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Toolkit Guide

Value Stream Mapping

Introduction

A Value Stream Map is a specialised type of process map that document and analyse the flow of materials and information within a process. It is a visual tool that depicts all crucial steps within a process and quantifies the time taken to perform each step and for the whole process to be completed. This allows you to analyse the map to see which steps add the most value to the customer, (in healthcare, your customer is usually the patient).

Value to the patient is defined any activity which improves the patients' health, wellbeing and experience (*Institute of Innovation and Improvement, 2007*). The customer should be satisfied with it and the step within the process must be performed correctly the first time. Examples of activities that add value to the patient are time with a clinician within an outpatient clinic or on a ward round, having treatments, having a test performed etc… Anything that does not accomplish this is non-value adding and is considered waste. Waste is known as Muda in Japanese. See our TIMWOODS Toolkit Guide here for more information. There are also essential non-value adding steps that are necessary within a process but do not necessarily add value to a patient e.g., filling in paperwork to ensure regulations are met.

Value stream mapping is an effective approach when investigating pathways that flow through the healthcare system. Improving the flow of patients can have a positive impact on the efficiency of services as well as patient and staff experience.

What is a value stream?

A value stream is a series of steps within a process that a piece of work that passes through from beginning to end. These steps can be value adding or they can be waste which includes waiting and delay. Each piece of work within a process is called a value object. For example, if the patient was waiting for an x-ray the value object is the x-ray. A value stream map allows you to see the journey of the value object, as it passes along the value stream.

Rationale

Using a value stream map is helpful to understand and improve how value is created within a process and how that value is delivered to the customer. Mapping the current and future state map can help you to:

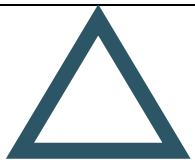
- **Visualise** the flow of materials and information within processes.
- **Identify and eliminate** waste within processes
- **Streamline** the value adding activities of processes after the waste has been identified and removed.
- By **involving** stakeholders, you can agree on the current state and how you want your process to look in the future and agree an action plan together.
- **Focus** on the needs of the customer (Patient, staff etc…)
- **Continuously improve** your processes.

Background

Value Stream Mapping is a core tool in Lean methodology and has been applied to several industries including healthcare where there are repeatable steps and handoffs within a process. It was created to visualise the flow of materials and information that is needed to produce a product or develop and deliver a service. Value stream maps were made popular through the book Learning to See (*Rother & Shook, 1999).*

Here is a list of the symbols that are used on a value stream map:

Symbol	Name
	Process step
	Pull

	Push
	First in, First Out
	Suppliers
	Work Cell
	Inventory
	Electronic Information Transfer

When to use

Value stream maps should be used to understand the patients' experience and expectations of the service, reduce wastes within a process, increase efficiencies by optimising the use of resources such as equipment, staff, and inventory. Value stream maps are particularly useful when investigating patient flow through a system e.g. initial referral to the final outcome.

How to use

When creating a process map, start by mapping the current state – this is how the process is working now and shows the reality of the process. Everyone involved in the process should be involved in mapping the process – including patients and carers because the main goal of a process map is to understand the value to the customer, therefore we need to ask them what is important to them.

Current State Map

Step 1: Identify the value stream.

Firstly, you will need to ask yourself what is the value stream you want to map? In this example we will map the process of booking an outpatient ultrasound examination. Define the start and the end step so that you know the scope of the process you are mapping. This should describe the process of adding value to a single type of work.

Example:

Value Stream - The process of booking an outpatient ultrasound examination.

Process Map – Start of the process is when the referral been received and stamped by the receptionist and the end step of the process is where the patient receives their appointment for the ultrasound exam.

Start Step:

End Step:

Step 2: Identify the Customer

Next, you will need to identify the customer. When you are doing a value stream map, you will need to decide whether each step is value adding for the customer therefore you need to clearly define who the customer is so we can eliminate any non-value adding steps.

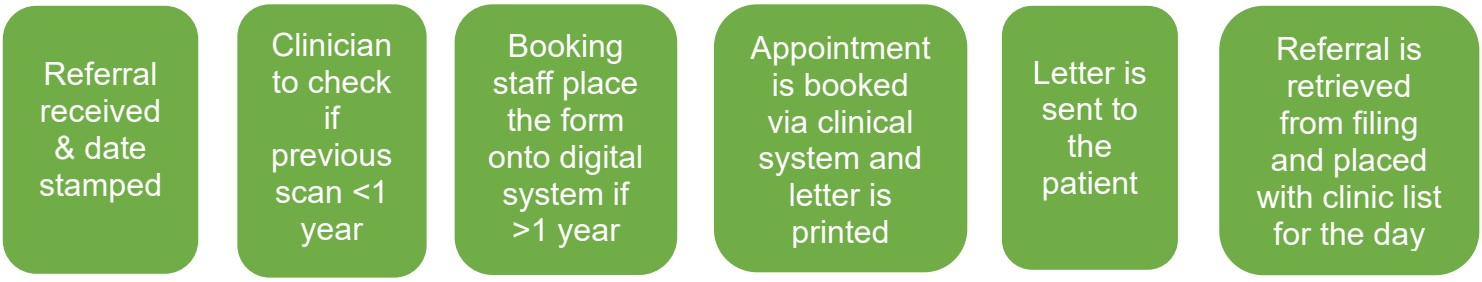
Example:

Value Stream - The process of booking an outpatient ultrasound examination.

Customer: The Patient

Step 3: Walk the Process

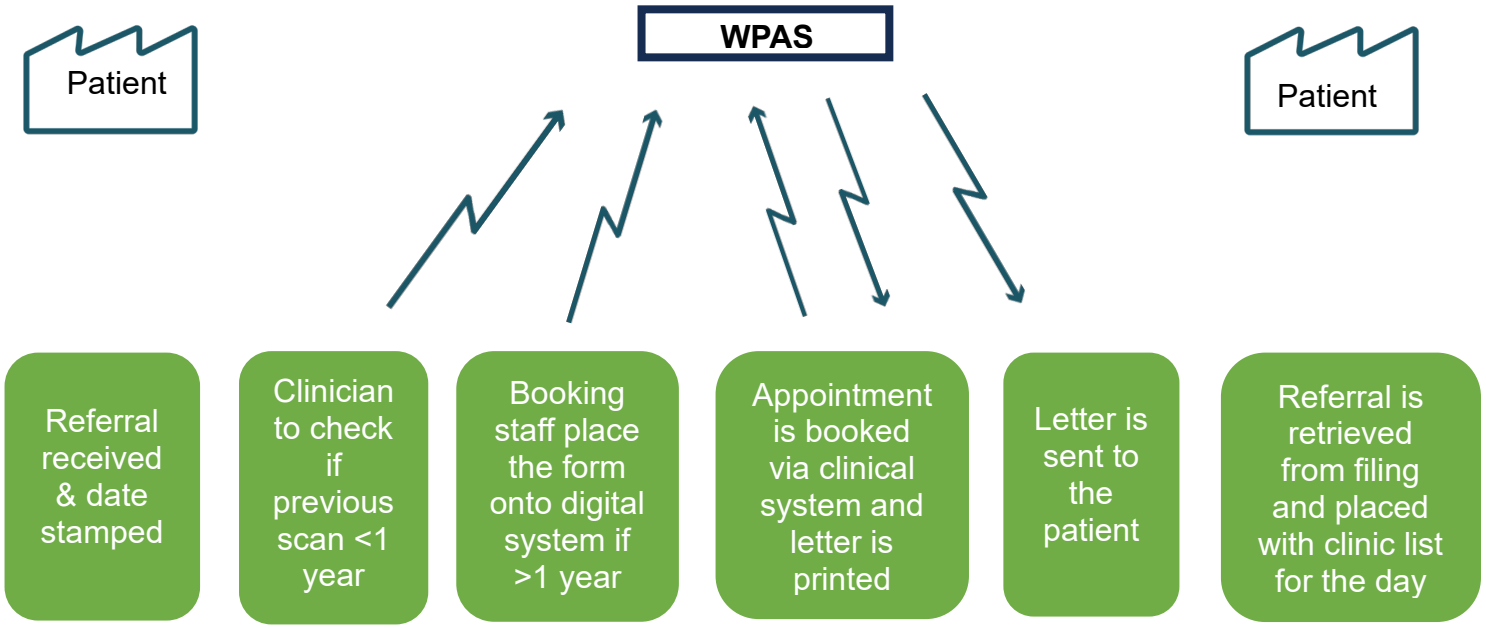
Firstly, you will need to map the process flow. You should do a Gemba walk (see our Gemba toolkit guide here for more information). A Gemba walk enables you to observe the exact process rather than observing what is written in a standard operating procedure (SOP) because this may not be followed. Different team members should map the process separately as they will each observe and see the process differently. Once you have mapped the process flow, map the information flow. This may be different and a separate Gemba walk may be needed. The process flow for the example of the process for booking an outpatient ultrasound examination is seen here:



Step 4: Add the supplier/customer and electronic information transfer

Now, that the process has been mapped, you will need to add the supplier and customer and the electronic information transfer. For this process the supplier and customer is the outpatient ultrasound team. This process involves some digital processes as well therefore you would need to add the digital system you are using.

In this process it is Welsh Patient Administration System (WPAS) and put the correct symbol to show the electronic transfer of information.



Step 5: Gather Data

As you move through the journey, collect data because this will help you understand the opportunities for improvement and help to shape your future state map. Use real observations when possible. Include a data box under each step with the relevant data that you will have measured for each step. Ensure that you make the time units consistent (e.g. seconds, minutes, hours) as this will make the map easier to interpret and will enable you to calculate the overall journey time.

The following are examples of common measurements that could be applied to your process:

Lead Time (LT) – Time taken for a patient to move all the way through a process of value stream.

Cycle Time (CT) – Time that passes between a patient or product finishing one part of a process e.g. having an ultrasound scan and the next patient finishing the same part of the process.

Value Added Time (VA) – Time that adds value to the customer (e.g. Patient)

Number of People (NP) – Number of people that are required to undertake a process of value stream.

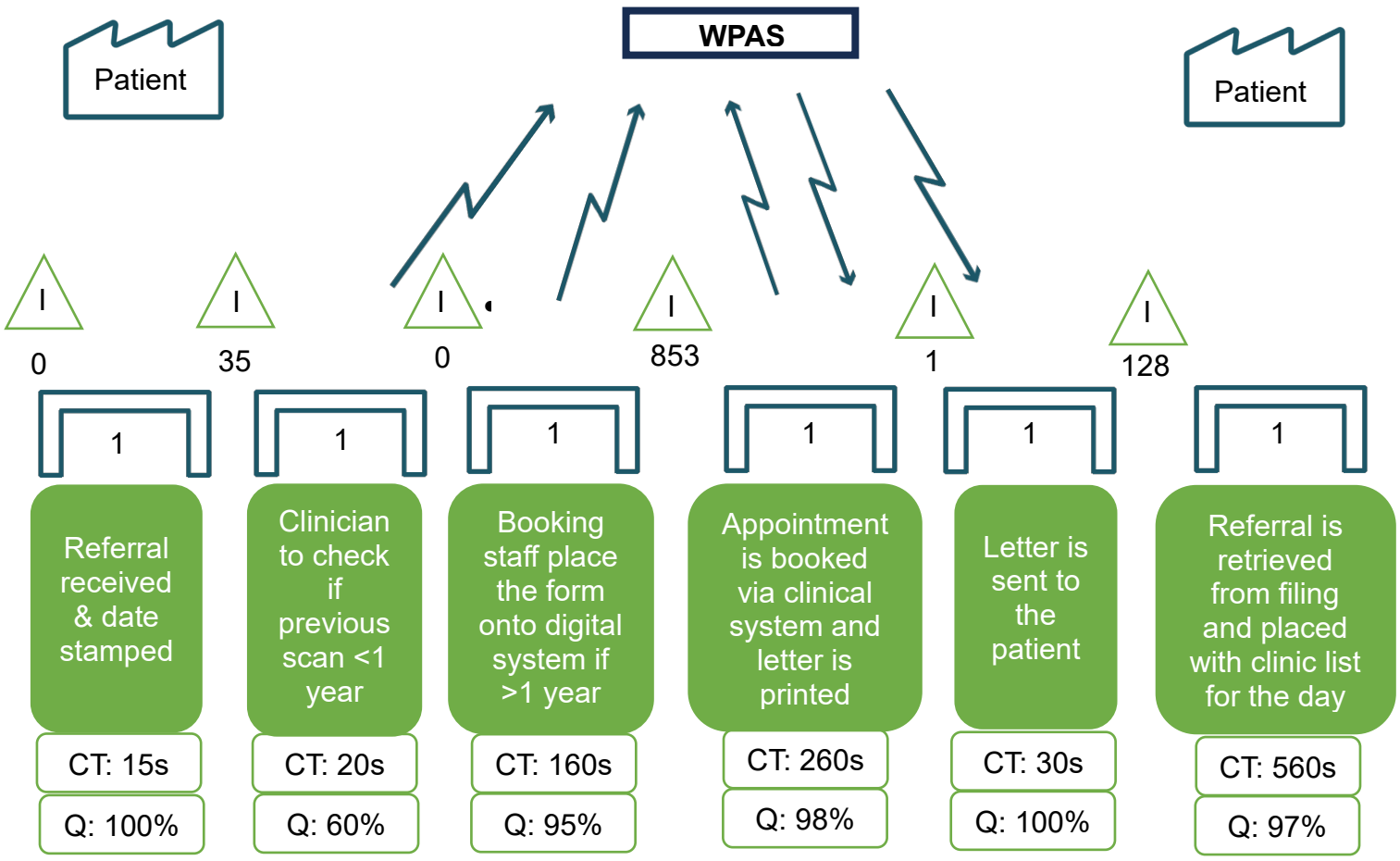
Percentage of the first-time quality (Q) (First-time yield) – Free from defects on the first attempt

Touch Time – The time required to get the patient through the value stream if seamless care were being delivered (i.e. all waste removed).

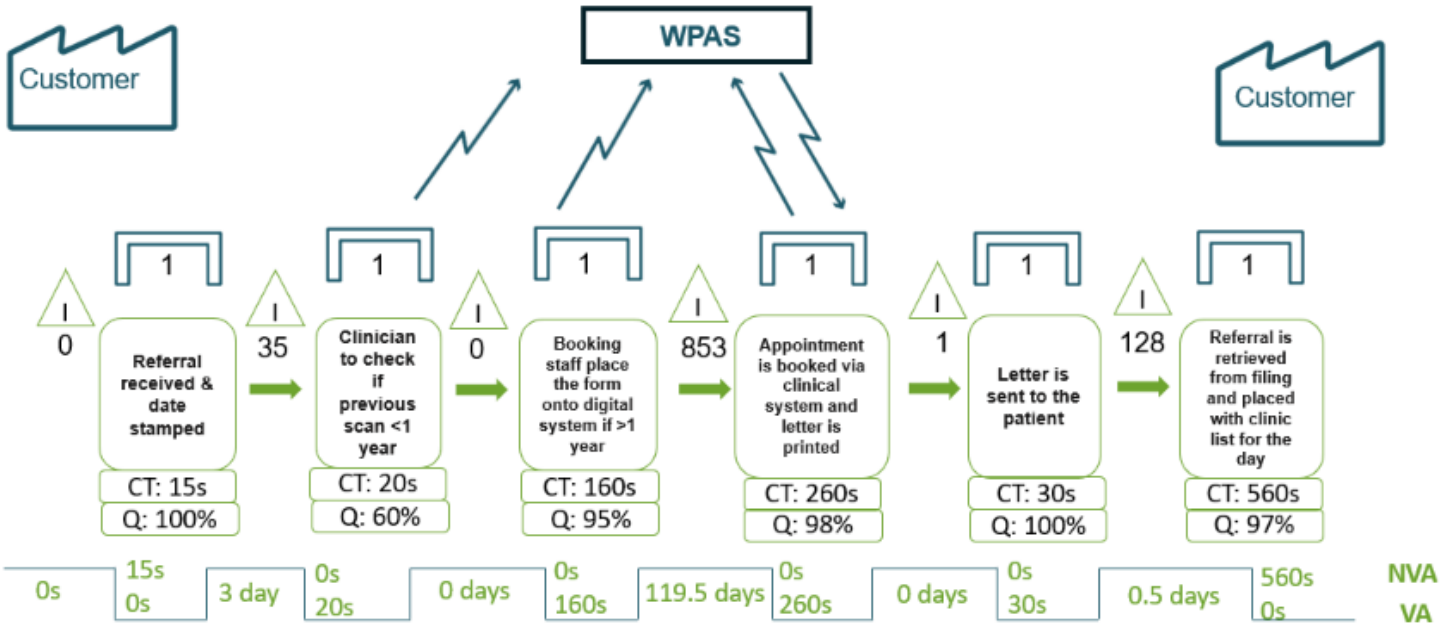
Here for the process of booking an ultrasound exam, the cycle time, number of people, and first-time quality has been added.

Example: Booking process for an ultrasound

Adding the cycle time, first-time quality, number of people for each step, and inventory



Adding the waiting time between each step, the value-added (VA) time and non-value-added (NVA) time for each step of the process



Calculate the total Value-added time.

To calculate the total value-added time, you will need to get the data from the lines at the bottom of your map and add these together.

Example from above:

20s + 160s + 260s + 30s = 470s

Therefore, the total value-added time in this process is 470s.

Calculate the lead time.

To calculate the lead time, you will need to as the value-added time, non-value-added time, and the waiting time. For this example:

Lead time = sum of waiting + sum of cycle times for each step

Waiting time = 1 + 3 + 119.5 + 0 + 0.5 = 124 days

Cycle Time = 15s + 20s + 160s + 260s + 30s +560s = 1045s

Lead time = 124 days + 1045s (0.1 days) = 124.01 days

Therefore, the lead time for this process is 124.01 days.

Step 6: Validate the Map

The map should be validated by people who do the process but were not involved in the original mapping. Ensure the map is a good description of what currently happens, and you will need to analysis it to make future improvements.

Future State Map

The ultimate goal of value stream mapping is to have the least amount waste whilst maintaining a high standard of quality and safety.

Step 1: Mark-up the Current State Process Map

Takt Time

You will need to analyse your current state process map and discover whether your process is running to Takt Time. Takt time is the rhythm or pace at which as a process should work at, to meet customer demand whilst ensuring wastes are kept to a minimum. Sometimes Takt Time can be helpful in some processes however because healthcare is a socio-complex environment, you cannot always say that each step should take the same amount of time e.g. to perform a Coronary Angiogram will take more time than to do a Pre-Assessment. Sometimes when you think a step should take less time and run to a Takt Time it can be tempting to say that you need more people to be involved in that part of the process to speed the process step along. However, it could be that the test will take a set amount of time to perform or adding more people to the process is unhelpful because you would need more equipment and/or more space. You should make every effort to eliminate wastes from your processes first before considering the addition of more people/equipment to that step of the process. See our Takt Time Toolkit guide here for more information.

Continuous Flow

Continuous flow is one of the goals when value stream mapping. Continuous flow allows waste to be eliminated so that the value stream can continuously flow without there being delays. Analyse your map to look for wastes that can be removed to streamline your process. If there are two steps in a process that are similar why not combine them into one step so they can be completed one after another. See our Process Mapping Toolkit Guide here for more information.

Step 2: Creating the Future State

Once improvement ideas have been generated you can create the Future Value Stream Map. This is a visual representation of what you will want your process to look like once improvements have been made.

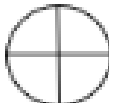
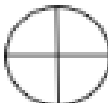
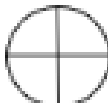
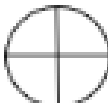
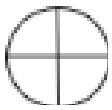
Take a look at our Divergent and Convergent Thinking Toolkit Guides for some ideas on how to develop your improvement ideas.

Future State Looping

Once a Future State Map has been created, you will need to create loops. A loop is a logical grouping of the improvements that need to be made to the current state map so that we can achieve the future state map. They are used to logically sequence improvement activities so you can implement improvement ideas incrementally rather than changing everything at once.

Step 3: Creating an Action Plan

Once the future state map is created you will need to create a detailed action plan of how you will move from the current state into the future state. An action plan should include what the action is, who is responsible for the action plan, when does it needs to be completed by, the progress made, and the action owners initials when complete. There is an example of an action plan template below.

Action point	Action	Who	By When	Progress	Initial
1					
2					
3					
4					
5					

Monitoring progress is critical to success and if an action is not followed up then it is often forgotten. The Value Stream Owner should conduct weekly meetings to review the process and focus on incomplete items.

What Next?

Once you have created a current state map and analysed it for any wastes and improvements that can be made, you can now create a future state map with your team about what you want the process to look like. Once you have identified the future state create an action plan to address what, why, who and when. Use plan, do, study, act (PDSA) cycles and reflect on the results.

Helpful Tips

It is important to be precise about what we are mapping and define the value object. It is important to only map one value object as anymore may involve different steps and have different performance metrics. Get the whole team involved with the Value Stream Process Map (See our Involving Others Toolkit Guide here for more information).

Additional Resources

If you are interested learning more about improvement please visit our website https://phw.nhs.wales/services-and-teams/improvement-cymru/improvement-cymru-academy/ or email us at improvementcymruacademy@wales.nhs.uk to find out about the improvement courses we offer.

Further Reading

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