PathStone Group

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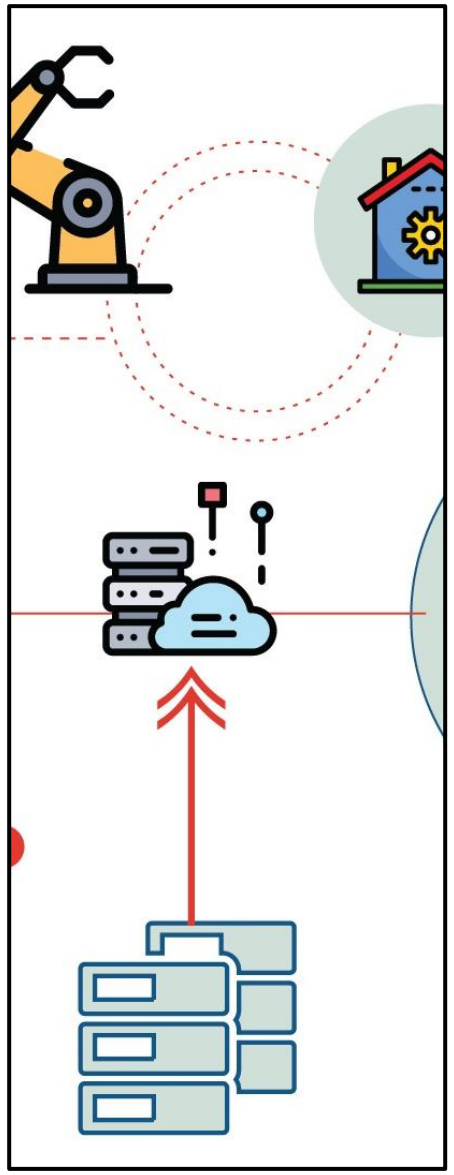
Value Stream Mapping

Agenda

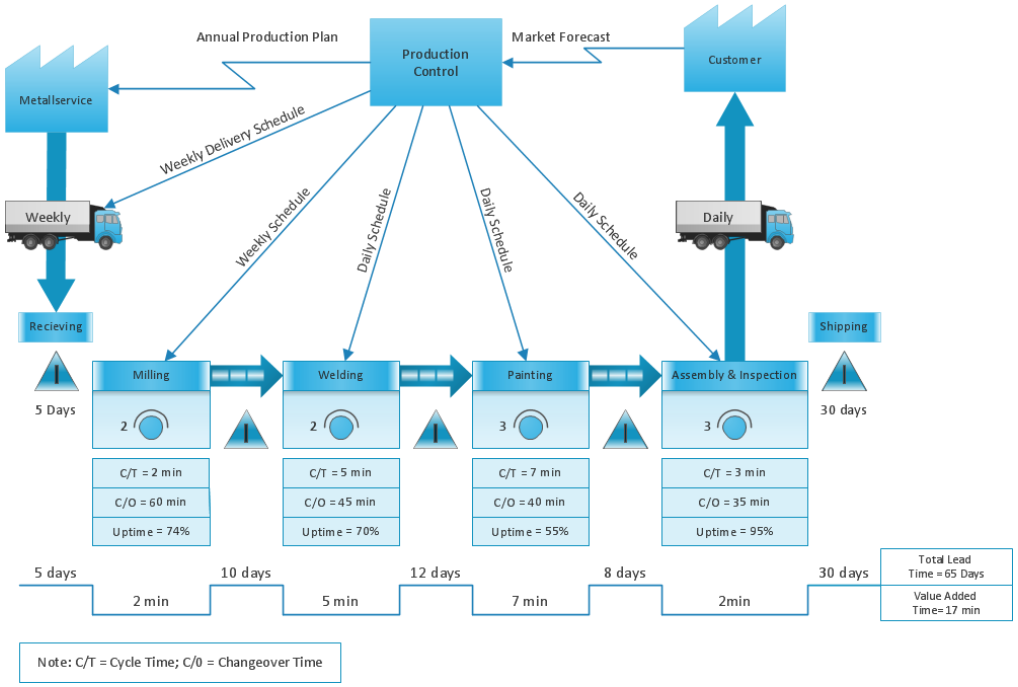
1. VSM: What is it ?
2. VSM purpose and benefits ?
3. VSM Current and Ideal State
4. VSM Metrics
5. Construction
6. VSM and Continuous Improvement
7. Takeaways



Introduction

What is it ?

Value stream mapping (VSM) provides us with a **structured visualization of the key steps** and **corresponding data** needed to **understand** and intelligently make improvements that optimize the entire process, not just one section at the expense of another.



VSM

Purpose and Benefits:

The VSM enables the team and leadership to see where the actual value is being added to the process, allowing them to **improve on the overall efficiency associated with the delivery** of a product or service.

A map represents the **current state,** and we develop another map to represent the desired **future state**.

A VSM shows **significantly more information** than the traditional process map and uses a very different, more linear format.

VSM BENEFITS

- Identify waste.
- Identify bottlenecks.
- Make processes efficient.
- Improve cross-functional collaboration.
- Improve end-product quality.

VSM

Purpose and Benefits:

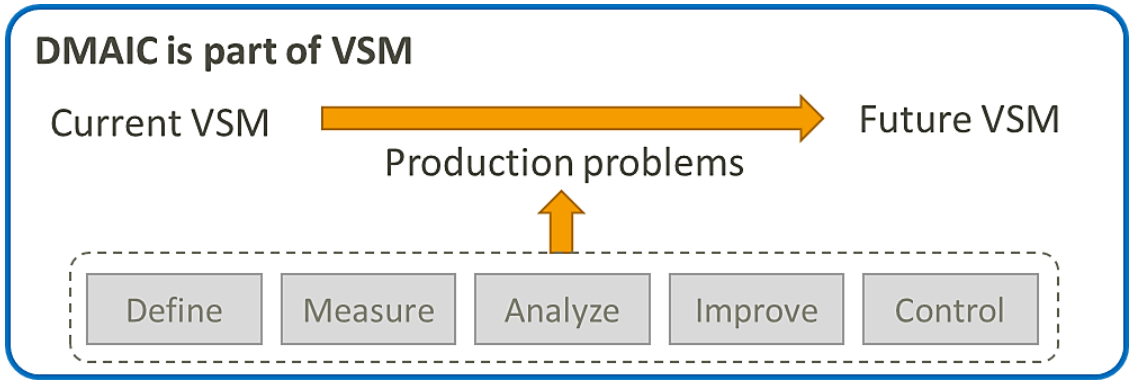
The resulting improved processes and understanding will reduce the need to chase down and put out fires by increasing focus on fire prevention.

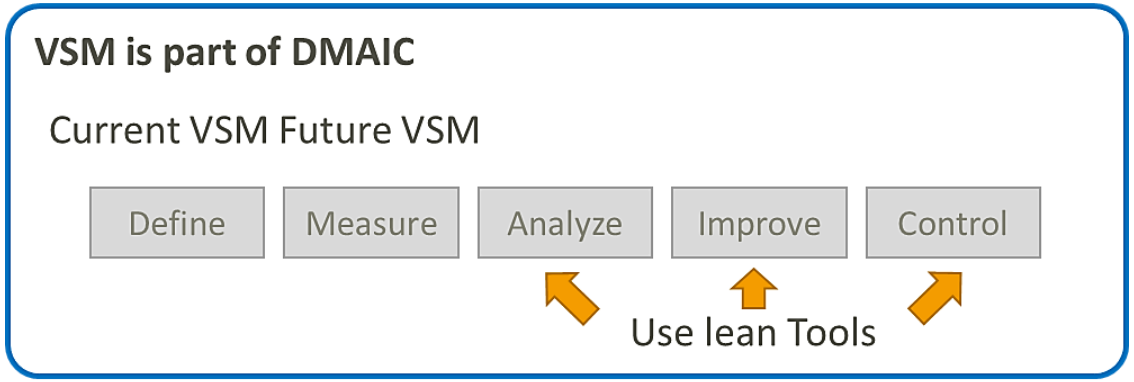
Without the holistic understanding that VSM provides, any improvements made to the life cycle typically benefit one segment, often at the expense of another.

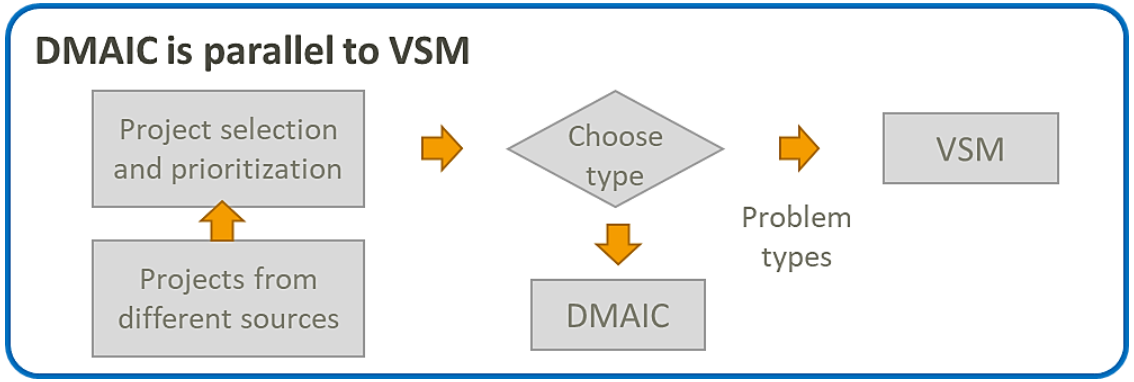
VSM

Purpose and Benefits:

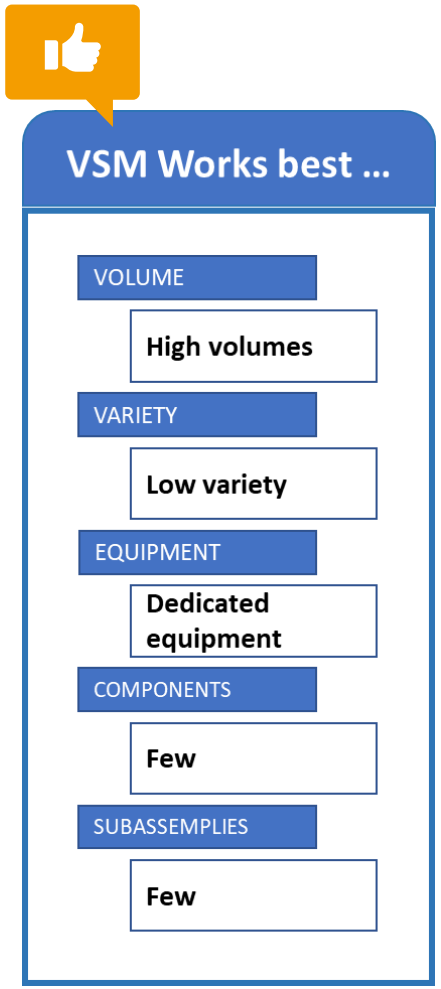
DMAIC and VSM

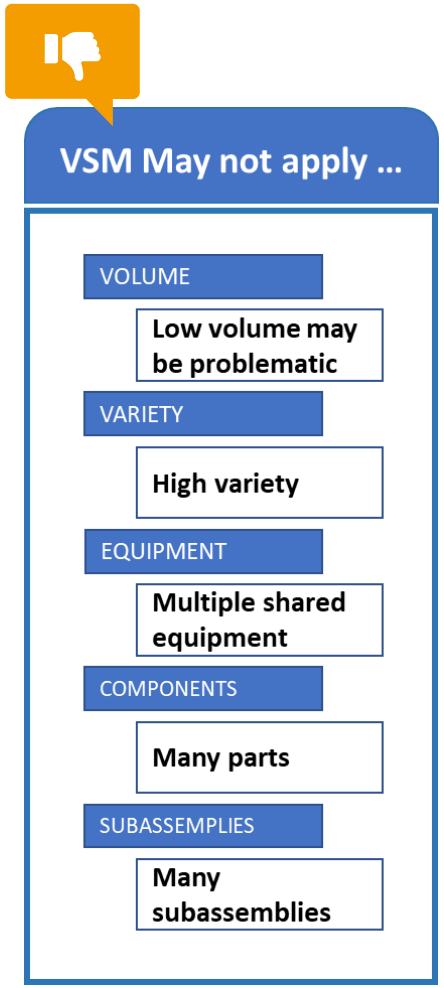






VSM

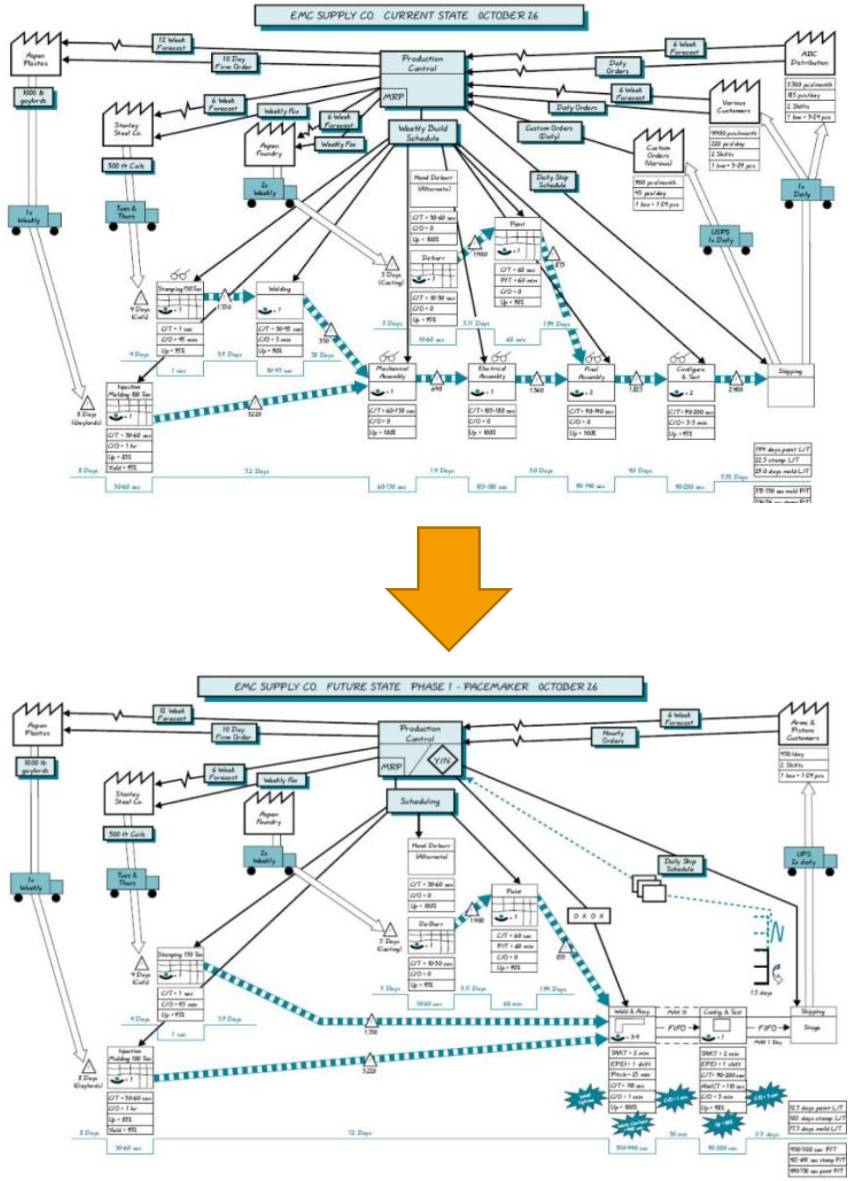

VSM Works best …
VOLUME
High volumes
VARIETY
Low variety
EQUIPMENT
Dedicated equipment
COMPONENTS
Few
SUBASSEMPLIES
Few


VSM May not apply …
VOLUME
Low volume may be problematic
VARIETY
High variety
EQUIPMENT
Multiple shared equipment
COMPONENTS
Many parts
SUBASSEMPLIES
Many subassemblies

VSM

VSM Current State:

Capture the current process despite how ugly it may be. There are often situations where cycle times vary, batch sizes vary for different reasons, and it is difficult to come up with values for the map.



VSM

VSM Ideal State:

Short Term:

Develop a short term (a week or a few weeks) map that is achievable with existing resources. The aim is to change the paradigm or the culture and **make the positive change visible.** This helps with the next iteration of improvements. Select a specific product family, set of machines, group of people if it is not possible to implement improvements across everything.

Long Term:

Develop the **desired future state** and **long-term vision**. The team should get creative and develop the future state regardless of what they think can be accomplished with some discretion regarding what is practical and economical.

VSM

VSM Metrics:

Cycle time (CT)

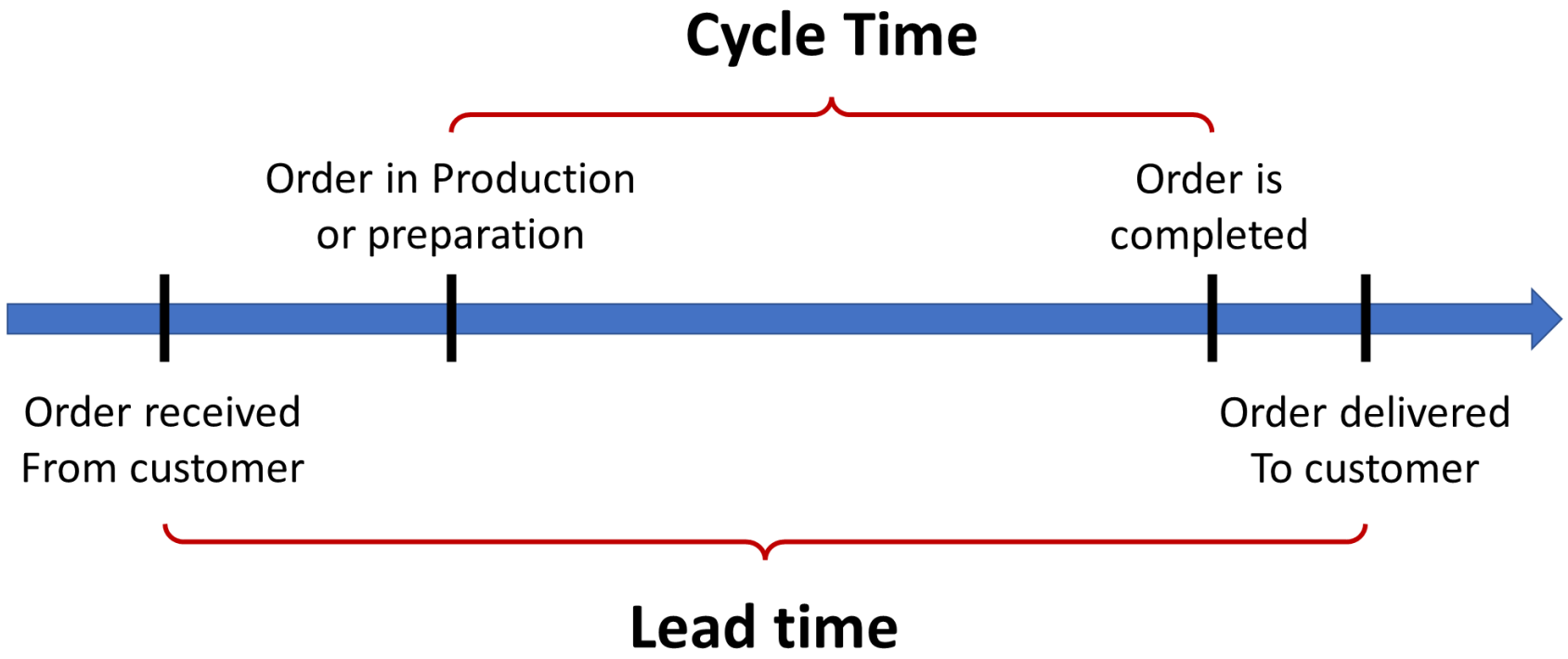
The time to do **one repetition of any task** typically measured from "Start-to-Start".

Lead Time (LT)

The **average time needed** for one feature request to make it through the entire process cycle concept to deliver.

VSM

VSM Metrics:



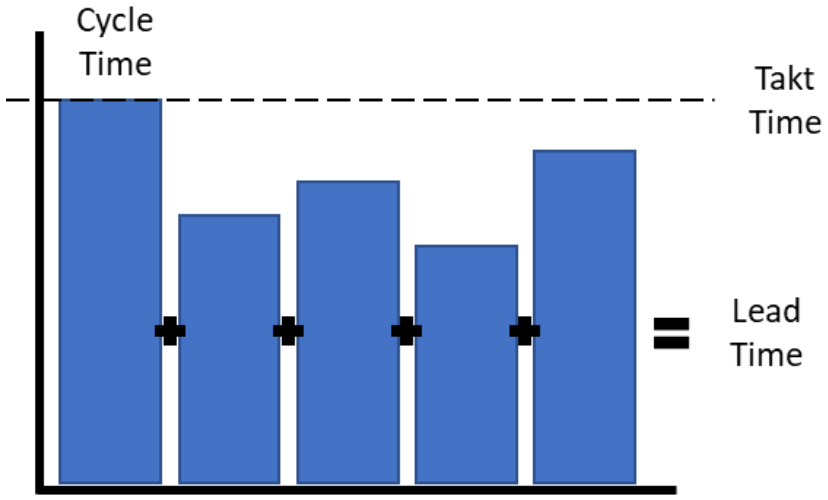
VSM

VSM Metrics:

Takt Time (TK)

It refers to the rate at which we need to manufacture a product to meet customer demand. Is also the "**minimum speed" we need to get the job done**.

$$\textbf{Takt Time} = \frac{\text{Available Minutes for Production}}{\text{Required Units of Production}}$$

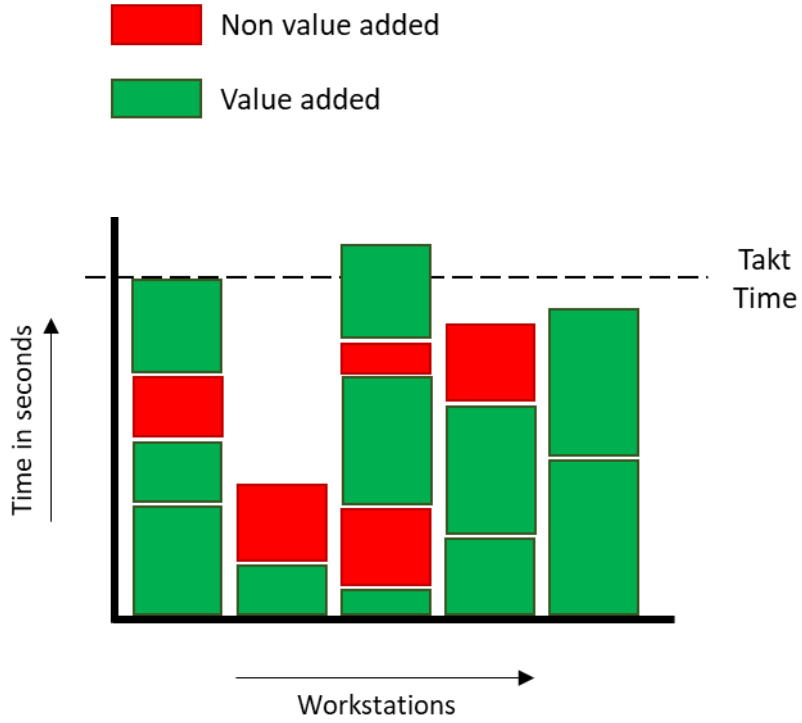


VSM

VSM Metrics:

What takt time does, however, is make customer demand appear level across a working day:

1. It makes **capacity calculations** easy through a complex flow.
2. We can determine what every process must be **capable of**.
3. We can determine the **speeds of machines** and other capital equipment.
4. **Minimum batches** are determined when there are changeovers.
5. We can look at any process and quickly determine the **optimum number of people** required to make it work.
6. We can see **opportunities** where a little improvement action will make a big difference in productivity.
7. Provides to team members a way to know exactly **what "success" looks like** for every unit of production.



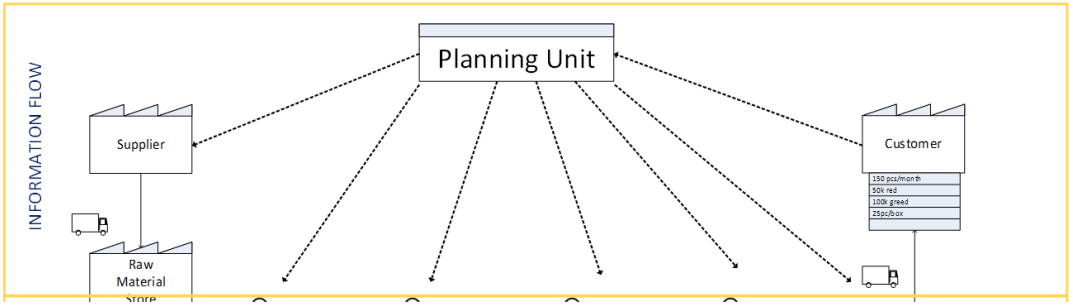
VSM

Constructing a VSM:

1. At the top-right of the sheet is the **customer(s) information** icon.
2. Create the **information flow to the company** that starts the process. This could be Production Control. This icon is in the center of the sheet.
3. Create the **information flow to the Supplier(s).** We place those icons on the left side of the sheet.
4. Working **from left to right**, add the process names, personnel, and complete the data boxes.

VSM

Constructing a VSM:

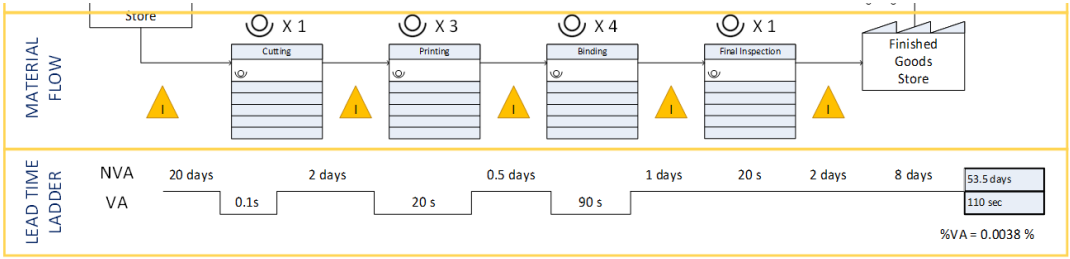


TOP: INFORMATION FLOW

1. This area of the VSM map is for the **flow of information, materials** to and from the customer(s) and Production (or Process) Control. The mapping exercise begins with the **Customer(s) data**.
2. The customer's name(s), location, takt times, part numbers, and as much **relevant information** should be placed in the upper right corner of the map. **Production Control** (or Process Control) is placed in the center at the top of the map.
3. The **Supplier(s)** is shown in the upper left area of the map, which includes name(s), description of parts supplied, frequency of delivery, and amount delivered.

VSM

Constructing a VSM:



MIDDLE: MATERIAL FLOW

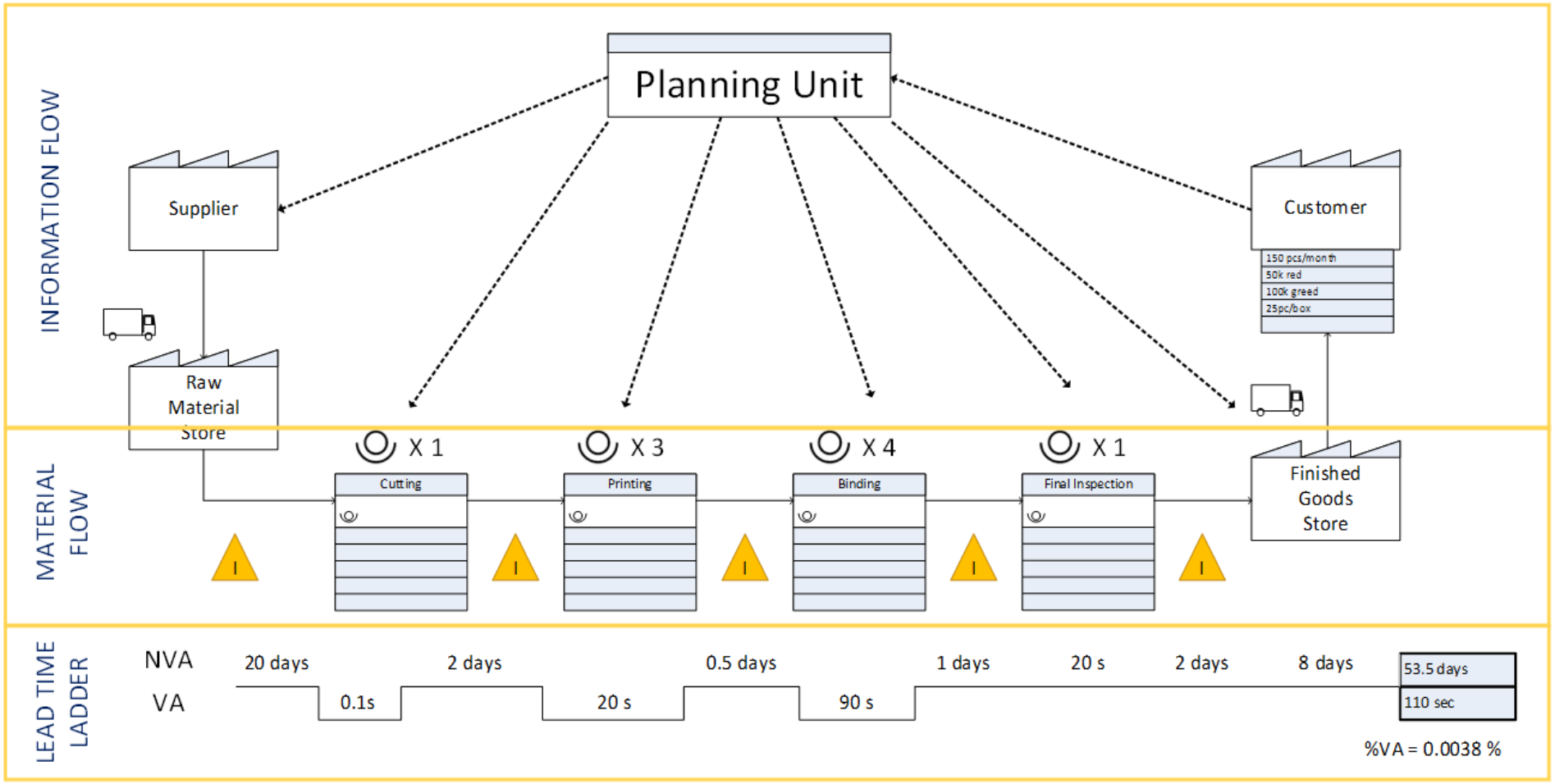
4. The Data Boxes, labour ratios, inventory level and type of movement.

BOTTOM: LEAD TIME LADDER

5. The Value-Added plus the Non-Value-Added Time equals the total Process Time.

6. Most teams are often surprised when presented with this data and it illustrates visually the opportunity.

VSM


INFORMATION FLOW
Planning Unit
Supplier
Customer
150 pcs/month
50k red
100k greed
25pc/box
Raw Material Store
MATERIAL FLOW
X 1
X 3
X 4
X 1
Cutting
Printing
Binding
Final Inspection
Finished Goods Store
LEAD TIME LADDER
NVA
VA
20 days
2 days
0.5 days
1 days
20 s
2 days
8 days
0.1s
20 s
90 s
53.5 days
110 sec
%VA = 0.0038 %

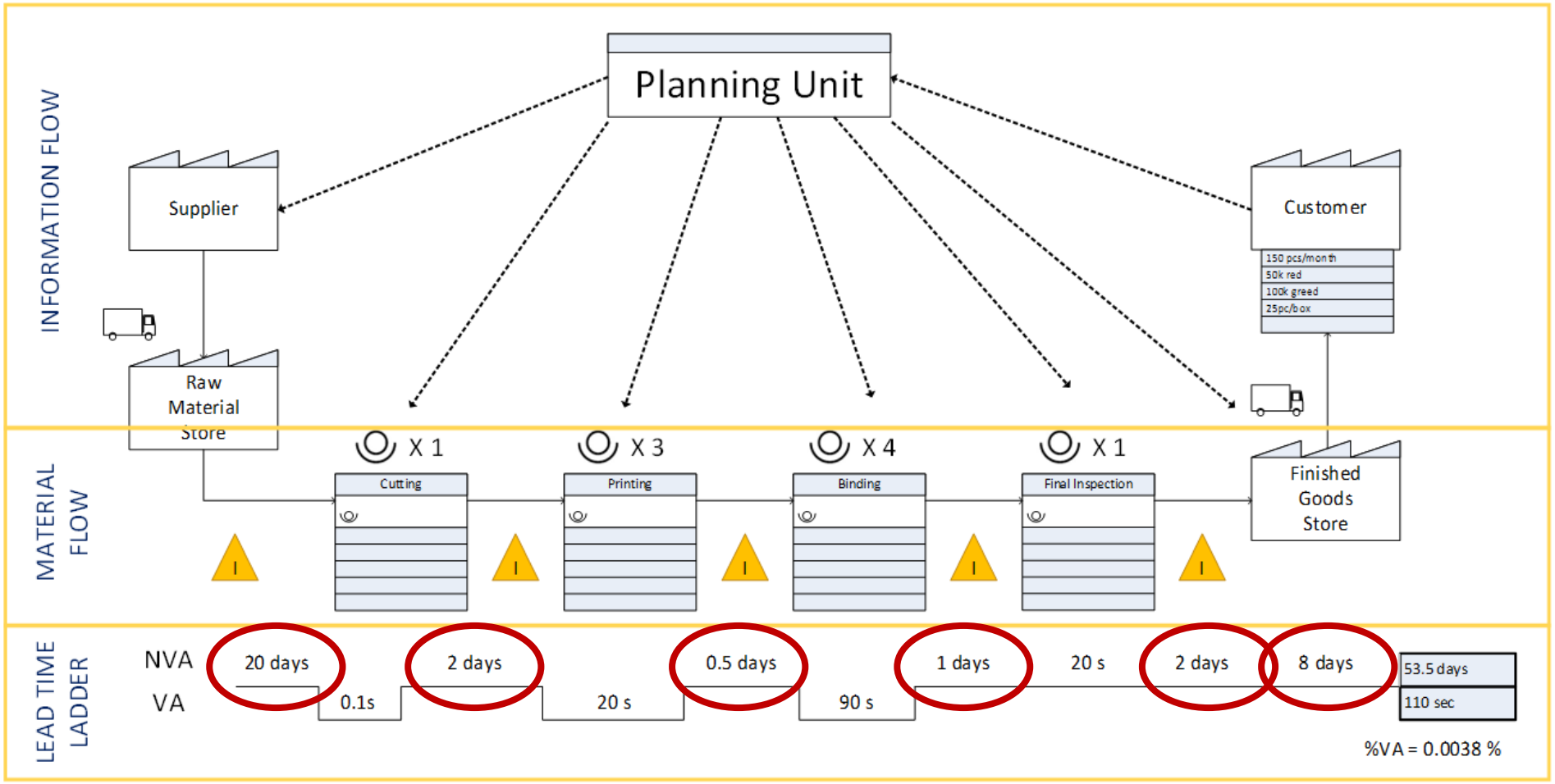
Constructing a VSM:

Step 1 – Understand Value.

The first step to developing a Value Stream Map is to understand the concept of "Value-Adding Activities." There are three criteria for Value-Adding Activities:

1. The customer wants us to do it.
2. The material or information is being processed or transformed into final products.
3. It is done right the first time.

VSM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Finished Goods Store
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VSM

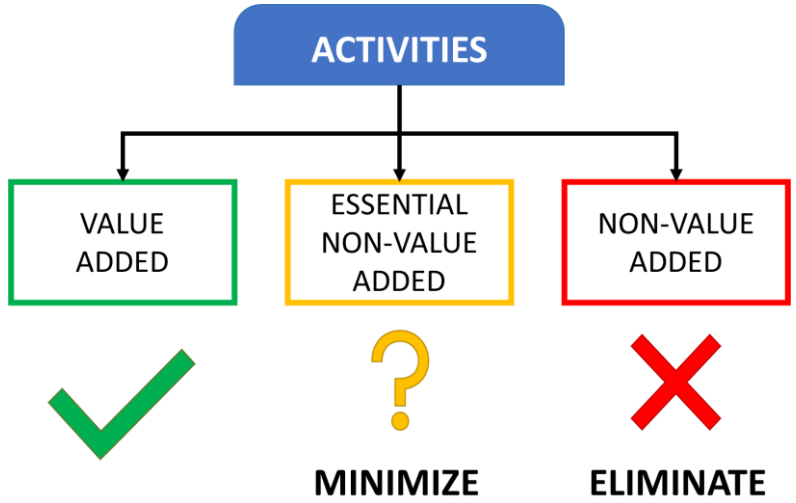
Constructing a VSM:

$$Process\ Cycle\ efficiency = \frac{Value - added\ time}{Cycle\ time}$$

Process Cycle Efficiency.

There is a metric that helps to identify how much of a process is value-added. It requires a few things:

1. **Map** the process.
2. Identify the **Value-added** steps, **Non-value-added** steps, and the Business non-value added steps (but necessary).
3. **Stratify** the map according to the items in two.
4. Add a **time dimension** to the process steps.



VSM

Constructing a VSM:

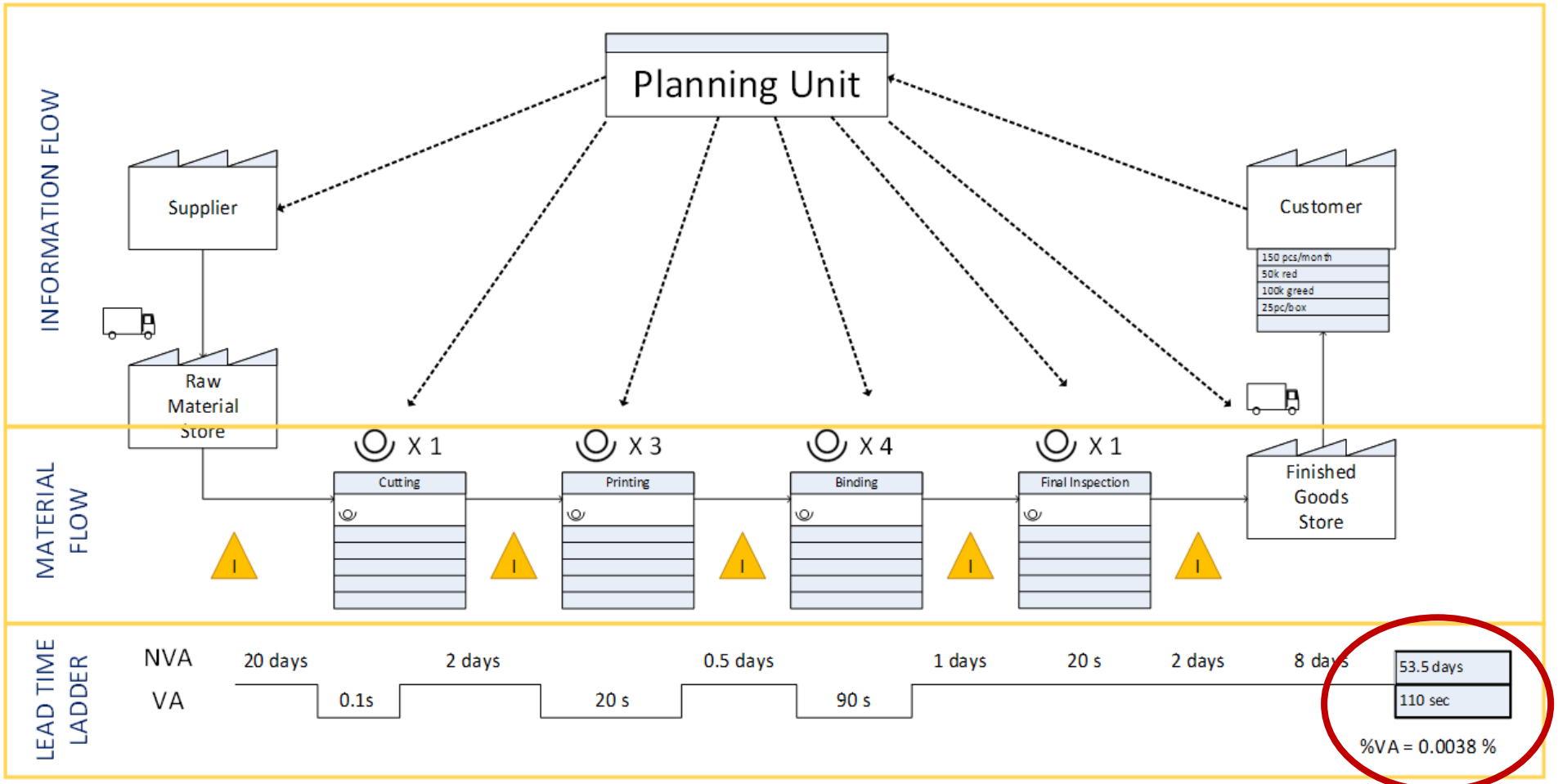
$$Process\ Cycle\ efficiency = \frac{Value - added\ time}{Cycle\ time}$$

The process A has a cycle time of 860 seconds. We then calculate the Process Cycle Efficiency as follows:

$$Process\ Cycle\ efficiency = \frac{182}{860}$$

$$Process\ Cycle\ efficiency = 0.21\ or\ 21\%$$

VSM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MATERIAL FLOW
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X 3
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X 1
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Final Inspection
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20 days
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20 s
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8 days
0.1s
20 s
90 s
53.5 days
110 sec
%VA = 0.0038 %

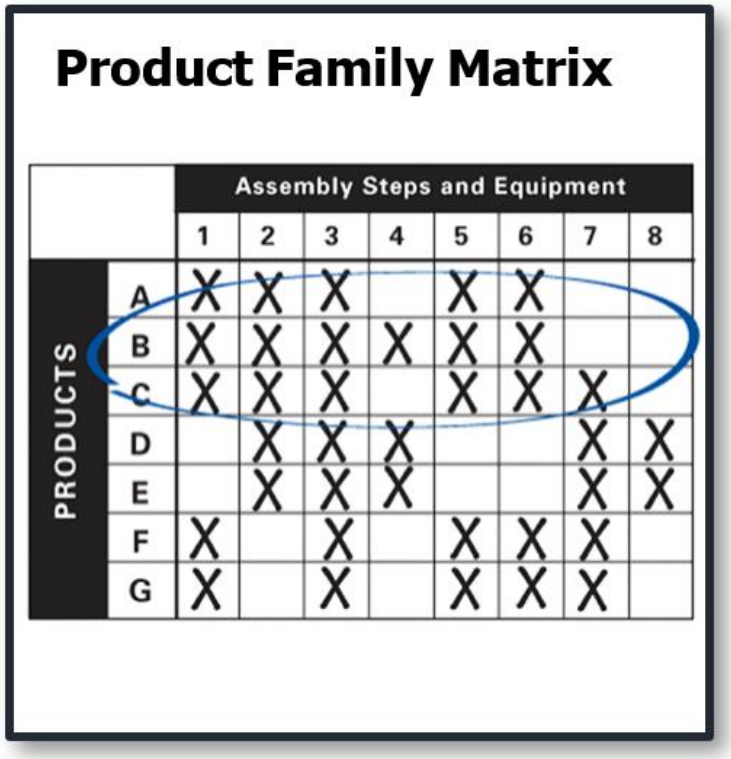
Constructing a VSM:

Step 2 – What is the Focus?

To define focus, use a tool like a **Product Family Matrix** to help us understand which of the products or family of products has the "biggest bang for the buck."

When choosing the product or product family to map, consider:

- Customer Return Rates.
- Greater Proportion of Units.
- Largest Dollar Volume.
- An output of a process that does not meet specification.
- Complex Products (use the most processes).



Constructing a VSM:

Step 3 – Go to Gemba (Process Walk).

Develop the VSM somewhere that the team has quick and easy access to the process.

VSM

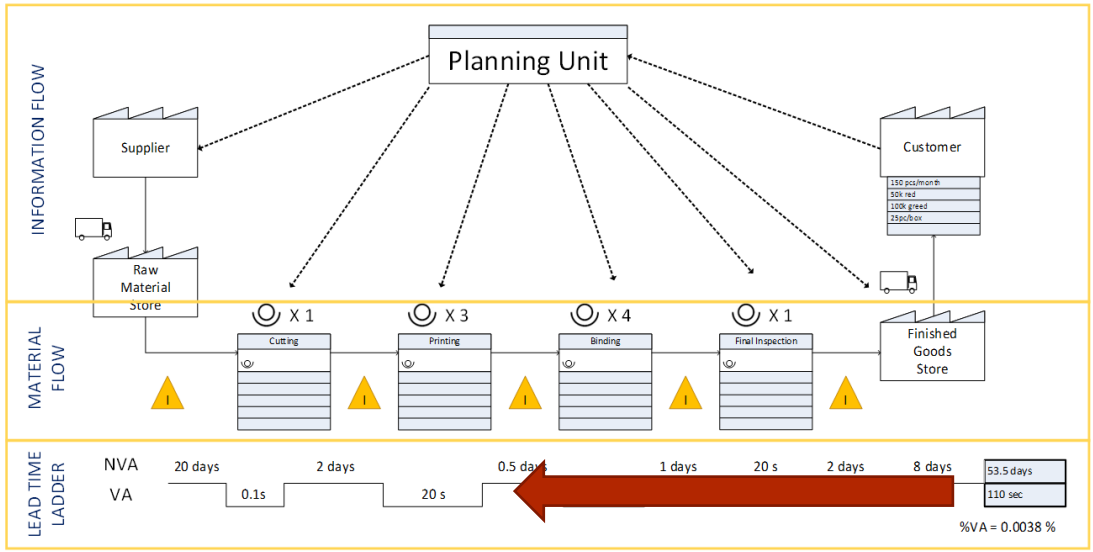
Constructing a VSM:

Step 4 – Work Backwards

The most troublesome part when drawing a VSM is not to turn it into a flowchart where we track all the different paths of the process.

There is a trick to avoiding that mistake, start from the end of the process and work backwards.

When we start with the end customer and work backwards, we have no choice but to track that "one thing."



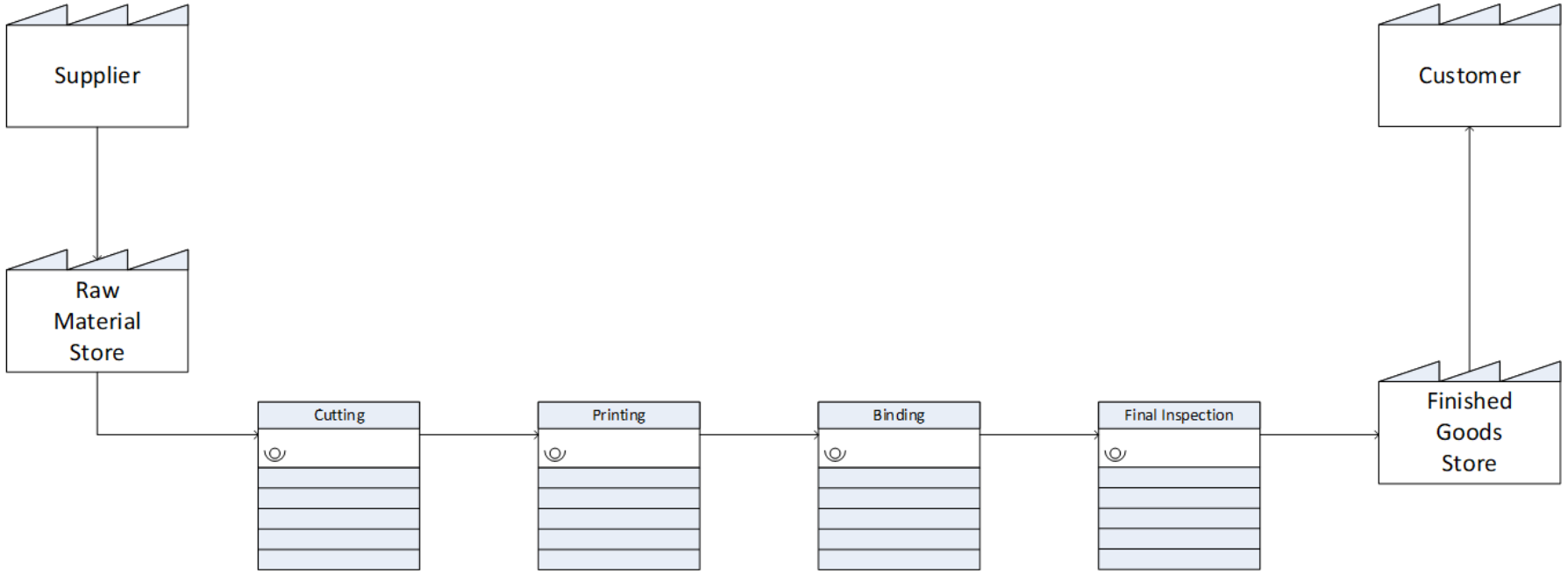
VSM

Constructing a VSM:

Step 5 – Define the basic Value Stream

From the data that we have collected from "Going to Gemba", define the basic steps in the Value Stream.

VSM

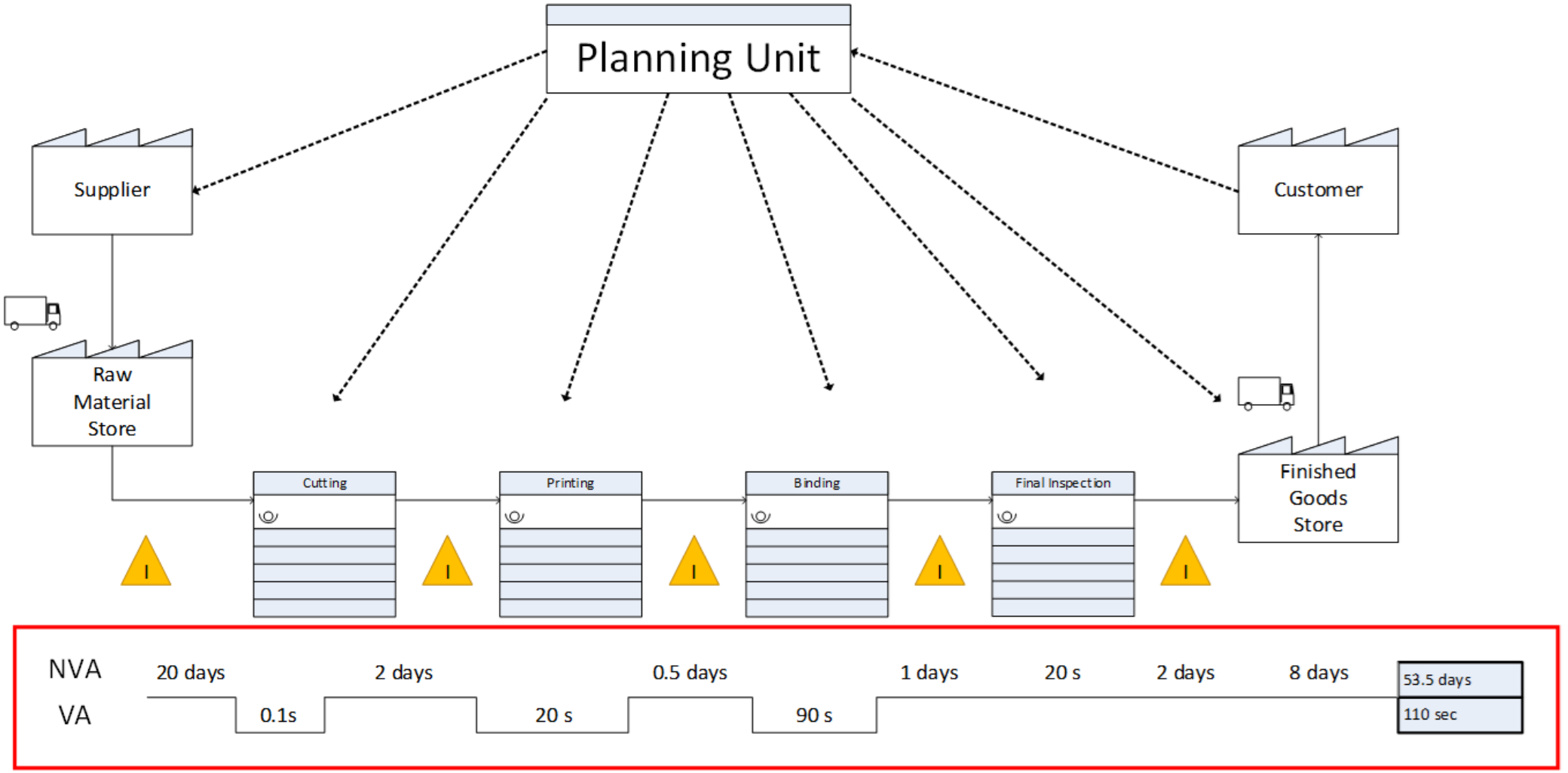

Supplier
Raw Material Store
Cutting
Printing
Binding
Final Inspection
Customer
Finished Goods Store

Constructing a VSM:

Step 6 – Fill in Queue Times (Time Ladder)

After we define the basic steps in the Value Stream, then we fill in Waiting Times between each process. In most VSM, the focus is on the Cycle Time. Separate the cycle times between NVA time and VA time.

VSM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Final Inspection
Finished Goods Store
NVA
VA
20 days
0.1s
2 days
20 s
0.5 days
90 s
1 days
20 s
2 days
8 days
53.5 days
110 sec

VSM

Constructing a VSM:

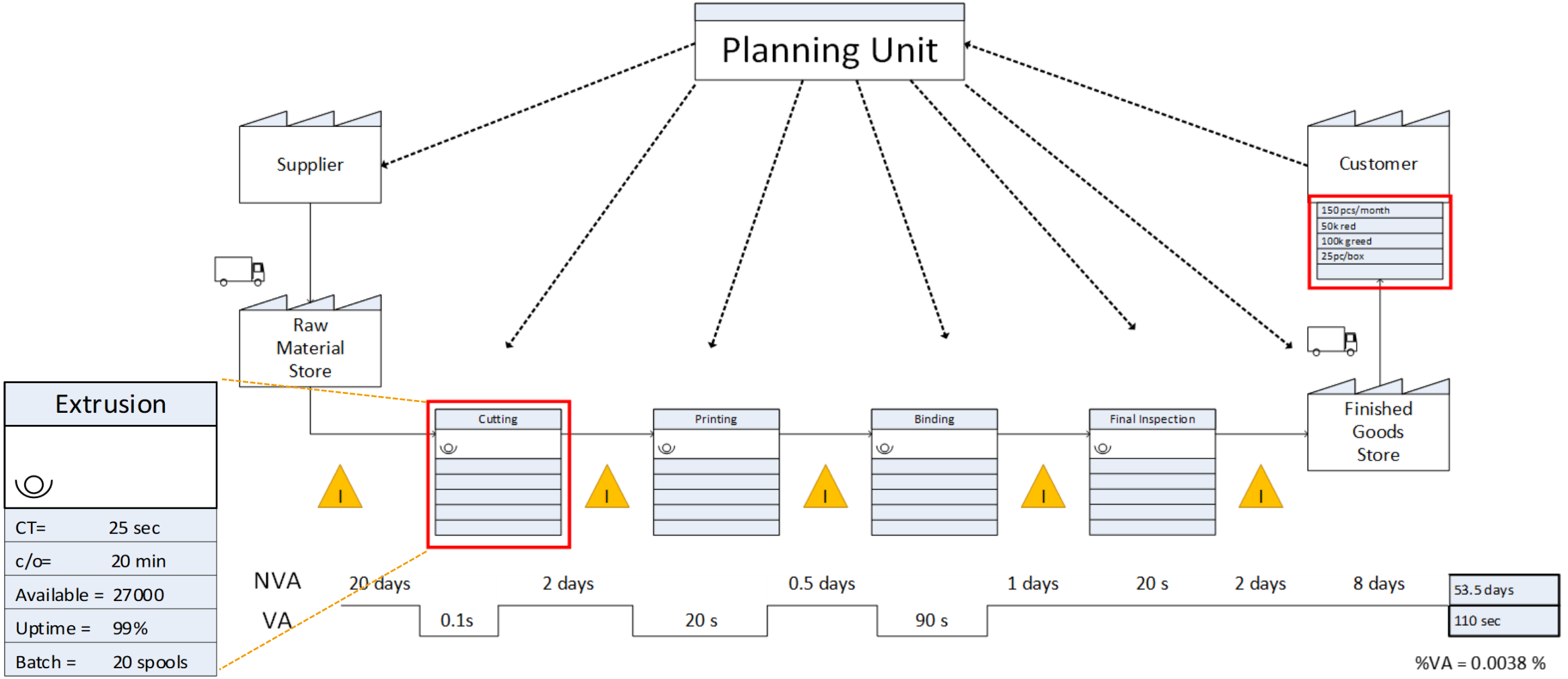
Step 7 – Fill in Process Data

Enter all pertinent process data in boxes beneath each main process step box (from step 5).

We need the following information to construct a map at a minimum. Some maps are more comprehensive, but not always necessary.

- Cycle Time.
- Labour force ratio, number of workers.
- Inventory level between each process.
- Batch sizes.
- Defect performance (or the Quality in OEE).
- Lead times from raw material, each process, delivery to the customer.
- Inspection may be a separate process - be prepared to study it as a process.

VSM


Planning Unit
Supplier
Customer
150 pcs/month
50k red
100k greed
25pc/box
Raw Material Store
Finished Goods Store
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CT= 25 sec
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Available = 27000
Uptime = 99%
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NVA
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20 s
90 s
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110 sec
%VA = 0.0038 %

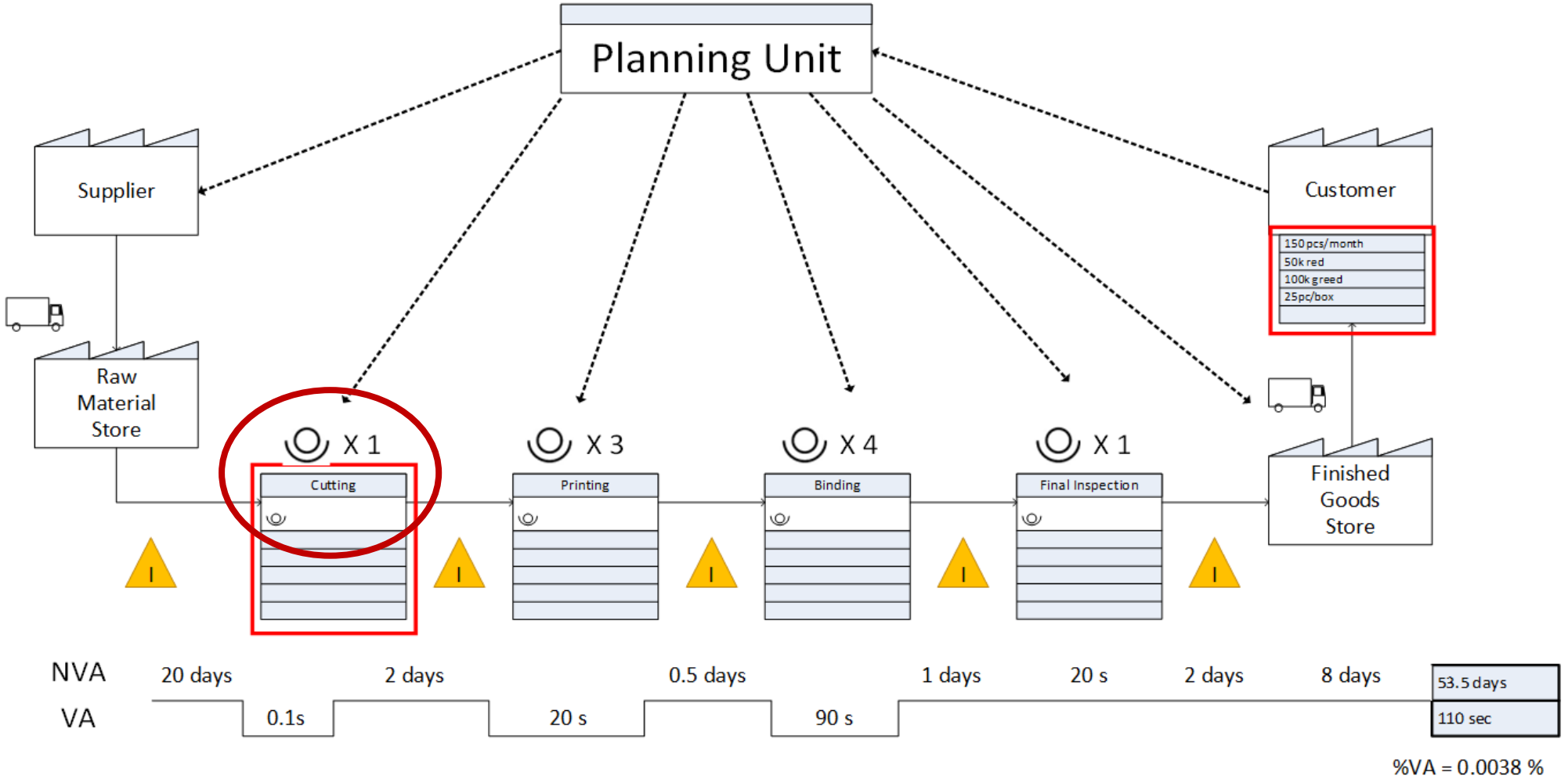
Constructing a VSM:

Step 8 – Add manpower (Capacity Labor)

It is important to understand the amount of capacity in labor at each process. When developing the VSM, we might see that a bottleneck exists because of an imbalance in labor.

Add a face icon over each process box to define the number of laborers that were in the process when the value stream was captured.

VSM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Final Inspection
NVA
VA
20 days
0.1s
2 days
20 s
0.5 days
90 s
1 days
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53.5 days
110 sec
%VA = 0.0038 %

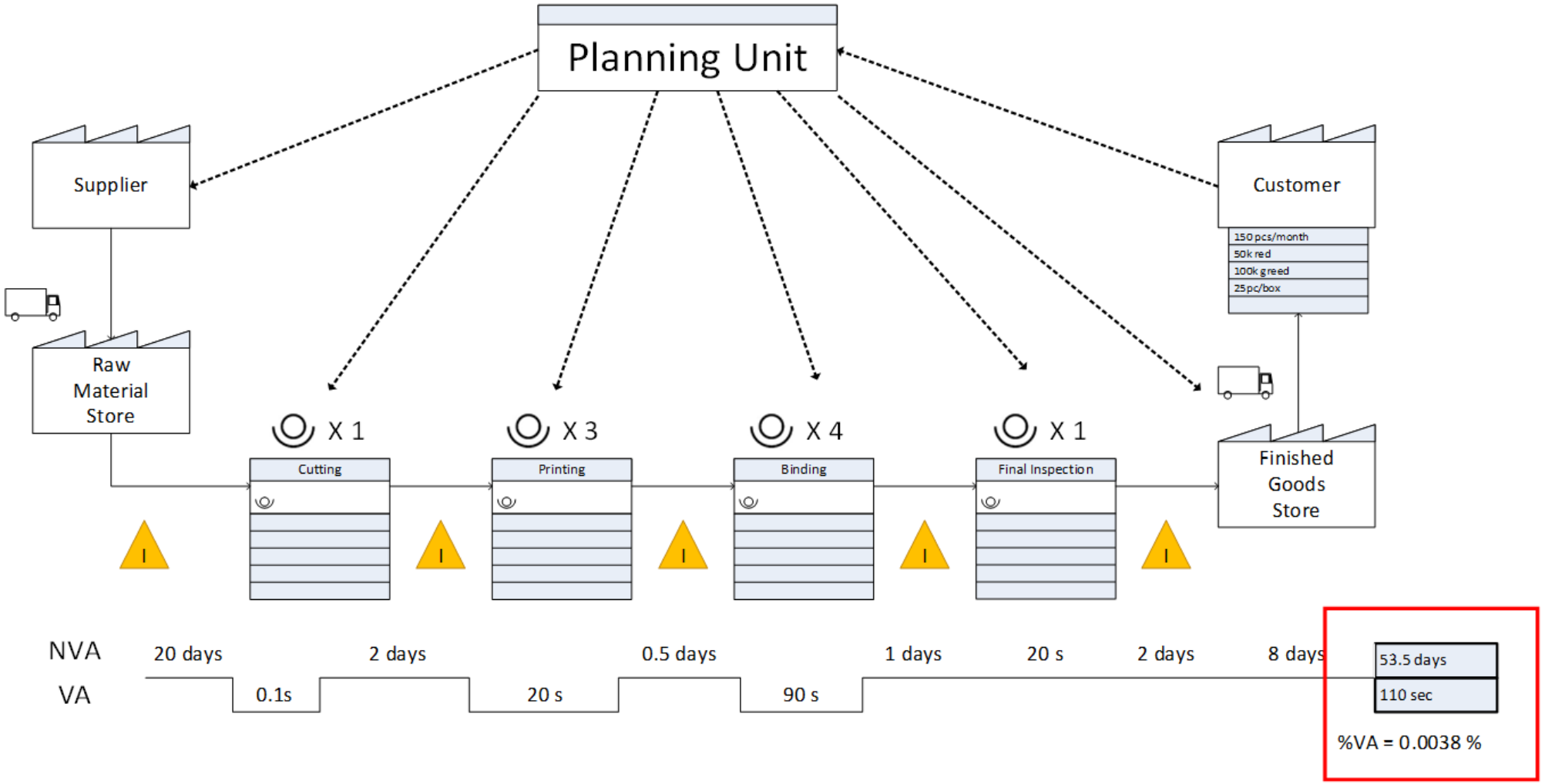
Constructing a VSM:

Step 9 – Add the Value-Added Percentage (%VA)

Add up all the data in the VA section and divide it by the Total Process. Cycle Time (the time it takes for the product or product family to travel through the entire value stream).

Convert the resulting number to a percentage (%) by multiplying by 100. This will give you the Percentage of Value-Added activities or %VA.

VSM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90 s
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110 sec
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VSM

Constructing a VSM:

Step 10 – Interpret the VSM

The VSM should now be a very pictorial view of the process and what has happened to that product or family of products.

The VSM should help build a **roadmap for Continuous Improvement projects** to get the process to the desired state.

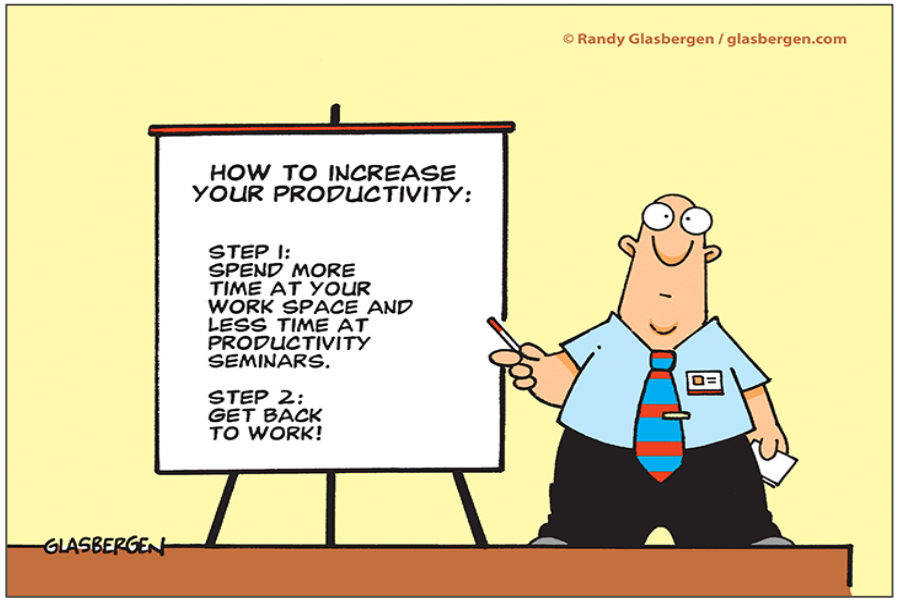
- Bottlenecks / Constraints.
- Long Cycle Times.
- Poor Uptimes.
- Excessive Setup Times.
- Poor Quality / Rework.

VSM

Constructing the Future State VSM:

1. **Define the Takt Time:** The speed at which the "customer(s)" demands the product. This will tell us how many products need to be produced in, for instance, a day or a shift.

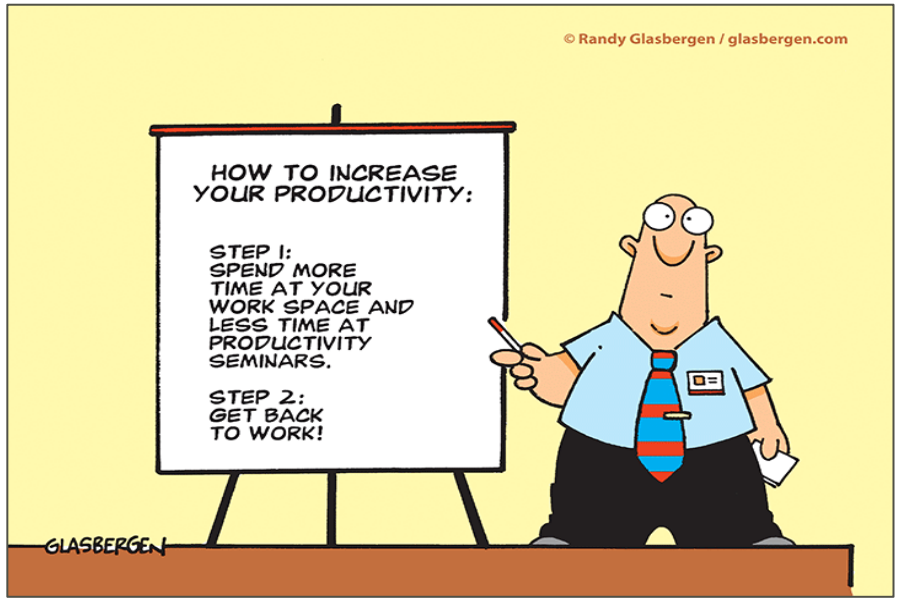
2. **Determine** the way inventories are controlled. **One-piece Flow**



VSM

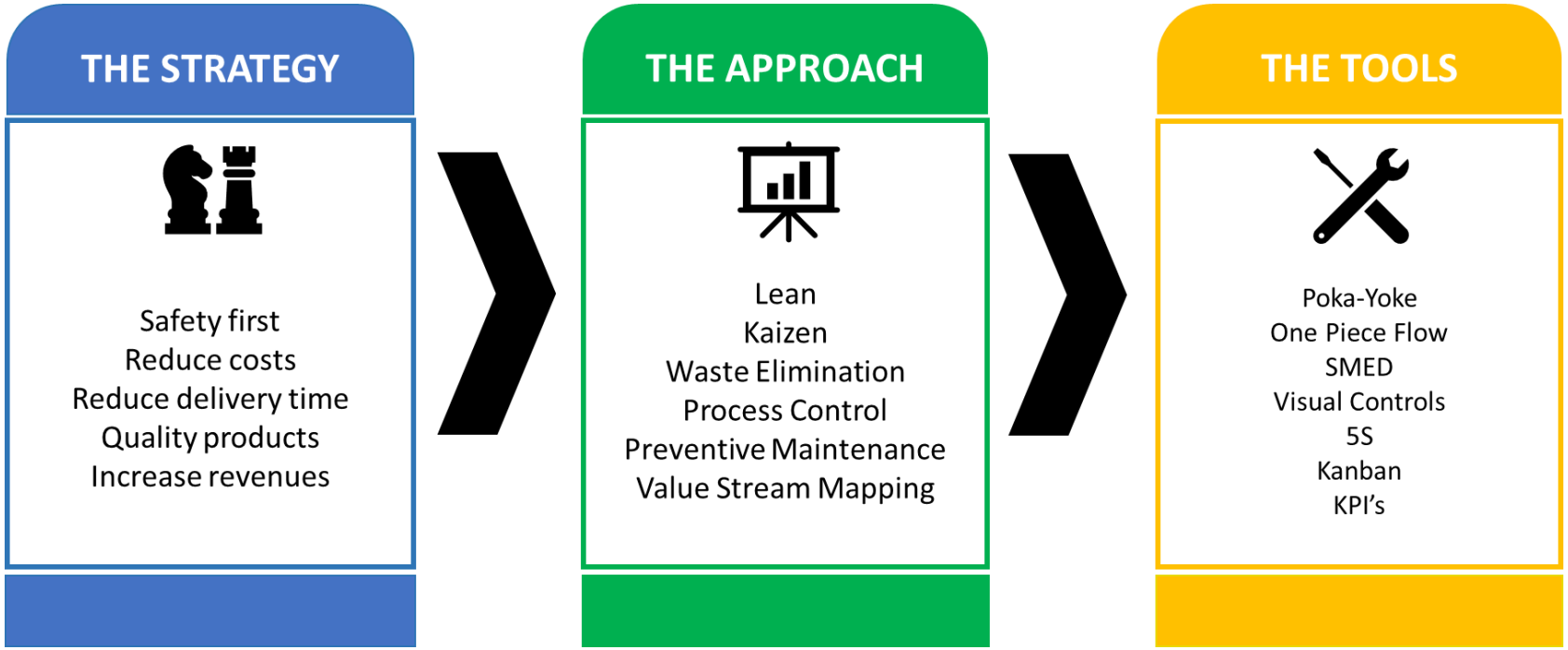
Constructing the Future State VSM:

3. When one piece flow **is not possible** and it is therefore not possible to get rid of the inventory, check whether we can transform the triangle into controlled inventory.
    - ✓ **FIFO-Lane** (First In First Out) or
    - ✓ A **supermarket (Kanban System)**
4. **D**etermination of the **Pacemaker process**.
5. **Leveling the Production** mix (**Heijunka**).
6. **Amount of work quantities (Pitch or Interval).**
7. **Reducing changeover** times.



VSM

VSM and Continuous Improvement:



VSM

VSM and Continuous Improvement:

The goal is to develop a corporate culture that provides the best possible product to meet or exceed customer needs and expectations. This is done by **making continual improvements to the value stream**.

The purpose of the value stream map is to **expose opportunities** and **help prioritize**. One major goal is often to reduce the cash conversion cycle from payment outlay to payment receipt.

VSM and Continuous Improvement:

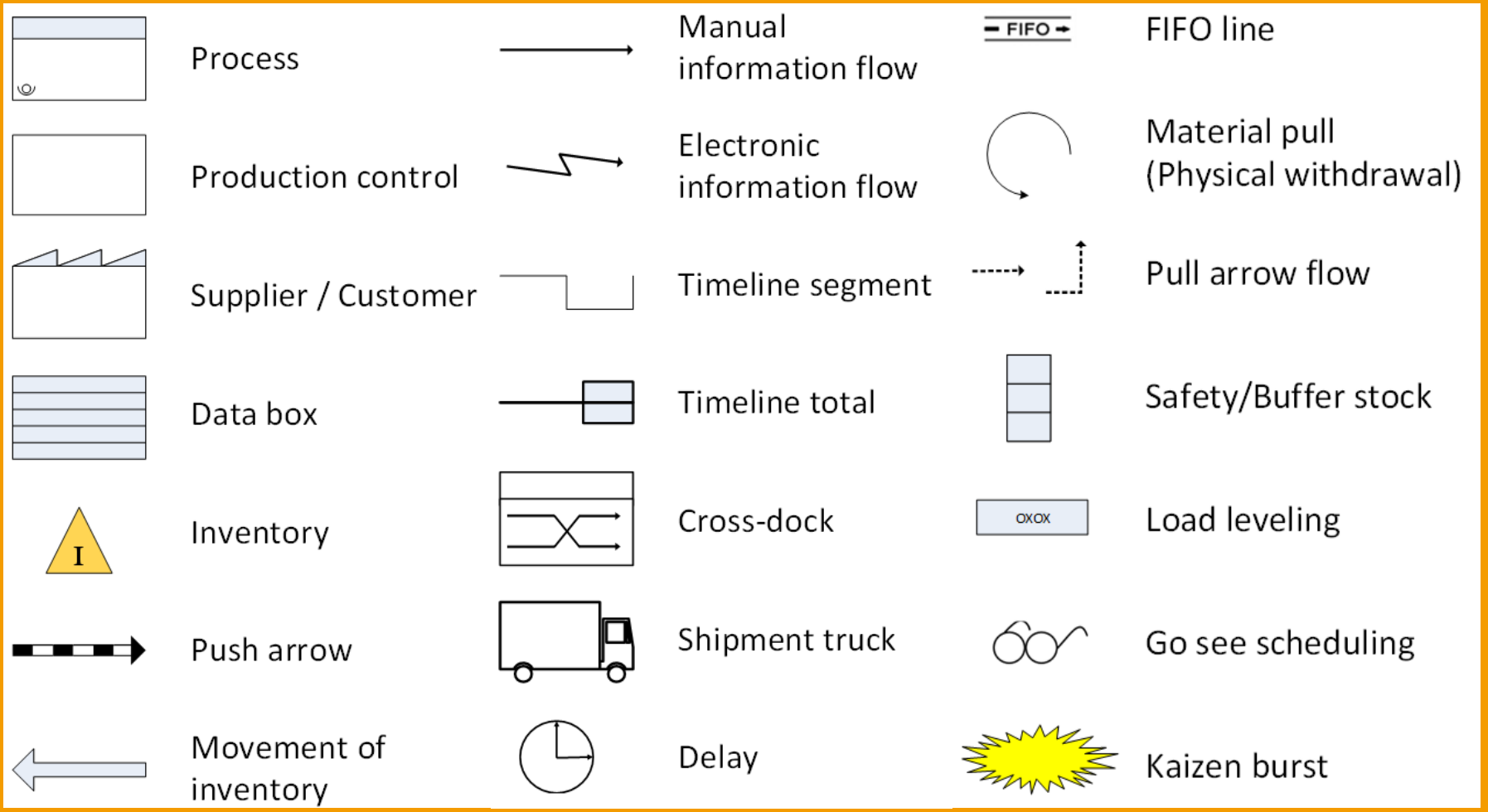
Some opportunities found from value stream mapping can be addressed through a **Kaizen Event** or **Blitz**.

Is better to call them "**Quick –Wins**" or "**Lean Experiments**". It will speak everyone's language and encourage curiosity and participation.

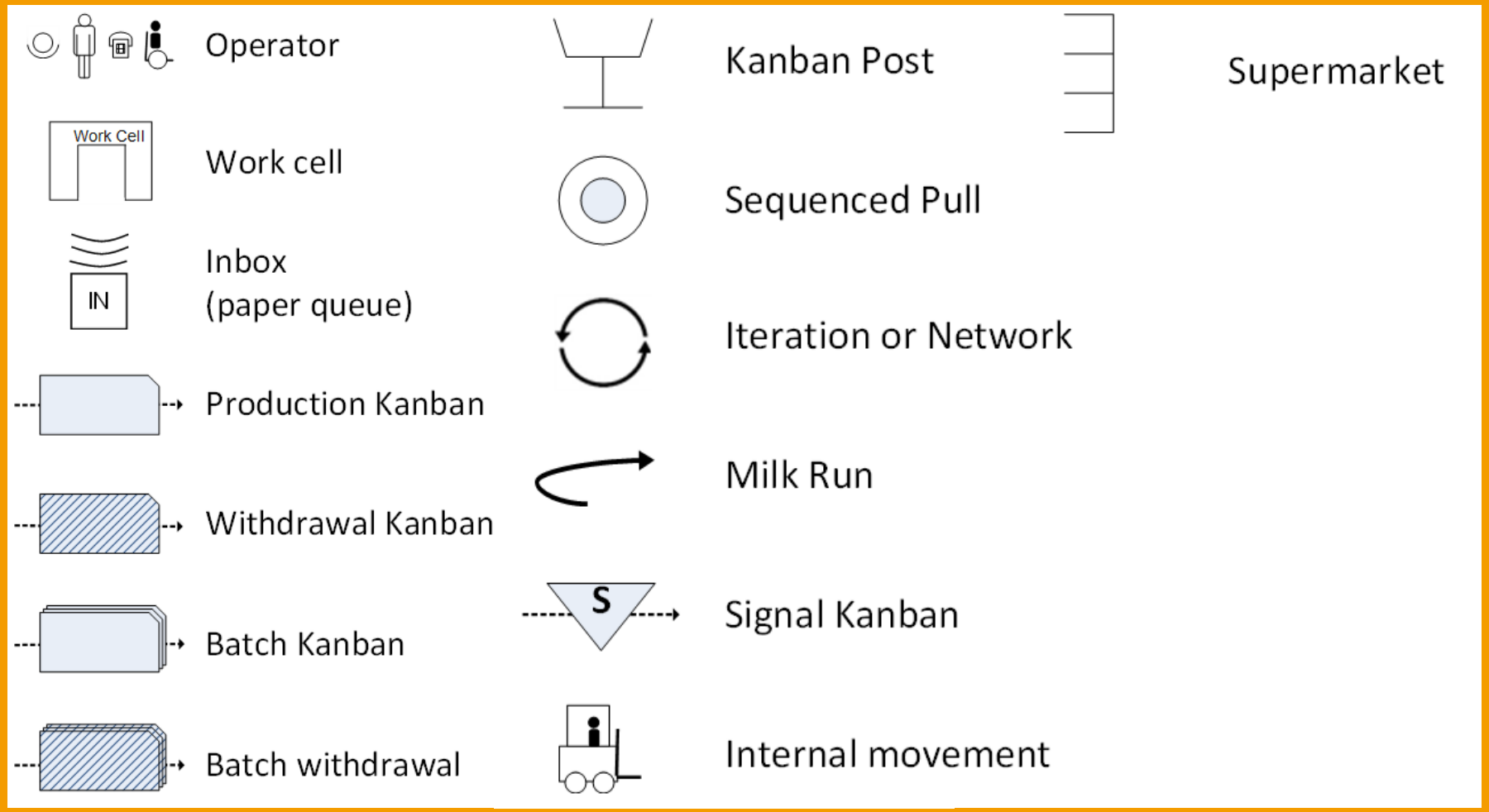
These are projects that are more than simply **doing** but yet do **not require a formal** Six Sigma project approach.

The solutions are known and agreed upon, but the **team** and their **collective effort** would be best to solve the problem.

VSM ICONS


Process
Production control
Supplier / Customer
Data box
Inventory
I
Push arrow
Movement of inventory
Manual information flow
Electronic information flow
Timeline segment
Timeline total
Cross-dock
Shipment truck
Delay
FIFO
FIFO line
Material pull (Physical withdrawal)
Pull arrow flow
Safety/Buffer stock
Load leveling
Go see scheduling
Kaizen burst

VSM ICONS


Operator
Work Cell
Work cell
IN
Inbox
(paper queue)
Production Kanban
Withdrawal Kanban
Batch Kanban
Batch withdrawal
Kanban Post
Sequenced Pull
Iteration or Network
Milk Run
S
Signal Kanban
Internal movement
Supermarket

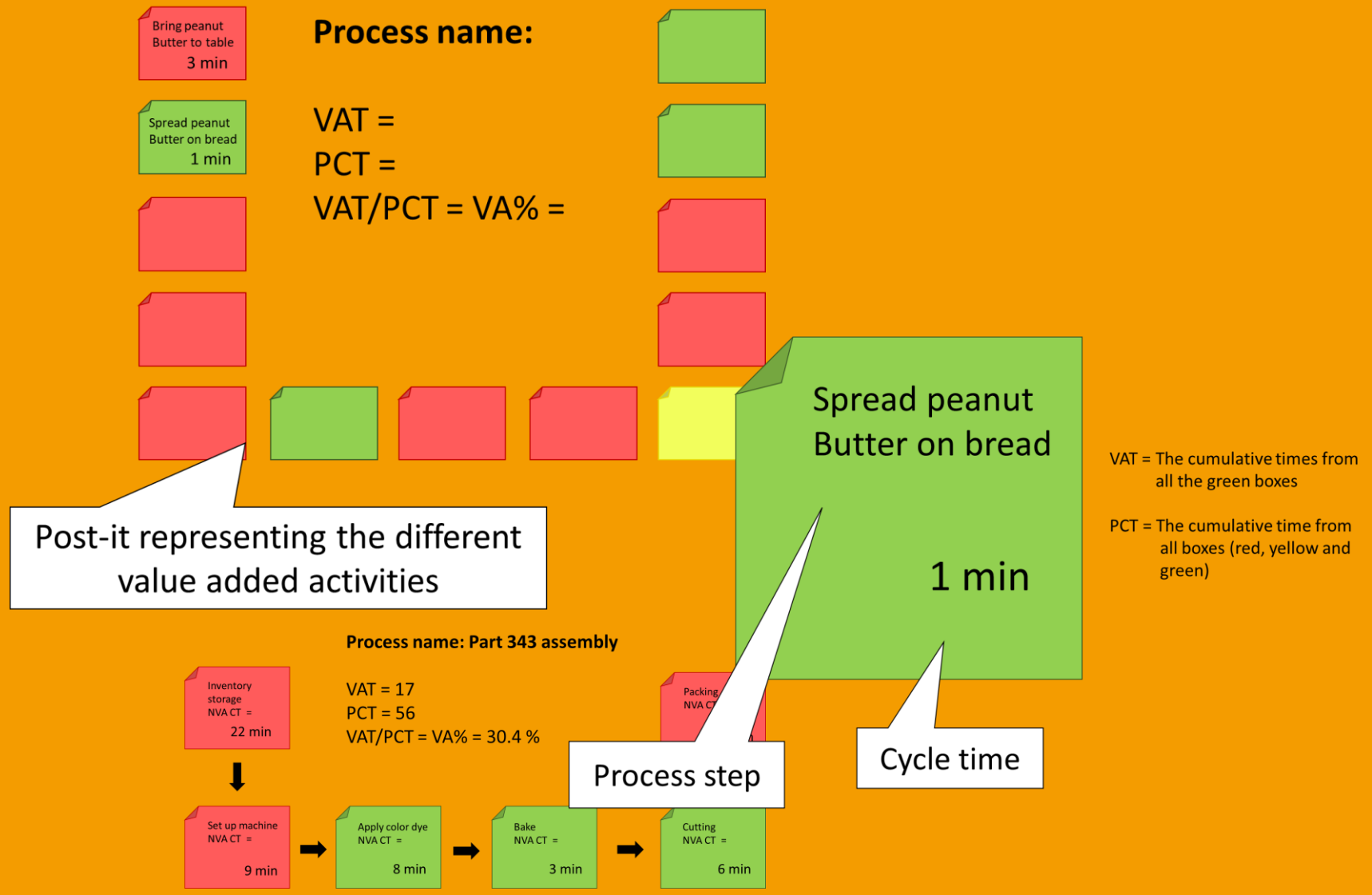
TOOLBOX

VSM Worksheet

Step	Process	Inventory	VA/NVA	CT/VA	CT/NVA	Crew	CO	Uptime	Waste	Available Sec
1	Receiving		VA	10 min		1		1	0.05	27600
	Cases	350	NVA		24 hrs					
2	Cutting		VA	3 min		1	10 min	1	0.01	27600
	units	400	NVA		24 hrs					
3	Cooking		VA	45 min		2				27600
	units	400	NVA		7 hrs					
4	Cooling		VA	30 min		2				27600
	units	200	NVA		5 hrs					
5	Bagging		VA	30 min		4	30 min		0.05	27600
	units	250	NVA		2 hrs					
6	Packing		VA	40 min		4				27600
	units	250	NVA		2 hrs					
7	Freezing		VA	45 min		2				27600
	units	250	NVA		24 hrs					
8	Palletizing		VA	45 min		1				27600
	cases	250	NVA		24 hrs					
9	Shipping		VA	30 min		1				27600

LEARNING HUB

VSM



Takeaways

- The 7 steps in **Value Stream Mapping** will help transform a value stream into a more flexible production line with as little waste as possible.
- Going to "**where the action happens**" is paramount to succeed with VSM methodologies.
- **Change will take time,** be patient**,** start small**,** encourage "**Lean Experiments**". Engage leaders to buy-in.
- Many Lean experts will start with current state data and look for "**hot points**"**, bottlenecks** or **issues** that can be resolved easily. This method typically looks for the "**low hanging fruit**" and prioritizes changes to the process accordingly.

Thank You

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Value Stream Mapping

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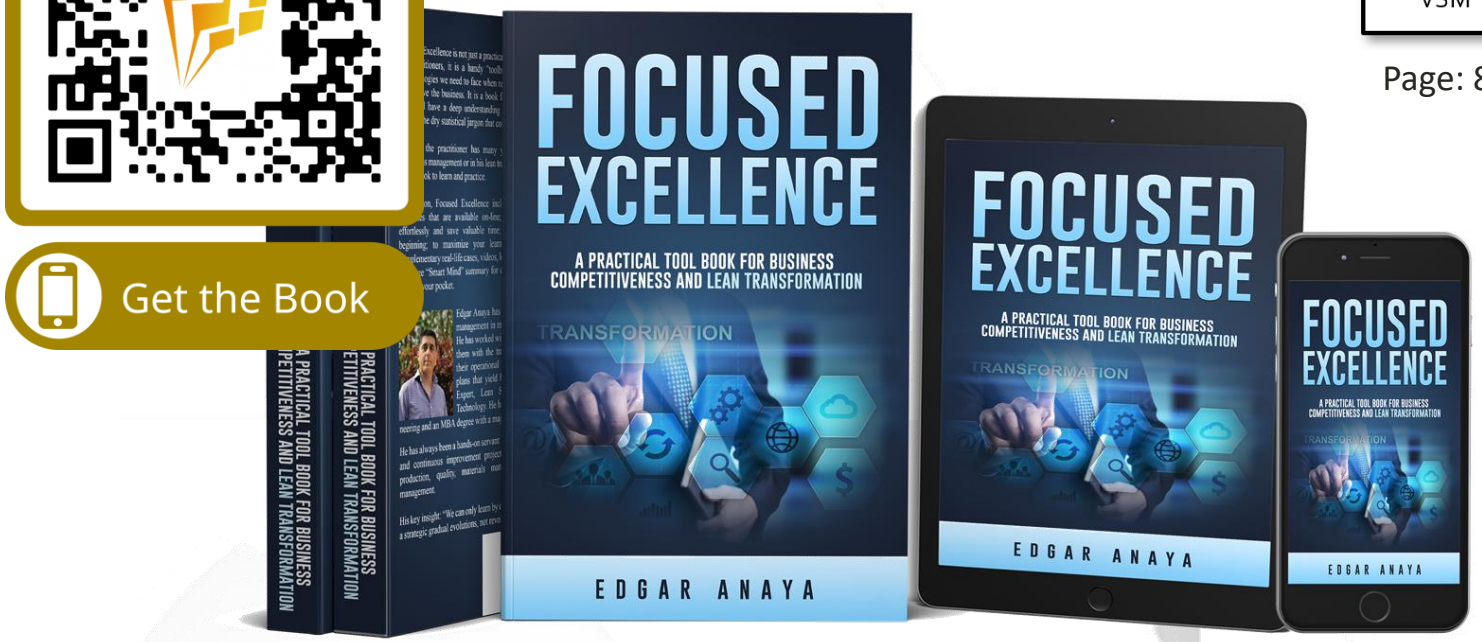

TOPIC

VSM

edgar@pathstonegroup.com

Reference: Focused Excellence
by Edgar Anaya

A Practical Tool Book for
Business Competitiveness and
Lean Transformation