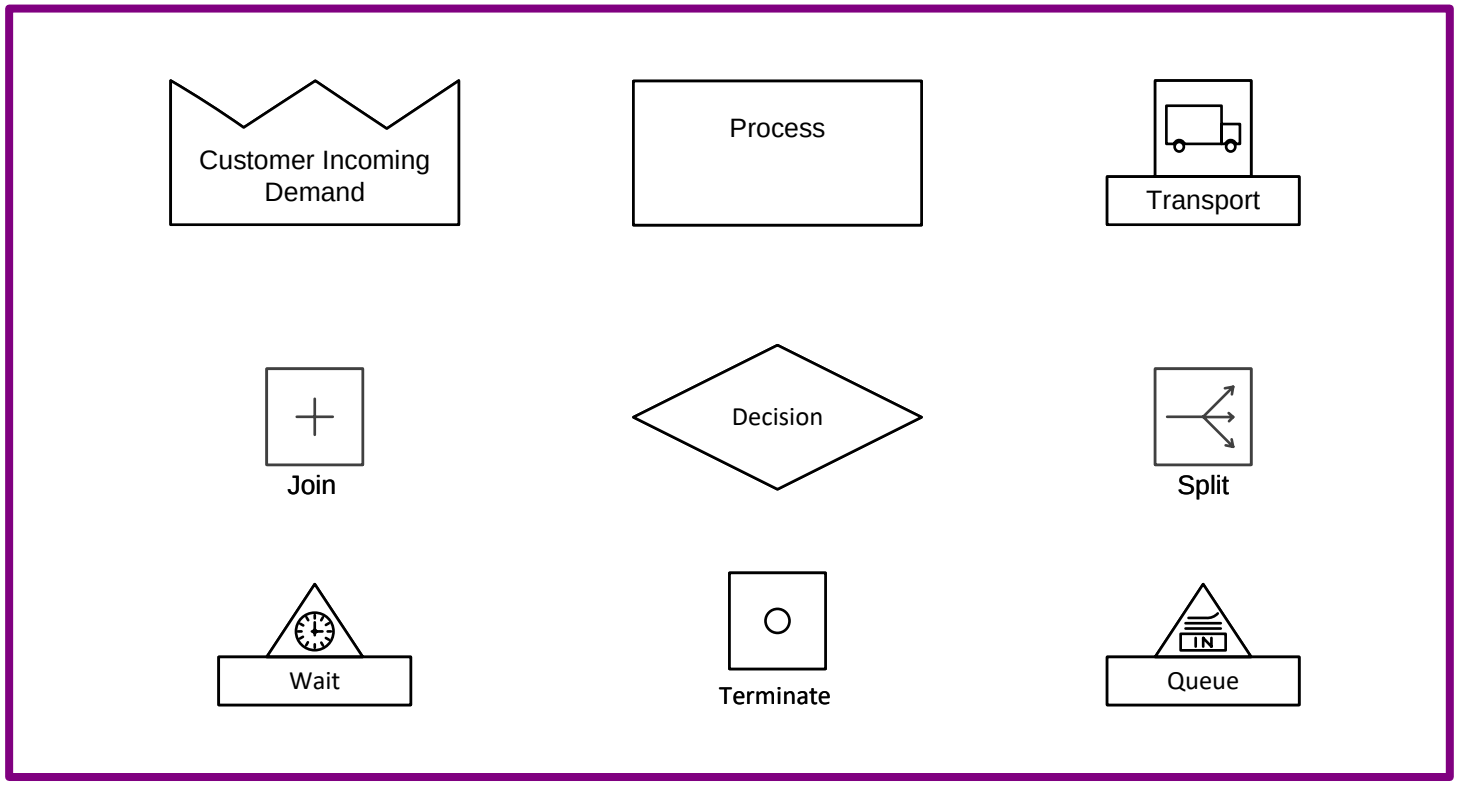
Transactional VSM

This course teaches the Quick Transactional Pro stencil with an example case study.



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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".

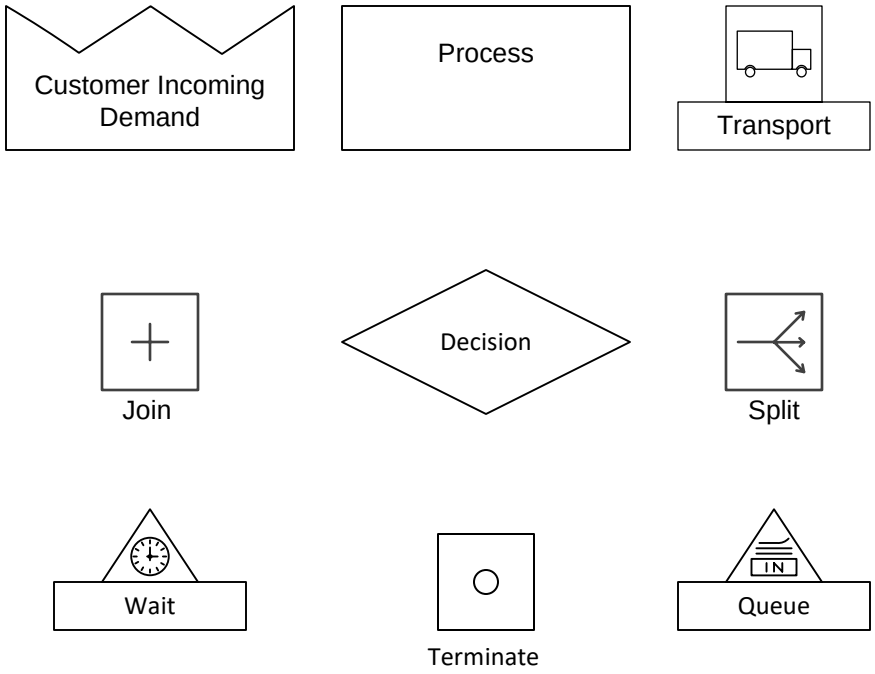
For hardcopy use, print the file on 8.5x11 or A4, and bind along the long edge.

Table of Contents

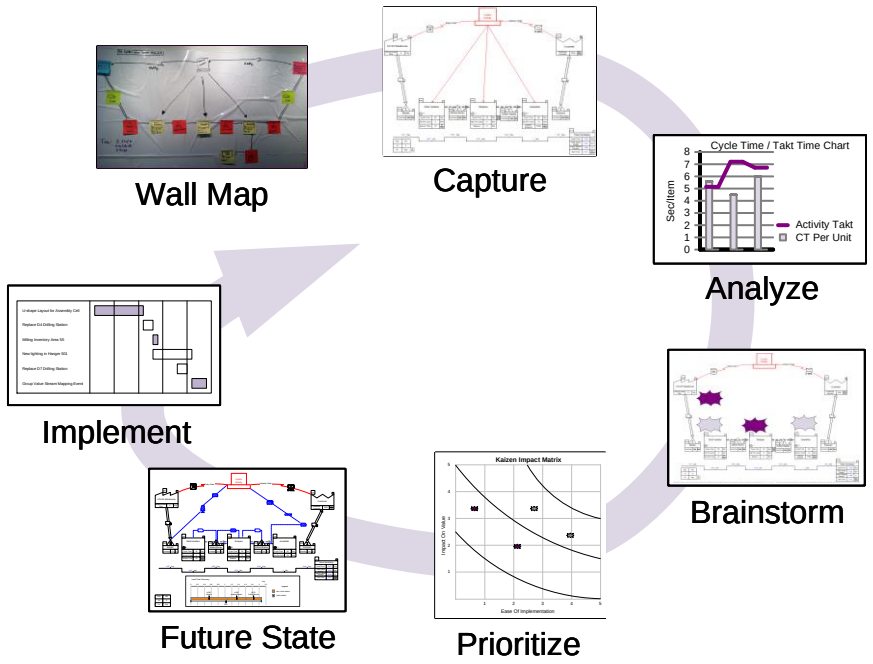
Transactional Mapping Concepts

This course will teach you to use eVSM's Quick Transactional application in an improvement cycle for transactional value streams in office, services, and healthcare. This first Lesson will introduce you to the icons, variables, and concepts that Quick Transactional is based upon.

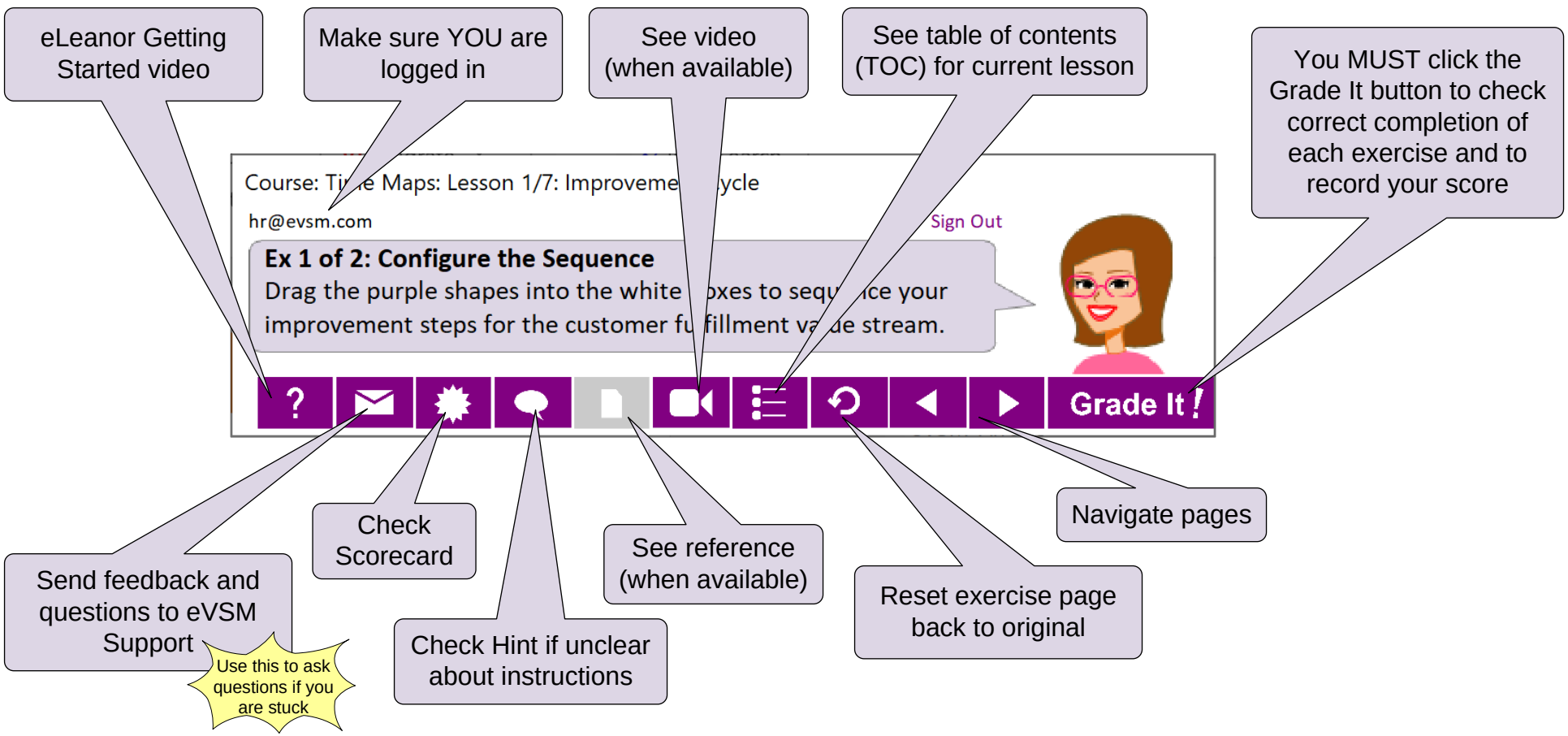
Transactional Icons



Continuous Improvement Cycle



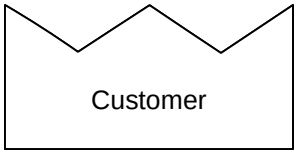
Working with eLeanor



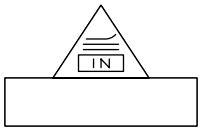
Important Notes

1. Make sure you have a good eLeanor environment: large screen PC, 1280x720 resolution minimum, physical mouse with scroll wheel
2. When you complete an exercise, you MUST click the “Grade It” button
3. You WILL lose points if you get an exercise wrong the first time
4. 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 in the eLeanor panel and ask your question.

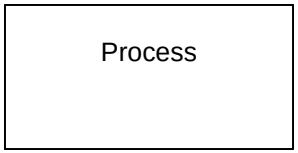
Transactional VSM Shapes



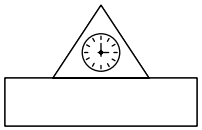
Customer Input



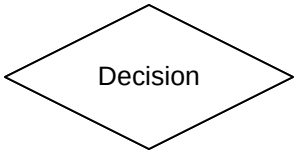
Queue Center



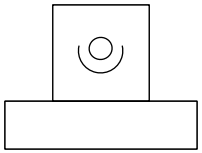
Activity Center



Wait Center

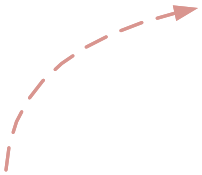


Decision Center



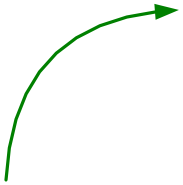
Resource Center

Join Center



Pipe Arrow

Split Center

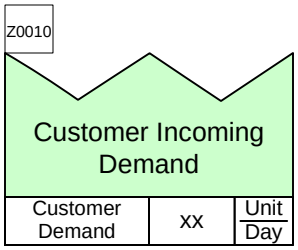


Sequence Arrow

Terminate Center

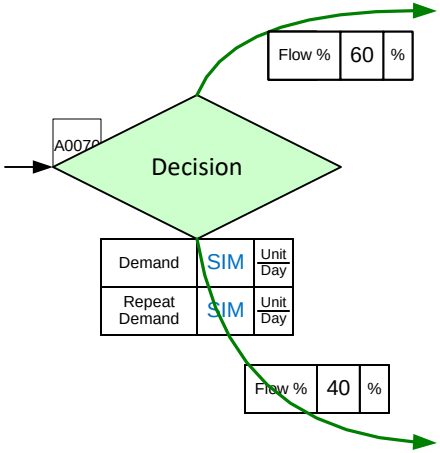
Transactional VSM Centers

Customer Input



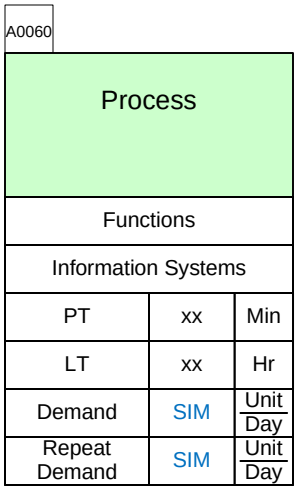
- The incoming documents that "trigger" the value stream
- Only one such shape allowed per value stream map
- Arrows can only come OUT from this shape

Decision Center



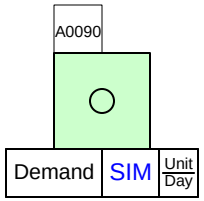
- The percentages coming out of the decision center must equal 100%.
- Any work item will go down ONE of the arrows and based on the percentages and probability

Activity Center



- Functions : Departments or Roles (Sales, Controller, ..)
- Information Systems : (SAP, Excel_HR..)
- PT : Process Time (Touch Time)
- LT : Lead Time (Work In to Work Out)
- Demand : First time demand
- Repeat Demand : Loop demand

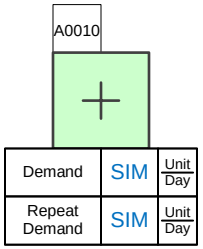
Terminate Center



- Processes can only terminate at Terminate Centers

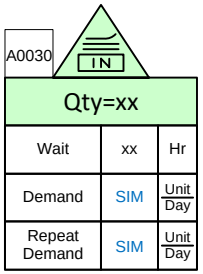
Transactional VSM Centers

Join Center



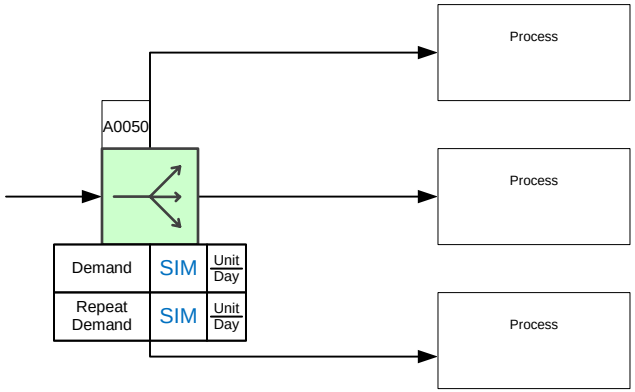
- Multiple inputs
- Only ONE output
- Multiple work items coming in create one work item going out

Queue Center



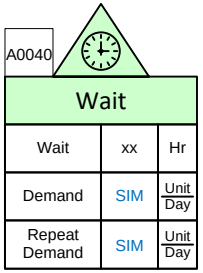
- Specify the quantity in the text field.
- Specify “Wait” as the time for the queue to clear.

Split Center



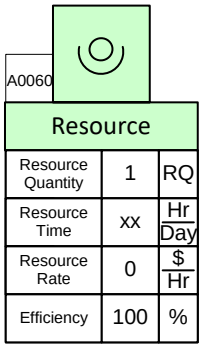
A Split center can only have one input, with multiple simultaneous outputs along all of the paths. Use the Decision Center if the output is supposed to go down any one path.

Wait Center



- Useful where activities only happen periodically (Ex : Bills get sent out at the end of each day)

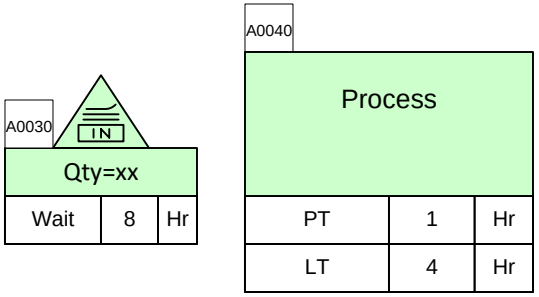
Resource Center

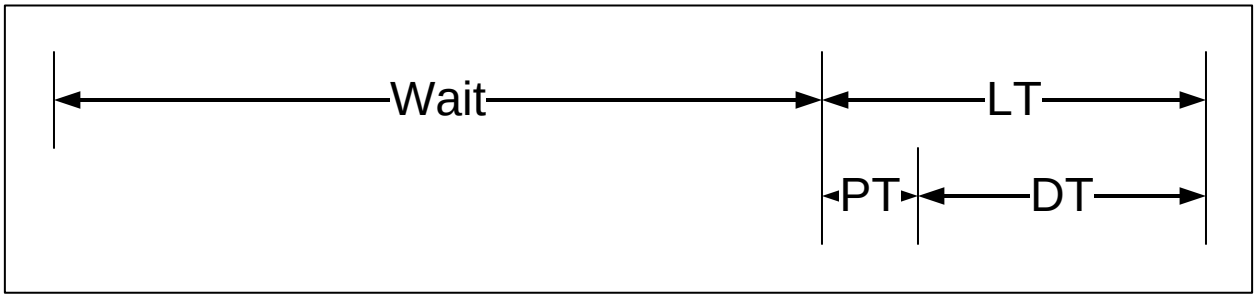


- This center is used to assign explicit resources to activities. Resources can be people or equipment. This center is connected via an outgoing pipe to each of the activities that it supports.

Process Time, Lead Time, Wait Time, Delay Time

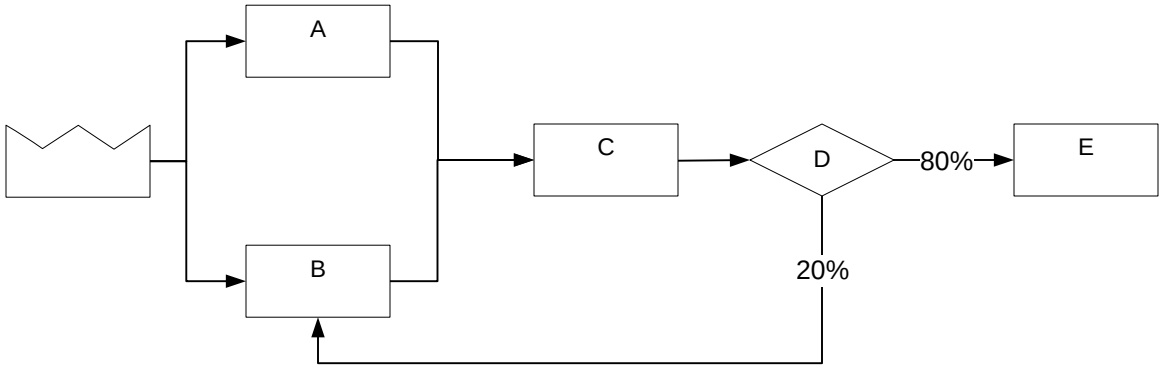
- Wait time (Wait) = queue or wait time ahead of an activity
- Process time (PT) = the actual work time, touch time, cycle time
- Lead time (LT) = elapsed time, throughput time, turnaround time
- Delay time (DT) = idle time within an activity





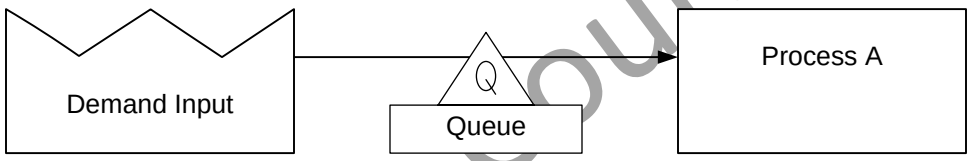
Importance of Demand on a Value Stream Map

- In a transactional map, work units are transformed along the process, sometimes loop back, split into multiple parallel processes and have processes join together before proceeding.
- This makes the understanding of “demand” at any step particularly challenging. Once demand is understood at a step, it can be “extracted” in considering its capacity, and then its contribution to overall cost and lead times.



Q. If there is an 'Input Demand' of 100 units, what will demand at Process A be?

- ◎ 40 Units
- ◎ 100 Units
- ◎ 140 Units



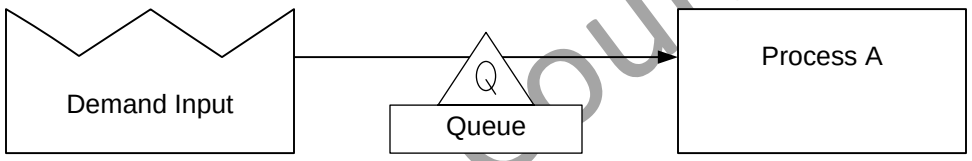
Demand = 100 Units

Queue = 40 Units

Lead Time = 15 Mins

Q. What will the demand be at process A if the number of units in the queue is increased from 40 to 50?

- ◎ 150
- ◎ 50
- ◎ 100



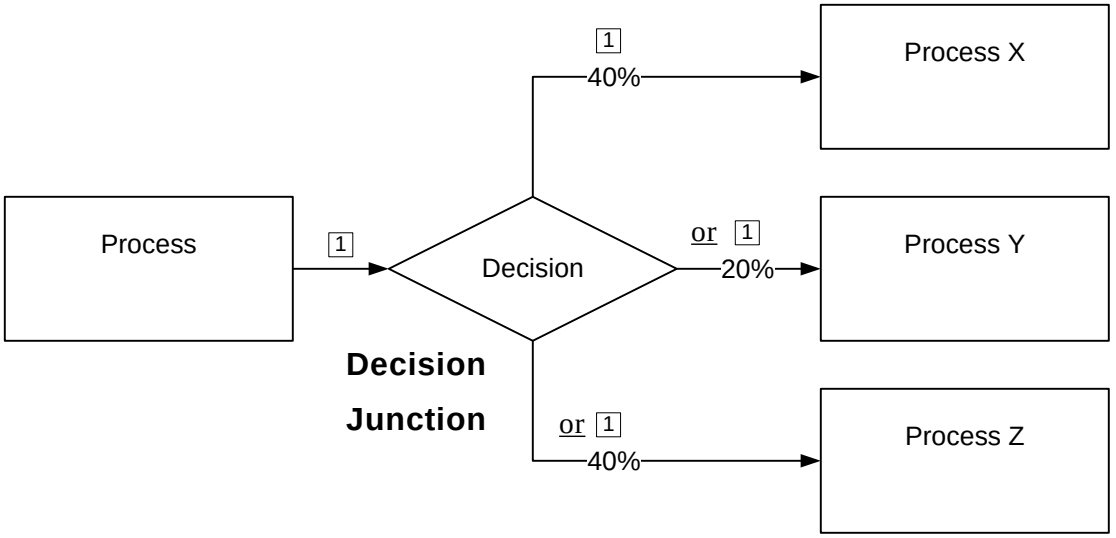
Demand = 100 Units

Queue = 40 Units

Lead Time = 15 Mins

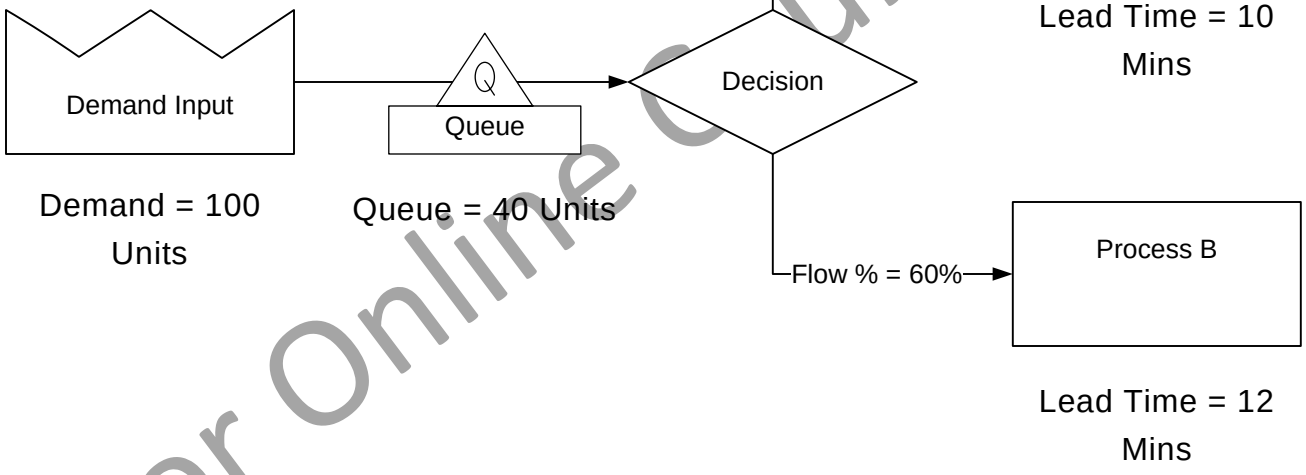
Decision Construct

A junction where incoming work units are routed to ONE of the outgoing paths based on the Flow % values and probability.



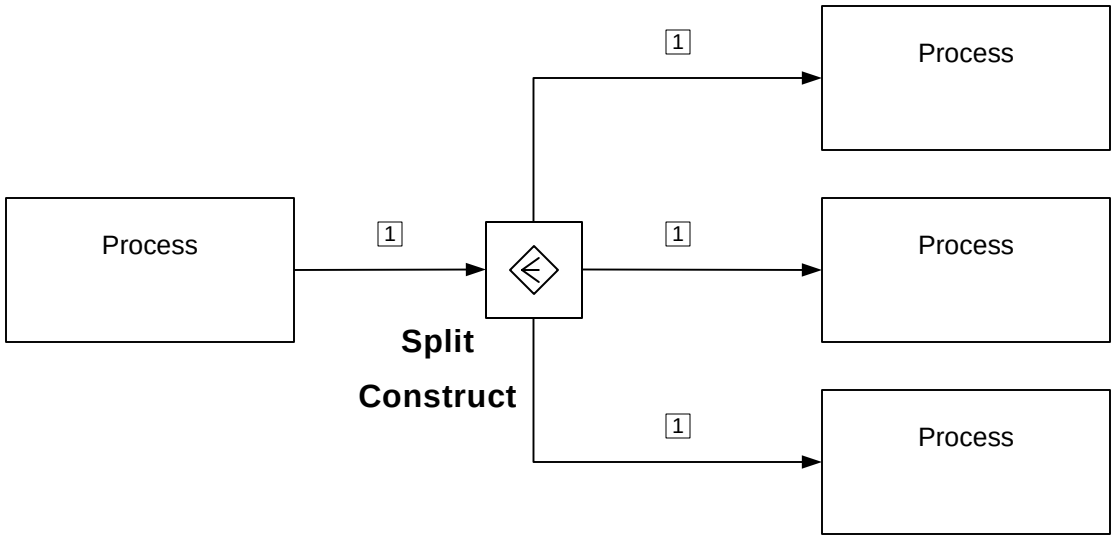
Q. What is the demand at process B?

- ◎ 60 Units
- ◎ 40 Units
- ◎ 100 Units
- ◎ 160 Units



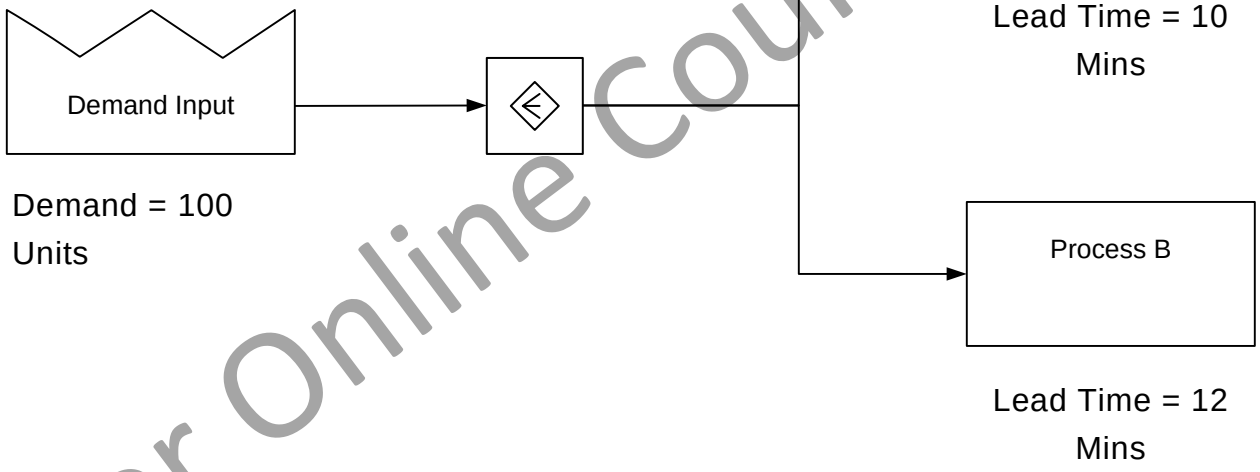
Split Construct

A junction with exactly one incoming path and two or more outgoing paths. The work unit from the incoming path results in a work unit on EACH of the outgoing paths.



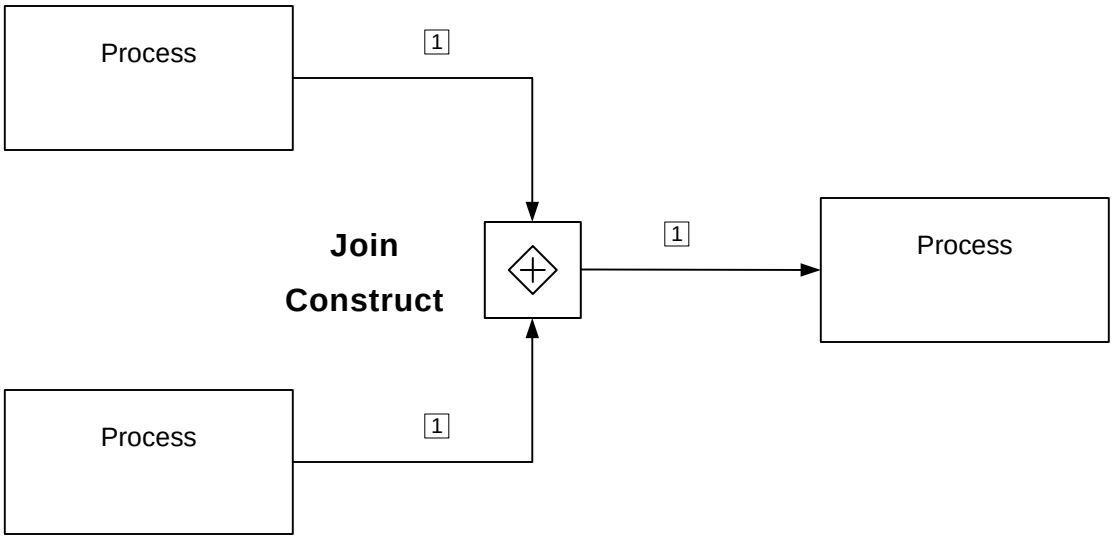
Q. What is the demand at process A?

- 50 Units
- 150 Units
- 100 Units



Join Construct

A junction with 2 or more incoming paths. Work Units on all incoming paths are needed for the work to move forward. There is only ever 1 outgoing path.

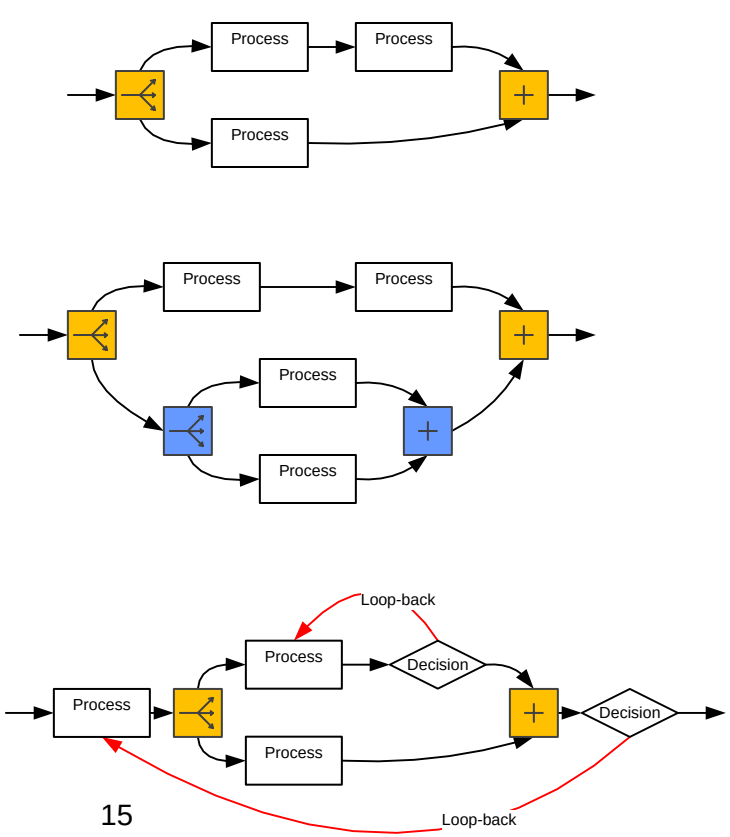


Split/Join Rules

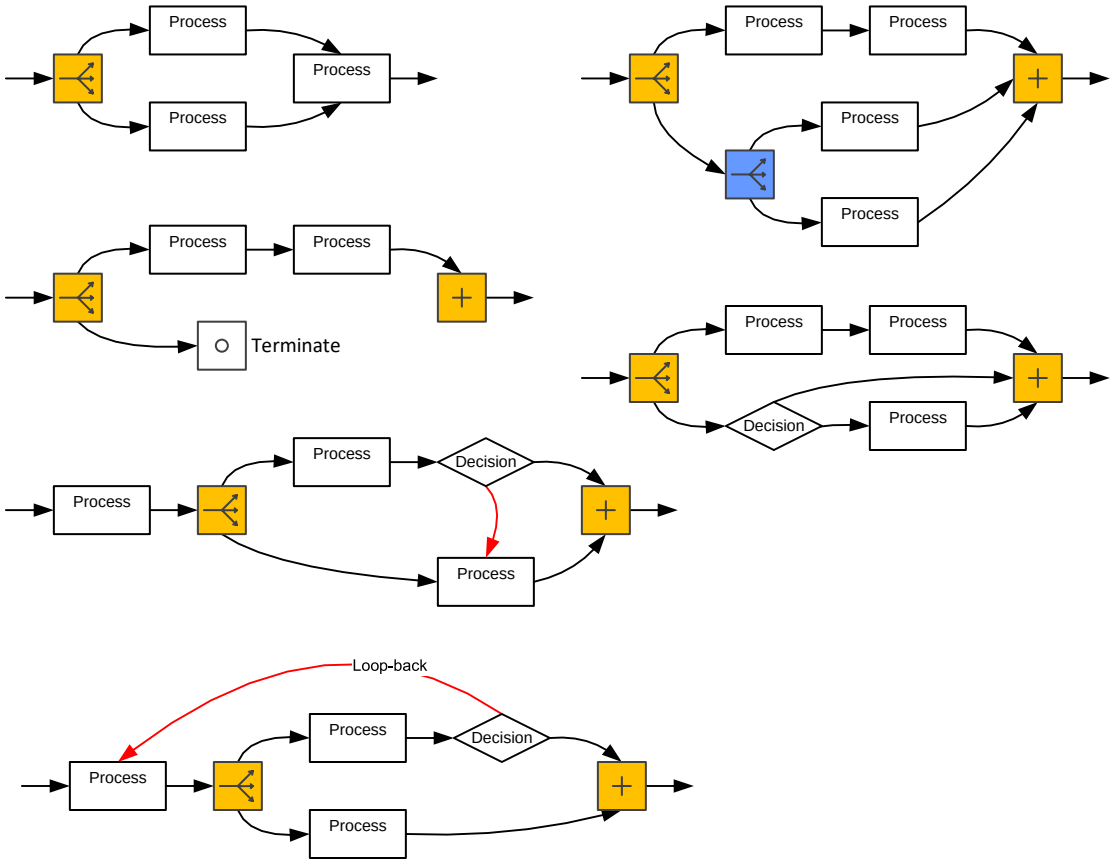
- All paths from a Split MUST have a corresponding Join.
- The number of paths coming into a Join must match the number of paths coming out of the corresponding Split
- Paths cannot terminate within the Split/Join pair
- Decision outcomes from within a Split/Join pair cannot by-pass the Join
- Cannot loop back from within a Split/Join pair to an activity outside the pair

The sketches below show valid and invalid configurations for Splits and Joins.

Examples of Valid Split/Joins

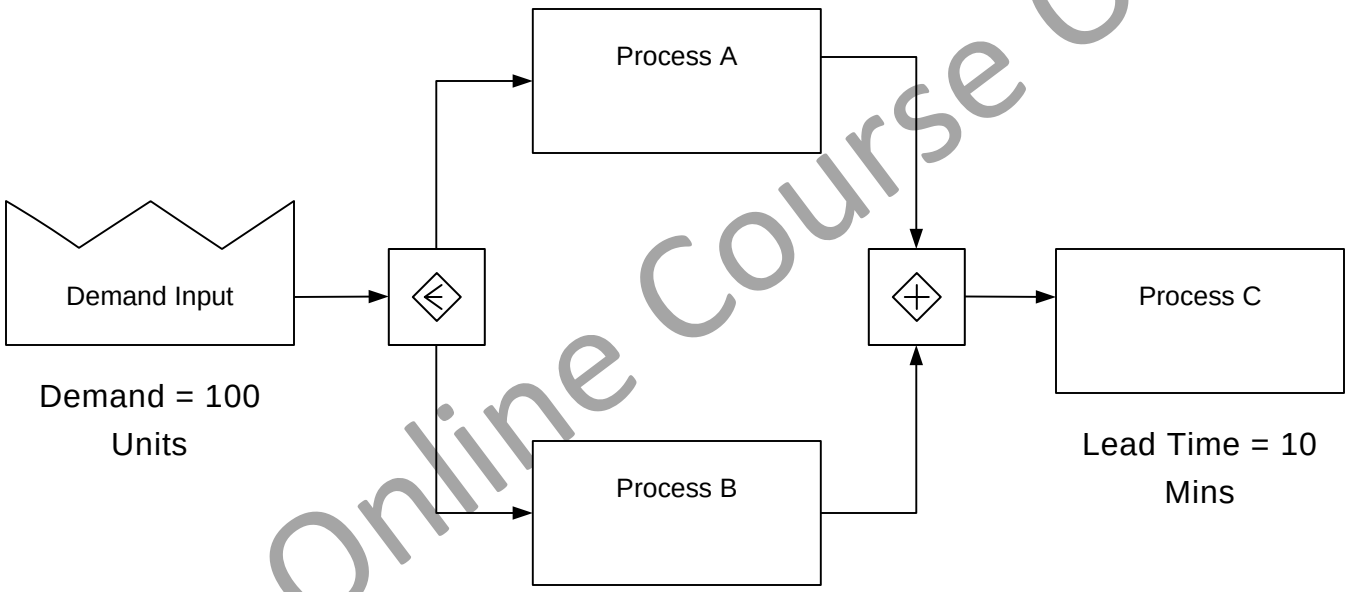


Examples of Non-valid Split/Joins



Q. What is the demand at process C?

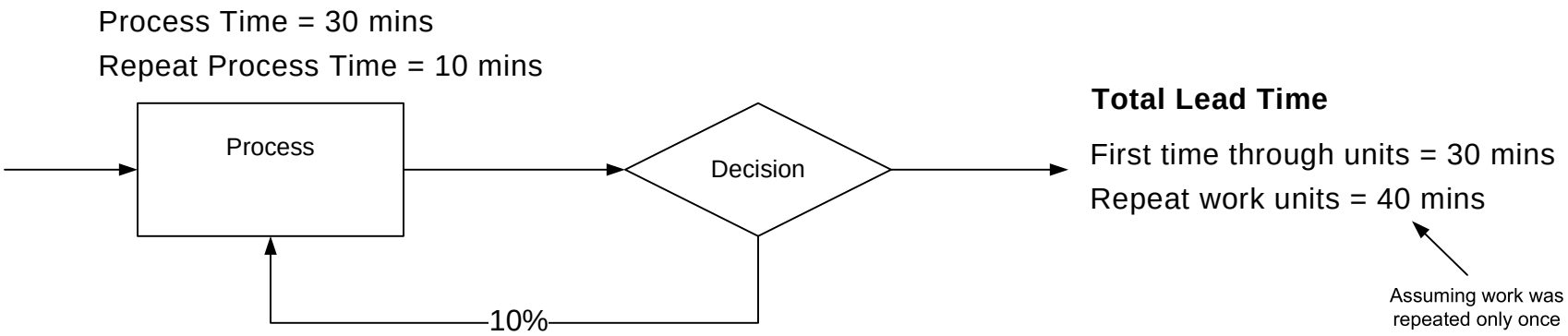
- 50 Units
- 100 Units
- 25 Units



First Time vs Repeat Work

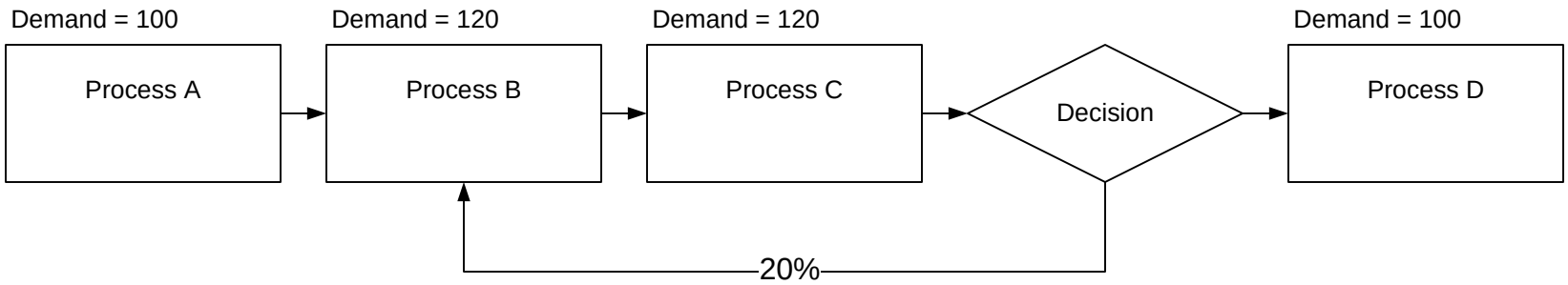
When work units go through an activity first time it may take a different time to process compared to when the same unit comes through again (because of iteration or rework).

Example



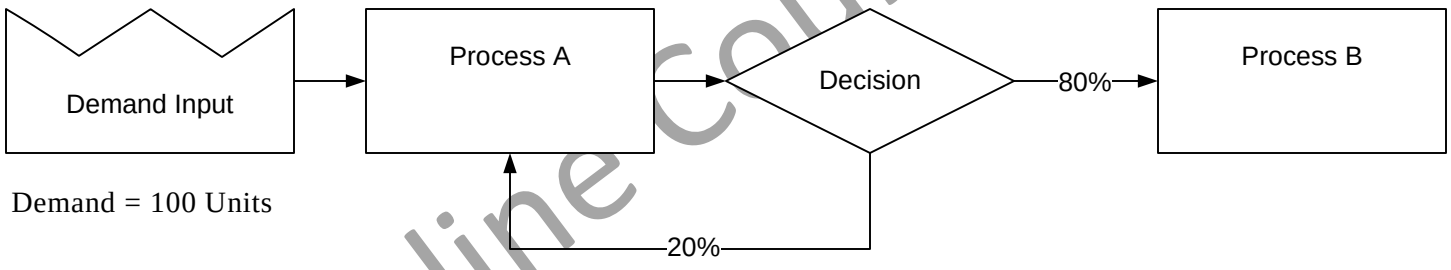
Demand due to repeat work

Repeat works increases demand, but only on the activities in it's path.



Q. What is the demand at process A if entities only ever loop back a maximum one time?

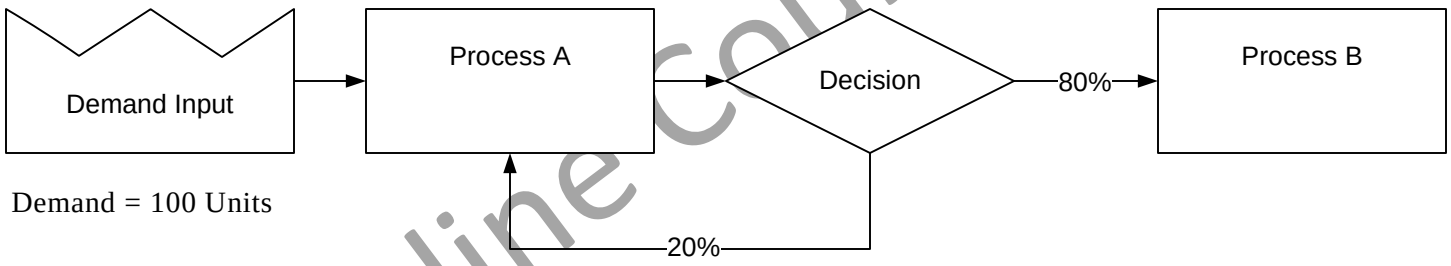
- ◎ 100 Units
- ◎ 120 Units
- ◎ 124 Units



Demand = 100 Units

Q. What is the demand at process B?

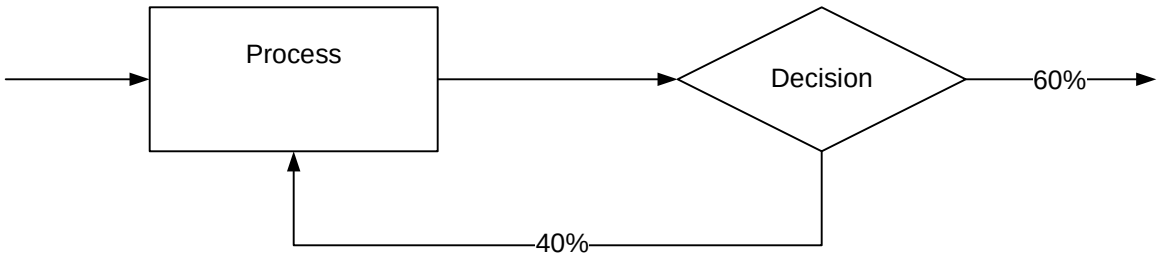
- ◎ 100 Units
- ◎ 80 Units
- ◎ 120 Units



Demand = 100 Units

Max Traversals

Maximum number of times a work unit can traverse a leg

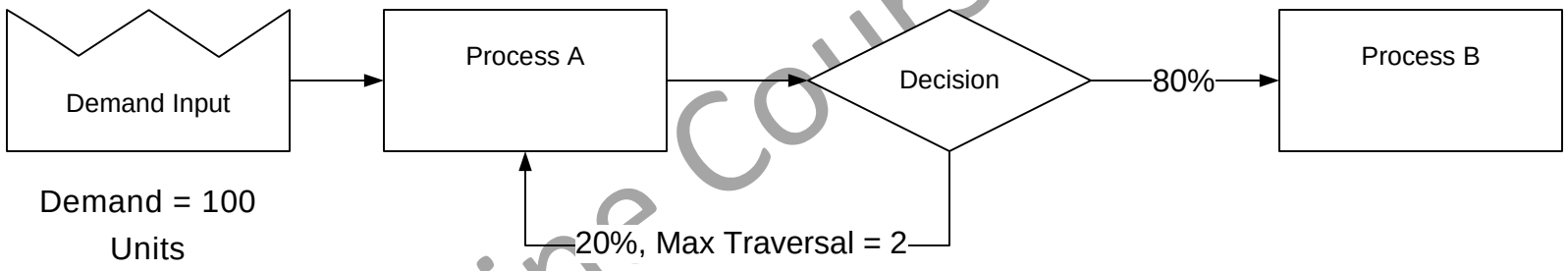


Max Traversals = 1

So 40% of the units when they come to the decision box loop back. Those same units when they come back to the decision box again never loop again because max traversals for the loop back is set to 1.

Q. What is the repeat demand at process A?

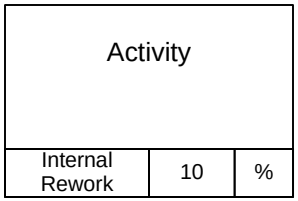
- ◎ 120 Units
- ◎ 124 Units
- ◎ 24 Units



Internal Rework

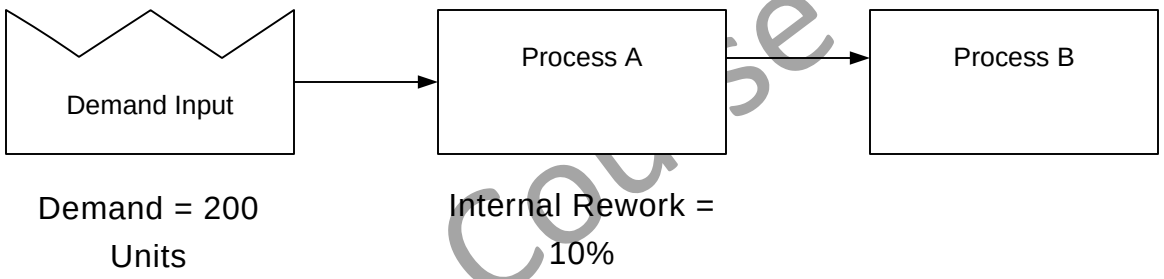
Internal Rework represents the % of units undergoing rework internally within the activity.

So if 100 work units come into this activity, then 10 of them have an internal rework step before the work unit exits the activity. So the first time demand is 100 and the effective repeat demand is 10. It assumes that the rework time to correct is the repeat process time, and also that rework is done only once per defective item.



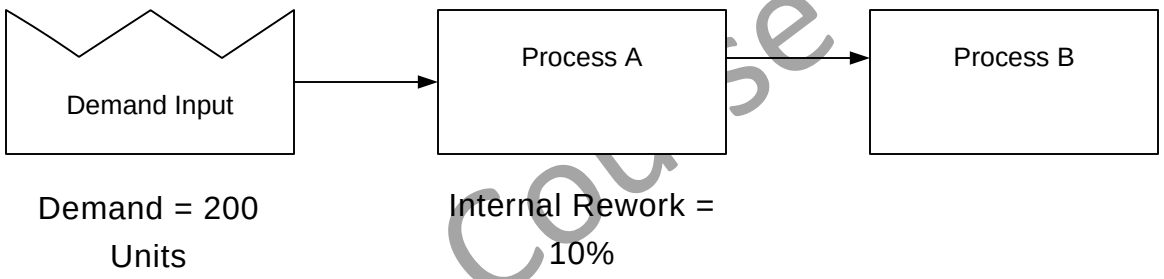
Q. What is the demand at process B?

- ◎ 200 Units
- ◎ 210 Units
- ◎ 220 Units



Q. What is the ‘First Time’ and effective ‘Repeat Demand’ at process A?

- ◎ 200 First Time, 10 Repeat Demand
- ◎ 200 First Time, 20 Repeat Demand
- ◎ 200 First Time, 90 Repeat Demand

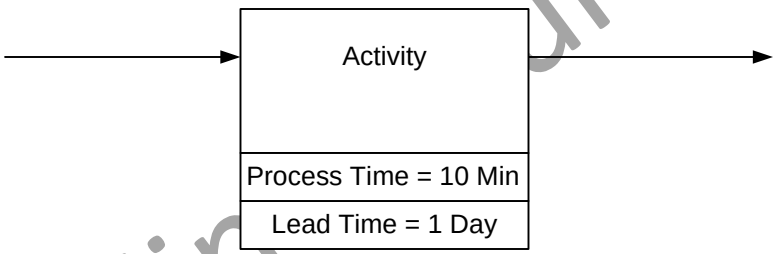


Q. What is the 'Lead Time' contribution to any work unit passing through this activity?

◎ 1 Day

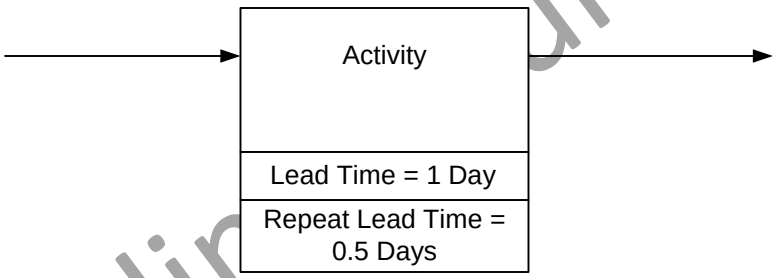
◎ 10 Min

◎ 1 Day, 10 Min



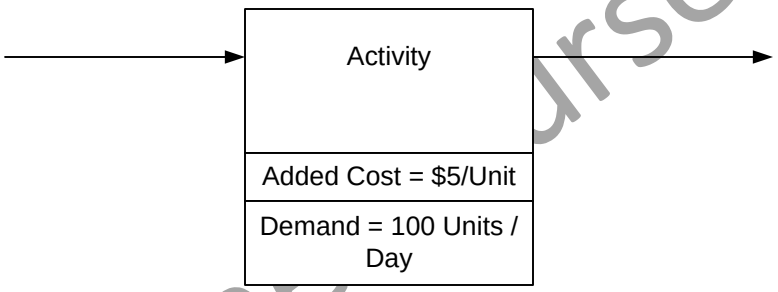
Q. What is the 'Lead Time' contribution to a work unit that passes through the same activity a total of 4 times?

- ◎ 1 Day
- ◎ 1.5 Days
- ◎ 2.5 Days



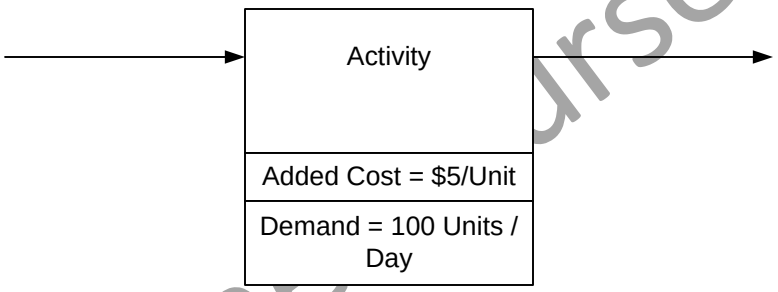
Q. What is the added cost to any work unit that passes through this activity?

- ◎ $500 / Unit
- ◎ $5 / Unit
- ◎ $100 / Unit



Q. What is the daily cost of this activity?

- ◎ $500 / Day
- ◎ $5 / Day
- ◎ $100 / Day

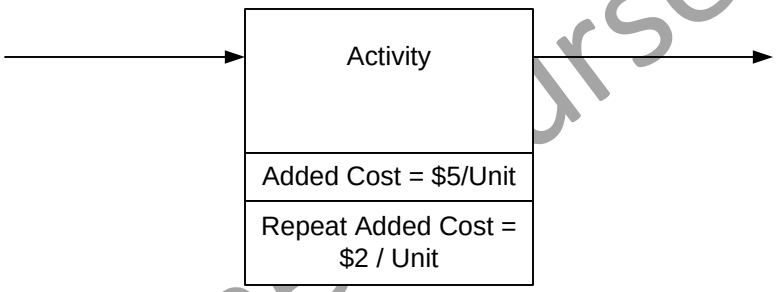


Q. What is the added cost contributed to a work unit that passes through this same activity a total of 4 times?

◎ $7 / Unit

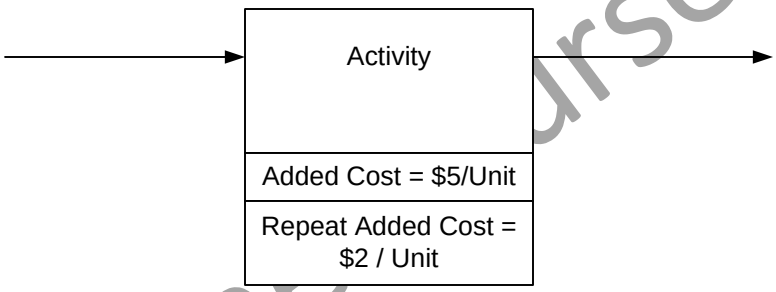
◎ $5 / Unit

◎ $11 / Unit



Q. What is the percent reduction in added cost if it only passes through 3 times total as opposed to 4 times total?

- ◎ 15%
- ◎ 18%
- ◎ 20%



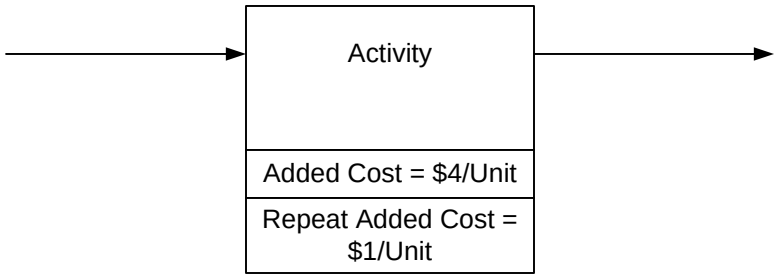
Total Cost

If Demand = 500 / Day and Repeat Demand = 200 / Day, what is the total cost of the activity per day?

= (Demand * Added Cost) + (Repeat Demand * Repeat Added Cost)

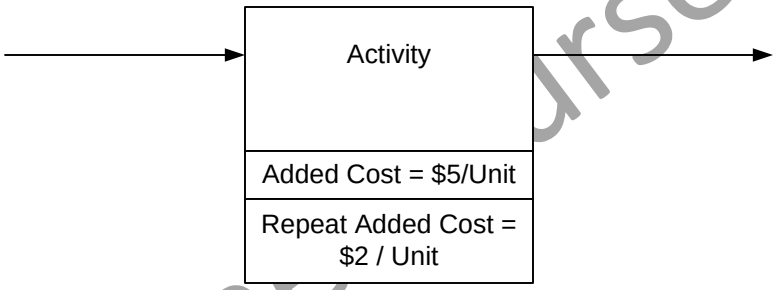
= (500 * 4) + (200 * 1)

= $2200 / Day



Q. If Demand = 300 / Day and Repeat Demand = 150 / Day, what is the total cost of the activity per day?

- ◎ $1500 / Day
- ◎ $1000 / Day
- ◎ $1800 / Day

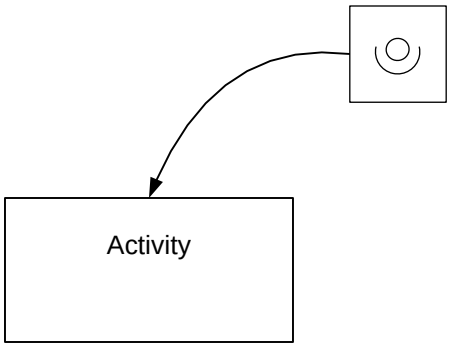


Resource Time

How much of the resource time is used each day?

$$\text{Resource Time} = \frac{\text{Demand} * \text{Process Time}}{\text{Efficiency}}$$

Example



Demand = 200 Unit/Day

Staff

Available Time = 4 Hrs/Day

Process Time = 6 Min/Unit

Cost = $45/Hr

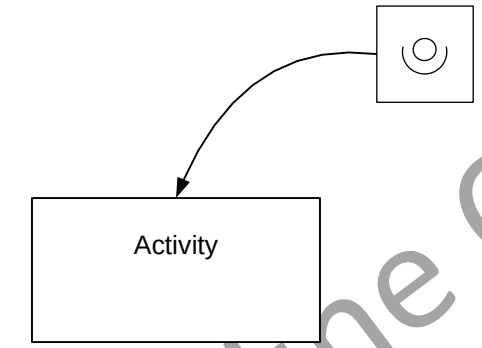
Efficiency = 90%

# of staff = 4

$$\text{Resource Time} = \frac{200 * 6}{0.9} = \frac{1200}{0.9} = 1333.33 \text{ Mins/Day}$$

Q. How much of the resource time is used each day?

- 1000 Mins / Day
- 4 Hrs / Day
- 8 Mins



Demand = 100 Unit/Day

Staff

Available Time = 4 Hrs/Day (per staff)

Process Time = 8 Min/Unit

Cost = $40/Hr

Efficiency = 80%

# of staff = 4

Used Time & Available Time

What are the costs of the used time and the available time?

$$\text{Used Time} = \frac{\text{Demand} * \text{Process Time}}{\text{Efficiency}}$$

$$\text{Cost of Used Time} = \frac{\text{Used Time}}{\text{Min per hour}} * \text{Cost}$$

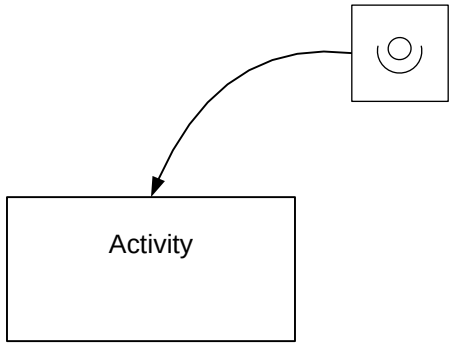
$$= \frac{(200 * 6) / 0.90}{60} * 45$$

= $1000 / Day

Cost of Available Time = Available Time * # of staff * Cost

= 4 * 4 * 45

= $720 / Day



Demand = 200 Unit/Day

Resource

Available Time = 4 Hrs/Day

Process Time = 6 Min/Unit

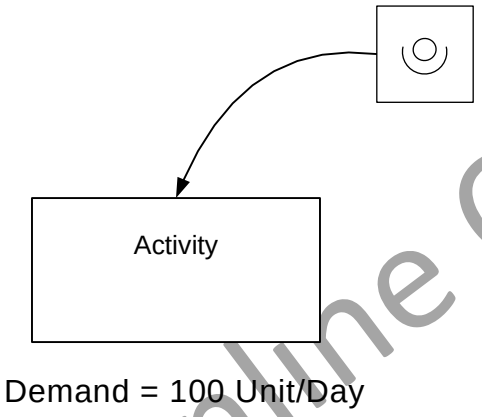
Cost = $45/Hr

Efficiency = 90%

# of staff = 4

Q. What are the costs of the used time and the available time?

- Used Cost = $700, Available Cost = $650
- Used Cost = $667, Available Cost = $640
- Used Cost = $640, Available Cost = $667



Staff

Available Time = 4 Hrs/Day (per staff)

Process Time = 8 Min/Unit

Cost = $40/Hr

Efficiency = 80%

# of staff = 4

Lesson Summary: Transactional Mapping Concepts

You learned that:

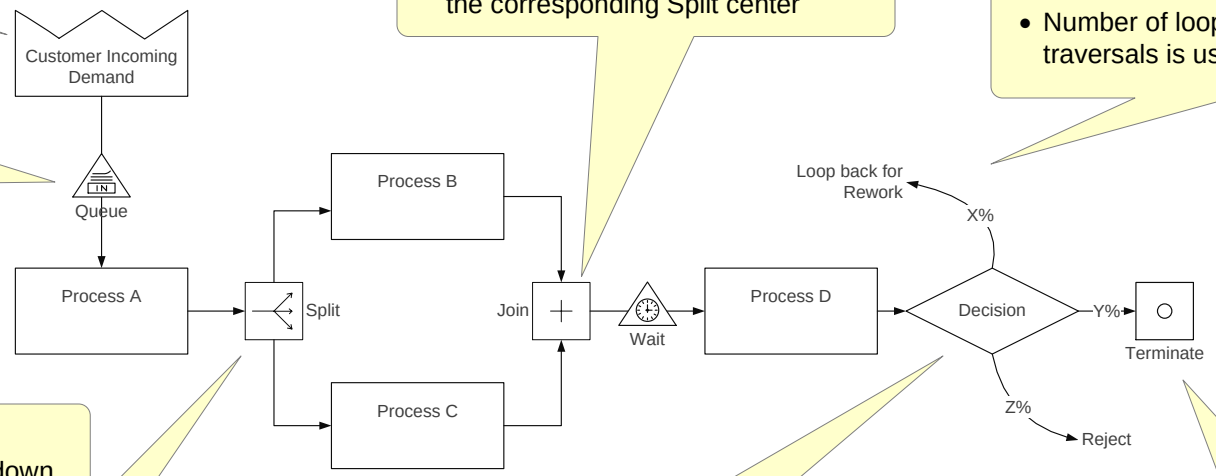
- Quick Transactional combines concepts from value stream mapping and business process modeling.
- Mapping allows loops, decision points, splits, and joins. These are all common in transactional processes.

Customer Center
- Specifies Demand and Triggers the process
- Only one Customer center on page
- No in-coming arrows, only one outgoing arrow

Queue center used to show number of items in a queue and to specify average wait times

Join Center
- Used to re-join split paths
- Limited to a single output
- Incoming paths must exactly match the corresponding Split center

Loop Backs
- Number of loop back traversals is user defined



Split Center
- Used to direct a full item of work down multiple paths
- Limited to single input
- Two or more outputs
- Must have a matching Join center downstream to re-join the paths

Decision Center
- Used to divide the traffic into multiple routes.
- Two or more outputs.
- Sum of outputs must add up to 100%

Terminate Center
- Every route must end in a Terminate Center

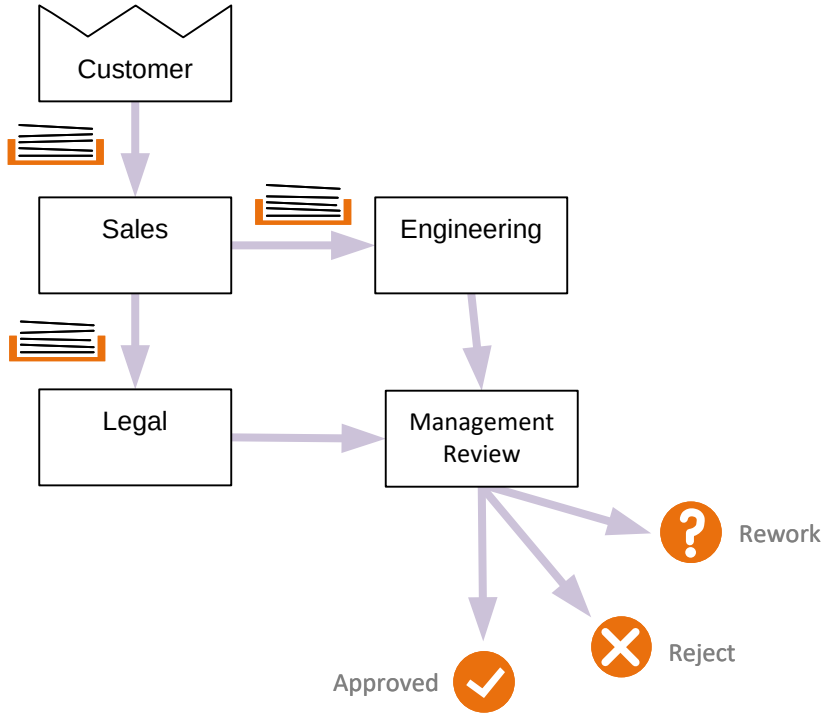
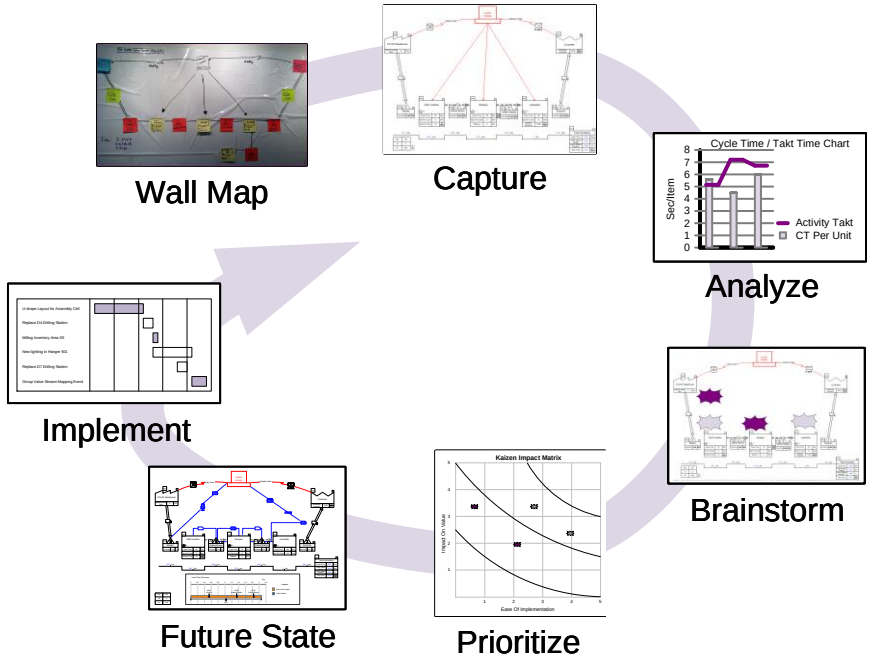
What's next:

We will apply the concepts learned to the ACME company's proposal fulfillment process.

ACME Case Study

The leadership at ACME Industries has become increasingly concerned about the time taken to respond to customers' RFQ's (Request for quotation) with proposals. They have received customer complaints about the long length of time quoted for response and additionally about proposals that are not then received by the quoted times. They have tasked a team to investigate and make recommendations towards improving the process, increasing customer satisfaction, and closing more sales.

You are the team leader and have built a cross-functional team to include representative staff involved in the process. The team has "walked" through the value stream to collect representational data. This is shown on the following pages.

ACME Case Study	Continuous Improvement Cycle
	

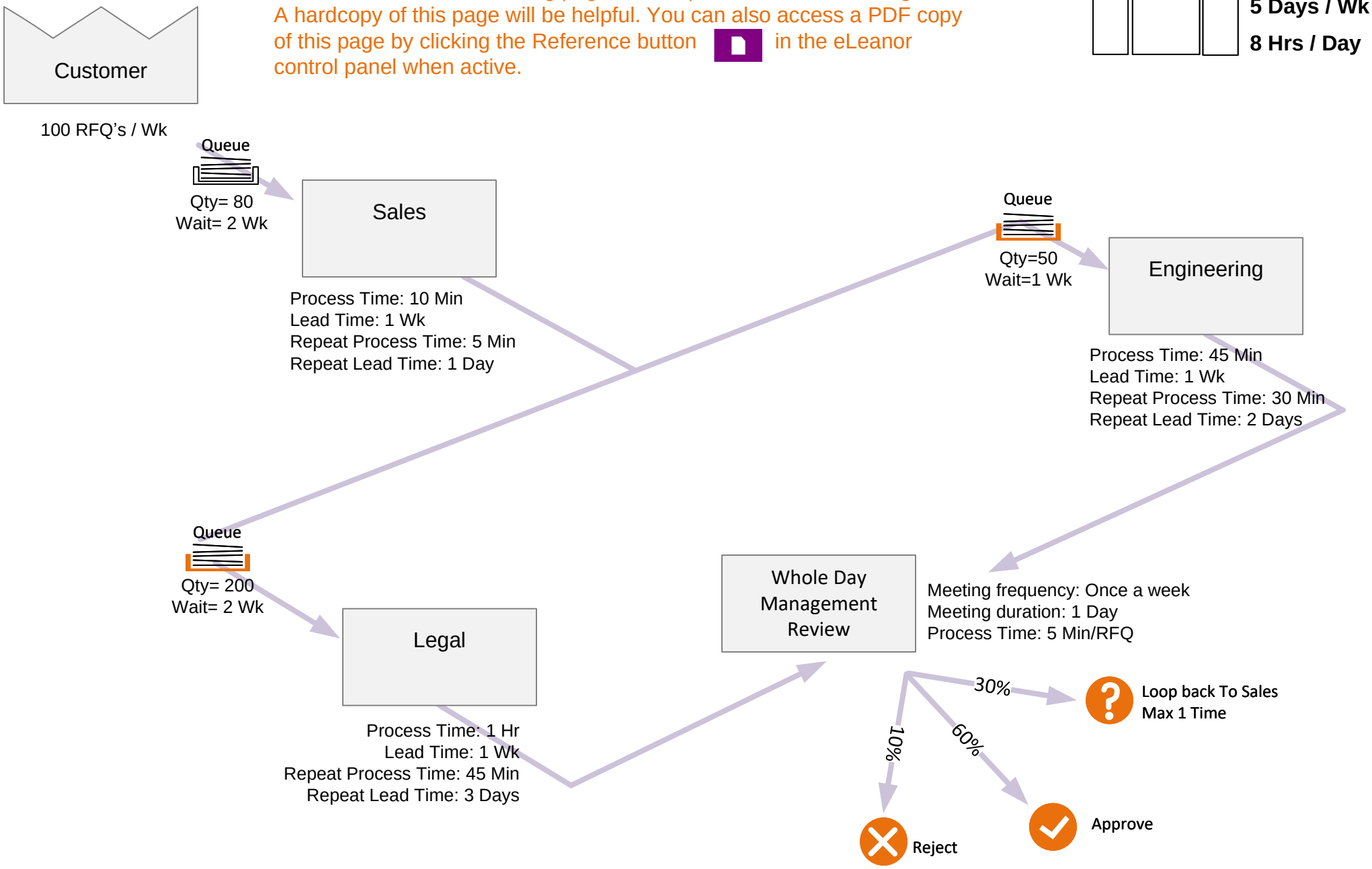
ACME Case Study : Proposal Fulfillment Value Stream

ACME

5 Days / Wk

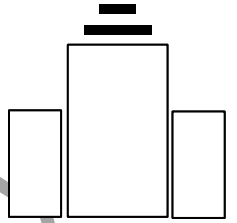
8 Hrs / Day

The exercises in the following pages will require data from this diagram. A hardcopy of this page will be helpful. You can also access a PDF copy of this page by clicking the Reference button in the eLeanor control panel when active.



Q. What is the lead time for a proposal (without any loop backs)?

- ~5 Weeks
- ~7 Weeks
- ~9 Weeks



5 Days / Wk
8 Hrs / Day

Customer

100 RFQ's / Wk

Queue
Qty= 80
Wait= 2 Wk

Sales

Process Time: 10 Min
Lead Time: 1 Wk
Repeat Process Time: 5 Min
Repeat Lead Time: 1 Day

Queue
Qty=50
Wait=1 Wk

Engineering

Process Time: 45 Min
Lead Time: 1 Wk
Repeat Process Time: 30 Min
Repeat Lead Time: 2 Days

Queue
Qty= 200
Wait= 2 Wk

Legal

Process Time: 1 Hr
Lead Time: 1 Wk
Repeat Process Time: 45 Min
Repeat Lead Time: 3 Days

Whole Day Management Review

Meeting frequency: Once a week
Meeting duration: 1 Day
Process Time: 5 Min/RFQ

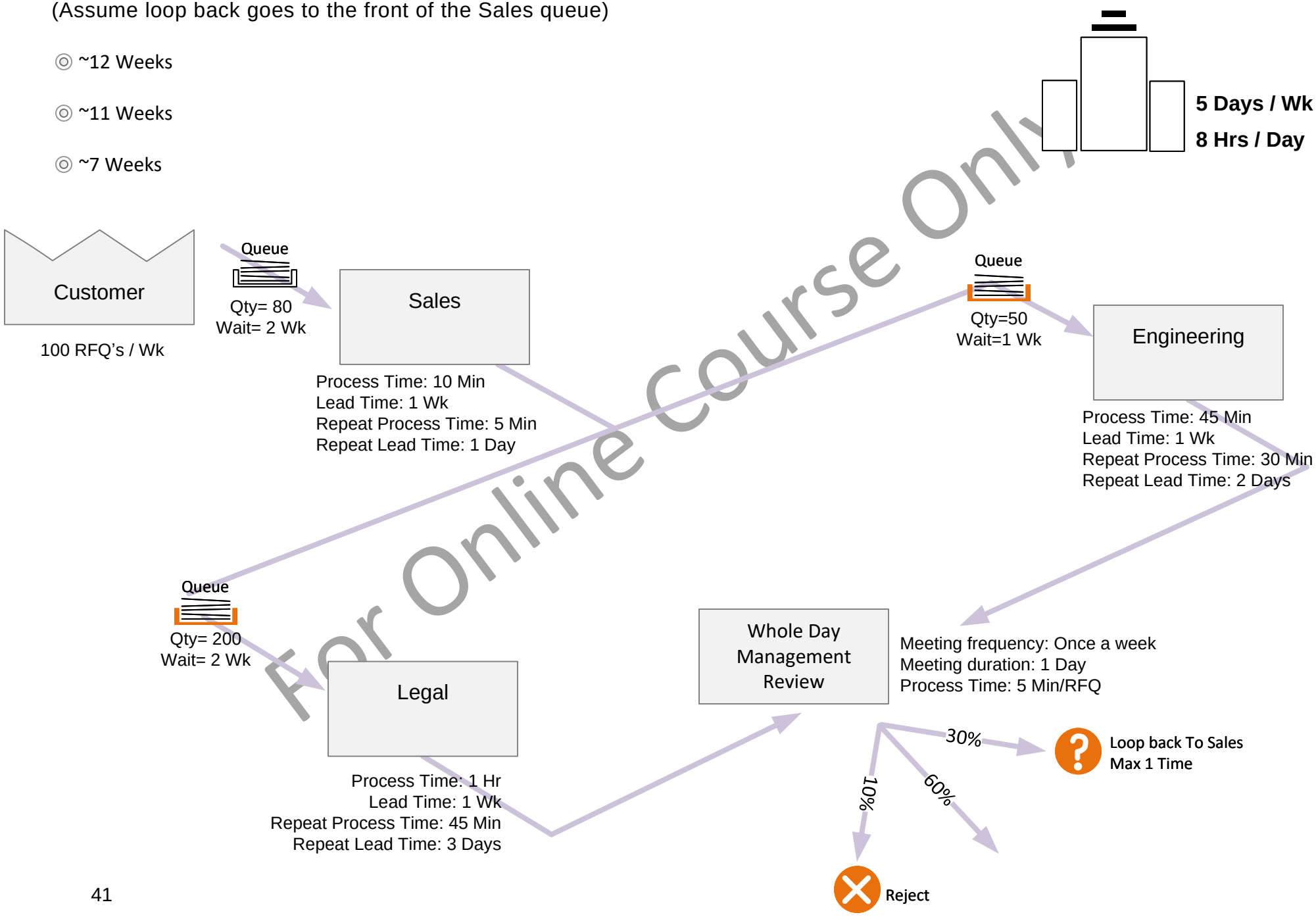
30%
Loop back To Sales
Max 1 Time

10%
60%
Reject

Q. What is the lead time for a proposal with one loop back?

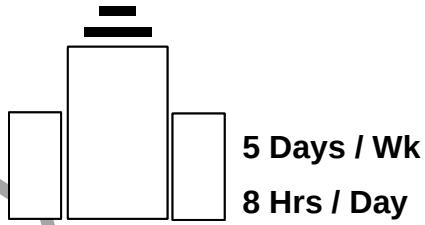
(Assume loop back goes to the front of the Sales queue)

- ~12 Weeks
- ~11 Weeks
- ~7 Weeks



Q. What is the 'Processing Time' for a proposal (without any loop backs)?

- ~120 Mins
- ~2 Weeks
- ~65 Mins



Customer

100 RFQ's / Wk

Queue
Qty= 80
Wait= 2 Wk

Sales

Process Time: 10 Min
Lead Time: 1 Wk
Repeat Process Time: 5 Min
Repeat Lead Time: 1 Day

Queue
Qty=50
Wait=1 Wk

Engineering

Process Time: 45 Min
Lead Time: 1 Wk
Repeat Process Time: 30 Min
Repeat Lead Time: 2 Days

Queue
Qty= 200
Wait= 2 Wk

Legal

Process Time: 1 Hr
Lead Time: 1 Wk
Repeat Process Time: 45 Min
Repeat Lead Time: 3 Days

Whole Day Management Review

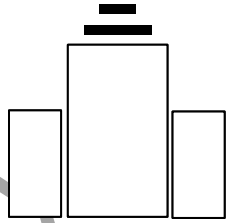
Meeting frequency: Once a week
Meeting duration: 1 Day
Process Time: 5 Min/RFQ

30%
Loop back To Sales
Max 1 Time

10%
60%
Reject

Q. What is the 'Processing Time' for a proposal (with one loop back) excluding Management Review?

- ~205 Mins
- ~2 Days
- ~1 Week



5 Days / Wk
8 Hrs / Day

Customer

100 RFQ's / Wk

Queue
Qty= 80
Wait= 2 Wk

Sales

Process Time: 10 Min
Lead Time: 1 Wk
Repeat Process Time: 5 Min
Repeat Lead Time: 1 Day

Queue
Qty=50
Wait=1 Wk

Engineering

Process Time: 45 Min
Lead Time: 1 Wk
Repeat Process Time: 30 Min
Repeat Lead Time: 2 Days

Queue
Qty= 200
Wait= 2 Wk

Legal

Process Time: 1 Hr
Lead Time: 1 Wk
Repeat Process Time: 45 Min
Repeat Lead Time: 3 Days

Whole Day Management Review

Meeting frequency: Once a week
Meeting duration: 1 Day
Process Time: 5 Min/RFQ

30%
Loop back To Sales
Max 1 Time

10%
60%
Reject

Staff Utilization Calculation

$$\text{Staff Utilization} = \frac{\text{Staff time used}}{\text{Staff time available}}$$

$$= \frac{[\text{Process Time}] \times [\text{Demand}]}{[\text{Efficiency}] \times [\text{Available Staff Time}]}$$

Example Calculation:

- 3 Admins working 7 hours per day
- Process Time per item of work = 12 minutes
- Efficiency = 80%
- Demand = 75 items per day

$$\textbf{Staff Utilization} = \frac{[12] \times [75]}{[0.80] \times [3 \times 7 \times 60]} = \textbf{89\%}$$

ACME Case Study : Additional Data

You will need data from the case study plus some of the data below for the following exercises.

Data for Capacity & Cost Analysis

Sales:

1 RFQ specialist, 6Hrs per day for this activity, $30/Hr, 80% efficiency

Engineering:

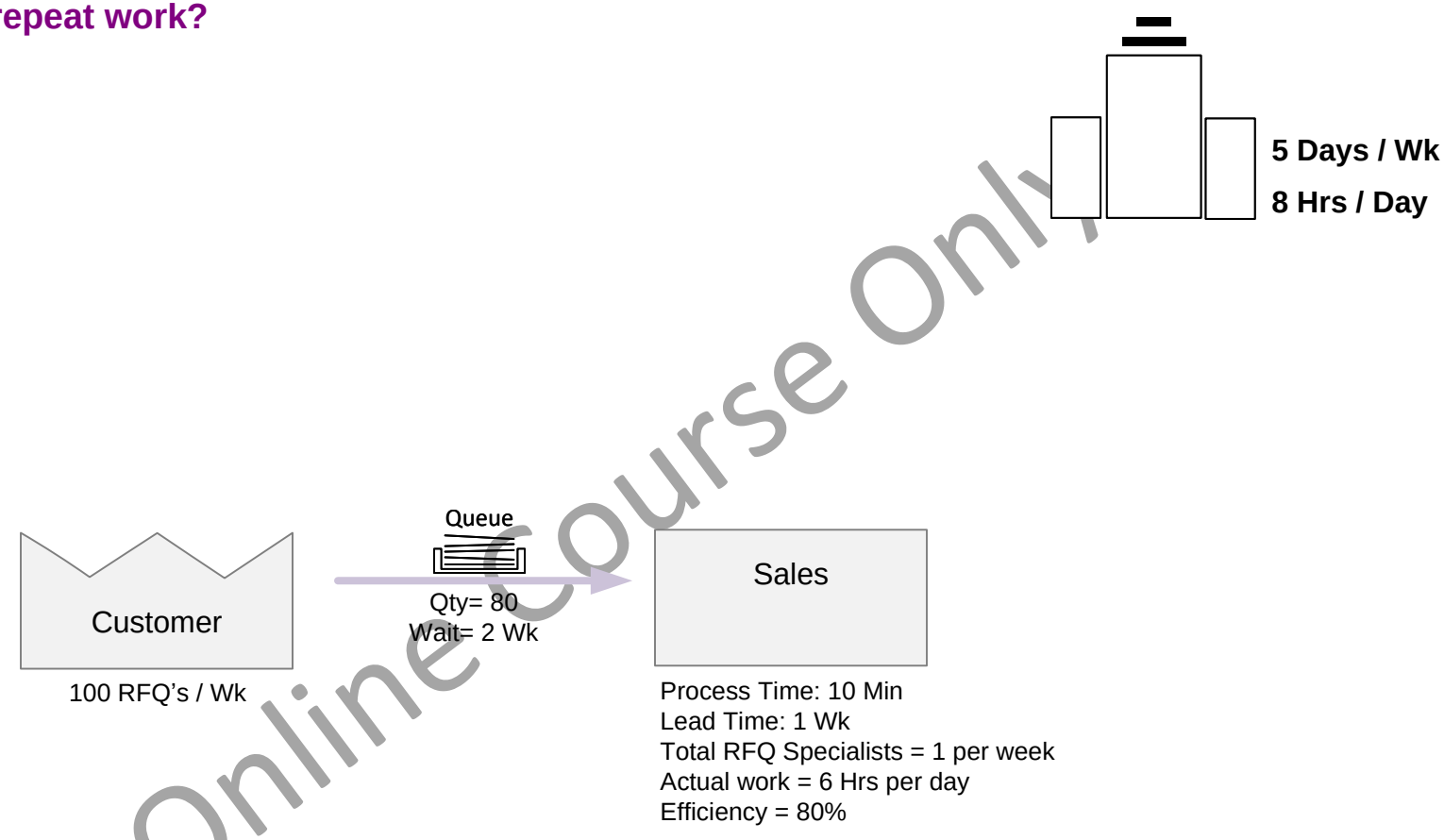
6 Engineers, 4Hrs per day for this activity, $30/Hr, 80% efficiency (to account for walking, interrupts etc..)

Legal:

5 Paralegals, 4Hrs per day for this activity, $30/Hr, 80% efficiency

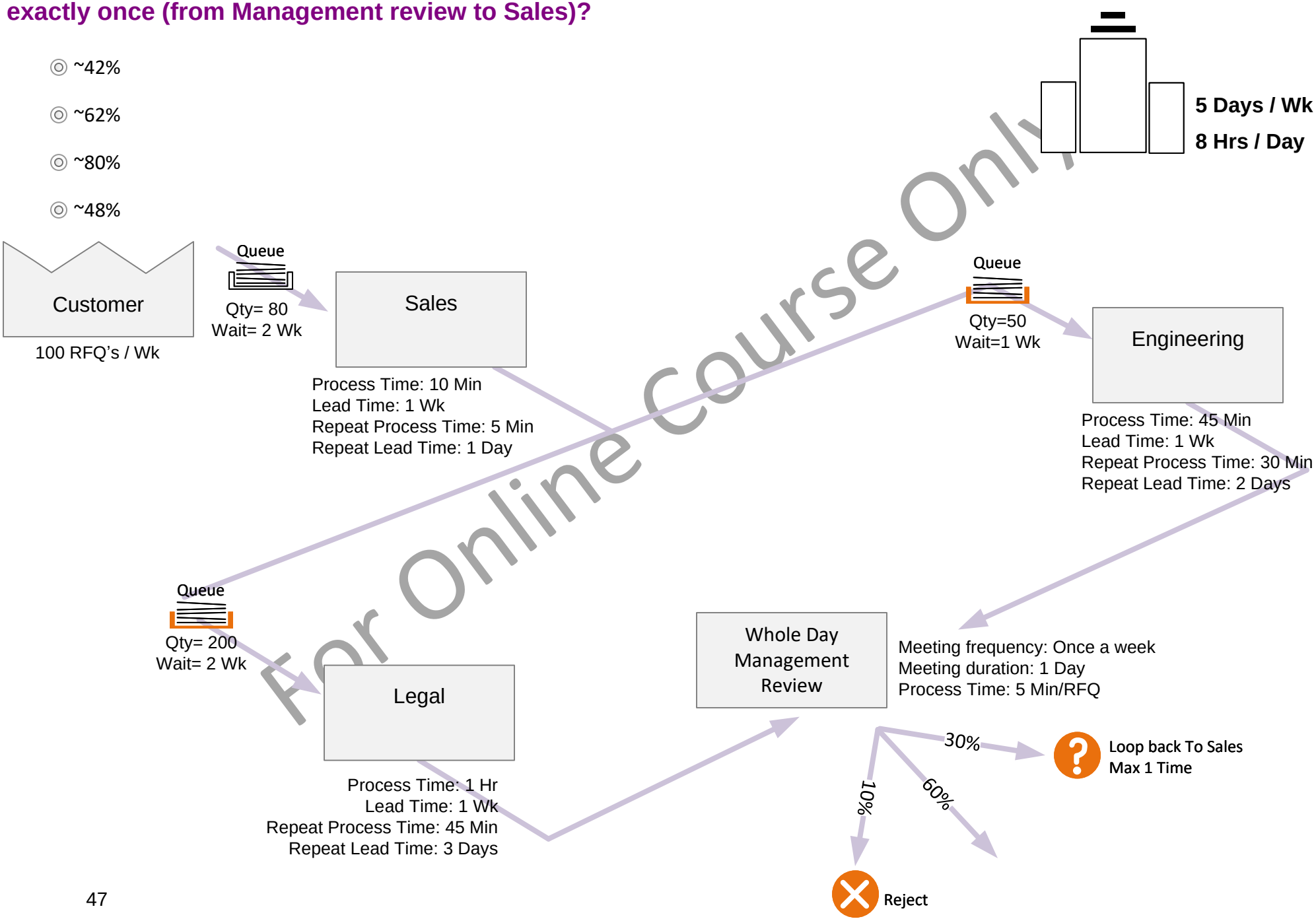
Q. What is the approximate utilization of the RFQ Specialist serving the sales process if there were no repeat work?

- ~57%
- ~69%
- ~82%
- ~95%



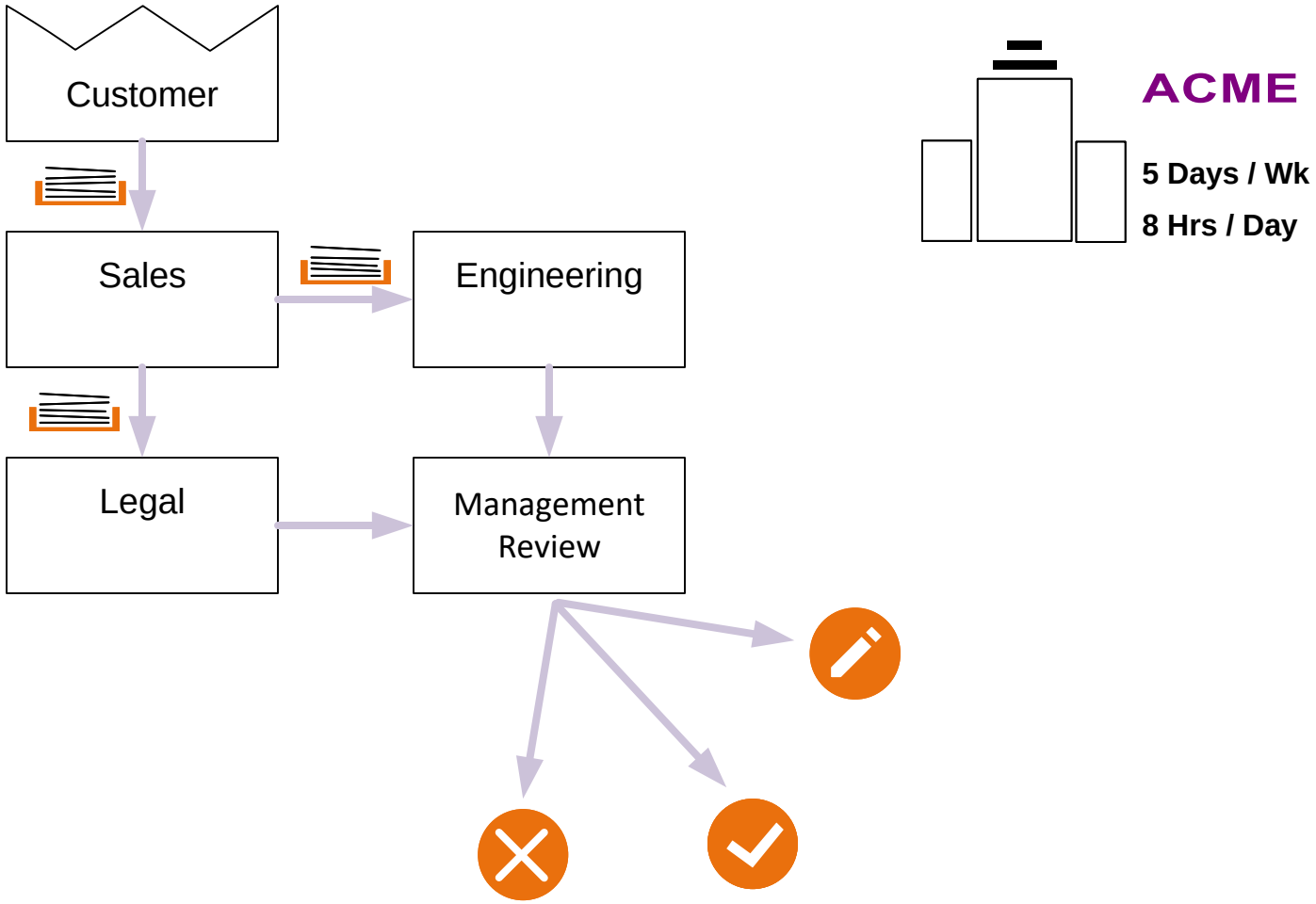
Q. What is the utilization of the RFQ Specialist with 30% of items looping back exactly once (from Management review to Sales)?

- ~42%
- ~62%
- ~80%
- ~48%



You learned that:

- You can use templates to build a wall map of the ACME proposal fulfillment value stream
- Lead Time, capacity, and staff utilization are all helpful in understanding and improving the value stream, but can be tedious to calculate.

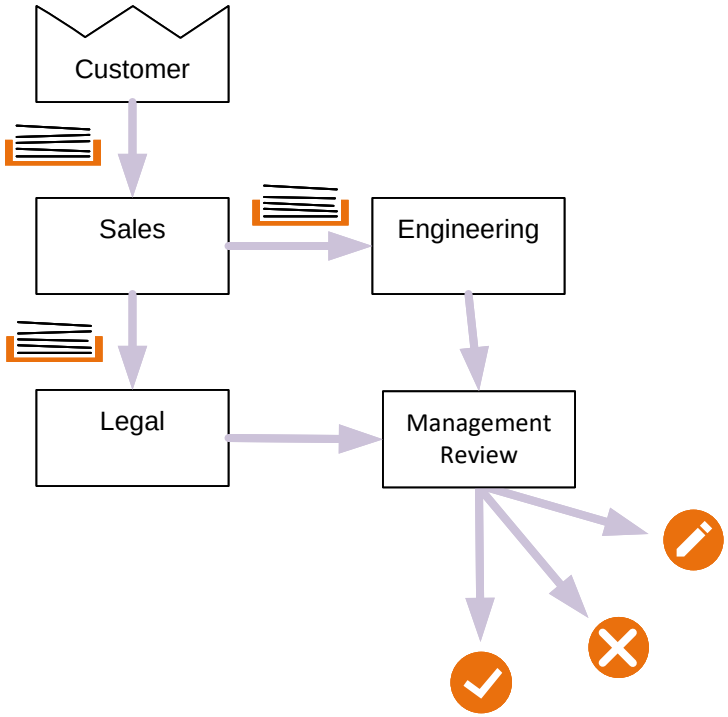
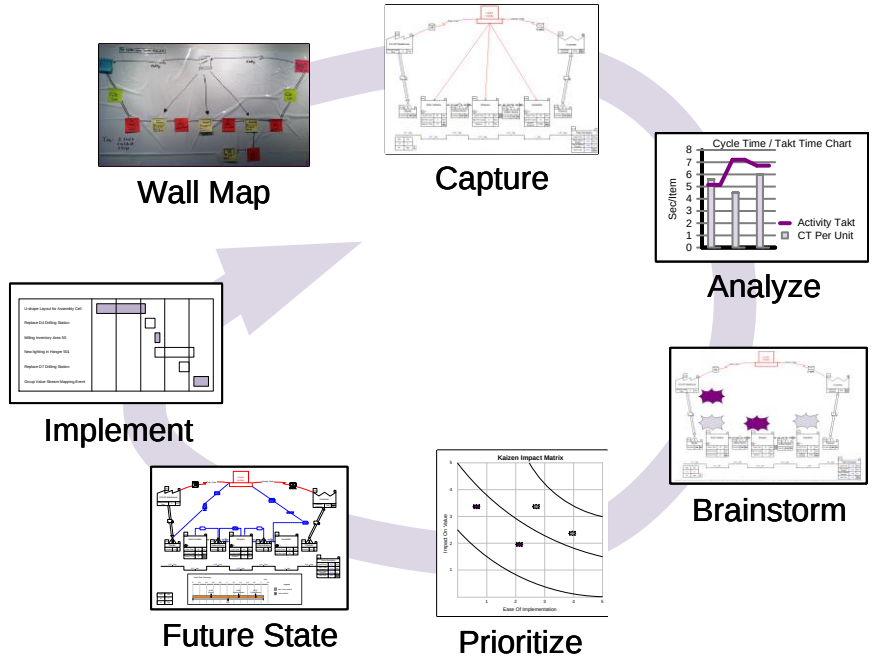


What's next:

You will use eVSM's Quick Transactional stencil to map and analyze the ACME process.

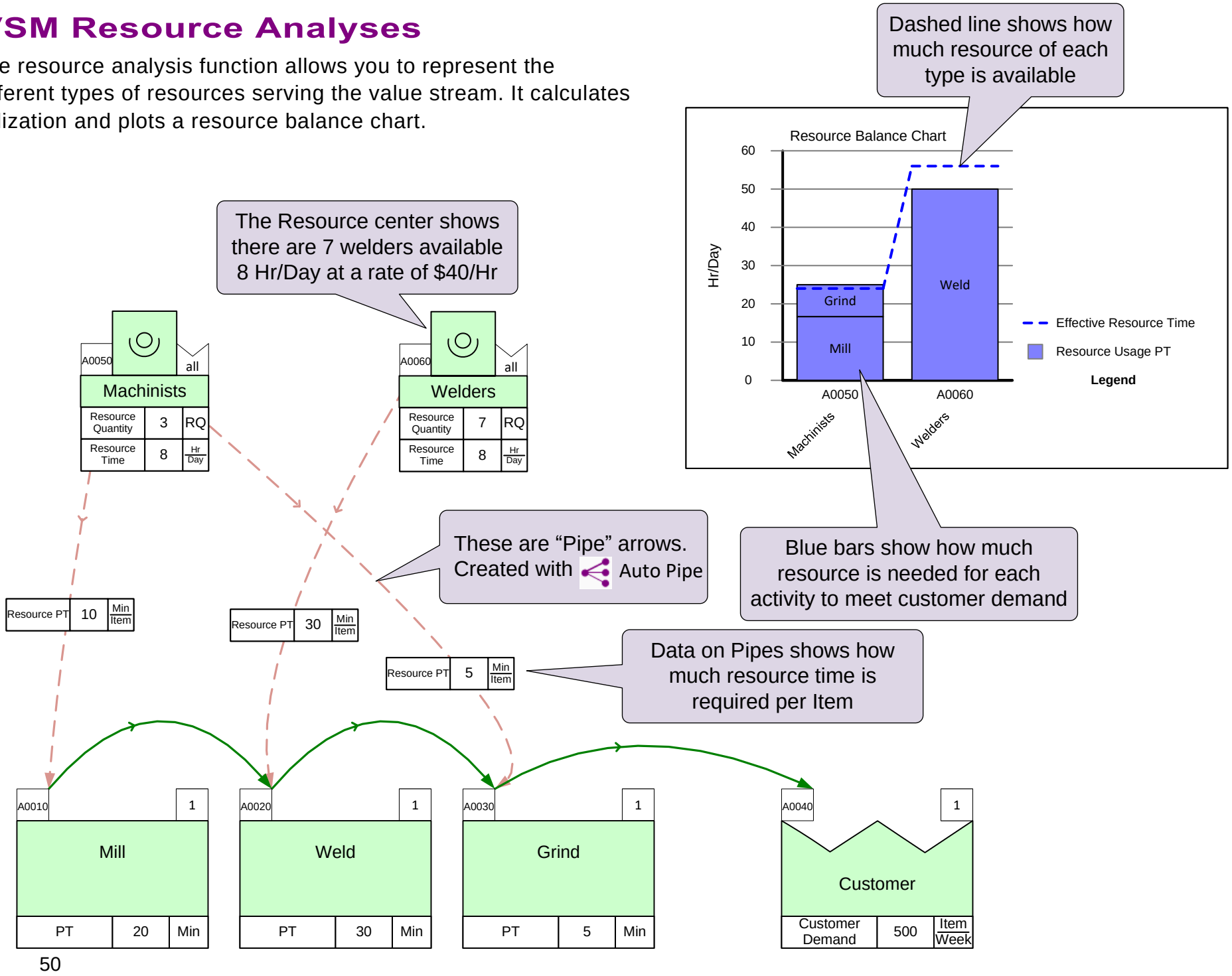
Mapping ACME Value Stream

This Lesson will allow you to download a tutorial that takes you step by step through mapping, analyzing, and improving the ACME value stream.

ACME	Continuous Improvement Cycle
	

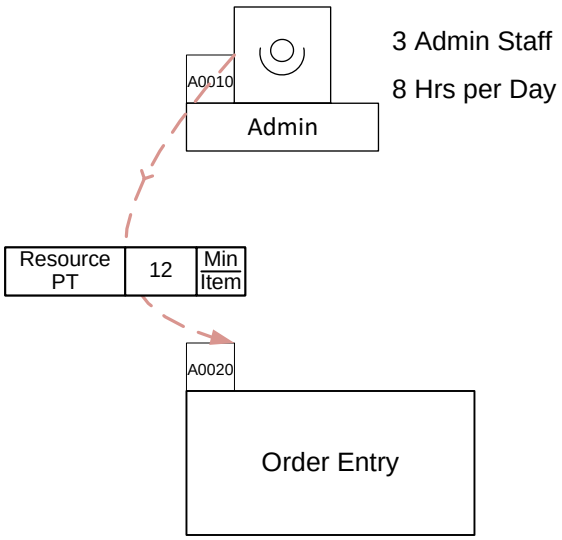
eVSM Resource Analyses

The resource analysis 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

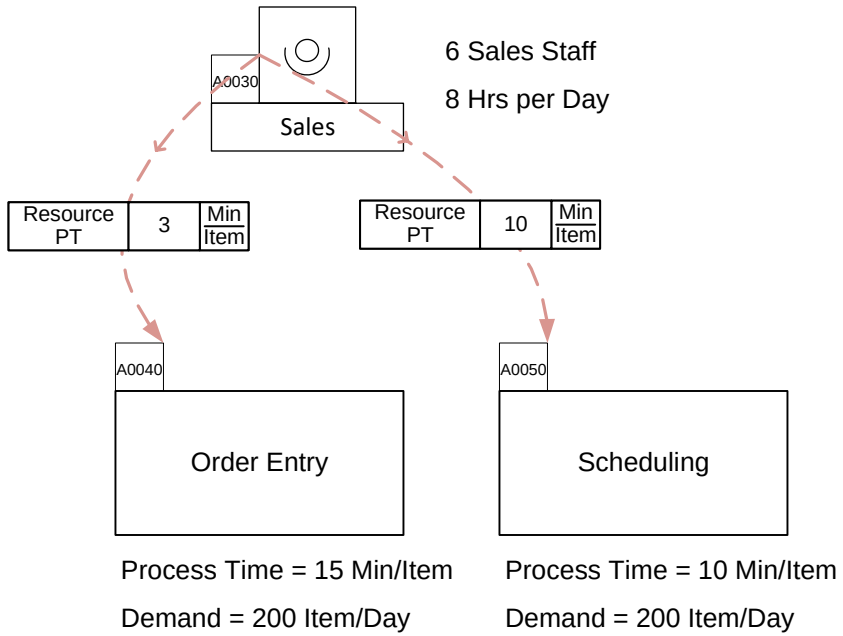


Available Resource Time = 3 x 8 x 60 = 1440 Min

Resource Used = 12 x 100 = 1200 Min

Resource Utilization = 1200/1440 = 86%

Example 2



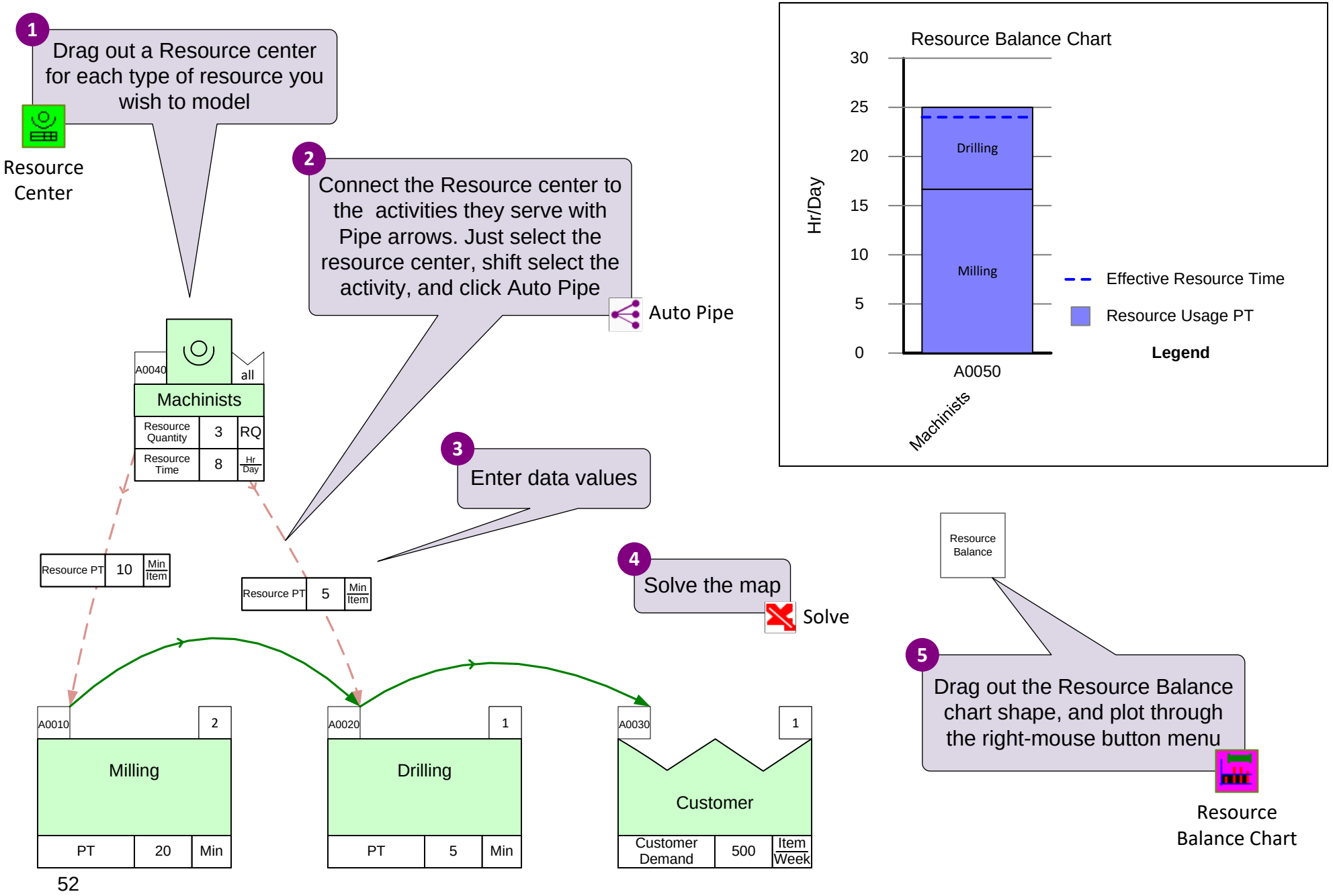
Available Resource Time = 6 x 8 x 60 = 2880 Min

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

Resource Utilization = 2600/2880 = 90%

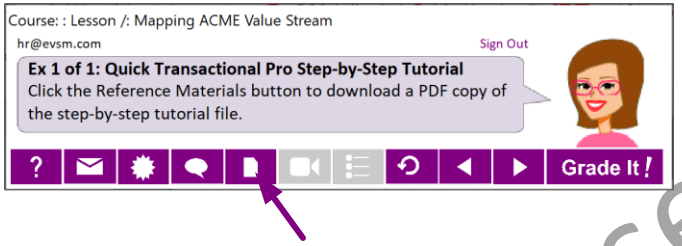
Note: resource process time (Resource PT) is not always equal to the activity Process Time. For example, a baker does not have to stay at the oven while the bread bakes

Resource Analyses Steps



Transactional VSM Tutorial

You have completed the concepts training for Transactional VSM. Next you will learn the mechanics of using eVSM with a step-by-step tutorial. Click the Reference Materials button in the eLeanor control panel to download the tutorial in PDF format.

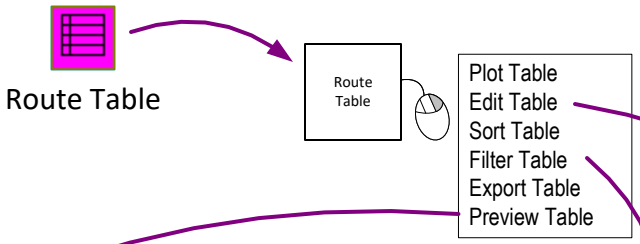


Reference Materials button

When you have completed the tutorial, return to this page and click the Grade It button in the eLeanor control panel.

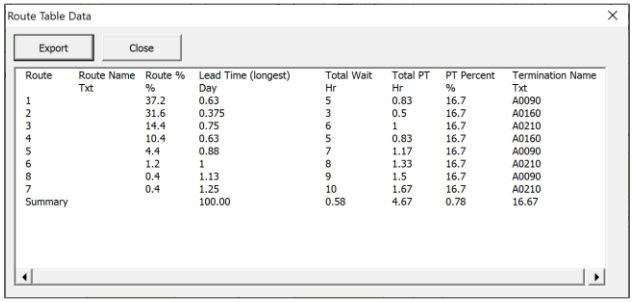
Route Table Pre-view and Filter

If the Route table is large, it can get very slow to plot or change. The Route table has some functions which allow you to trim it down to the data you wish to show.



Preview Route Table

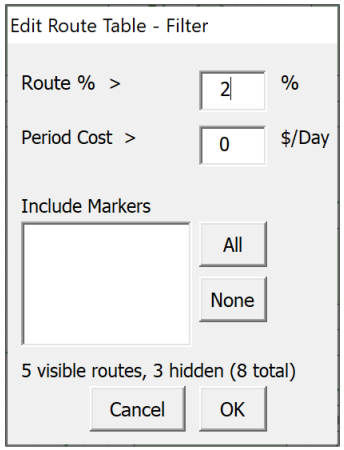
Get an instant view of the Route table content. Use it to decide if you wish to plot all or some filtered subset.



Filter Route Table

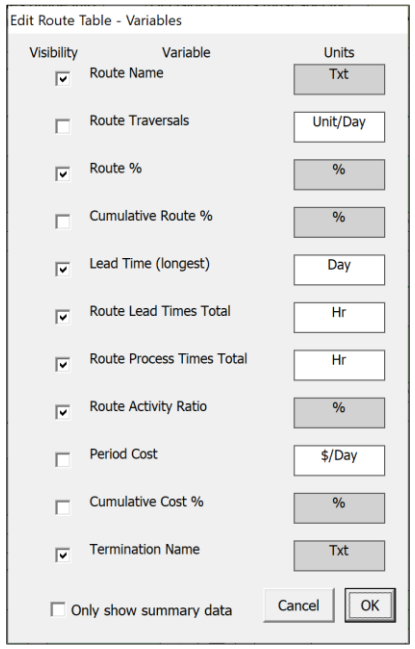
Filter routes to plot in Route table.
Filter options:

- Route % - Demand volume
- Period Cost – total cost per time period
- Route Markers

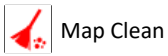


Hide/Show Route Table columns

Select columns to plot and set units for columns.



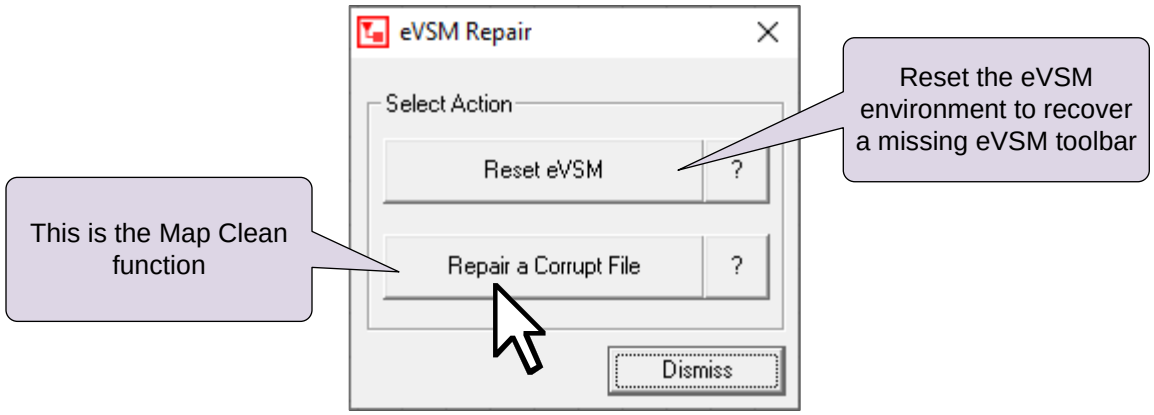
Map Clean



As you work in a Visio file, over time, you may see some performance degradation as the Visio cache grows. The Map Clean function allows you to clean this up. It is essential creates a new empty file, and copies all your maps to it.

We recommend you run this if you suspect any corruption in the file, or, if you see performance degradation. It is a good idea to run the Map Clean function every couple of hours when working with large files.

If the eVSM Toolbar is missing, Map Clean can also be accessed through the Windows Start menus. Click “Start>Programs>eVSM Software>eVSM Repair”



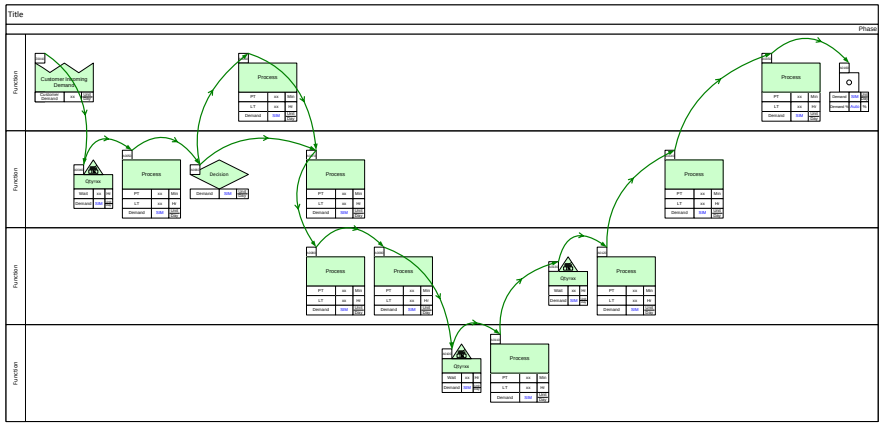
Just click the “Repair a Corrupt File” button and follow the prompts.

This function is also available through the Windows Start menu (useful if your eVSM toolbar is missing) at “Start > Programs > eVSM Software > eVSM Repair”.

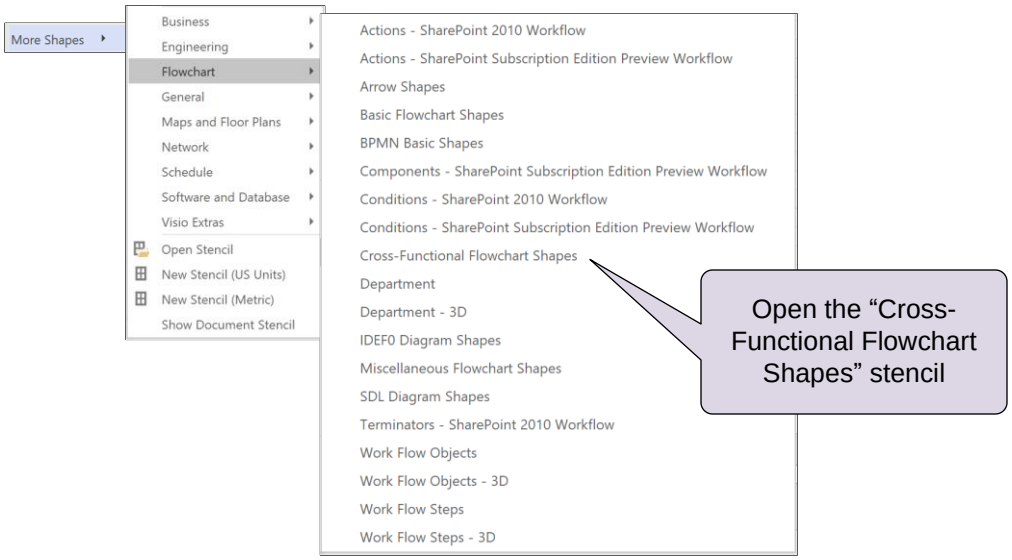
Value Stream Maps in Swimlanes

Visio has a useful swimlane diagramming capability which may be used with eVSM.

Example VSM in Swimlanes



Open the Swimlanes Stencil



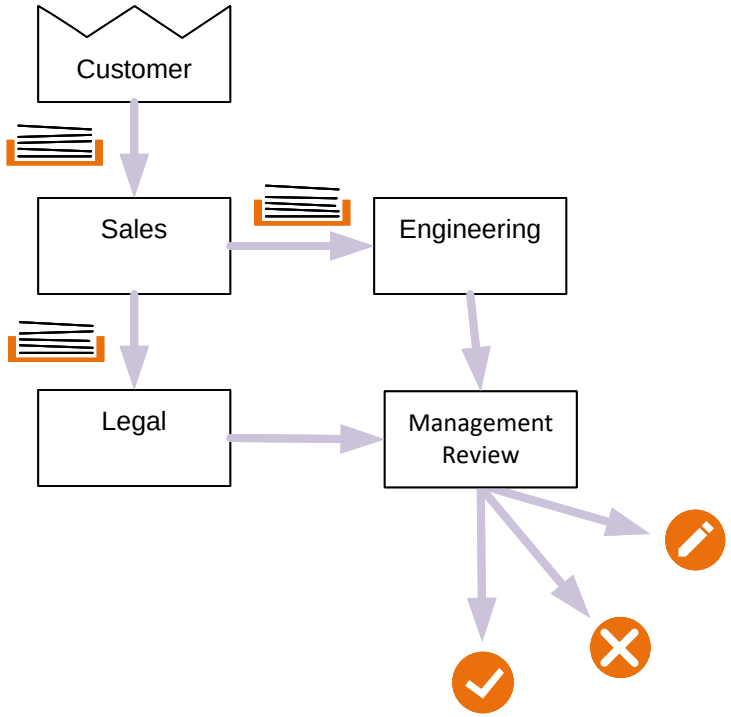
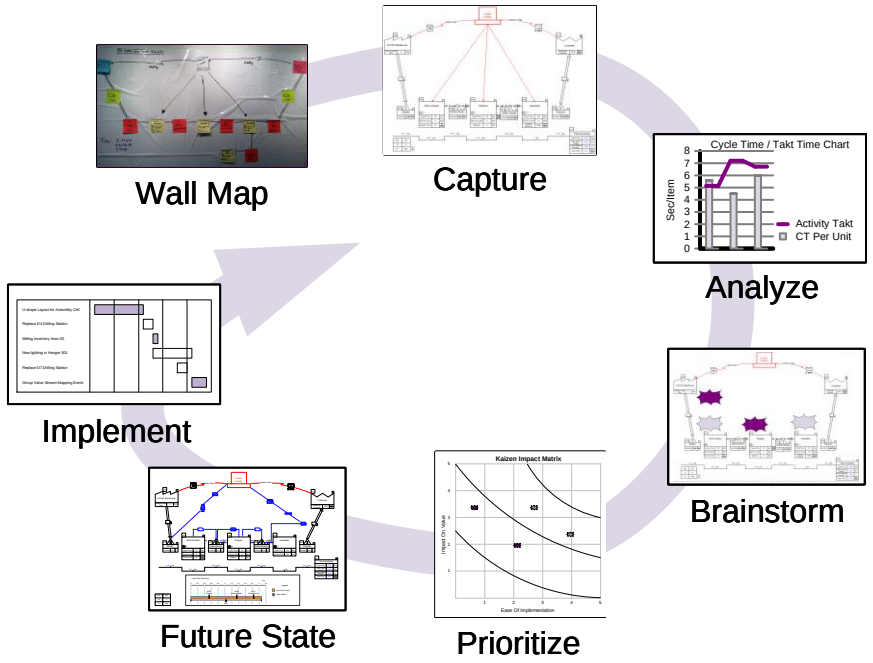
How to Use Swimlanes

Watch the Movie

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

You learned that:

- Quick Transactional allows you to move from a value stream map to a simple value stream model where you can better see cause and effect and do "what-if" studies.

ACME	Continuous Improvement Cycle
	

What's next:

This completes the Course for Transactional VSM. Your next step should be to attempt capturing one of your value streams in eVSM. This will generate some new questions. If you wish to discuss this with an eVSM expert, please contact the eVSM Group via support@evsm.com.

Useful Links

eVSM Toolbar Guide	evsm.com/toolbarguide
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