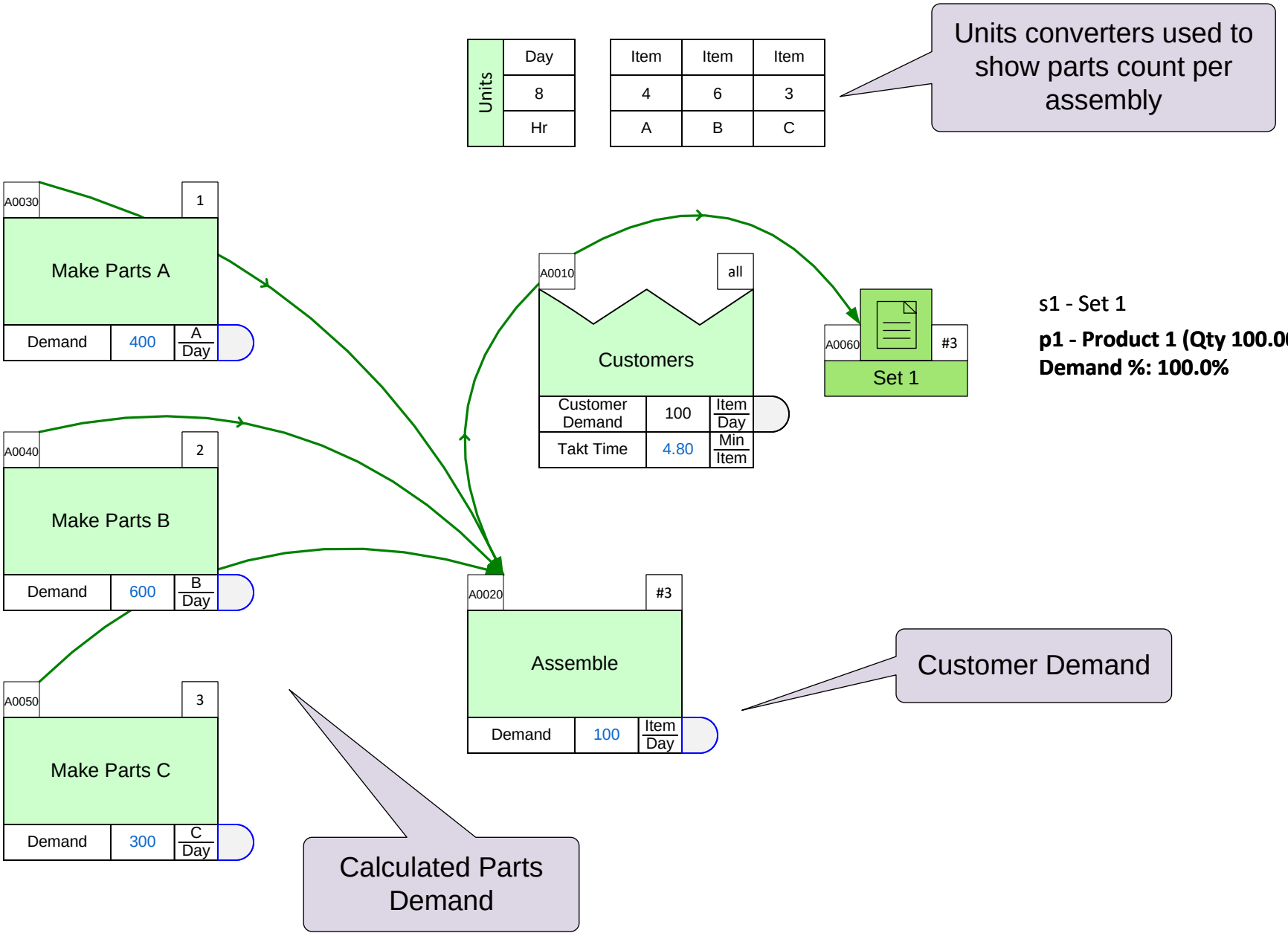
Unit Converters can also be used calculate parts demand for assemblies.

In this example, each assembly (Item) requires:

Part A = 4

Part B = 6

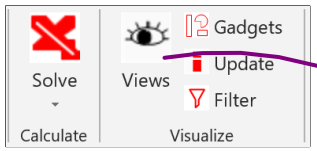
Part C = 3

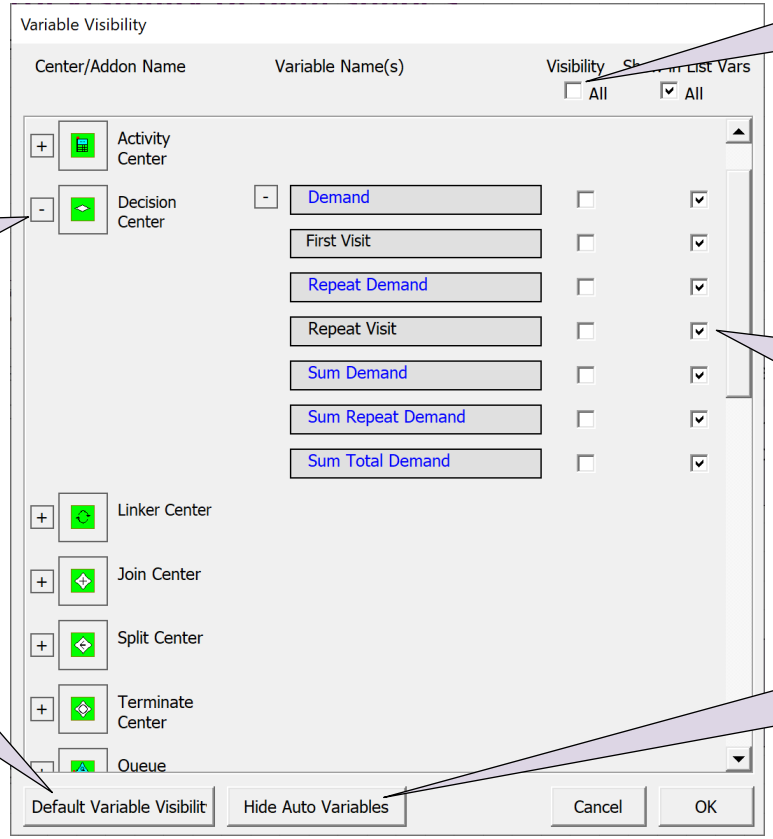


Using "Views" to control visibility of data shapes

The Mix Transactional centers include data shapes for data input and to display calculated values. By default, most of these data shapes are hidden to keep the map view simple. Visibility of these is controlled through the Views form.

Views Form





Use this checkbox to hide ALL or show all data shapes on the map

Use Expand/Collapse button to access all data shapes for a center

This column of switches is used to determine which variables will appear in the List Variables form (covered in a later lesson)

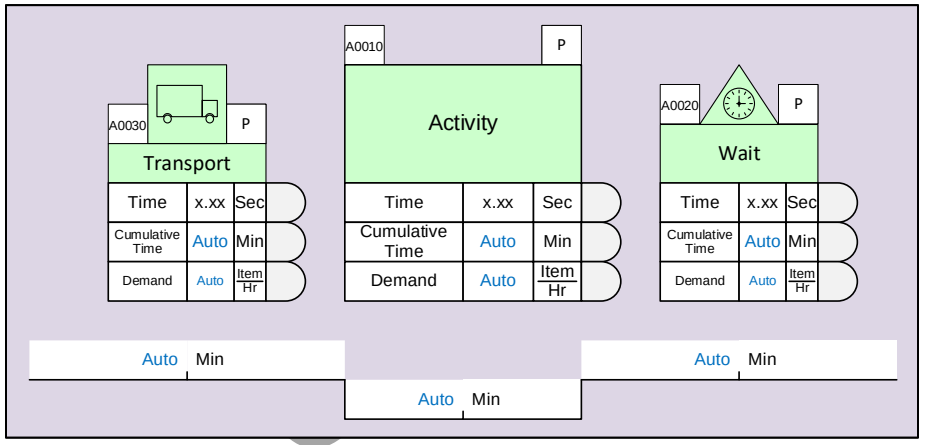
This button reverts the switches back to the default state (as it was for a new map)

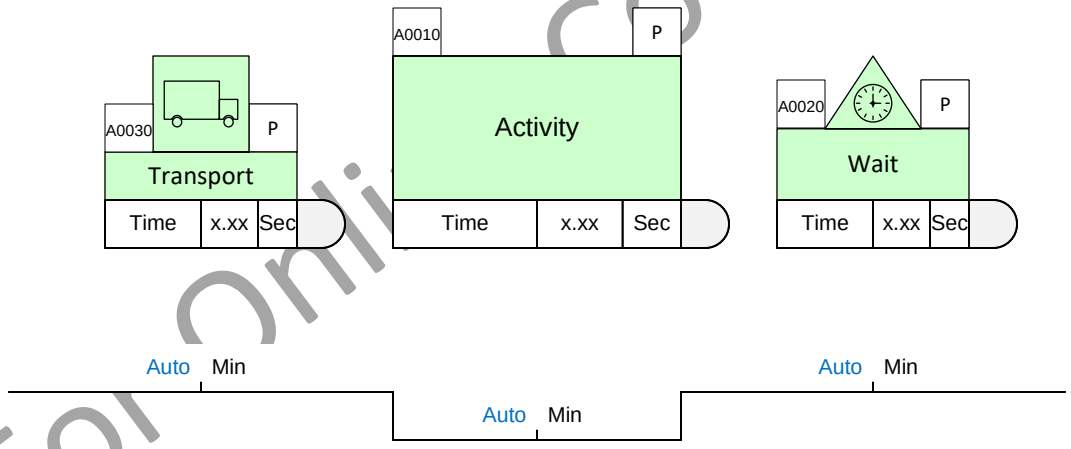
Use this button to hide all data shapes containing calculated values

If the above Views dialog box is opened without selecting any centers on the page, it displays the full list of variable for the current application. If a center on the page is selected before opening the dialog, then the display is limited to the variables for that center.

Hide/Show Data shapes

Use the “Views” button to Hide/Show data shapes and match the blue thumbnail image





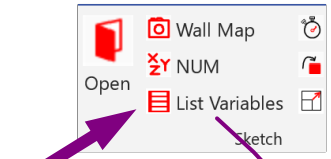
For Online Course

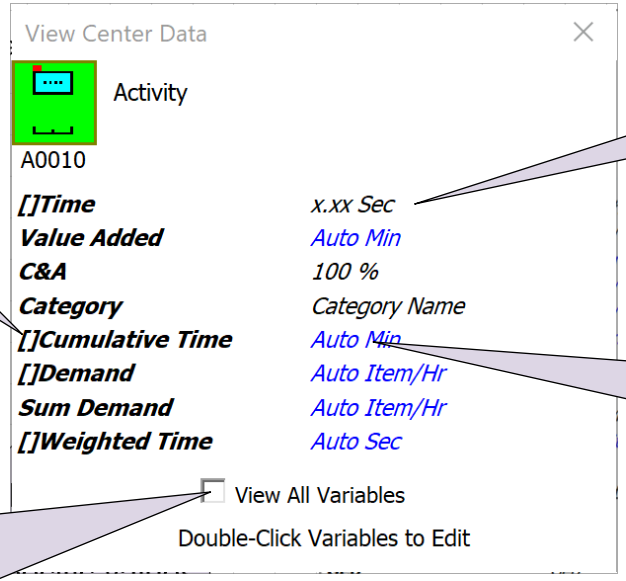
Accessing Hidden Data Shapes

Data shapes can be edited directly when they are visible on the map. The List Variables form provides an alternate way of viewing and editing values and works for both visible and hidden data shapes

List Variables Form

Select a center on the drawing page, and then click the List Variable button.





Double-click input variables to edit

Variables with preceding [ ] support product specific values

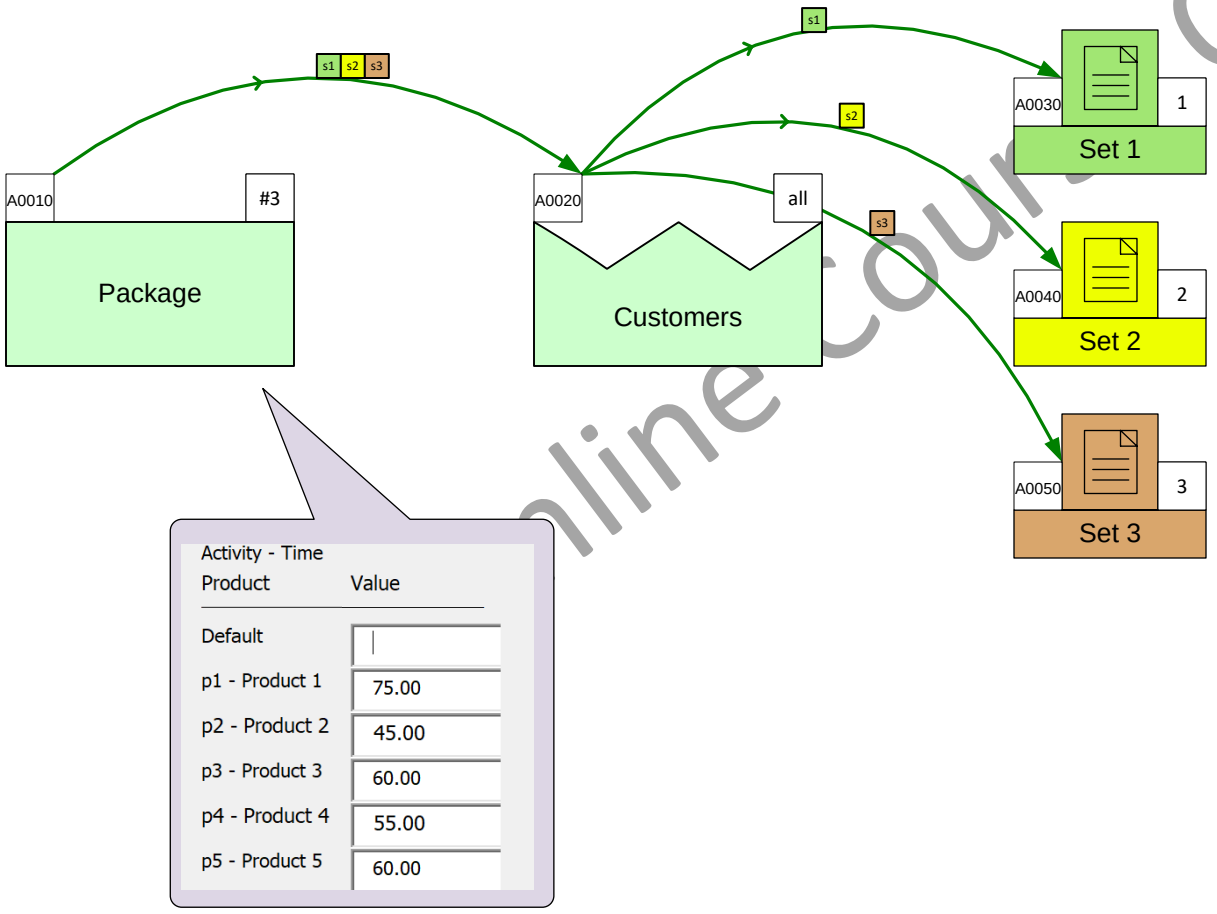
Double-click blue variables to see product specific results where available

Some variables may be hidden even from this form. Click here to see them.

You can set up which variables can be seen by default in this form via the "Views" button

Enter the Time values for the Package activity

Use the **List Variables** form to enter the Time values for the Package activity as shown in the callout. The units are seconds.



s1 - Set 1

p1 - Product 1 (Qty 0) Demand %: 0%

p2 - Product 2 (Qty 0) Demand %: 0%

s2 - Set 2

p3 - Product 3 (Qty 0) Demand %: 0%

p4 - Product 4 (Qty 0) Demand %: 0%

s3 - Set 3

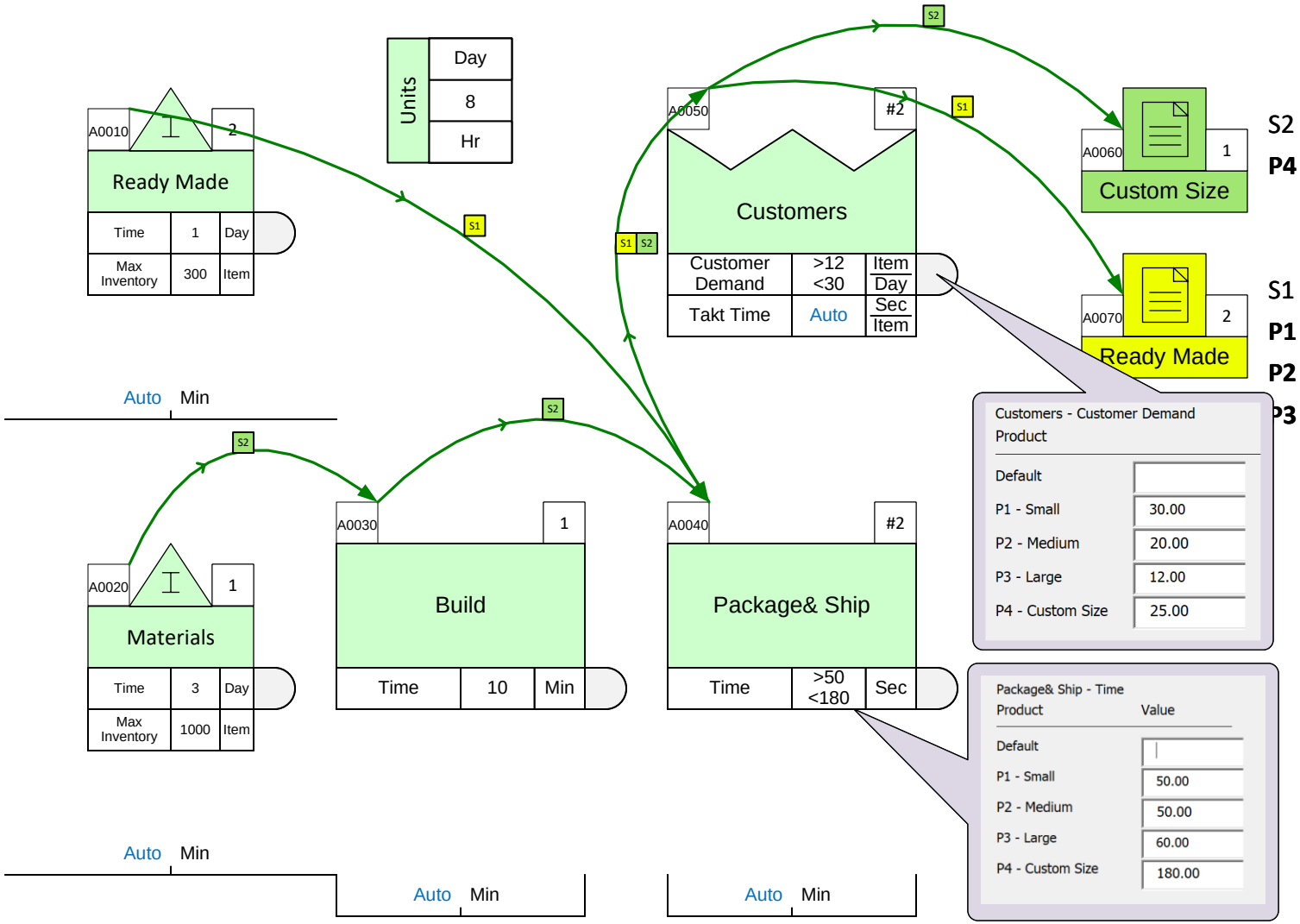
p5 - Product 5 (Qty 0) Demand %: 0%

Online Course Only

Example Map 1

In the exercise on the next page, you'll create this map from scratch. For convenience, consider viewing the map on a second screen or having a printout nearby.

Set ID	Set Name	Product ID	Product Name	Ready Made	Materials	Build	Pack & Ship	Customer
S1	Ready Made	P1	Small	X			X	X
S1	Ready Made	P2	Medium	X			X	X
S1	Ready Made	P3	Large	X			X	X
S2	Custom Build	P4	Custom		X	X	X	X



S2 - Custom Size

P4 - Custom Size (Qty 25.00) Demand %: 28.7

S1 - Ready Made

P1 - Small (Qty 30.00) Demand %: 34.5%

P2 - Medium (Qty 20.00) Demand %: 23.0%

P3 - Large (Qty 12.00) Demand %: 13.8%

Build this VSM Model

Follow the steps listed above this page.

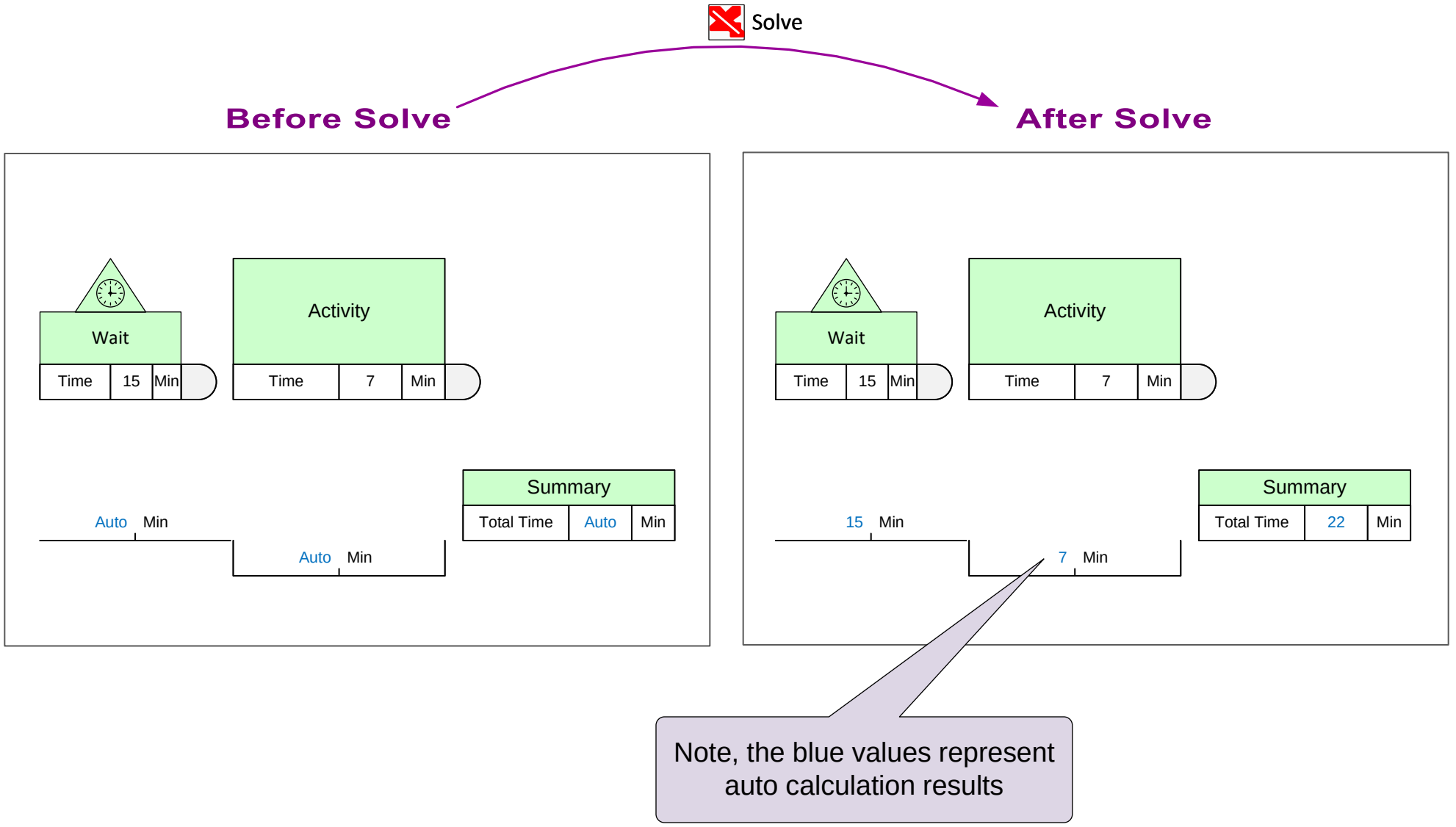
Set ID	Set Name	Product ID	Product Name	Ready Made	Materials	Build	Pack & Ship	Customer
S1	Ready Made	P1	Small	X			X	X
S1	Ready Made	P2	Medium	X			X	X
S1	Ready Made	P3	Large	X			X	X
S2	Custom Build	P4	Custom		X	X	X	X

For Online Course Only

Solving the Map

Solve

eVSM has pre-built equations that do the automated calculations. Once you have checked the map, use the Solve button to apply the equations. Values on the map that are a result of the equations are shown in blue.



Common Error Messages and How to Interpret Them

Some common errors are detected by the solver and reported in an error message.

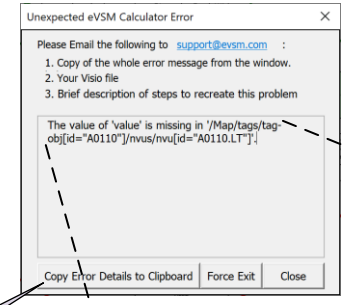
Example Common Mapping Errors

- Unconnected or missing Sequence arrow
- Missing mandatory data
- Missing units convertors
- Conflicting units conversions
- Unglued data shapes
- Disconnected operation tags
- Duplicate operation tag numbers

Many of the above and other errors will be detected and reported by the Solver.

Example Error Message

Some error messages are reported in raw program language. Here is an example reporting that “LT” value is missing.



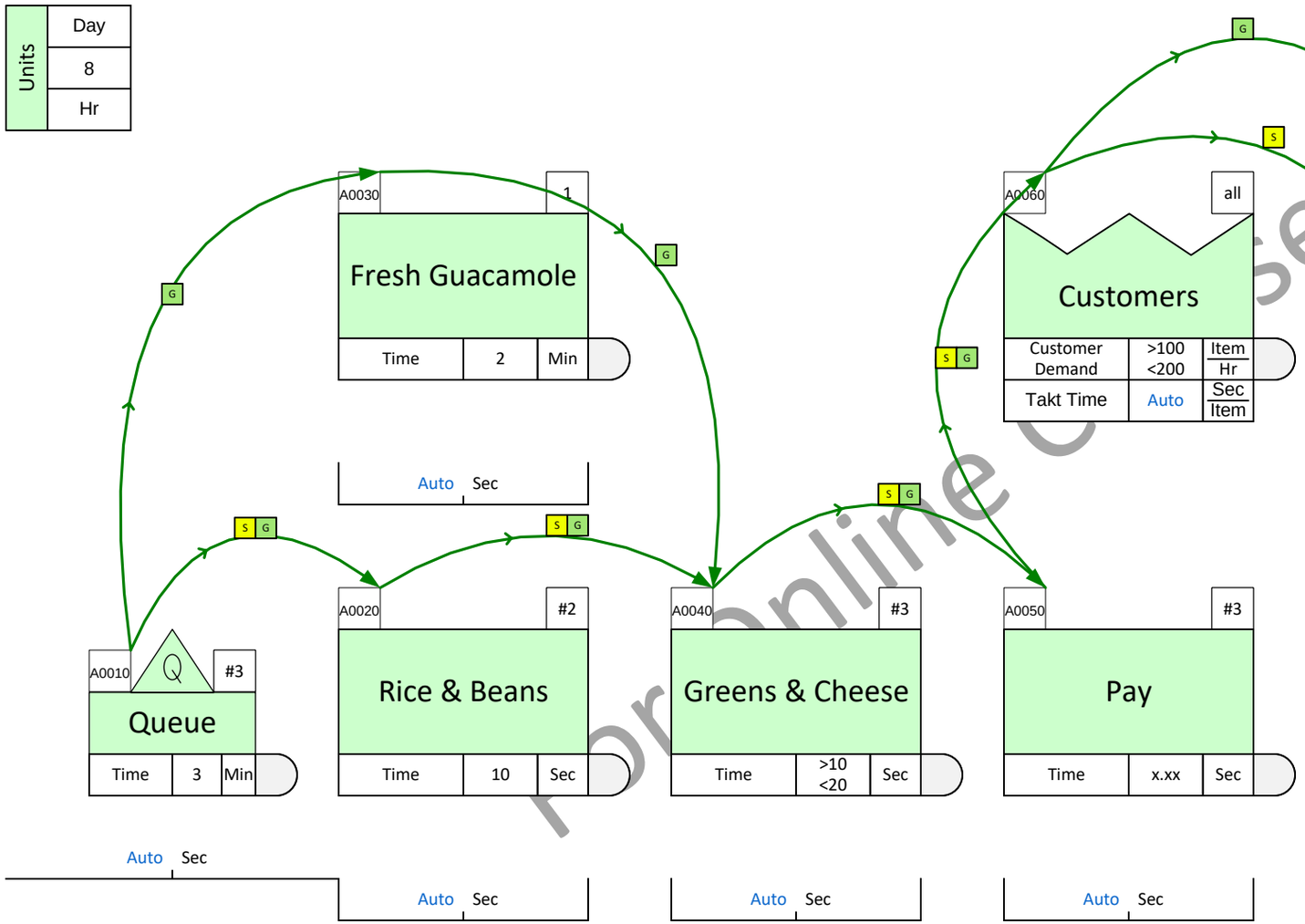
The value of 'value' is missing in '/Map/tags/tag-obj[id="A0110"]/nvus/nvu[id="A0110.LT"]'.

If you need support, click this button to copy the full error message. You can paste it into an Email and send it to support@evsm.com

A0110		#12
Collate Review Package		
LT	xx	Wk
Added Cost	50	$/Unit
PT	10	Min

The message provides the operation tag number (A0110) and the variable name (LT) to pin-point the problem on the map

Fix any problems reported by the Solver and Solve this map.



G - Plus Guacamole

GC - Guacamole (Qty 100.00) Demand %: 40.0%

S - Standard

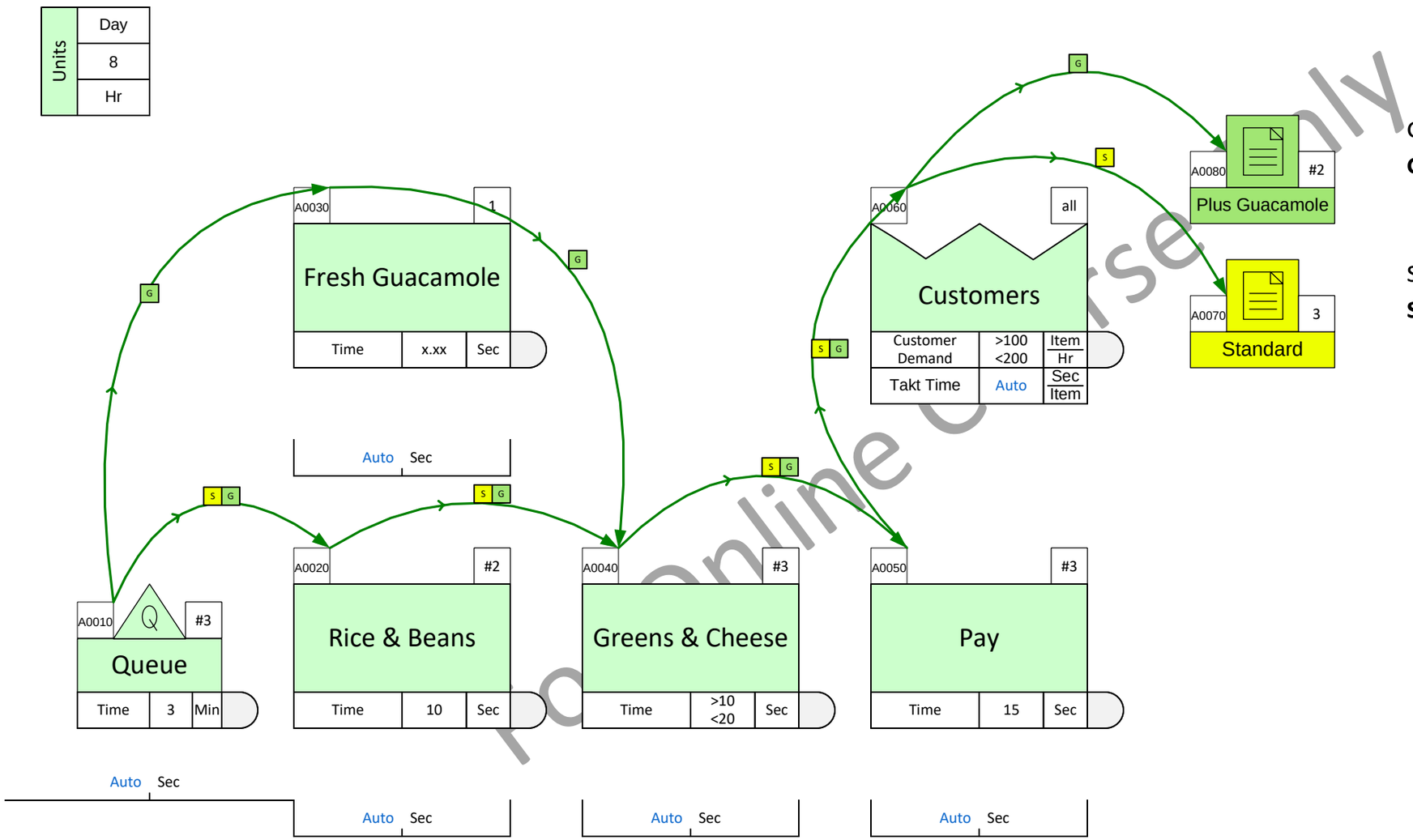
ST - Standard (Qty 200.00) Demand %: 60.0%

For the Pay activity the Time value should be set to 15 Sec.

For online use only

Fix any problems reported by the Solver and Solve this map.

For any missing or conflicting data, see the correct values on the map used in last exercise.



G - Plus Guacamole

GC - Guacamole (Qty 100.00) Demand %: 37.5%

S - Standard

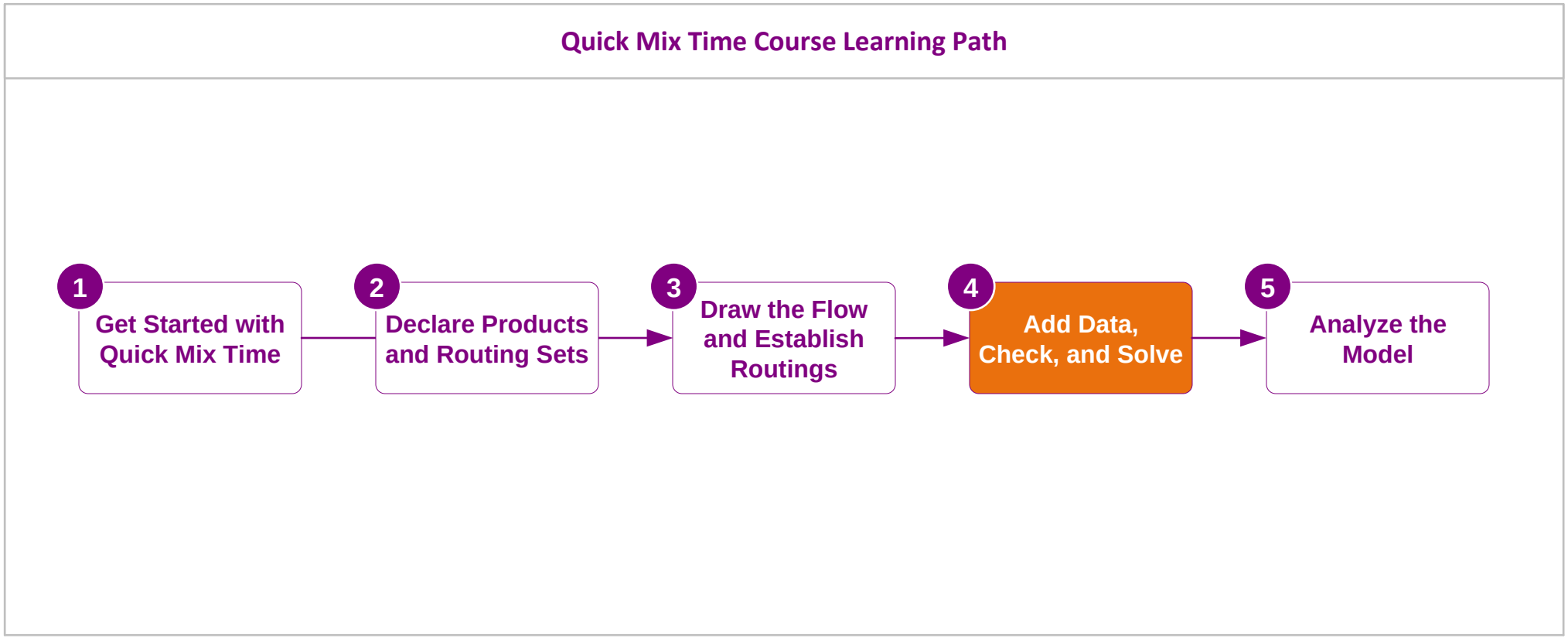
ST - Standard (Qty 200.00) Demand %: 62.5%

Online Course only

Lesson 4 Summary

You learned:

- How to enter product specific data directly on the map and through the List Variables dialog
- How to work with Units
- How to Solve the model and see the calculation results



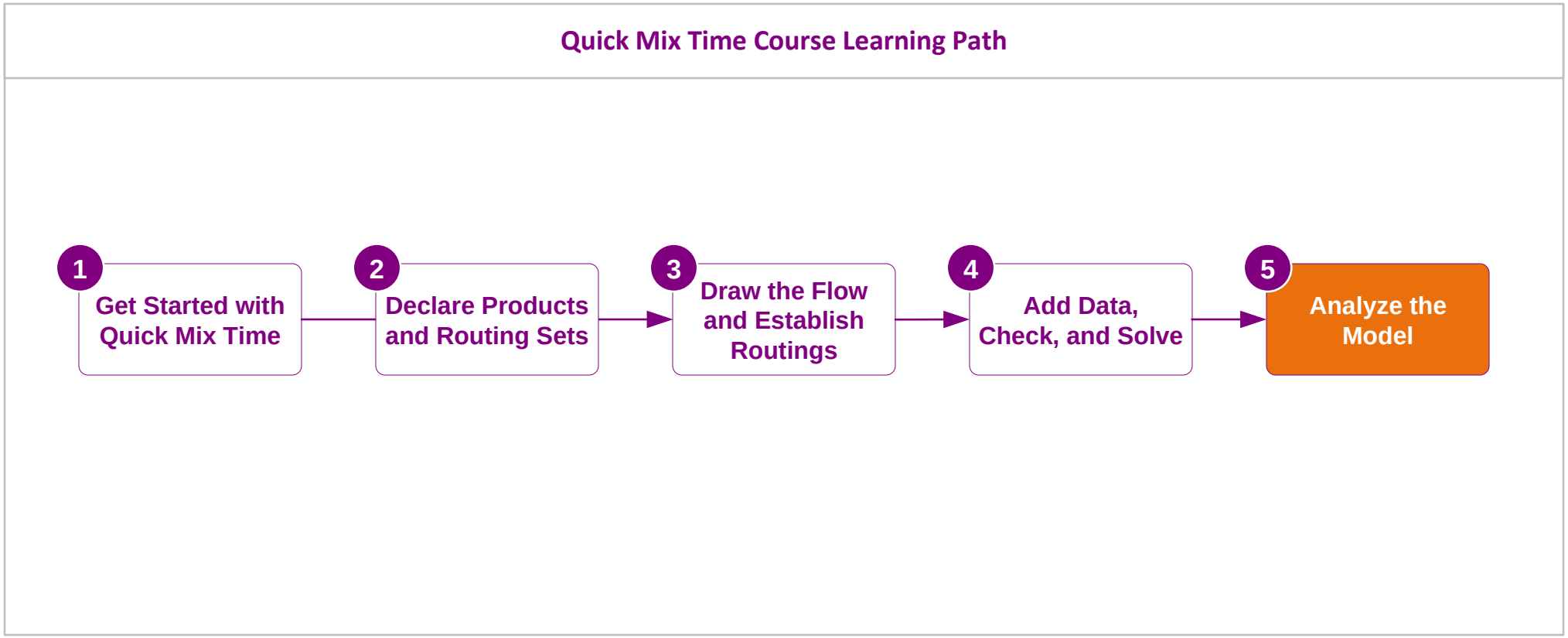
What's next:

Once you create the map and solve it, you can use standard charts lead time to see the waste in the value stream and come up with improvement ideas

Analyzing the Value Stream

In the previous lessons you learned how to build a new value stream model from scratch.

In this lesson, we will discuss how to analyze the current state map with summaries, charts, and visual gadgets. You will also learn how to extend the model with add-on calculations.



Topics Covered in this Lesson

1. Value Stream Analyses Overview

Now that you have a value stream model, what can you do with it?

2. More on Routing Sets, and Paths

Learn how to explore routings and paths.

3. Parallel Work

Learn how to control flow of items through the different paths in multi-path maps.

4. Optional Add-on Variables

Extend your value stream model for additional analyses.

5. Category Function - Summaries for subsets f the value stream

Summarize calculations for a subset of the value stream.

6. Visualizing Data with Charts

Learn to plot and modify standard charts for lead time, capacity, resource balance, etc.

7. Using Gadgets to Visualize Data

Visualize any data values entered in eVSM shapes with simple visuals.

8. Resource Analyses

Resource utilization and balance.

9. Input Products and Routing Set through Excel

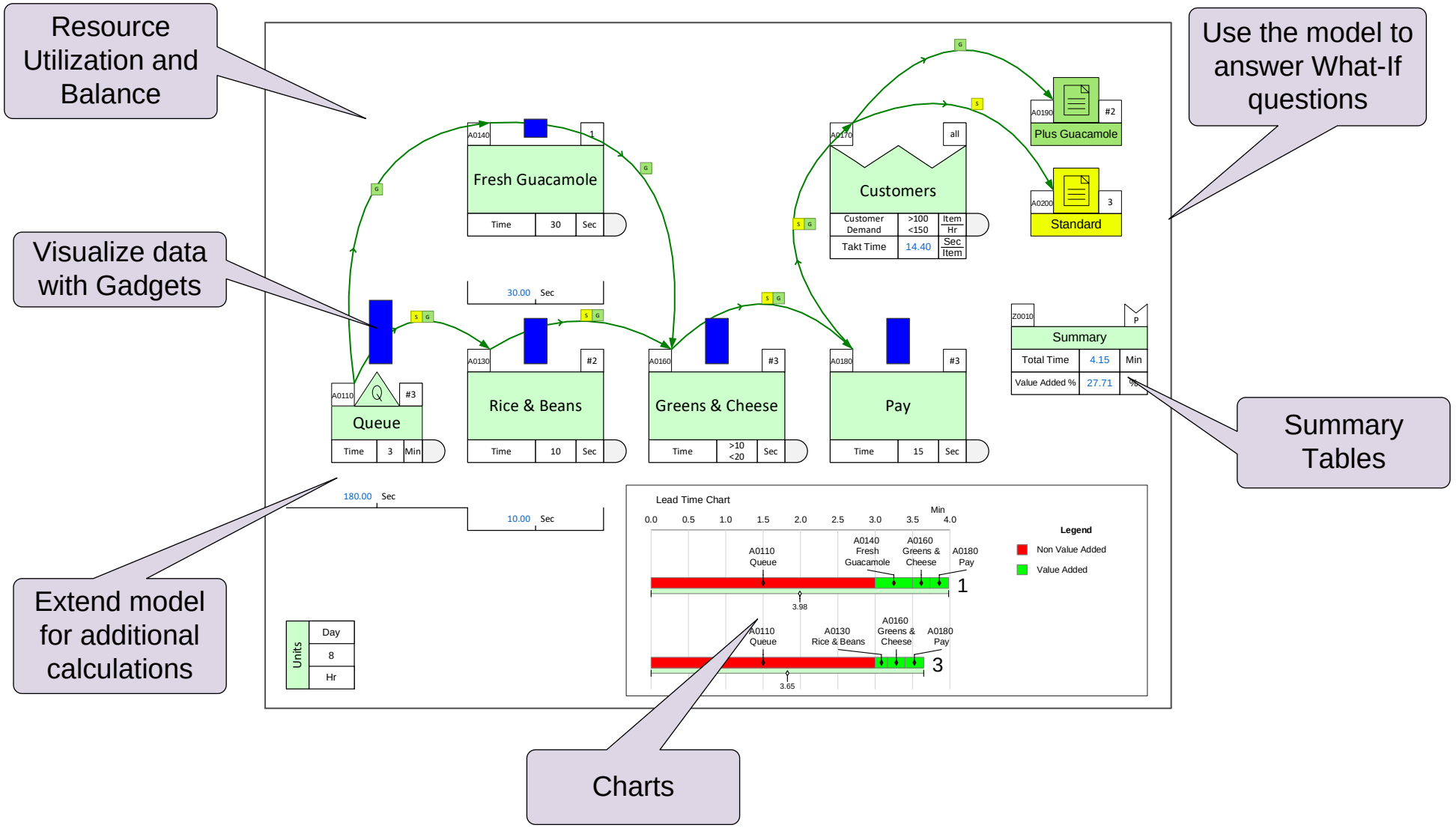
Declare products and group into routing sets in a product matrix in Excel and then import to your map.

10. Data input through Excel

Learn how to collect and input operational data values through Excel.

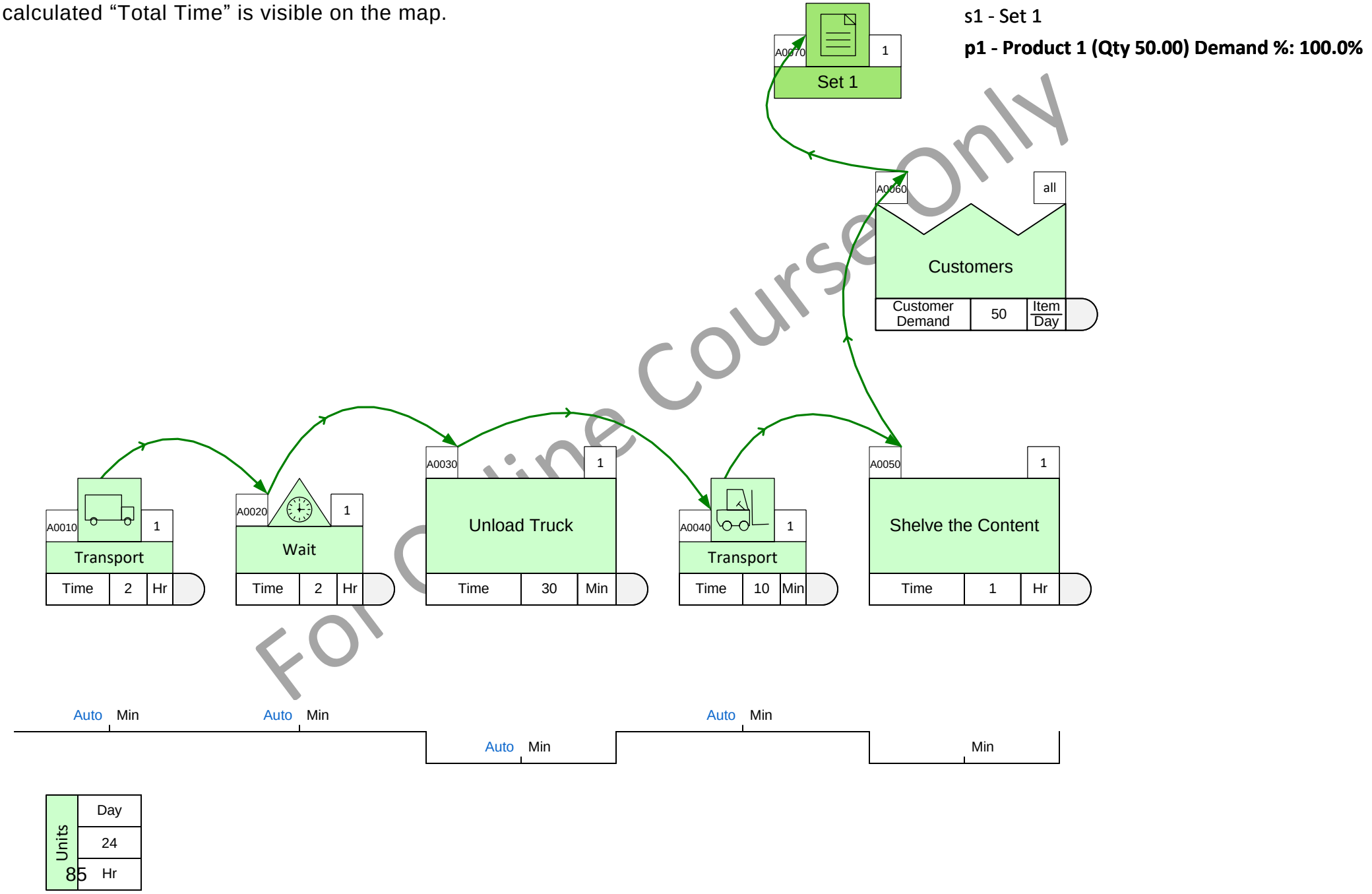
Analyzing the Value Stream

When the model is successfully solved, the results can be summarized using summary tables, charts, and gadgets. The model can be expanded to perform additional analyses.



What is the lead time for this value stream?

Use the Summary Center to calculate. Click Grade It once the calculated “Total Time” is visible on the map.



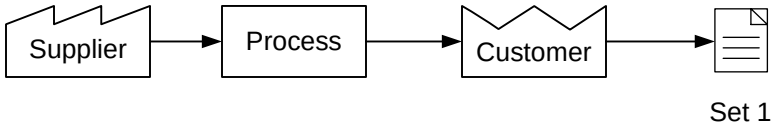
For Online Course Only

Routings, Sets, and Paths

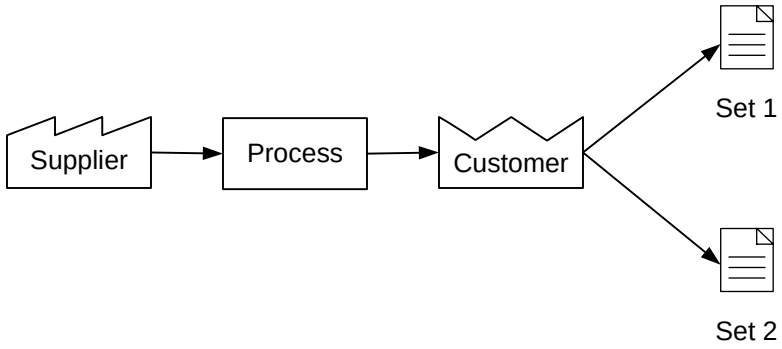
A routing is a distinct set of steps that a product follows. A routing set is made up of all products that go through the same routing. So, the number of routings equals the number of sets. Depending on parallel work in the flow, each routing can have one or more paths. A path is a unique route from an upstream leaf node (starting point) to a downstream Set Center.

Routings and Paths Examples

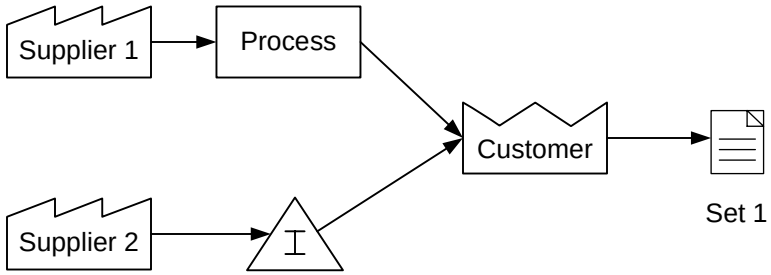
Routings = 1, Paths = 1



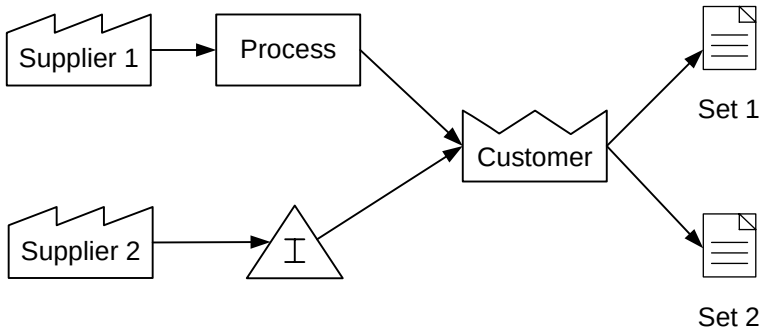
Routings = 2, Paths = 2



Routings = 1, Paths = 2



Routings = 2, Paths = 4

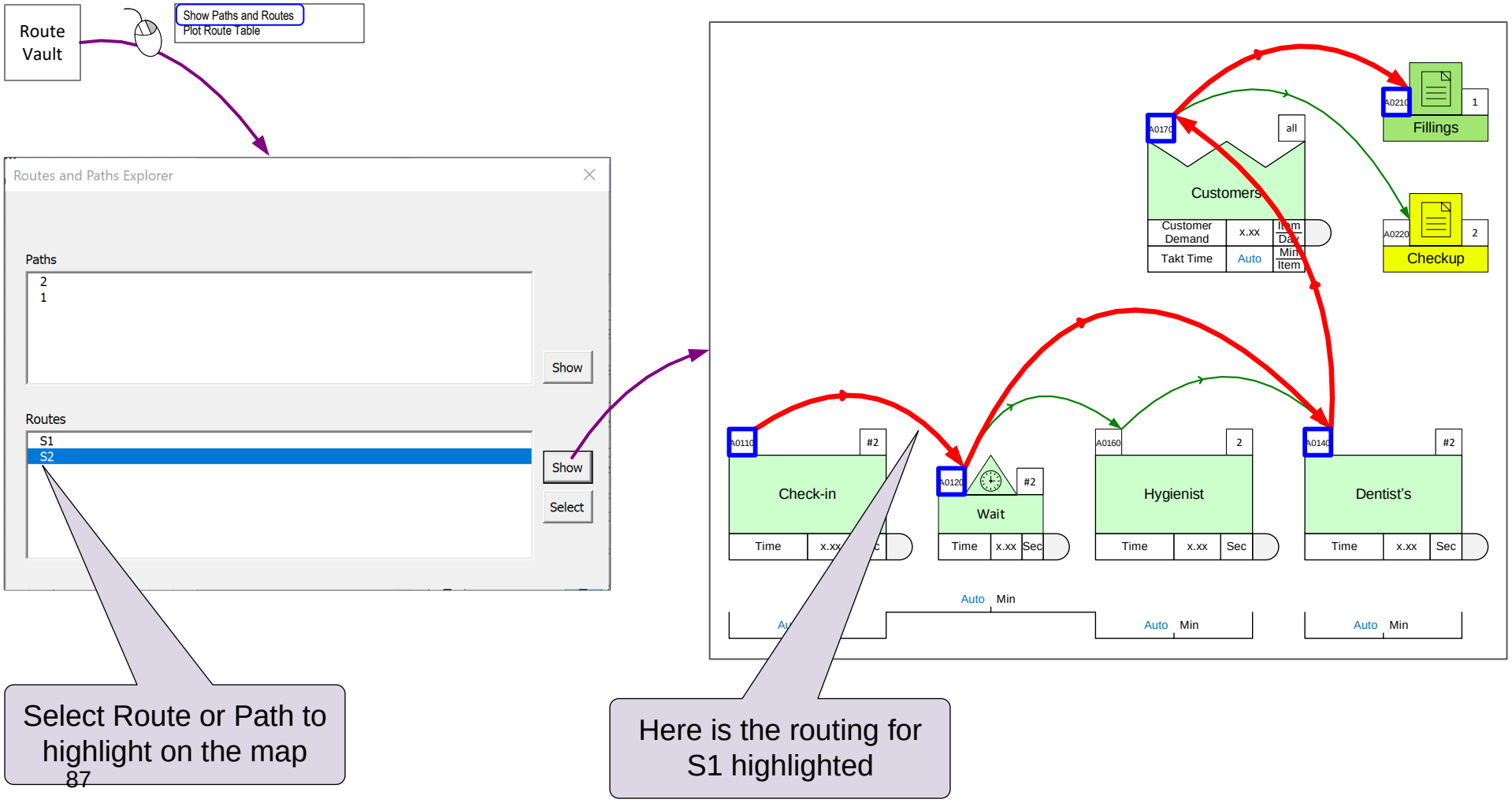


Working with Routings and Paths

A Route Vault shape will appear automatically on the page on Solve. Right mouse commands on this shape allow you plot the Route Table and to open the Routes and Paths Explorer form.

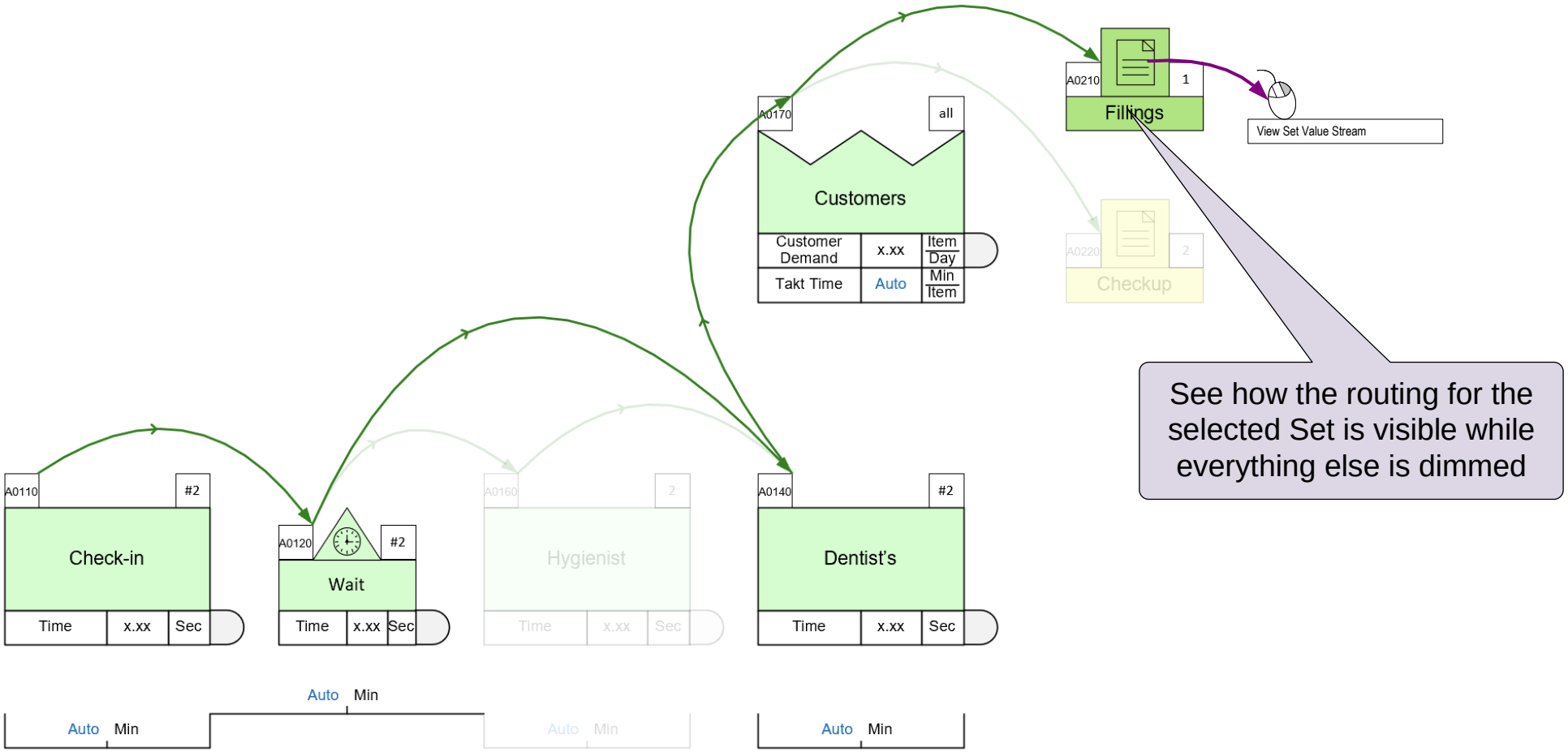
Routings and Paths Explorer

Routings and paths can be explored with the Route Vault which gets created automatically (During AutoPath, Draw Sets, or Solve) on the page. Use the right-mouse menu to open the Routings and Paths form.



Highlighting Routings

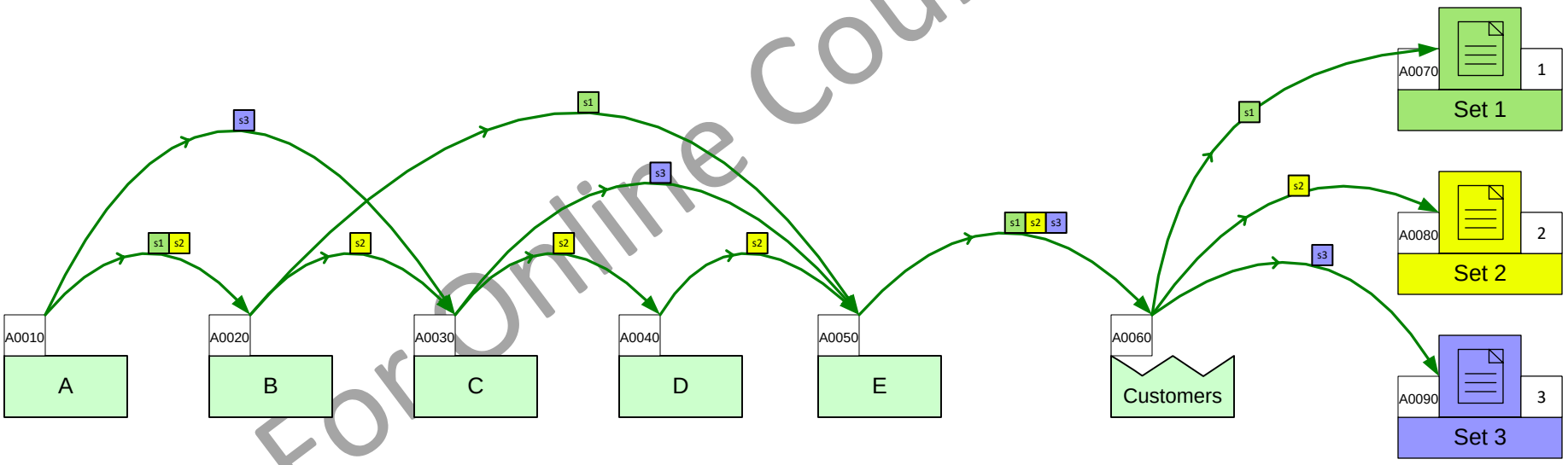
Routings can also be explored with right-click command on the set centers.



Which processes are NOT required for Set 1?

Highlight the routing for Set 1 to see.

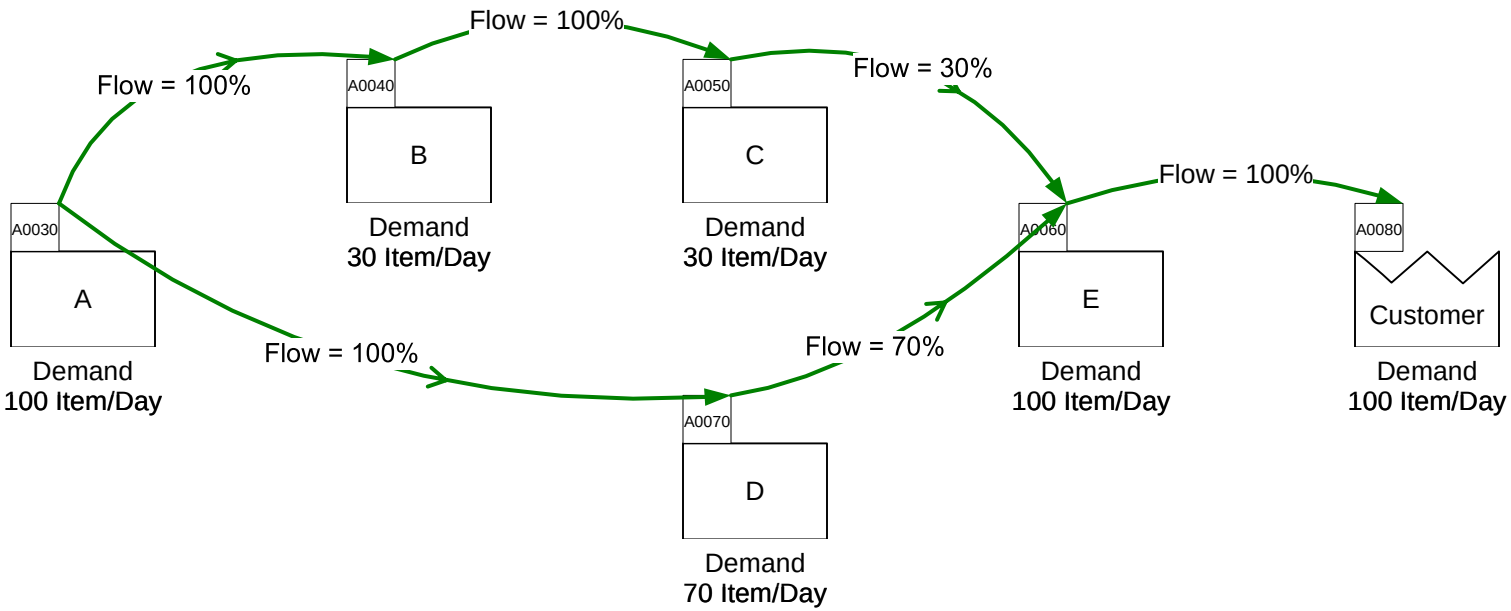
- A and E
- B, C, and D
- C and D
- B and D



For Online Course Only

Path Flow %

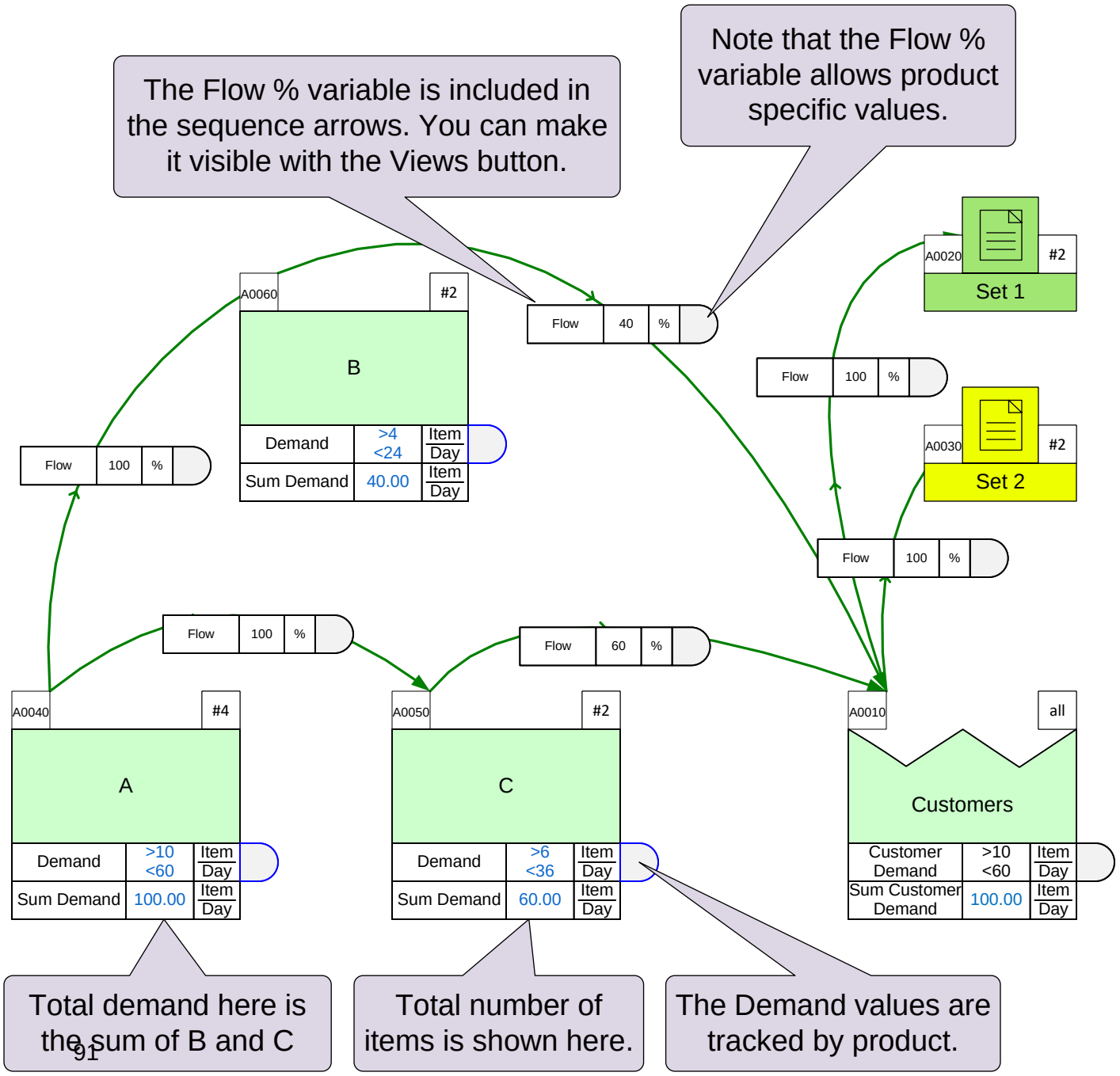
The Flow% variable built into the sequence arrows allows you to control the flow of demand through a path.



Notes:

1. The demand at E equals the demand at the Customer because the downstream arrow has a Flow of 100%.
2. Because the downstream arrow is limited to 30%, the demand at C is 30 Item/Day.
3. Because the downstream arrow has a Flow of 100%, the demand at B is the same as the demand at C.
4. The demand at A is 100 Item/Day, which is the sum of the two downstream arrows' demands.

Flow % Example



s1 - Set 1

p1 - Product 1 (Qty 10.00) Demand %: 10.0%

p2 - Product 2 (Qty 30.00) Demand %: 30.0%

s2 - Set 2

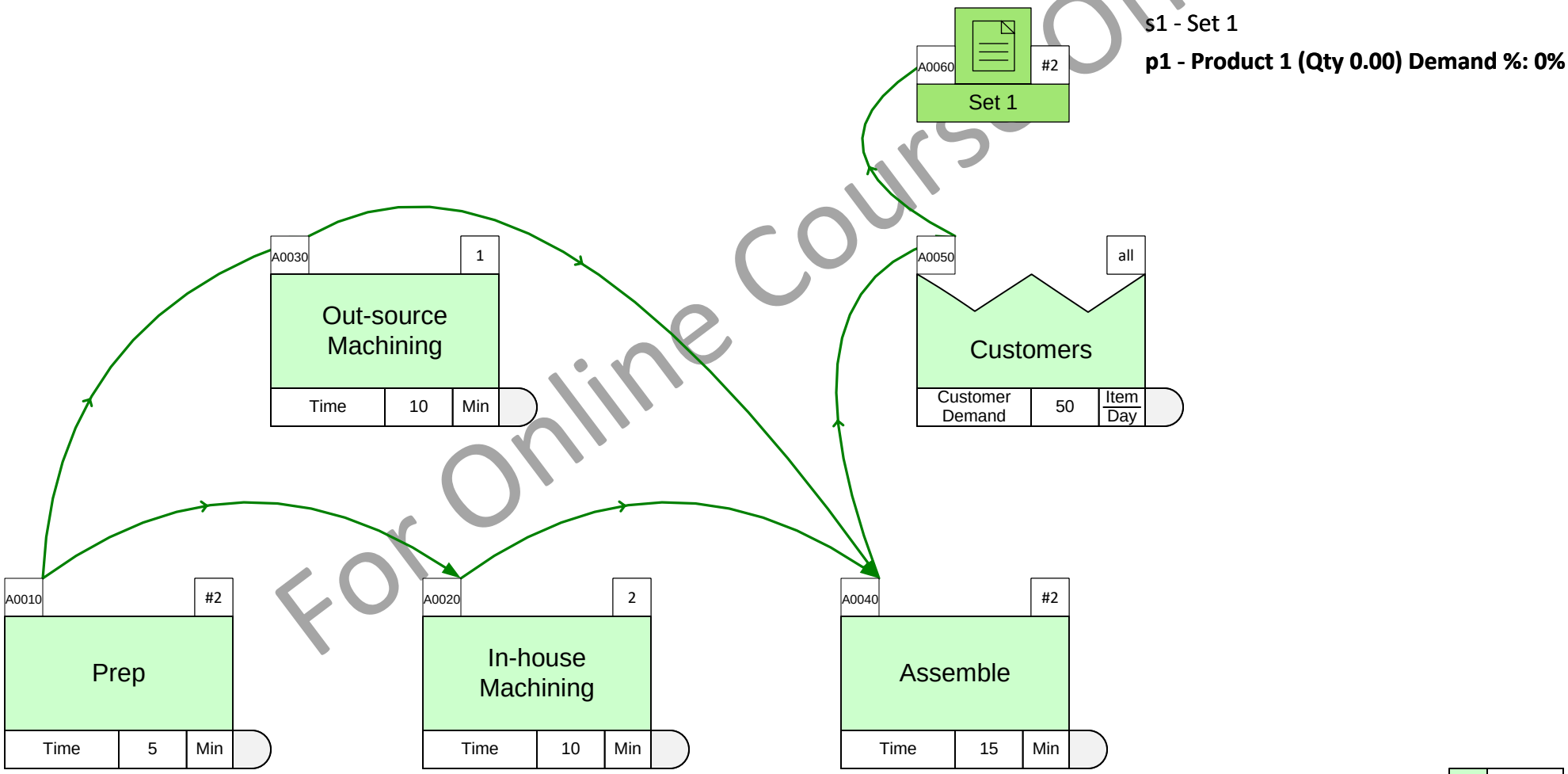
p3 - Product 3 (Qty 60.00) Demand %: 60.0%

Units	Day
	8
	Hr

Flow % Exercise

Set up this model so 40% of machining is outsourced and 60% is done in-house. Steps:

1. Make the “Flow” variable visible on the sequence arrows.
2. Enter the Flow values and Solve.
3. Make the “Sum Demand” variable visible and check that it looks correct at all activities.



For Online Course Only

Units	
	Day
	8
	Hr

Optional Add-on Variables

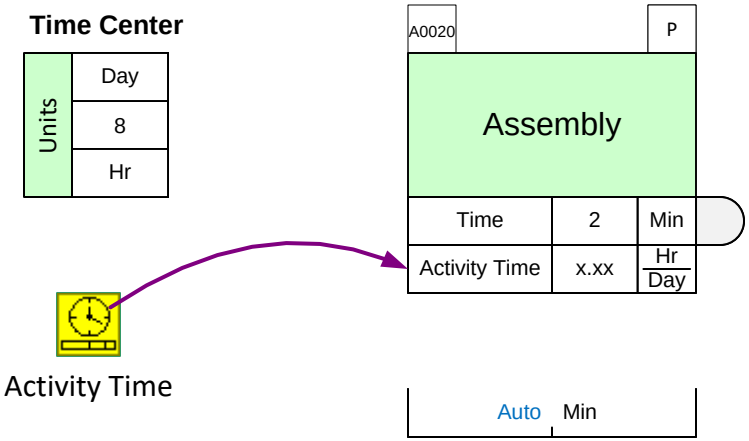
In addition to the default variables and calculations, the eVSM Mix applications include a set of optional variables and equations. These are called add-ons and are available in the yellow icons. The add-ons must be glued to the bottom of the data shapes stack for the center they are assigned for.

How to Use Add-ons

Just drag out the desired add-on from the stencil and glue it to the bottom of the data shapes stack. New add-ons can also be dropped on the green center shape and it will automatically get attached to the bottom of the stack.

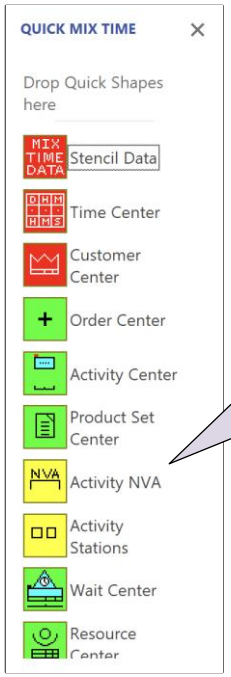
Example

This plant works 8 hours per day as indicated in the Time Center. However, Process B works part-time at 5 hours per day. You can use the Activity Time yellow add-on to show the actual available time.



Add-ons Icon Positions in the Stencil

There is a unique correspondence between green icons in the stencil and the yellow icons that immediately follow the green icon. So yellow icons can be used ONLY with the green icons they “belong” to.



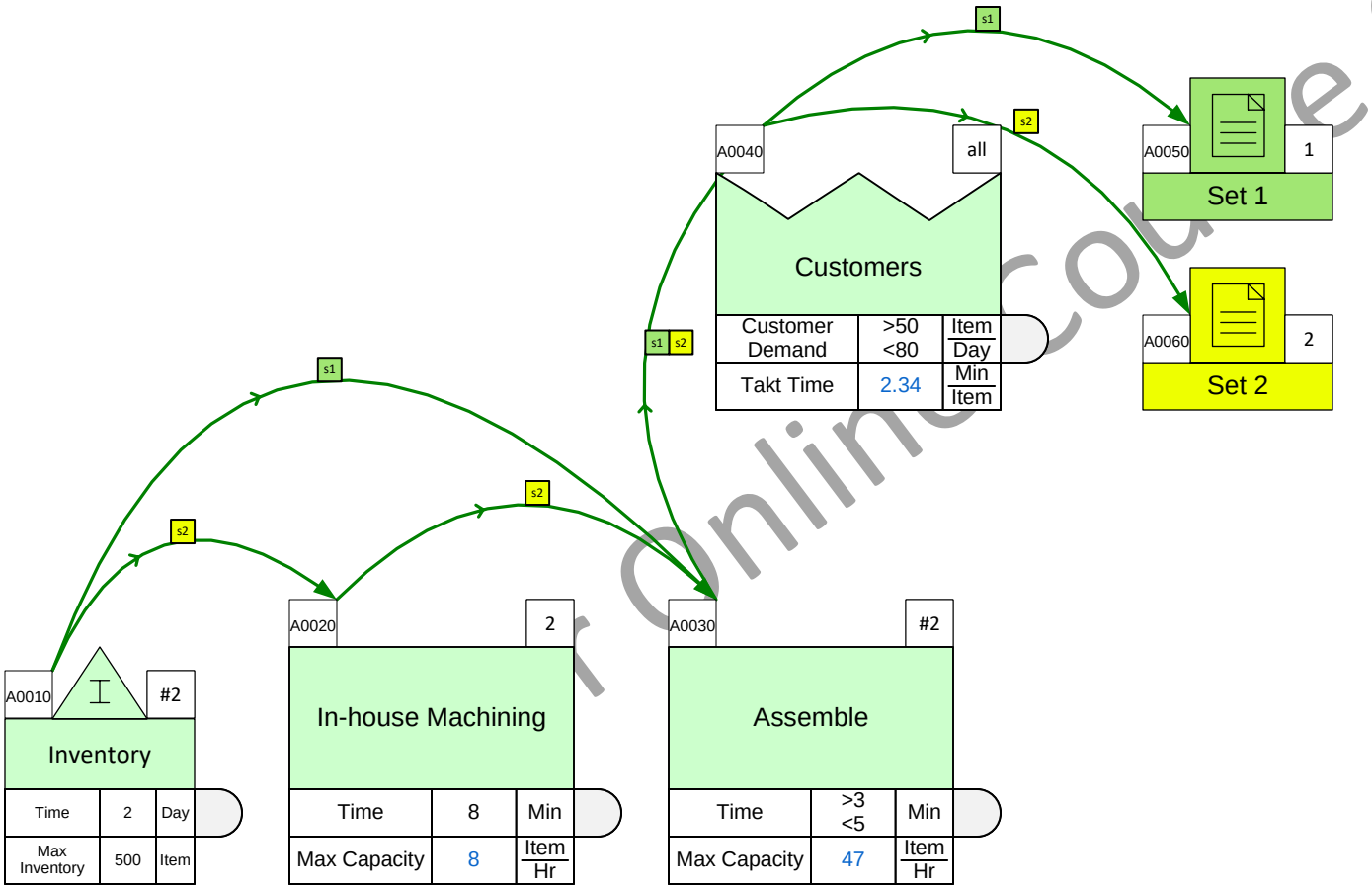
These two yellow icons can only used with the Activity center since:

1. They follow the Activity Center in the stencil position

2. Since the first word in their name is “Activity”

We need to double the capacity at the Assemble operation

Use the Activity Stations add-on to add a second station at the Assemble operation and Solve the model.



s1 - Set 1

p1 - Product 1 (Qty 50.00) Demand %: 24.4%

p2 - Product 2 (Qty 80.00) Demand %: 39.0%

s2 - Set 2

p3 - Product 3 (Qty 75.00) Demand %: 36.6%

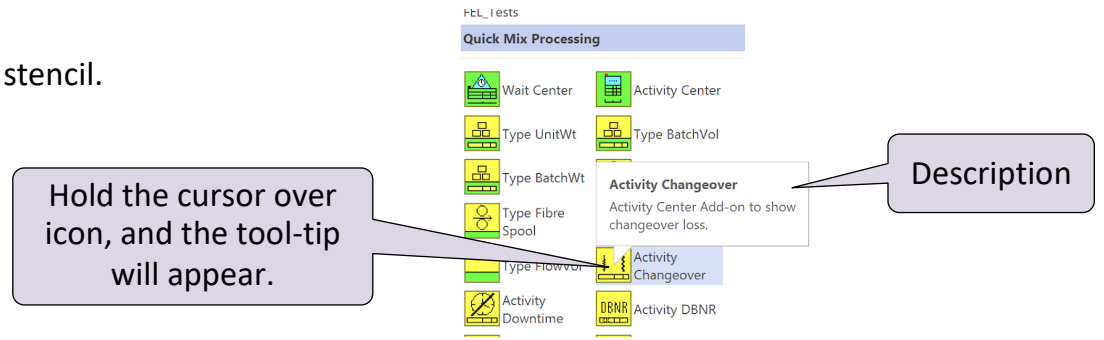
Online Course Only

Units	Day
	8
	Hr

Add-ons Help

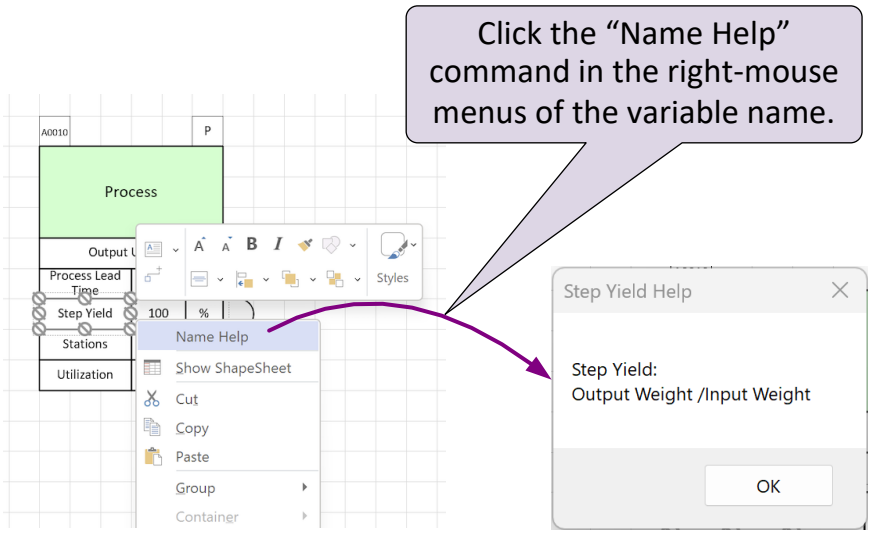
Add-ons Brief Descriptions

Brief help for each add-on is available as a tooltip in the stencil.



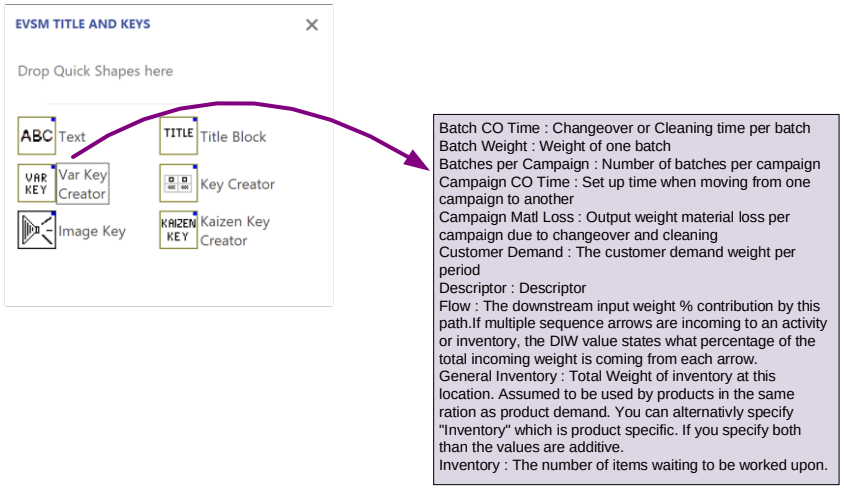
Variable Names Descriptions

Brief description is available for all the variables. In the right-mouse menu of the variable.



Variable Names Key

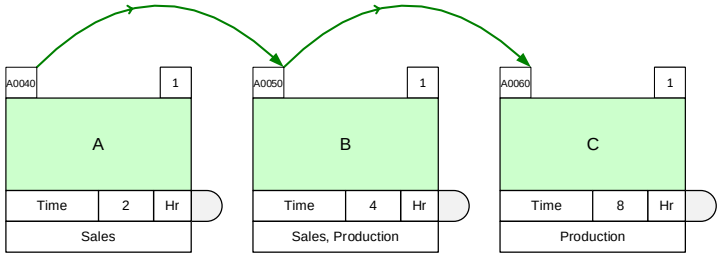
For your audience, a key of all the variables used on the map is useful. This can be generated automatically with the “Var Key Creator” shape.

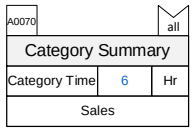


Category Function

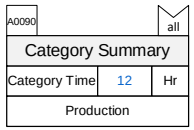
The eVSM Category capability allows you to create summaries for a subset of the value stream. You can specify exactly which operations are included in the category

Example

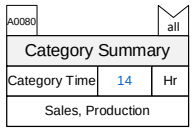




Summary for the Sales staff

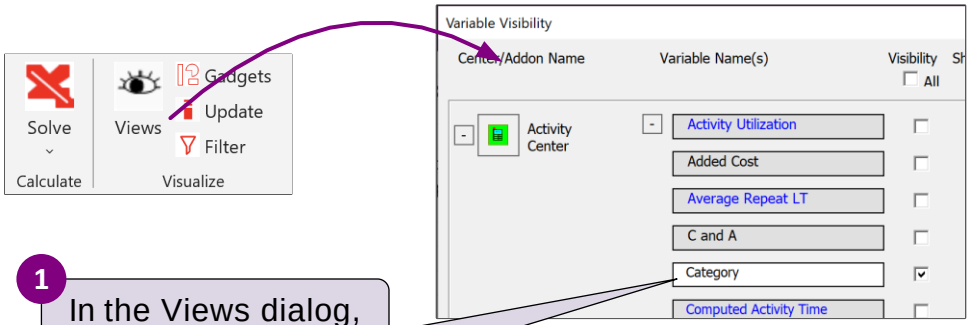


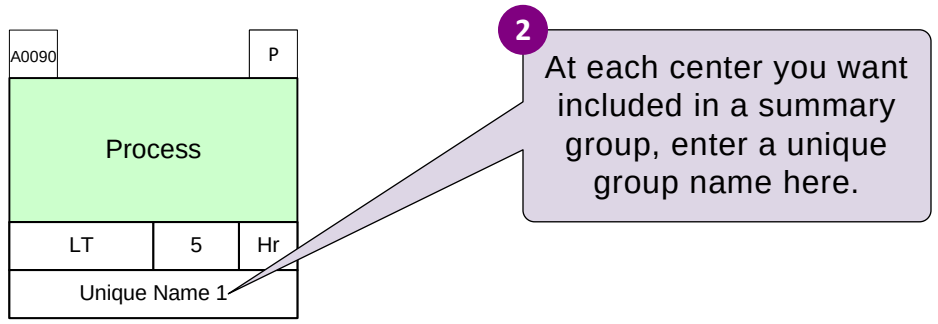
Summary for the Production staff

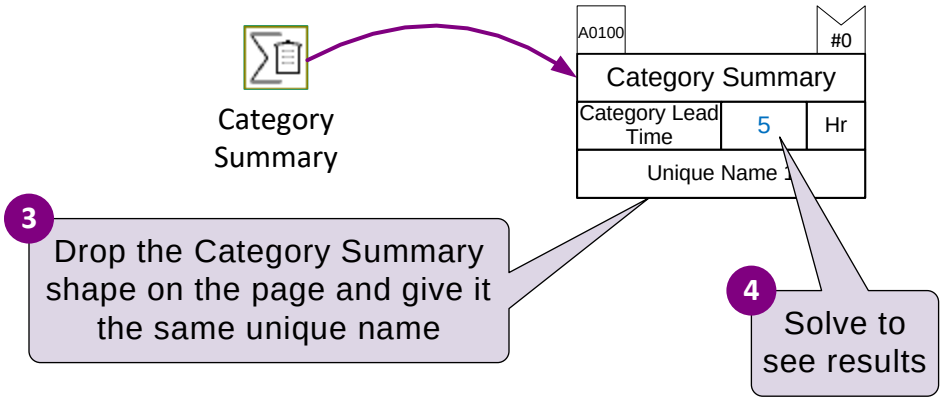


Summary for the Sales and Production staff

How to Use...

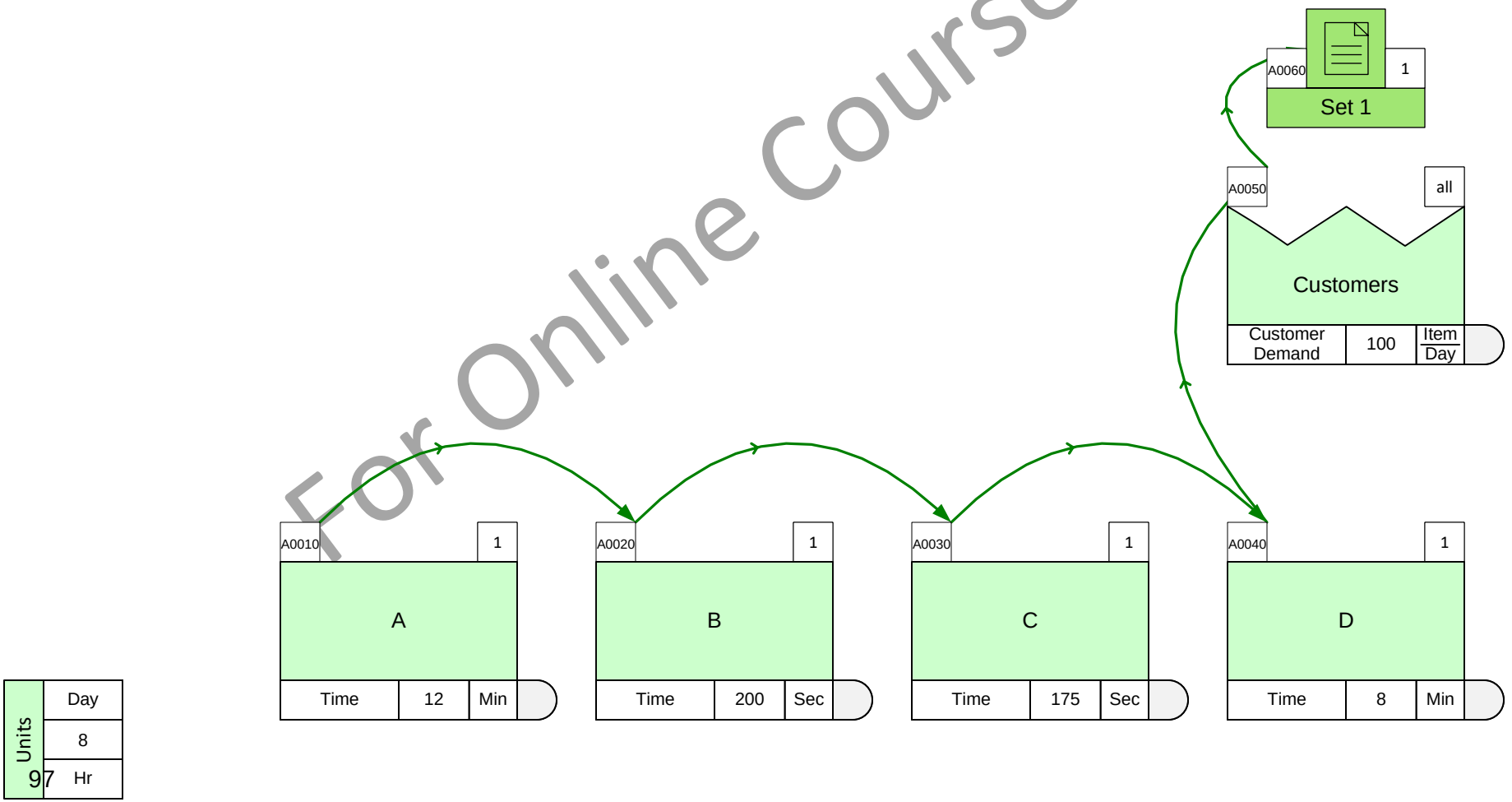






Category Exercise

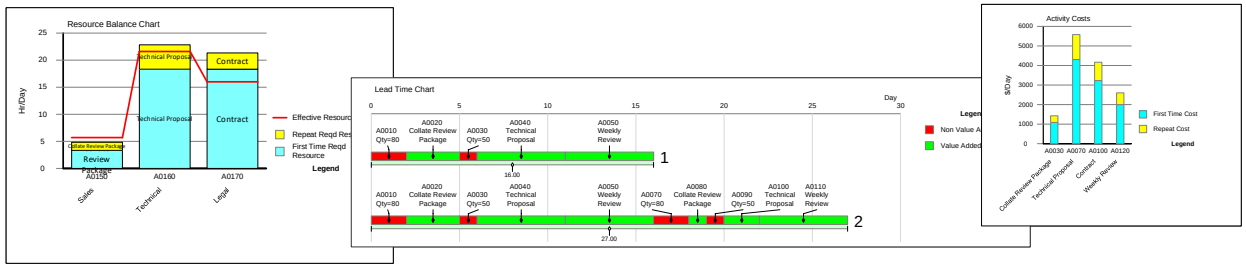
Use the Category Summary center to calculate the total time for activities B+C+D



For Online Course Only

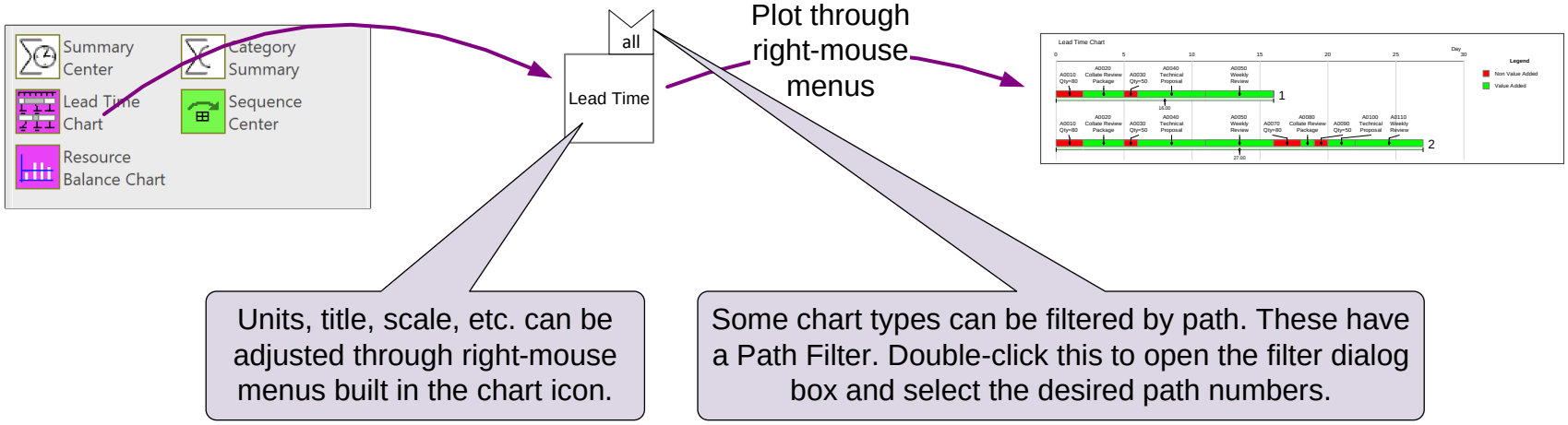
Charts

Charts are a simple way to summarize data on a value stream map. The eVSM Quick stencils include many pre-built charts.

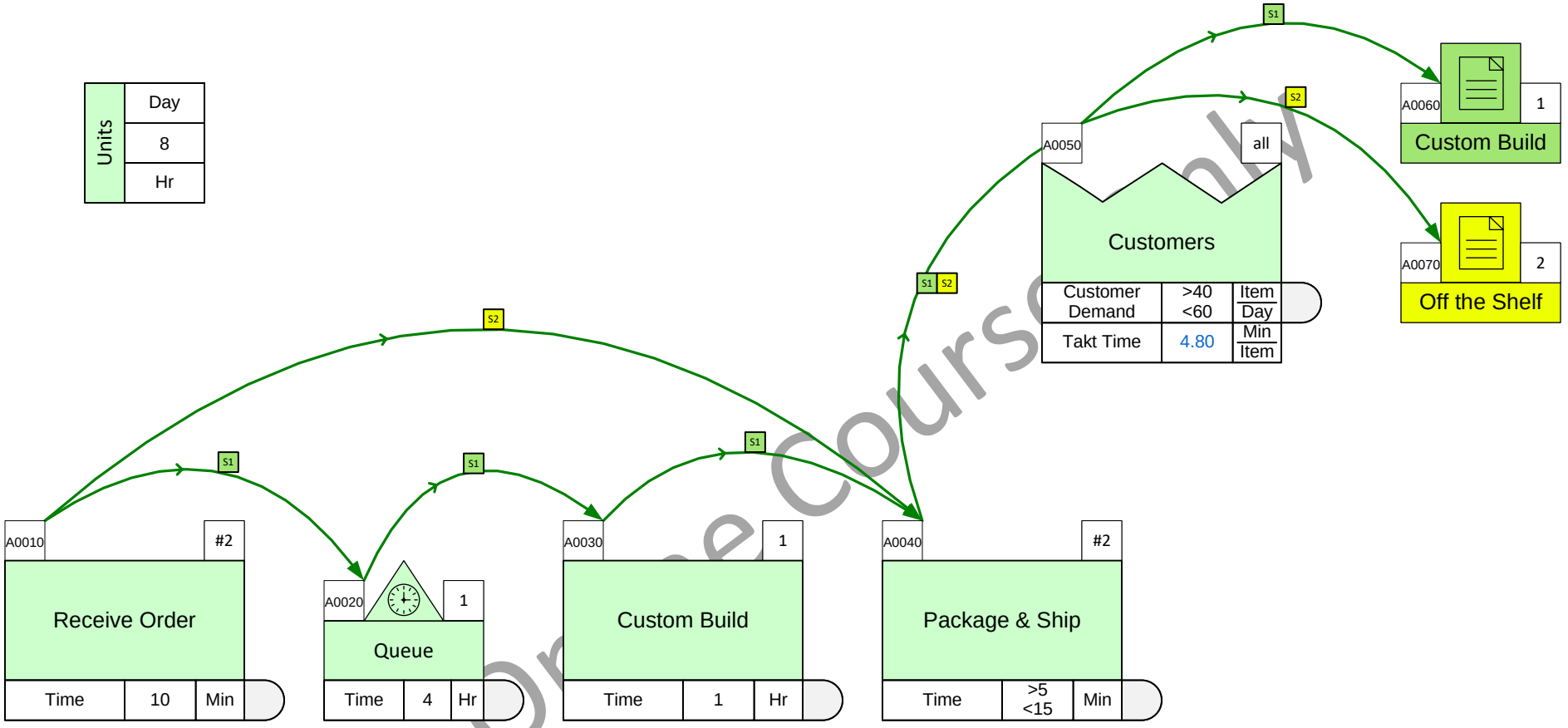


Plotting Charts...

The pre-built chart icons are colored magenta in the stencils. After the model has been solved, just drop the chart icon on the page and plot through the right-mouse menus.



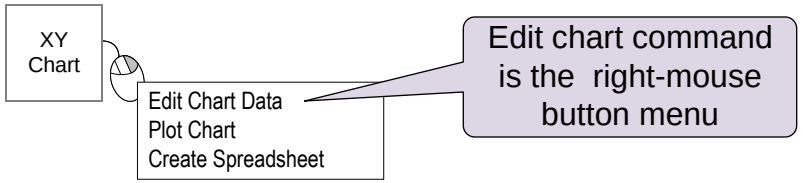
Plot the Lead Time chart for the "Custom build" path

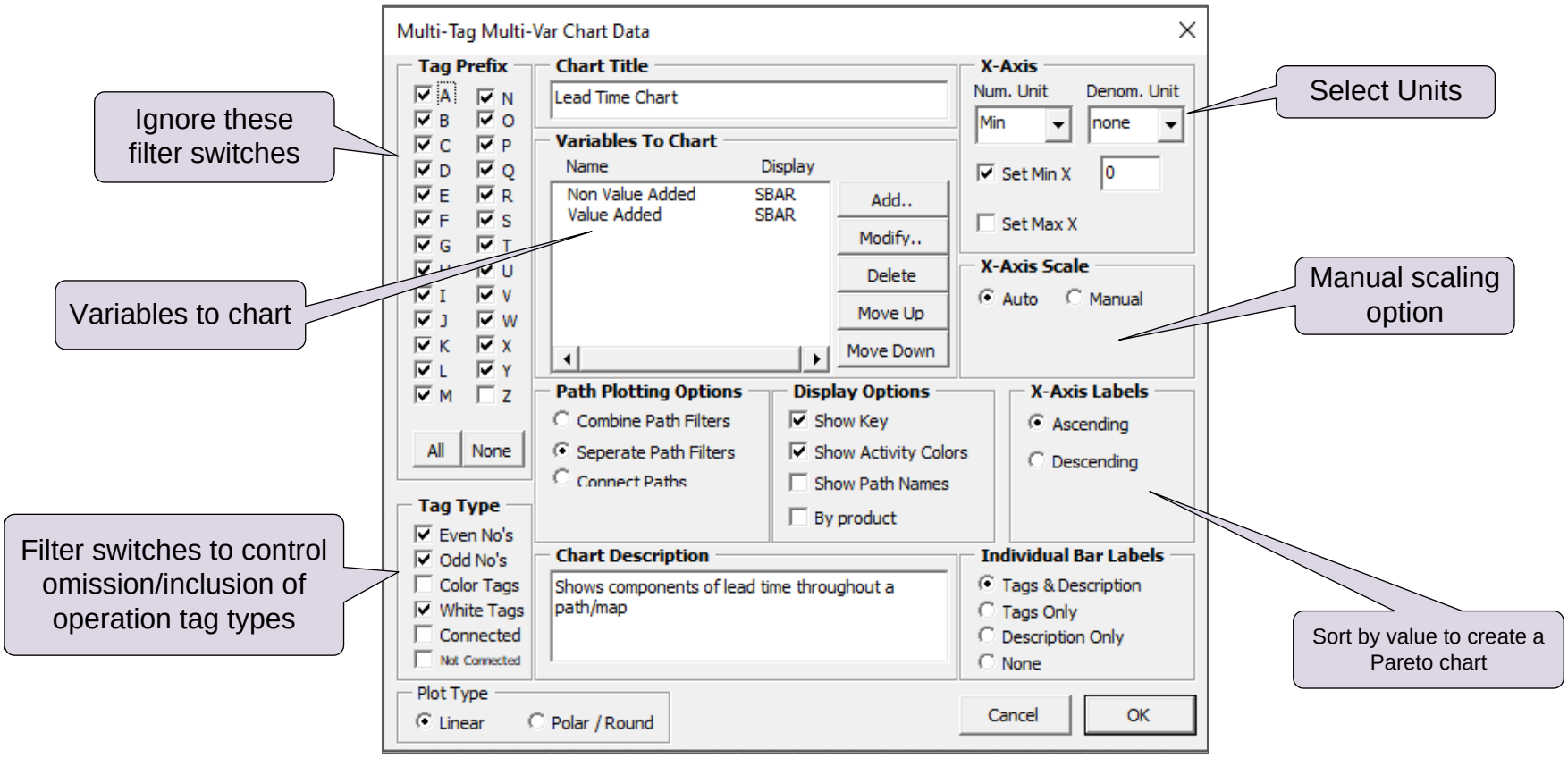


For Online Course Only

Editing Charts

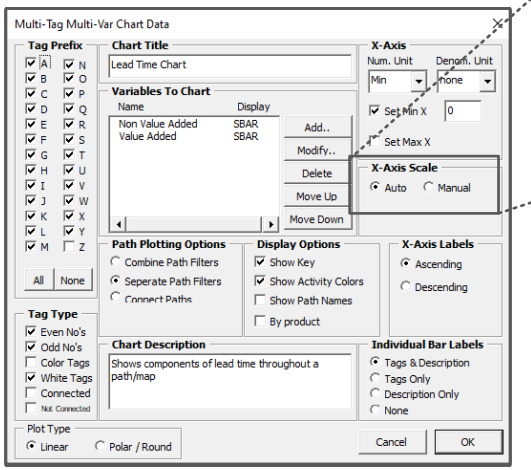
Some properties of charts (size, scale, units, title, colors, etc.) may be edited by the user. The edit dialog box is accessed through the right mouse menu of the chart shape.

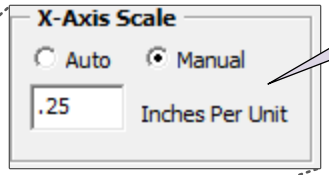




Manually Scaling Charts

The chart size may be adjusted like any other Visio shape. The aspect ratio with remain locked. The chart scale is automatically set by default but may be adjusted manually as shown here.





Scale the Lead time as required

Chart before manual scaling

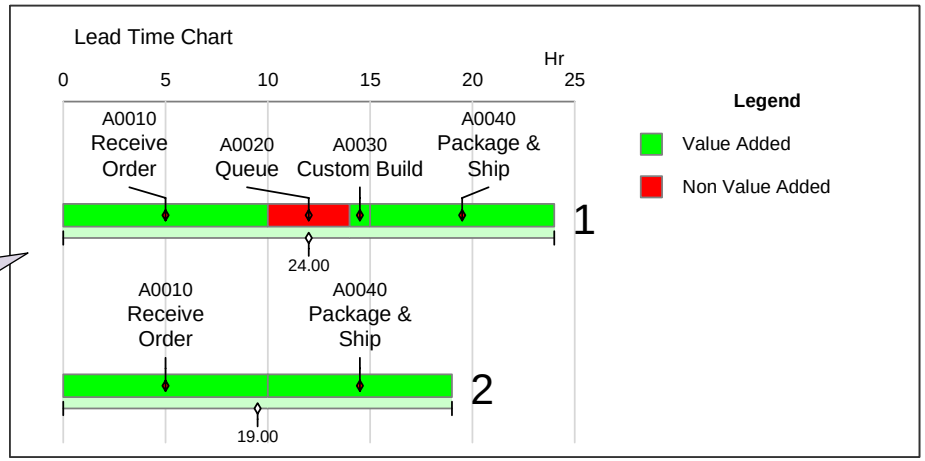
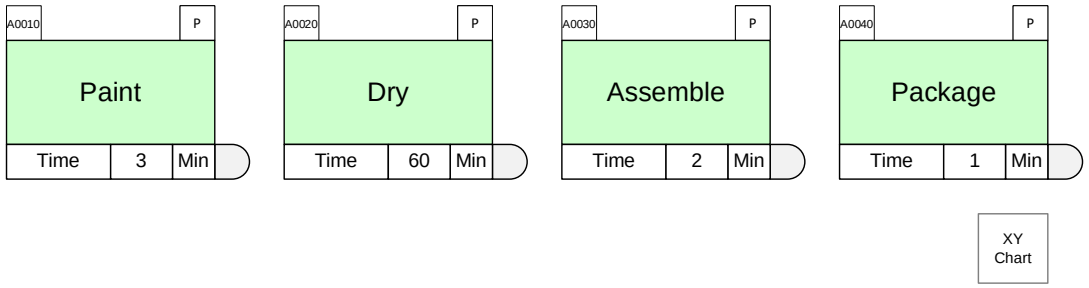


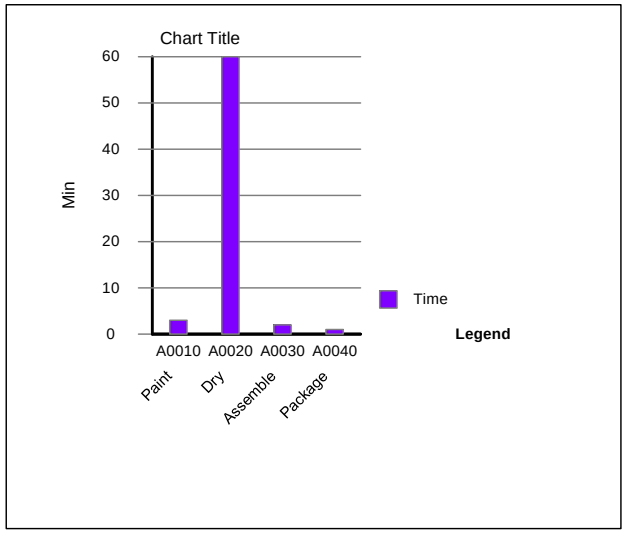
Chart after manual scaling

Filtering Chart Data

Sometimes you may want to eliminate some data points in a chart to clarify the rest. The filter switches in the Edit Chart dialog can be used to achieve this. In the example below, the “Dry” operation is swamping out all data in the chart. It can be eliminated from the chart by simply making the operation tag any non-white color.

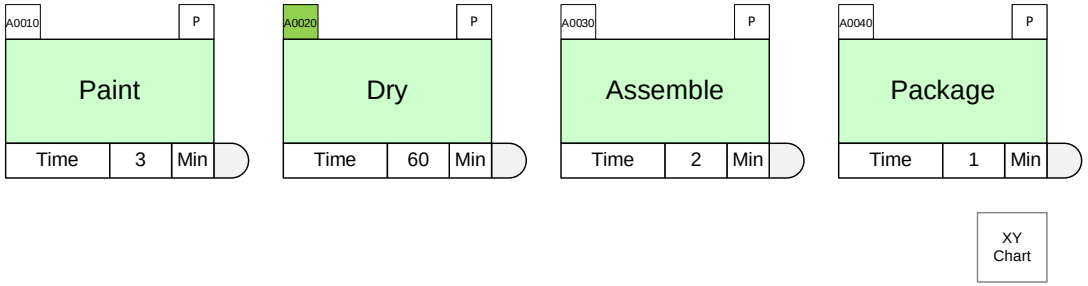
Before

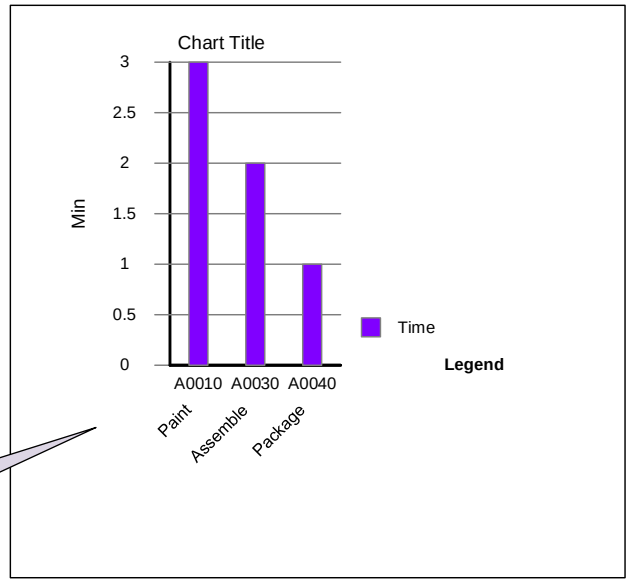




After

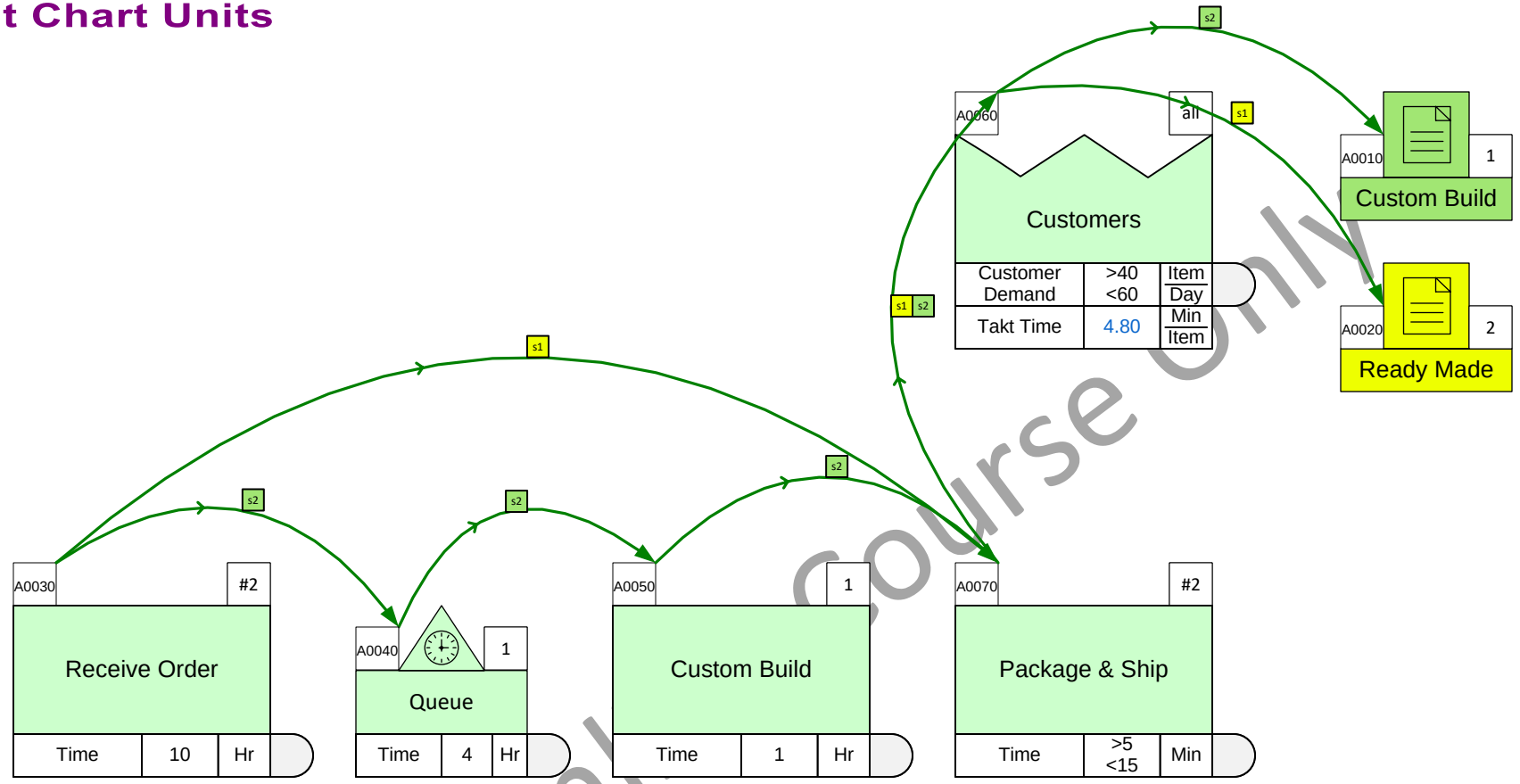
Operation Tag fill color has been set to a non-white color





The “Dry” operation is eliminated from the chart

Edit Chart Units

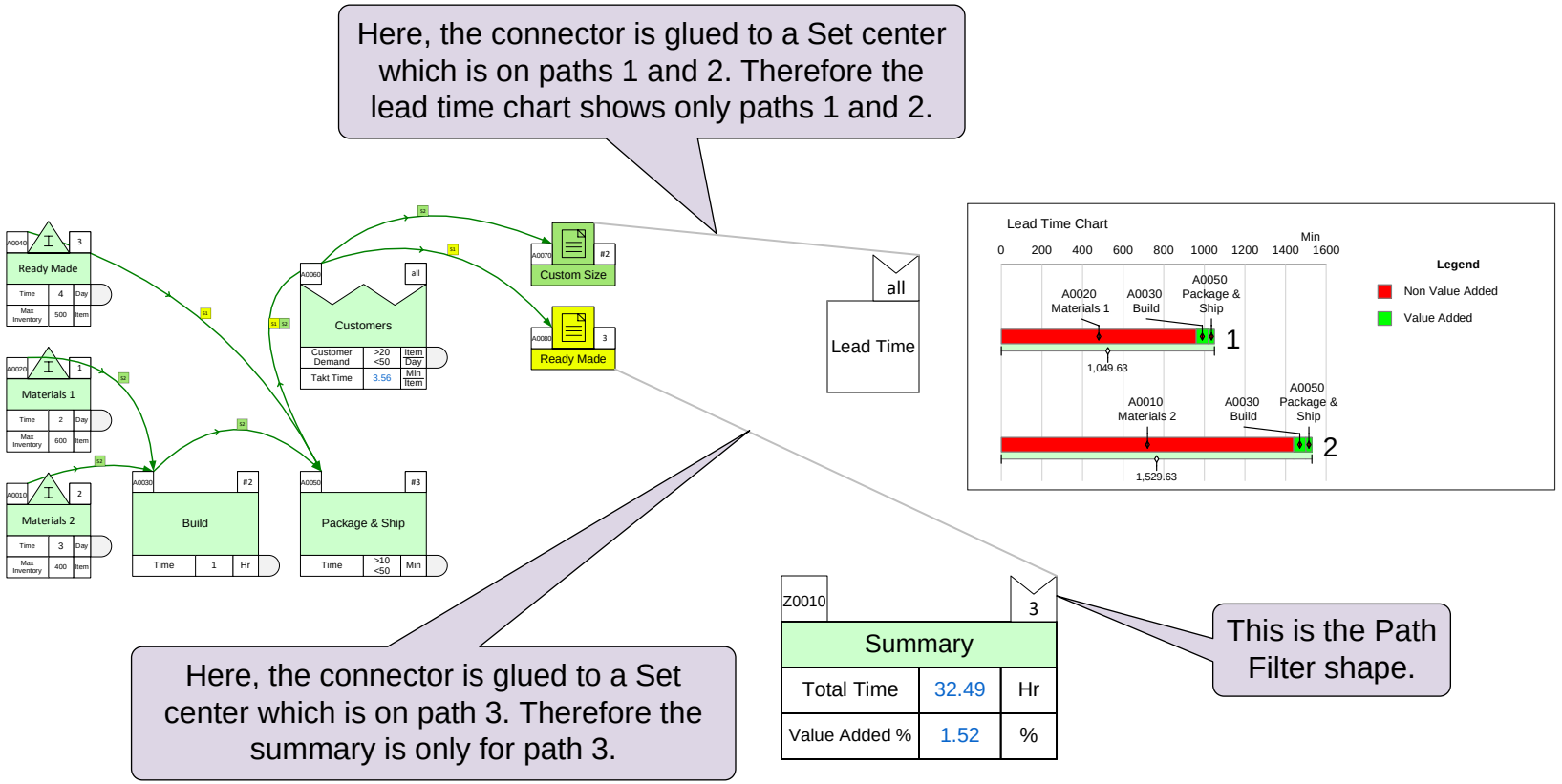


For Online Course Only

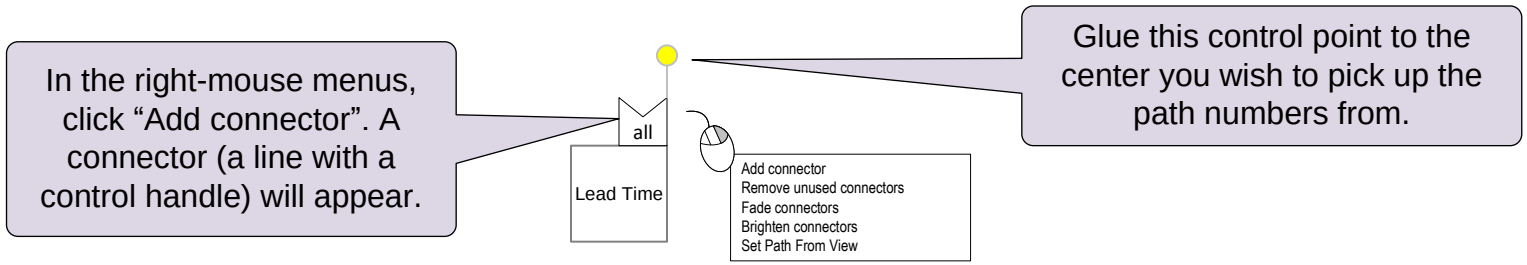
Units	
	Day
	8
103	Hr

Path Filter Connectors

The path filter shape has connectors which can be glued to any center to automatically pick up all the paths numbers the center is on. This makes path selection easy. More important is that it will update automatically if path numbers change due to changes in routings.

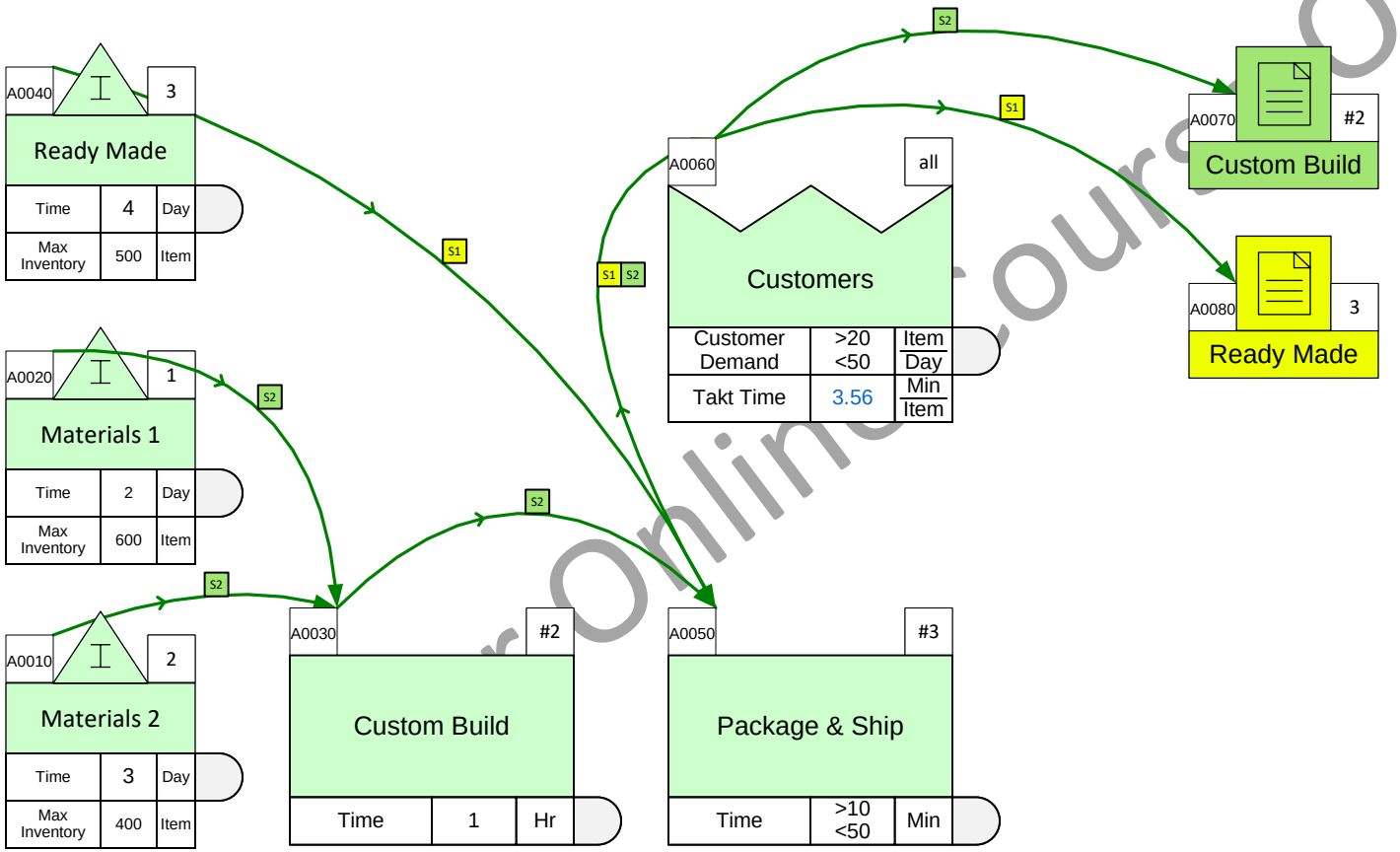


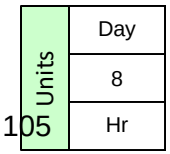
How to use...



Add a Summary Center for the Custom Build Routing

1. Add a Summary center to the page from the Mix Time stencil.
2. Use the “Add connector” command on the path filter to add a connector.
3. Glue the connector to the “Custom Build” Set center and then Solve the map.





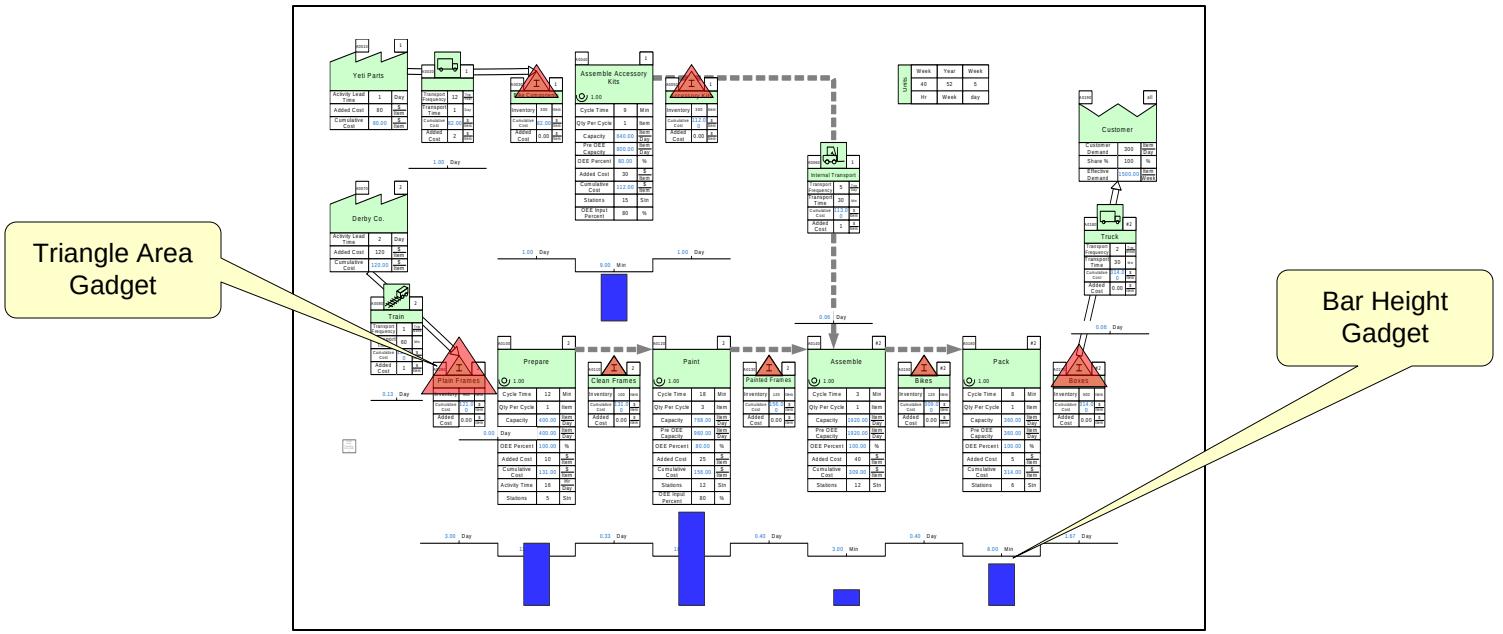
Online Course Only

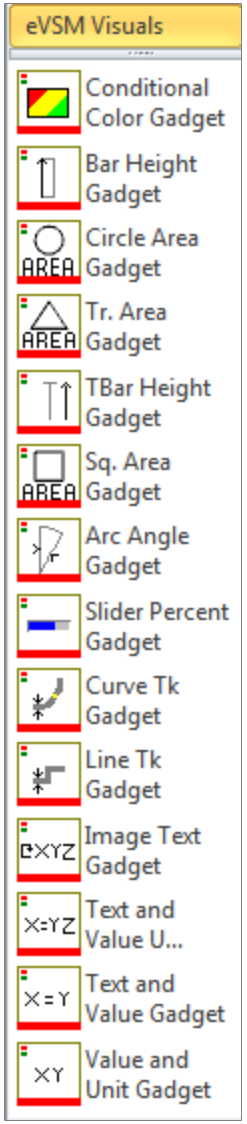
Using Gadgets to Visualize Data

In addition to charts, you can use geometric gadgets to visualize data with the gadget positioned near the data block they represent. Any NVU (data shape in Name-Value-Unit format) variables on the map can be linked to visual gadgets whose size and color changes in proportion to the value. This allows you to visualize values “in-place” on the map.

Gadgets are available in many shapes as shown on the right. Each gadget has exactly one parameter (e.g. length, area, thickness, etc.) which can be tied to represent a data value. Different gadgets can be used to represent different variables on the same map. Gadgets size/color will update automatically for any changes in data when the “Solve” is run. Gadgets may also be updated with the Update button in the eVSM ribbon.

Gadget properties (scale, colors, visibility) can be managed with the Gadgets button in the eVSM ribbon.





Using Gadgets to Visualize Data (continued)

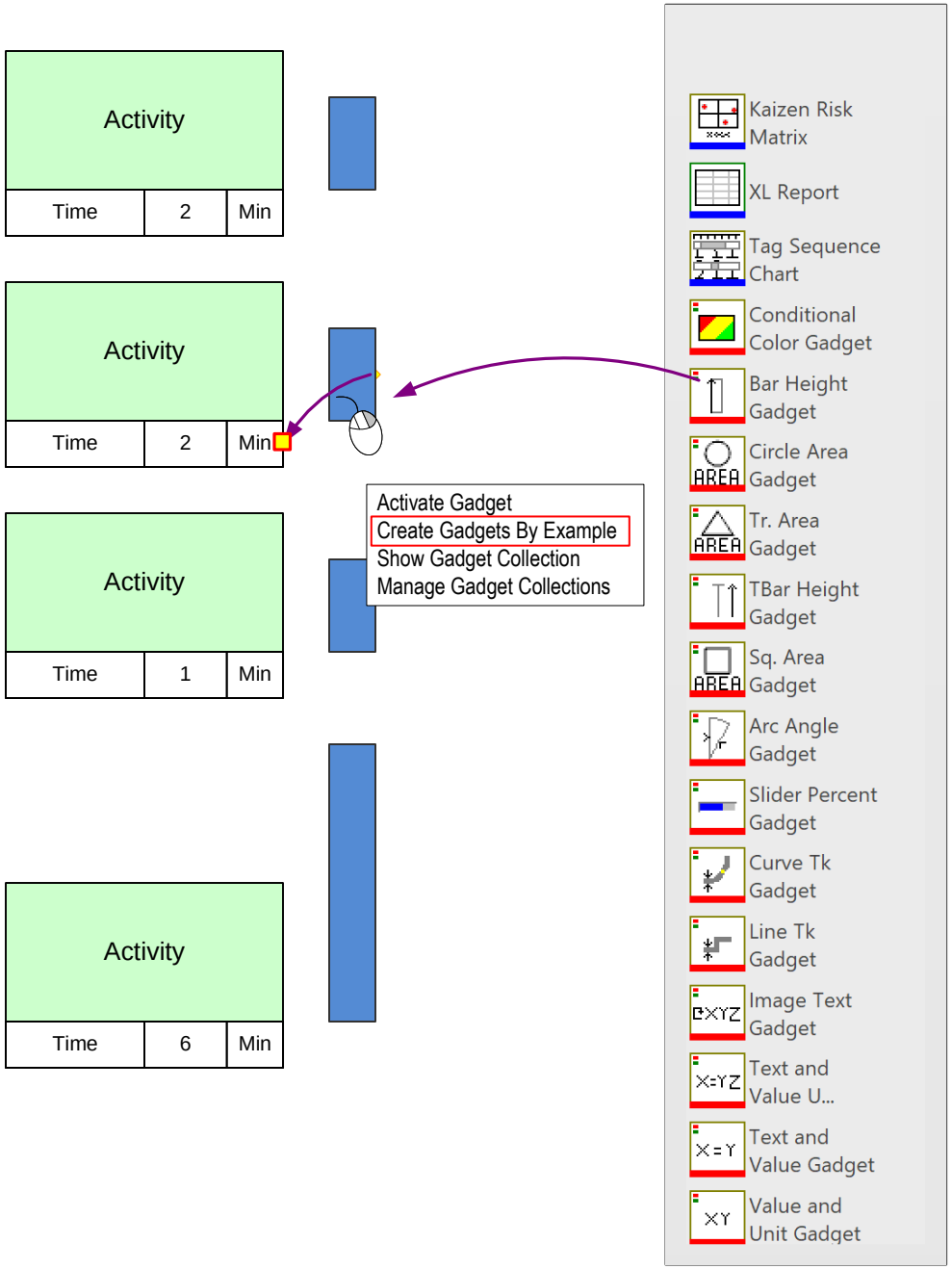
To apply, drag out the “Bar Height” gadget from the “eVSM Charts and Gadgets” stencil on the right and position it near the data value with which it will be associated. Apply a fill color to the gadget if you wish.

Select the gadget, glue the gadget’s yellow flying connector to the side of the NVU data shape.

Right-click on the gadget and use the “Create By Example” option to create similar gadgets near all “Time” NVU’s on the map as shown on Process B.

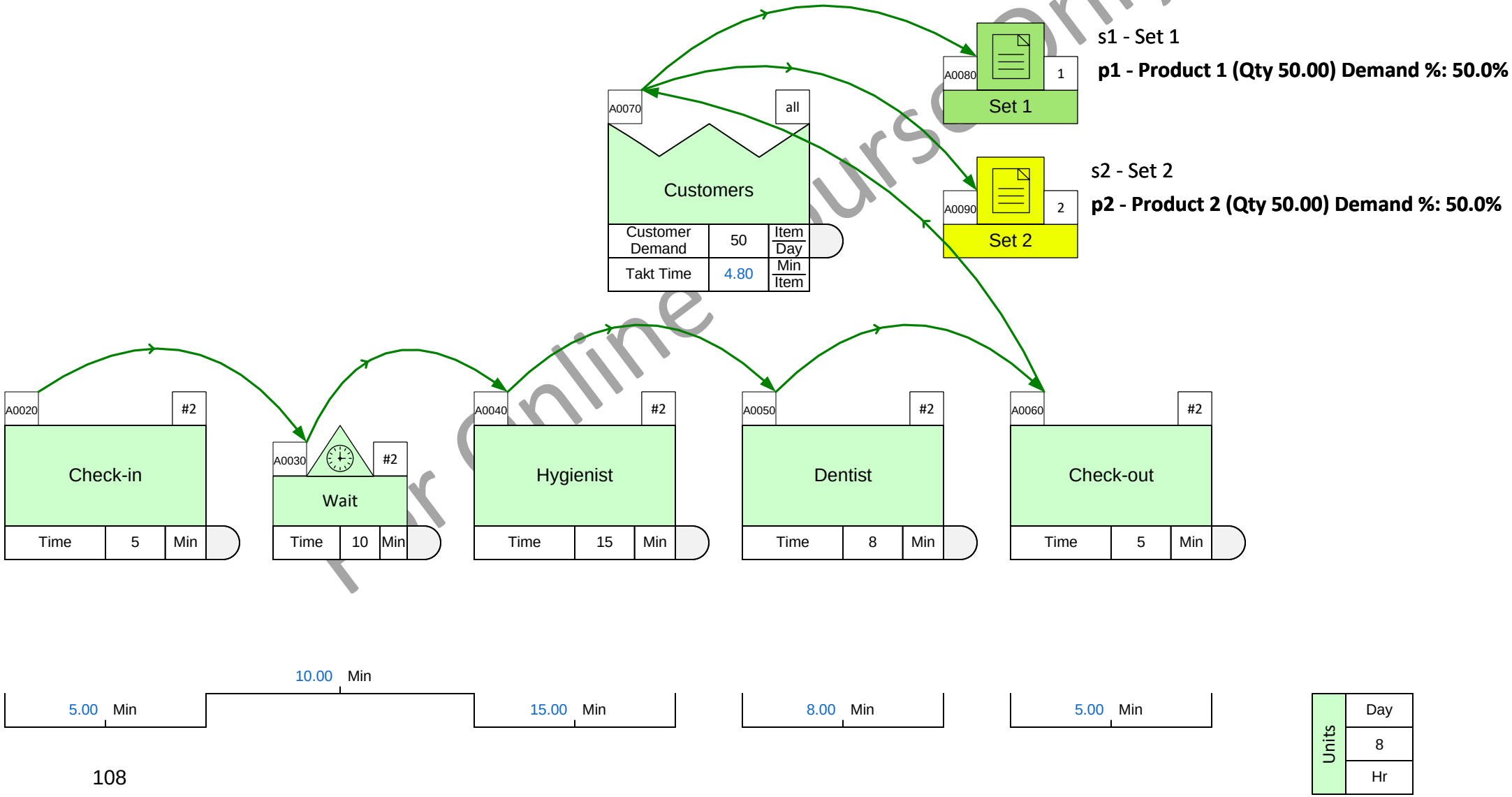
The “Create By Example” creates a similar gadget on the maps for every instance of the selected variable.

You can manage the gadget family using the “Gadget Manager” button in the eVSM ribbon. This allows you to scale the gadget and even apply color-coding to it based on variable value.



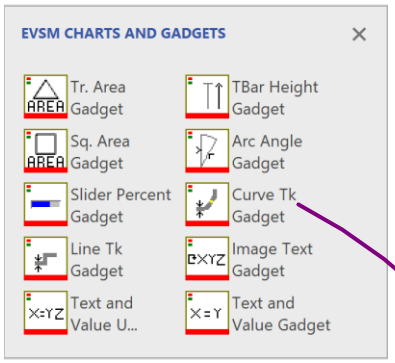
For more help on eVSM Gadgets, see http://www.evsm.com/toolbarguide

Bar Height Gadget



For online course only

Line Thickness Gadget Steps

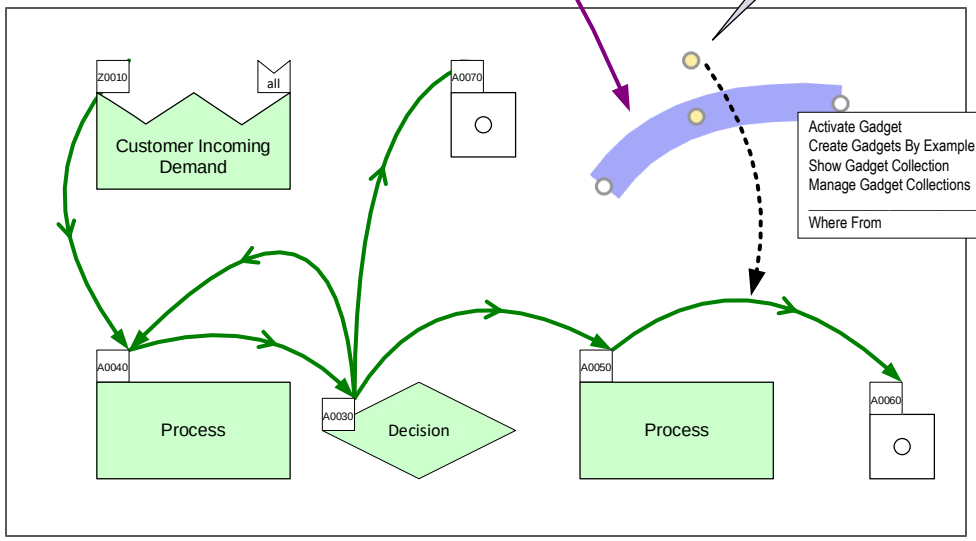


1. Drop a Curve Thickness gadget anywhere on the page

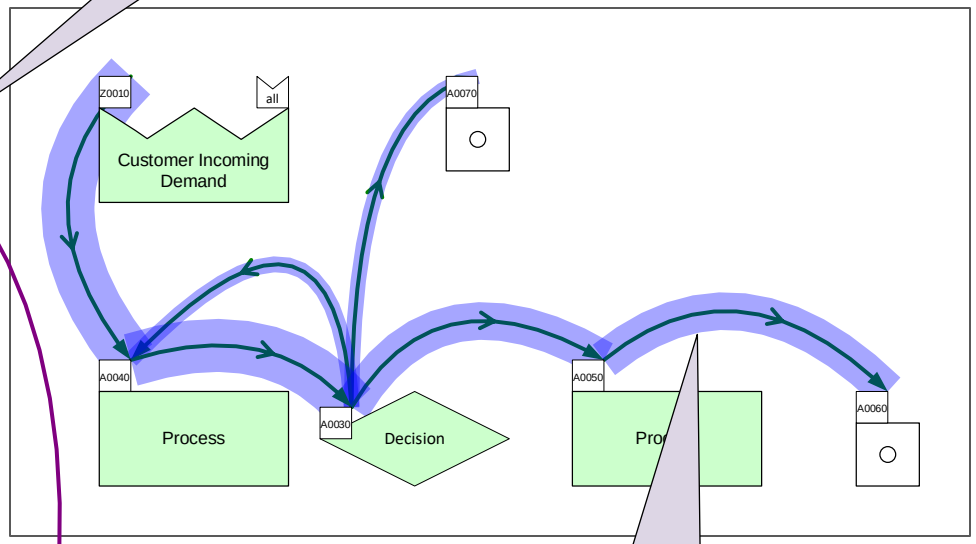
2. Glue it's floating glue-point to any one sequence arrow

3. In the right-mouse-button menus, click the "Create Gadget By Example" command

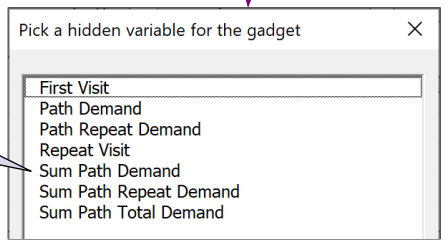
Before



After

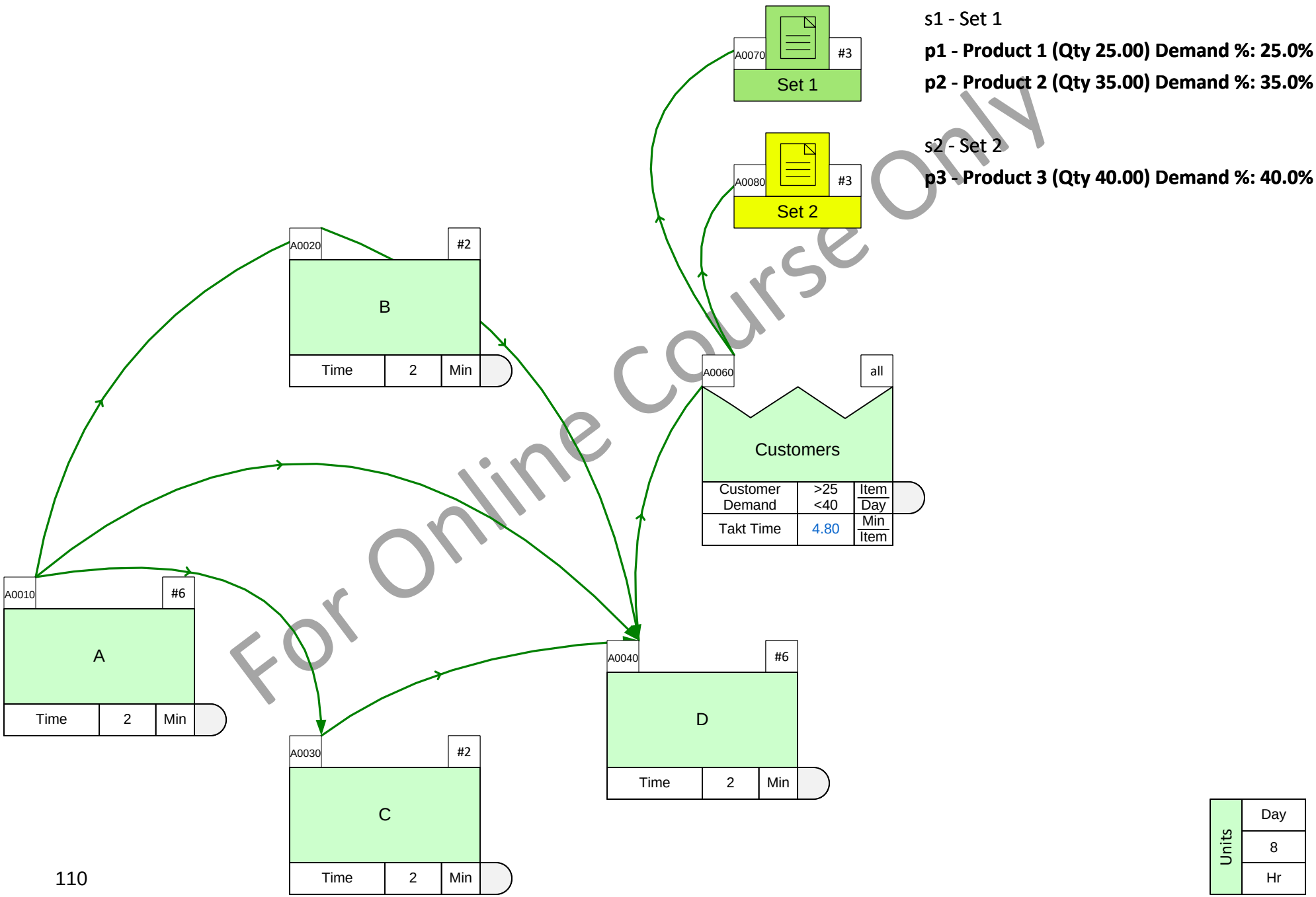


4. Select the Sum Path Demand variable and click OK



The gadget thickness represents the total demand flowing through each sequence arrow

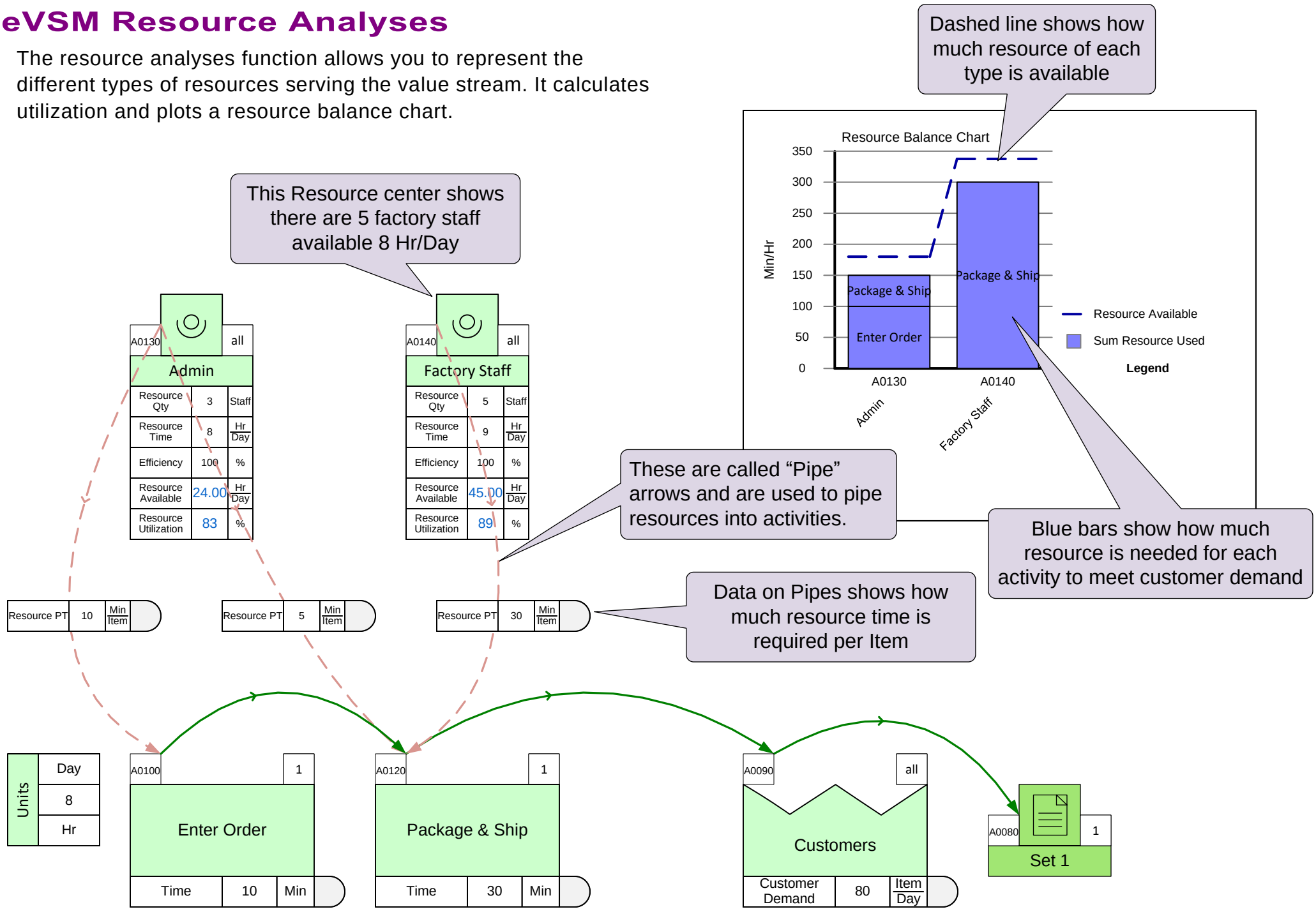
Line-thickness Gadget



For Online Course Only

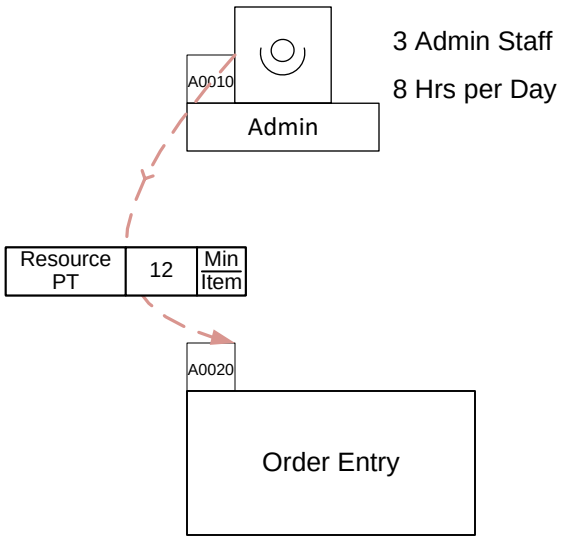
eVSM Resource Analyses

The resource analyses function allows you to represent the different types of resources serving the value stream. It calculates utilization and plots a resource balance chart.



Resource Calculations

Example 1



Process Time = 12 Min/Item

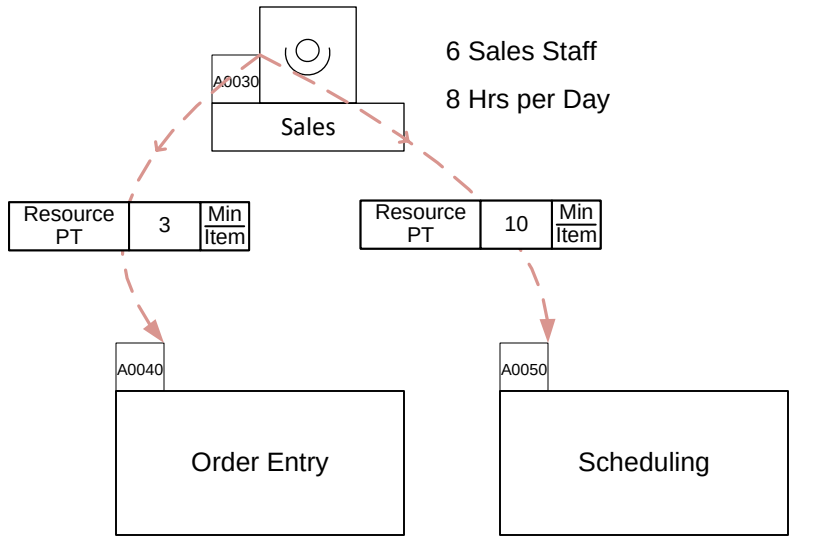
Demand = 100 Item/Day

Available Resource Time = 3 x 8 x 60 = 1440 Min

Resource Used = 12 x 100 = 1200 Min

Resource Utilization = 1200/1440 = 86%

Example 2



Process Time = 15 Min/Item

Demand = 200 Item/Day

Process Time = 10 Min/Item

Demand = 200 Item/Day

Available Resource Time = 6 x 8 x 60 = 2880 Min

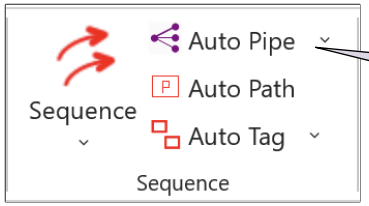
Resource Used = (3 x 200) + (10 x 200) = 2600 Min

Resource Utilization = 2600/2880 = 90%

Note: resource process time (Resource PT) is not always equal to the activity Process Time. The Process Time reflects the clock time, the Resource PT reflects the person hours needed

Resource Pipes

Resource pipe arrows are used to pipe resource info activities.



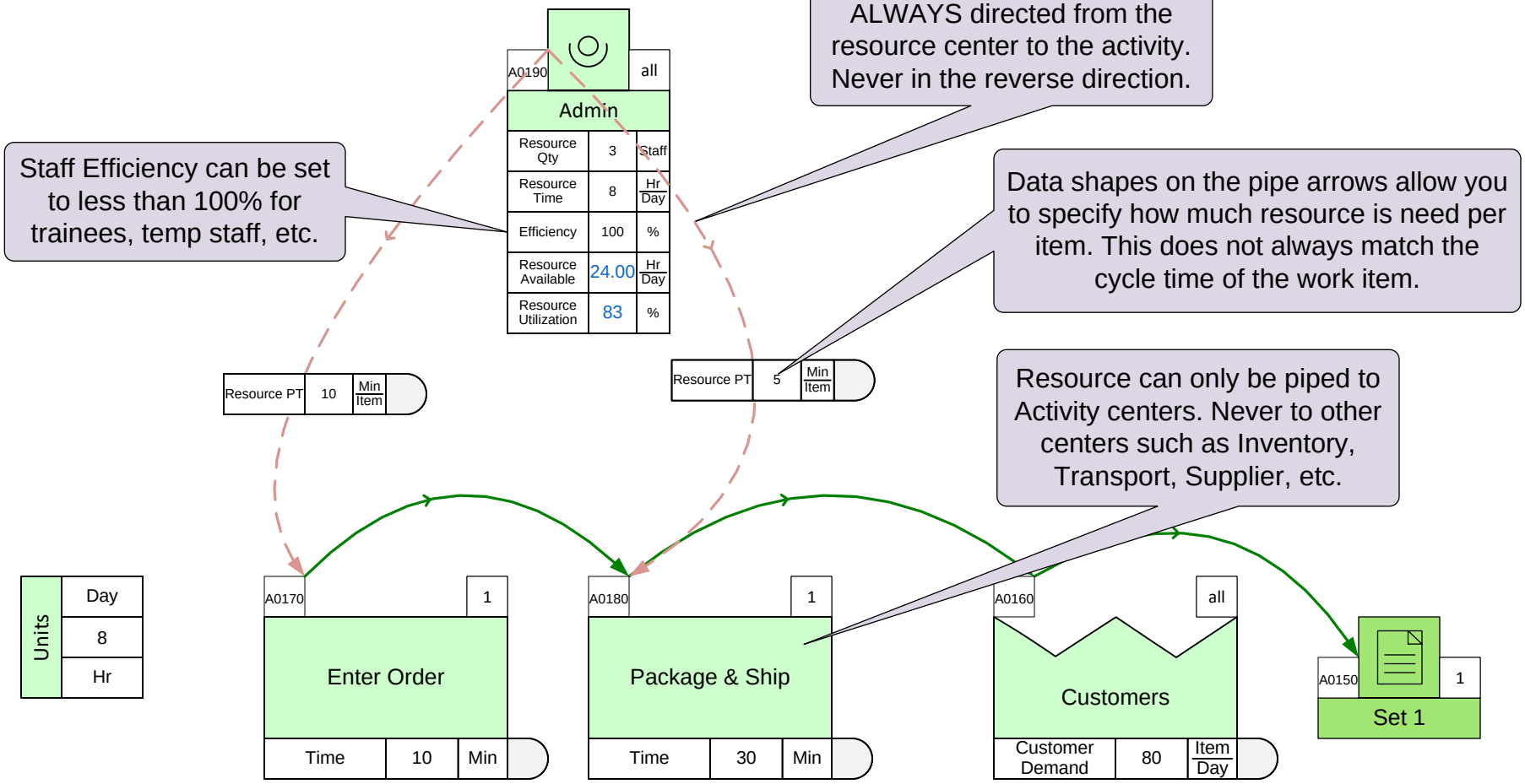
Resource pipes are created with this button.

Resource pipe arrows are ALWAYS directed from the resource center to the activity. Never in the reverse direction.

Staff Efficiency can be set to less than 100% for trainees, temp staff, etc.

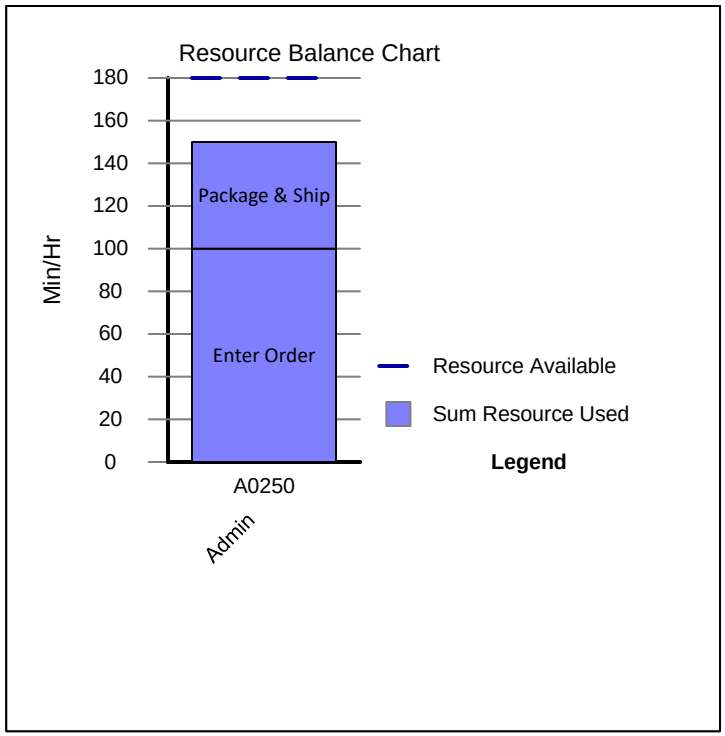
Data shapes on the pipe arrows allow you to specify how much resource is need per item. This does not always match the cycle time of the work item.

Resource can only be piped to Activity centers. Never to other centers such as Inventory, Transport, Supplier, etc.



Resource Modeling Steps

Resource pipe arrows are used to pipe resource info activities.



1 Drag out a Resource center for each type of resource you wish to model

Resource Center

2 Connect the Resource center to the activities they serve with Pipe arrows. Just select the resource center, shift select the activity, and click Auto Pipe

Auto Pipe

3 Enter data values

A0250	all
Admin	
Resource Qty	3 Staff
Resource Time	8 Hr/Day
Efficiency	100 %
Resource Available	24.00 Hr/Day
Resource Utilization	83 %

Resource PT 10 Min/Item

Resource PT 5 Min/Item

4 Solve the map

Solve

Resource Chart

5 Drag out the Resource Balance chart shape, and plot through the right-mouse button menu

Resource Balance Chart

A0230	1
Enter Order	
Time	10 Min

A0240	1
Package & Ship	
Time	30 Min

A0220	all
Customers	
Customer Demand	80 Item/Day

A0210	1
Set 1	

Resource Analyses Exercise

In this value stream we wish to estimate Admin staff utilization.

Use the Resource Center to model this and solve the model to calculate the Admin staff utilization.

Admins Information

Number of Admins = 3

Availability = 8 Hrs/Day

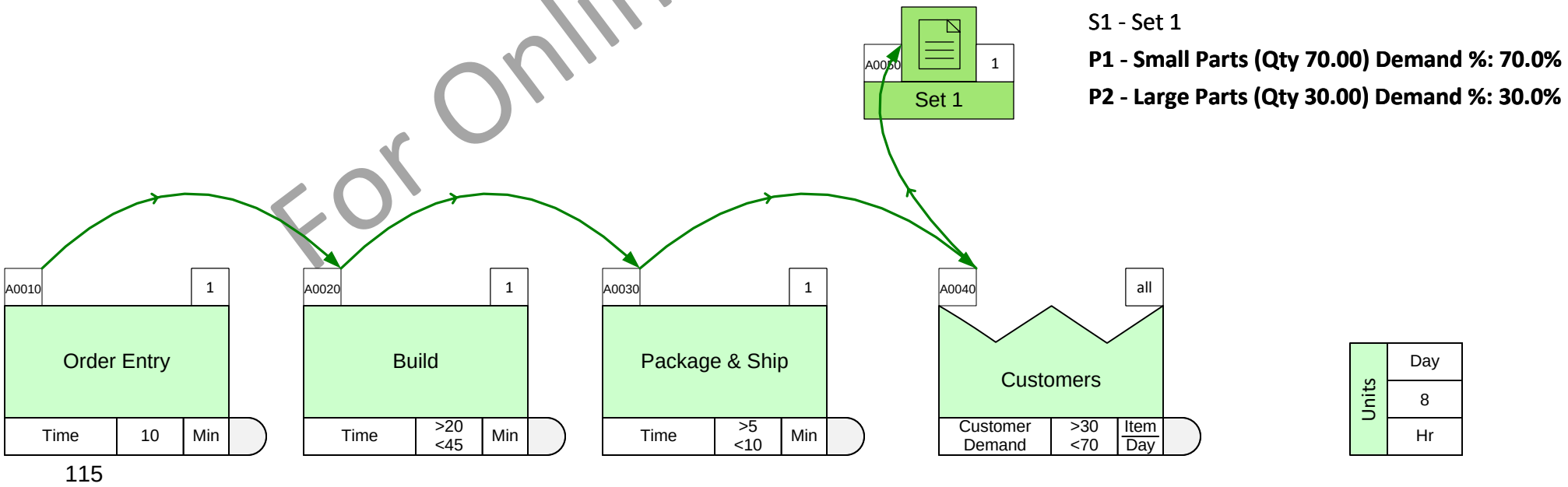
Working Efficiency = 90%

Admin time required for Order Entry = 10 Min/Item

Admin time required to Package Small Parts = 2 Min/Item

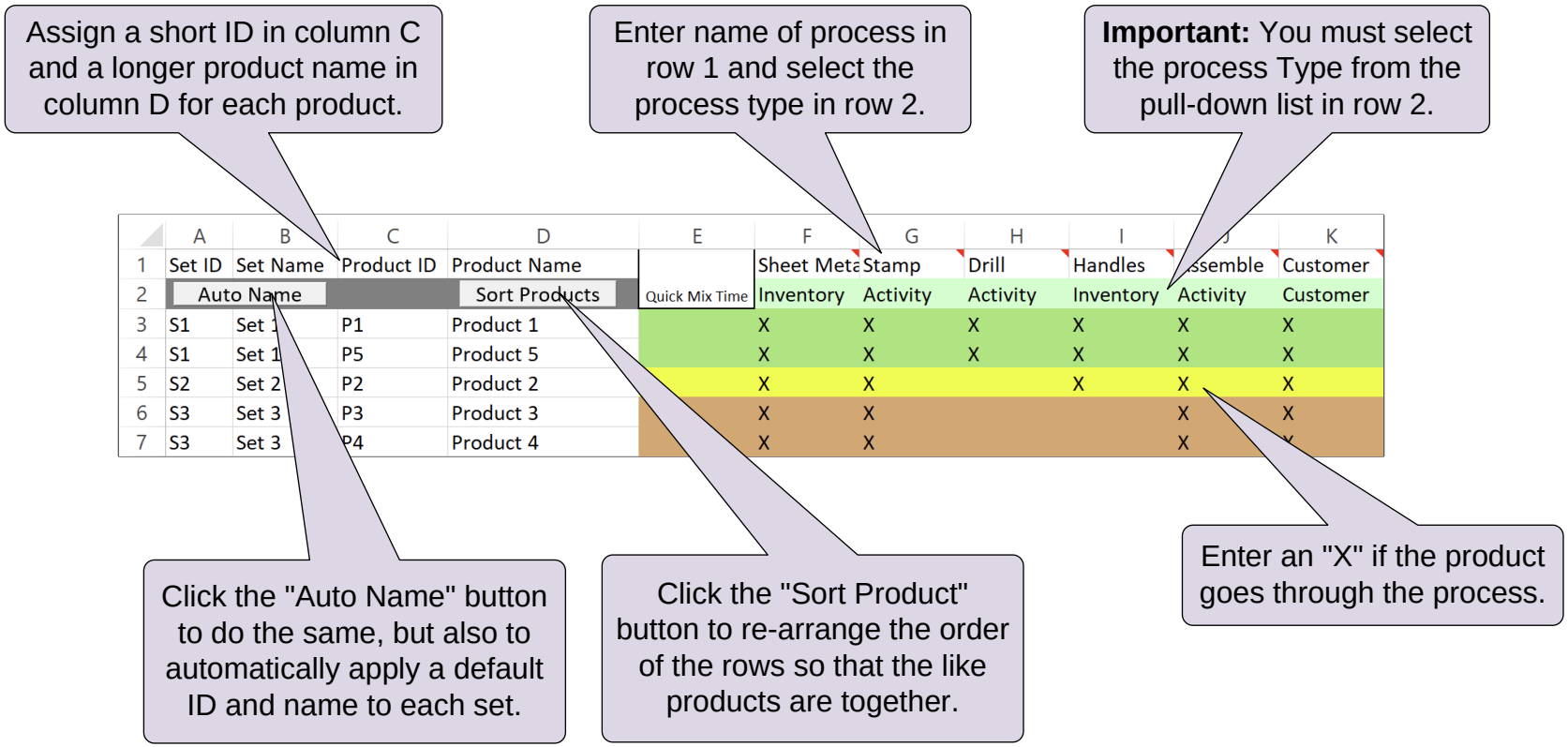
Admin time required to Package Large Parts = 4 Min/Item

For Online Course O



The Product Matrix

eVSM Mix includes a product matrix template (in Excel format) which provides a quick way to enter a large number of products and group them into routing Sets. Instructions for using the template are below and also included in the front worksheet of the automatically created Excel template.



	A	B	C	D	E	F	G	H	I	J	K
1	Set ID	Set Name	Product ID	Product Name		Sheet Meta	Stamp	Drill	Handles	ssemble	Customer
2	Auto Name			Sort Products	Quick Mix Time	Inventory	Activity	Activity	Inventory	Activity	Customer
3	S1	Set 1	P1	Product 1		X	X	X	X	X	X
4	S1	Set 1	P5	Product 5		X	X	X	X	X	X
5	S2	Set 2	P2	Product 2		X	X		X	X	X
6	S3	Set 3	P3	Product 3		X	X			X	X
7	S3	Set 3	P4	Product 4		X	X			X	

When the matrix is imported into Visio, the software will:

1. Populate the Mix Manager dialog with the products and routing sets.
2. Draw the process centers below the drawing page
3. Draw the set centers beyond the right side of the page

Note: The purpose of the product matrix is only to enter products, and sort them into routing sets. The matrix is intended for one-time use. You can later edit products (and routing sets) and add additional items directly into the Mix Manager dialog.

What are the uses of the eVSM Product Matrix? Select ALL 3 that are true.

- ☐ Provides an easy way to input products for the value stream
- ☐ Imports product specific customer demand to the map
- ☐ Allow sorting to identify low volume products
- ☐ Groups products together which follow exactly the same routing
- ☐ Automatically draws centers on the map on Import

For Online Course Only

Steps to create the Product Matrix

Watch the Movie

Click the Video button in the eLeanor panel to start the video

Summary of steps followed in the movie

1 Select the map type with  Open

2 Initiate the map by dropping the Time Center from the Quick stencil on the page.

3 Open the  Mix Manager form. Then click “Create Template” to open the product matrix template in Excel.

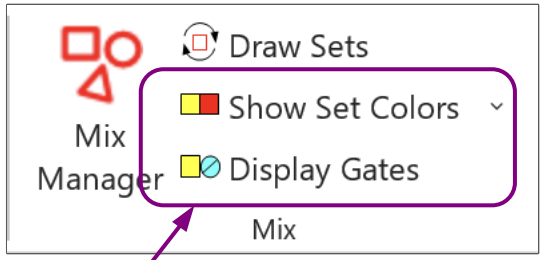
4 Fill out the Excel template (for help, see the “Instructions” worksheet in Excel).

5 Sort products into Routing Sets and name the Sets.

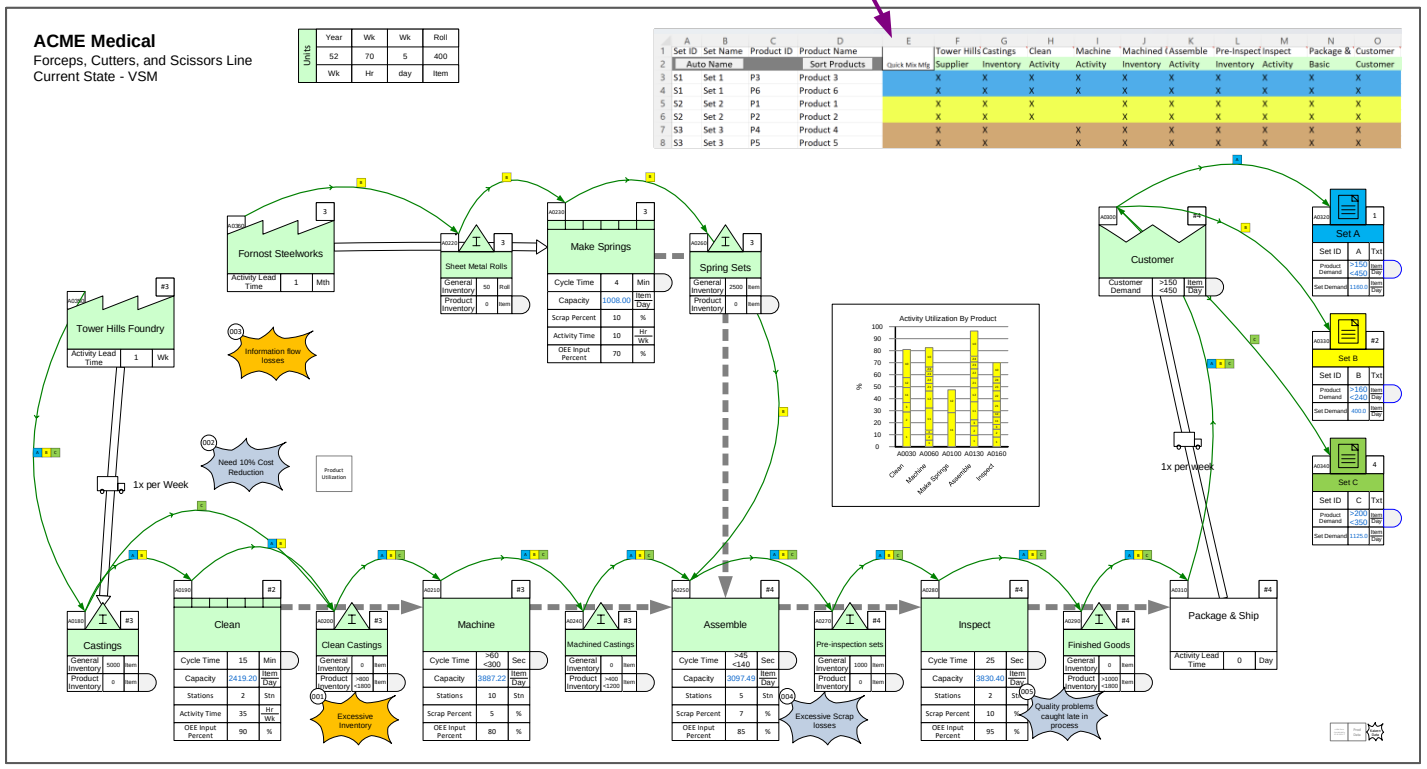
6 Click the Import button to import the products and sets into the Mix Manager.

Tips on Setting up Routings

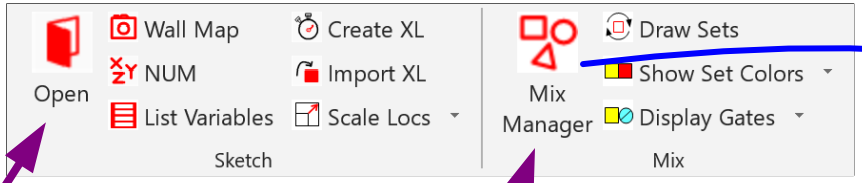
Setting up the routings is the non-trivial part of building an eVSM Mix value stream model. Here are some useful tips and notes.



- The Excel product matrix template to input products is for ONE-TIME USE only. You cannot update and import it again on the same page.
- Importing from Excel automatically (i) populates the Mix Manager with the products and product sets, (ii) draws the centers at the bottom and right side of the page. It DOES NOT set up the routings.
- Use BOTH functions (Display Gates and Show Set Colors) to set up and check the routings. For presentation of the final result, use Show Set Routes.
- For maps with complex routings, a view of the product matrix is very helpful. Just paste a picture of the matrix at the top of the Visio page as shown here.

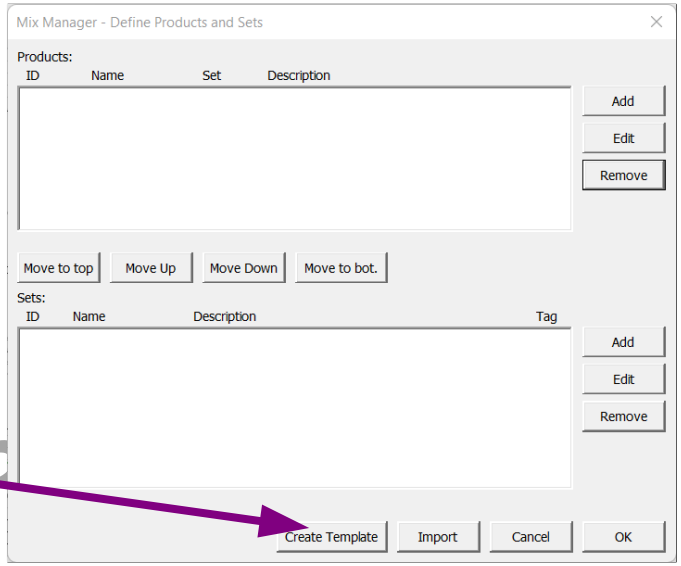


Complete all 7 steps on this page and then click Grade It!



1 Initiate the page for a Mix Time map.

2 Open the Mix Manager form



3 Create Template. This will open an Excel template file

4 Populate the Excel template as shown here

	A	B	C	D	E	F	G	H	I	J
1	Set ID	Set Name	Product ID	Product Name		Queue	Order	Wait	Pay	Customer
2	Auto Name			Sort Products	Quick Mix Time	Wait	Activity	Wait	Activity	Customer
3			P1	Product 1		X	X	X	X	X
4			P2	Product 2		X	X		X	X
5			P3	Product 3		X	X		X	X
6			P4	Product 4		X	X	X	X	X
7			P5	Product 5		X	X	X	X	X

Row 2 is important

5 Click the Auto Name button

	A	B	C	D	E	F	G	H	I	J
1	Set ID	Set Name	Product ID	Product Name		Queue	Order	Wait	Pay	Customer
2	Auto Name			Sort Products	Quick Mix Time	Wait	Activity	Wait	Activity	Customer
3	S1	Set 1	P1	Product 1		X	X	X	X	X
4	S1	Set 1	P4	Product 4		X	X	X	X	X
5	S1	Set 1	P5	Product 5		X	X	X	X	X
6	S2	Set 2	P2	Product 2		X	X		X	X
7	S2	Set 2	P3	Product 3		X	X		X	X

Notice how the rows got sorted and colored, and how the routing sets got named.

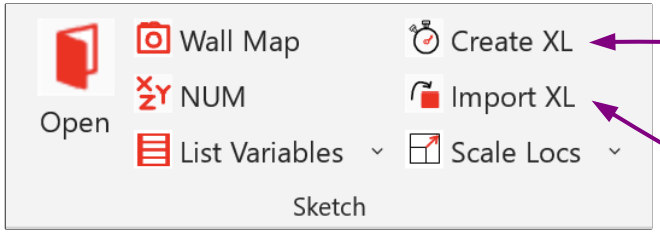
6 Click “Import” and close the Mix Manager form.

7 Click Draw Sets

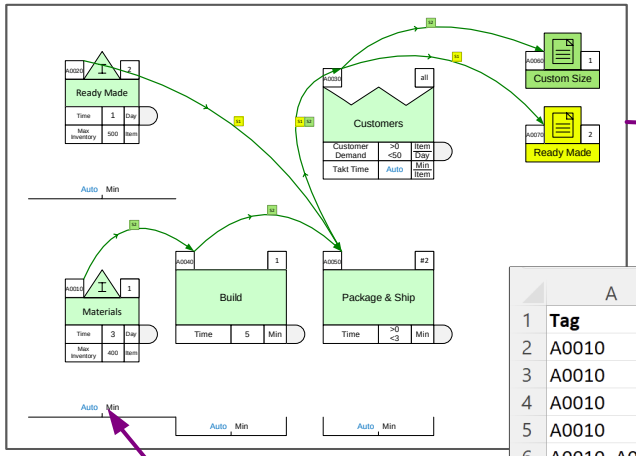
For Online Course

Data Input through Excel

If you have a significant amount of data to enter, you can do it through Excel.



- Creates an Excel file containing all data input value fields for the current map.
- Import XL pulls data from Excel into the map.



Create XL

Import XL

Excel filters are set up to shorten the list

Do not change the units here. Change them on the map if necessary.

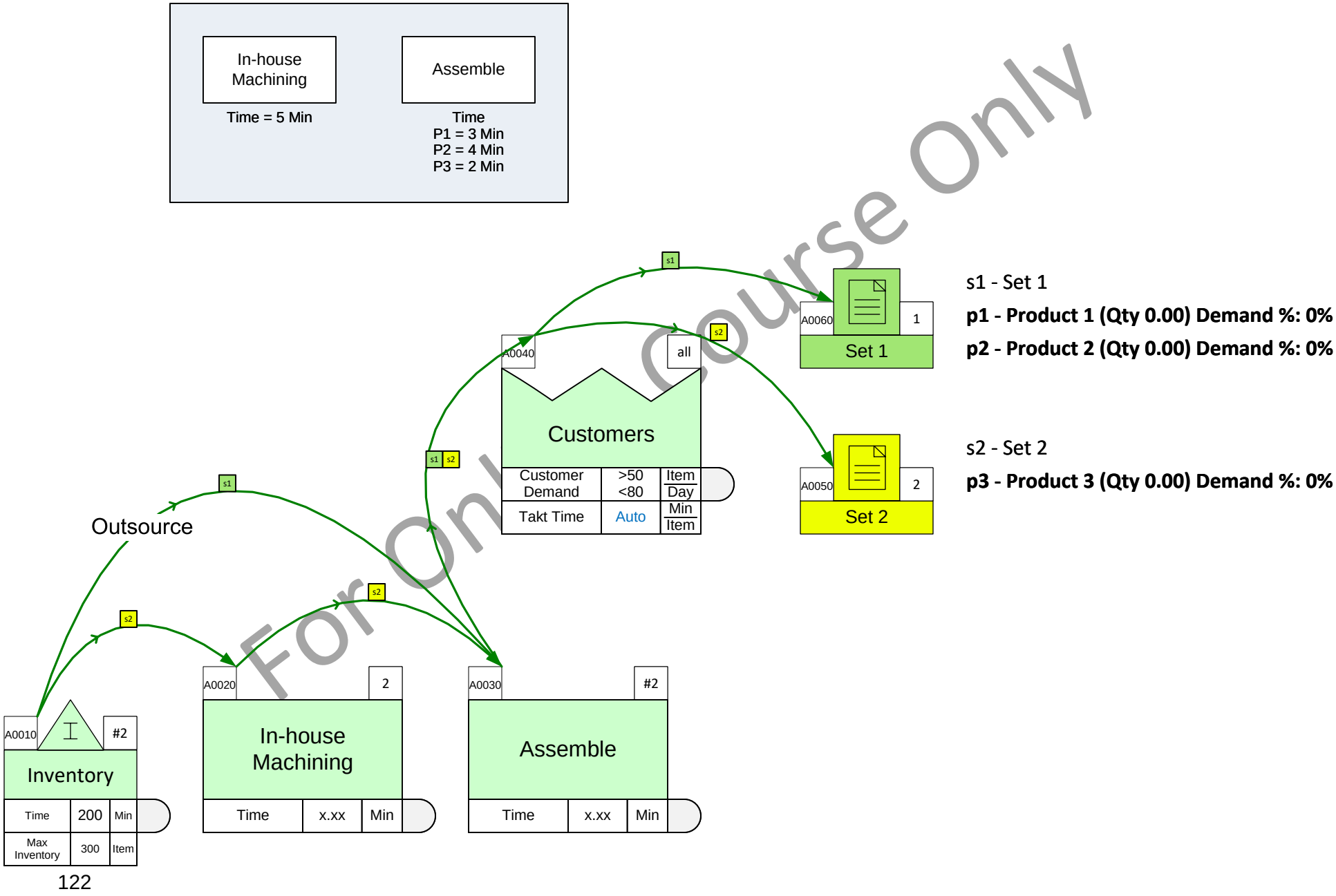
	A	B	C	D	E	F	G
1	**Tag**	**ID**	**Type**	**Produ**	**Variable**	**Value**	**Unit**
2	A0010	Materials	Inventory Center	Default	Time	3	Day
3	A0010	Materials	Inventory Center	P4	Time		Day
4	A0010	Materials	Inventory Center		Max Inventory	400	Item
5	A0010	Materials	Inventory Center		Category	Category Name	Txt
6	A0010_A0040	Materials_Build	Sequence Center	S2	Sets Allowed	1	0or1
7	A0010_A0040	Materials_Build	Sequence Center	Default	Flow	100	%
8	A0010_A0040	Materials_Build	Sequence Center	P4	Flow		%
9	A0020	Ready Made	Inventory Center	Default	Time	1	Day
10	A0020	Ready Made	Inventory Center	P1	Time		Day
11	A0020	Ready Made	Inventory Center	P2	Time		Day
12	A0020	Ready Made	Inventory Center	P3	Time		Day
13	A0020	Ready Made	Inventory Center		Max Inventory	500	Item
14	A0020	Ready Made	Inventory Center		Category	Category Name	Txt
15	A0020_A0050	Ready Made_Package & Ship	Sequence Center	S1	Sets Allowed	1	0or1
16	A0020_A0050	Ready Made_Package & Ship	Sequence Center	S2	Sets Allowed	FALSE	0or1
17	A0020_A0050	Ready Made_Package & Ship	Sequence Center	Default	Flow	100	%
18	A0020_A0050	Ready Made_Package & Ship	Sequence Center	P1	Flow		%
19	A0020_A0050	Ready Made_Package & Ship	Sequence Center	P2	Flow		%
20	A0020_A0050	Ready Made_Package & Ship	Sequence Center	P3	Flow		

The rows represent the centers. Sorted by Operation Tag number

Values entered in this column will appear on the map when the spreadsheet is imported.

Enter the product specific data using Create XL and Import XL

Click Create XL, enter the following missing values in Excel, and then click Import XL and see the values on the map.



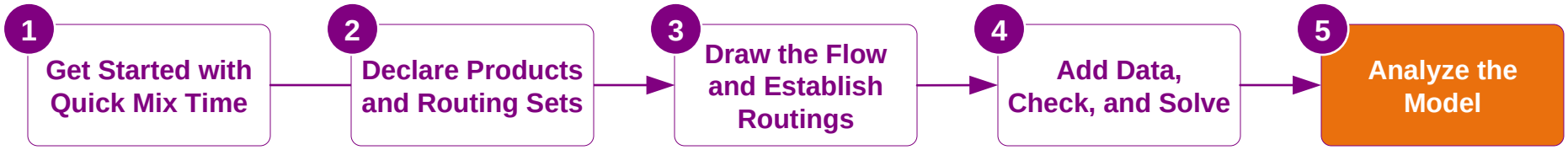
For Online Course Only

Lesson 5 Summary: Analyzing the Value Stream

You learned:

- How to summarize calculations results with tables, charts, and gadgets.
- How to work with Paths and Routings.
- How to extend the value stream model with add-on calculations.
- How to input value stream data through Excel

Quick Mix Time Course Learning Path



What's next:

Once you have completed this pre-requisite course, you are ready to learn any of the production applications in eVSM such as Plant level Mix Manufacturing, Mix Processing, Mix Supply Network, etc.

Useful Links

eVSM Toolbar Guide	evsm.com/toolbarguide
eVSM Productivity Guide	evsm.com/productivity
eVSM Blogs	evsm.com/blog
eVSM Support FAQ	evsm.com/support
Download the Latest Version	evsm.com/install