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Moderator questions in Bold, Respondents in Regular text.

KEY: **Unable to decipher** = (inaudible + timecode), **Phonetic spelling** (ph) + timecode), **Missed word** = (mw + timecode), **Talking over each other** = (talking over each other + timecode).

Moderator: This webinar is about using process mapping to examine your business processes from customer to cash. My name's Katherine Boyle and I work for Invest Northern Ireland as an Operational Excellence coach. The Operational Excellence team are trained coaches with numerous years of business experience across a wide range of sectors and sizes of companies. We work with Northern Ireland businesses to improve their productivity, profitability and competitiveness. If you've any queries or you want some more information about the support that we offer, then please send your request through to opexquery@myinvestni.com. During the session, I'll talk about how to map your business processes. I'll also cover how you can use a process map during problem solving and to identify value adding activities and non-value adding tasks or wastes. I'll then show you how to generate a simple value stream map. So, what is process mapping? A process map is a visual representation of the movement or flow of orders, material, data, information and people through your process using a combination of symbols and arrows. A process map shows all the tasks which are carried out in sequence. In order for a process map to be meaningful, it's important that it captures the agreed process flow. In other words, the actual process as it runs normally, rather than how you think it runs or what your policies and procedures say. So, what are the benefits of carrying out a process map? Mapping out your processes increases staff awareness and understanding of the work sequence. It provides clarity on resource utilisation across the entire organisation, rather than using silo thinking and focussing on individual tasks and departments.

A process map highlights information flow and potential barriers to this. Mapping out your processes will help to expose activities that use resources but don't add any value, thereby helping you to identify potential opportunities for improvements. Process maps are a useful tool, which can also be used during problem solving activities, to help pinpoint the source of the problem and clarify data collection details. Depending on what you're trying to do, you may want to map the entire process from receipt of an order, through to the delivery and payment, or just a small section of the process. You need to determine what the boundaries of the map are before you start. In other words, which process steps are being included and where you want to start and finish. Then decide what level of detail you need. Is a high level overview sufficient or do you want to include every single task that's carried out? Sometimes it can be useful to map the high level process first, and then you can drill down in more detail into one or two process steps where the problem is arising. To get the most benefit out of the process mapping exercise, it's important to map the actual process and not what you think it is or what it should be. Make sure you include the hidden element, like inspection and re-work loops, short cuts and different variations, delays while awaiting approvals and signatures etc. Basically, ensure you map the true process as it is, warts and all. To help you with this, it's useful to actually walk through the process, following an order from

start to finish, to get a true picture of what happens.

Ensure that you involve those who actually perform the different tasks to capture what really takes place. It can also be valuable to include the process manager, suppliers to the process and those involved in the next process step down stream, in other words, the internal customers. What sequence do the tasks follow? Does everyone follow the same sequence or is there a lot of variation? When we map processes in businesses, we use post-its to represent each process step or activity so they can be easily moved around if needs be, as it can sometimes take a few drafts to capture the agreed sequence. This is a simple process map for making a basic cup of tea. In terms of the boundaries. We're focussing on the actual tea making process, not what happens before or afterwards. The first step is what triggers the process to take place. So, in this case, you want a cup of tea, so the first thing you do is check that you have the ingredients. Check how many cups you need to make. Fill the kettle. Boil the kettle. Get the cups from the cupboard. Get the teapot from the cupboard. Check how you take your tea. Put tea bags into the teapot. Water into the teapot. Pour tea into the cup. Then you've your first decision point. Do you take milk? If no, skip to the next step, if yes, add milk. Second decision point is if you take sugar. So, if no, skip to the end, if yes, check how many sugars you take. Add the sugar and stir the tea and then enjoy your cup of tea. If this is your process and the customer reports that there's an issue with the final product quality, in other words, the customer says the tea is undrinkable, you may need to go back to them for more information to help you to narrow down which steps may have been the problem.

Was there too much or too little milk or sugar? Was the tea too weak or too strong? Or was it a temperature issue? If it turns out that the problem is that the tea is too cold, you know that something has gone wrong at one of three points in the process. So, either the kettle didn't boil properly, or this step was skipped out, or too much milk was added, or there was too long a delay between the kettle being boiled and the tea being drunk. You may then decide to investigate these steps further, collect some data or map them out in more detail to help you to get to the root cause of the problem. So, let's start by collecting more data to try to determine which of these steps are the source of the problem. When you're collecting data in your process, it can be useful to show where you're taking measurements on a process map, so it's totally clear to everyone exactly what's being measured to remove any ambiguity. The feedback from the customer told us that the tea was too cold. In order to identify the process step where the failure occurred, we measured the temperature during different steps in the process as shown here and found the temperature of the water didn't rise as much as expected between the first and second data collection points, which would suggest that something went wrong when we were boiling the kettle. So now we need to map this step out in more detail to see if we can identify the exact problem. The trigger in this case is that you need to boil the kettle. So, the first step is to close the kettle lid, then switch it on at the plug, press the switch at the kettle, the kettle heats the water. Then you wait. The kettle boils. The kettle switches off and then your boiled water is ready.

We then monitor this process in detail and realise that the kettle heats up okay, but it's switching off before it's properly boiled. Using this more detailed process map of a short section of the process allows us to more precisely pinpoint the root cause of the problem, which appears to be a fault with the kettle thermostat. Depending on the complexity of your process, you may require a greater level of detail in your process map or some variations to take into account different products. This process map is also for making a cup of tea, but it includes variations for different types of tea. For example, water temperature and the time required for the tea to brew, both of which will depend on the type of tea that you're making. A swim-lane process map is useful if there are a number of different departments involved in a process. It can help to clarify who's responsible for each element of the process and identify critical hand overs between teams. This swim-lane map shows the typical process followed when each order is slightly different and a design has to be completed each time, then approved by the customer before the order can be passed to the production team. Process maps can also help with the identification of waste in your process. In lean terms, wastes are activities which use time, people and financial resources without adding any value. There's another Invest NI training video on identifying improvement opportunities using a waste walk, which will give you information on how to identify these wastes. If we go back to our original process map for making the cup of tea, there're a number of steps which do not add value.

Checking that you have the ingredients could highlight the waste of inventory as you may have too many tea bags or too much milk, which could lead to damaged or out of date tea bags or the milk going off. Are these stored in the correct place? Is the milk in the fridge or left out on the counter, or have you run out of either of these ingredients? As this would lead to delays or the waste of waiting while you go to the shop to get some more. Is the kettle near the tap and easy to fill? Or is it a large water boiler which heats several litres of water, even if you only need enough for one cup? These are the wastes of motion and over-production. The waste of waiting occurs when you have to wait for the kettle to boil. Next, are the cups and tea pot readily accessible or do you have to go looking for a clean cup? The waste of motion. Do you really need to make a large pot of tea for just one person? Again, over-production. How many tea bags do you put in the pot? Is this the waste of over-processing? What happens when you add in too much milk or too much sugar to your tea. You create defects or re-work and have to pour some out and add more hot water, or even start again to make another cup. This is a very basic example, but already you see how you can use a process map to identify a number of areas where there are potential opportunities for improvement. A value stream map is a more detailed process map which looks at the entire process from the receipt of a customer order until you're paid for it, or from customer to cash. This type of map also includes details of your customers, suppliers and the production control system you use in your business to process orders and communicate these to the different processes.

Under each process step shown in the map, there will be some data about that step. For example, cycle time, equipment used, people involved etc. The inventory or work in progress which is waiting between the process steps is also shown in the map, which will give you an idea of the length of time an order has to wait in a queue before it will be processed. This information can be used to estimate the actual lead time of an order passing through your processes, as well as the operational

efficiency of the process which I'll talk about a bit later. Here's a typical example of what a value stream map looks like. At first glance, it appears to be a lot more complicated than it actually is. But if you look more closely, it's more straight forward than you think. Here are the process steps that you identified during the standard process map. If you look at the second step here, which is the first weld stage, there's some data about this process step in the box underneath. In this case, the cycle time, changeover time, what percentage of the time the process is running, in other words the up-time, how many shifts it takes to run it, and its availability over the course of the day. This shows the inventory or queue sitting between the second weld and first assembly steps. The details of the supplier are here, along with what they supply to the business, in this case, they supply the raw material in 500 foot coils and they deliver on Tuesdays and Thursdays by truck. The customer is shown here, along with their demand details, and how often we deliver to them. This value stream map tells us that we get 90, 60 and 30 day forecasts and daily orders from our customers, which are sent into our production control system here.

The production control system in this case is an MRP system, which sends out a weekly schedule to all of the stages in the process. This system also sends out six week forecasts and weekly faxed orders to our suppliers. There are ten steps required to create a value stream map. You may find it useful to print out this list and stick it up on the wall above or beside where you're creating your value stream map as a reminder. This is what value stream maps look like in reality when you're creating them. Rough and ready with post-it notes and comments written on them. Just a little bit of advice. When our team carry out value stream mapping on-site with clients, we use post-its rather than writing directly onto the paper. This is because often when we start mapping out processes, there's some disagreement or misunderstanding about the order of the different process steps or someone remembers some additional steps to be added in, and it's much easier and less messy just to move around the post-its. Once you've created your current state value stream map, you'll need to start gathering some information about your process to get a better picture of how it's performing. The operational efficiency, which is the percentage of your total lead time that is value adding, is a simple calculation to do, and will give you a baseline figure for your current performance. If you think about your lead time, this equates to the time taken for an order to pass through each step of the process, plus how long the order typically has to wait in a queue between process steps. To give you a rough idea of what your operational efficiency is, to start with, you can consider the actual processing time as value adding and the in-between steps or queue time as non-value adding.

Adding these two figures together for all of the steps will give you a feel for the total lead time for your process. The operational efficiency for your process can be calculated using the simple formula shown here. To give you a rough idea, the operational efficiency for most businesses is typically around 10%. This can vary for different types of sectors and businesses, so don't panic if yours works out to be more or less than that figure. If only 10% of the lead time is spent adding value, then that means that the other 90% of the time that your customers are waiting for their order is taken up with non-value adding activities or waste, which is a huge opportunity for improvement in any business. In reality, there will be non-value add time within the actual

processing time, but often there are more potential time savings to be gained by reducing the delays and queues of work in progress in between the process steps before looking at the individual steps themselves. There are a few different ways to go about gathering information and data about each step in your process, as well as the gaps between the steps. You could use a pace board or a concern register, which give live information about output and losses and help to identify the major causes of down time and delays. An order tracker is another useful tool, which can give you a snapshot of how an order flows through your process and any issues encountered. An easy way to do this is to physically attach the tracker to an order and keep it with the order as it moves through the process. Each department should fill in the date and time of when they received it and when it left them, as well as any problems found.

If you do this for a range of order types, in terms of complexity and size, or for all orders over a specified period of time, then you should get fairly representative data. You can always repeat this exercise for a longer period if you feel the results were not reflective of true performance. Details can be completed virtually or on paper, whatever makes the most sense for your process. Once you know what the current condition of your process is, and how the business is performing, then you and the team will hopefully have identified some areas for improvement. This list of questions should help prompt some ideas in terms of potential opportunities for your business. Ask yourself, what would you like the business to look like in six months, one year, five years? Generate a value steam map for this proposed future state, so you know what you want to work towards and can visualise what it will look like. Then develop an action plan to help your business move towards this future state. What do you need to do this week, this month and this year in order to make it happen? The focus of lean activity is to make your processes easier, better, faster and cheaper in that order of priority. When you're developing the future state map, think about what you want to achieve in the three dimensions of performance, operating performance, capacity performance and financial performance. For operating performance, what impact do you want to have on productivity, on-time delivery, team time, right first time quality etc.? Or will the focus be on improving your capacity performance by reducing the non-value adding tasks to increase availability?

In lean activities, the focus should be making your processes easier, better and faster, rather than being purely cost-driven. However, there will be a positive impact on financial performance as a side effect. But it may take longer to show than the impact on the other two dimensions. To help with generating the future state map, highlight what the problem areas are on the current state value stream map, using star bursts like the ones shown here or using different colour pens or post-its. Get the team to help develop solutions for each issue. Just to give you a head start, here are some of the typical issues which we see in businesses and potential solutions for how they could be improved. If the issue is that there are high levels of inventory, consider establishing a supermarket type system to control the inventory. In other words, manage re-ordering based on actual usage not a system-driven schedule. For process bottleneck, generate a line-balancing chart and use it to identify problem areas. There are details of how to create a line-balancing chart in the Invest NI training video on introducing consistency in your process using standard work. If there's no flow or

poor flow due to batching, combine operations to achieve flow, or reduce the batch size, aiming for single piece flow where possible. For process steps with a high work content, remove non-value adding activities to achieve the target. For more information on how to do this, watch the Invest NI training video on identifying improvement opportunities using a waste walk. If you've an issue with high levels of work in progress, or WIP, control the WIP level by introducing kanbans where the demand to produce is triggered by the customer pulling finished items from the end of the production line.

For high levels of re-work, carry out problem solving to find the root cause of the quality issues and update your procedures to include appropriate counter measures to address this. Then introduce standard work sheets and have each department responsible for their own quality, so they don't pass on errors to downstream processes. Refer to the Invest NI training video on introducing consistency in your process using standard work for more information on how to do this. So, just to recap on some of the benefits of process mapping. It increases understanding of the process among the team involved. Mapping minimises assumptions made about what happens. Walk the process and see what really goes on. Value stream maps expose waste and problems that are occurring on a daily basis. Mapping highlights flow and sequence, which will help you to identify opportunities for future improvements. It also helps engage your staff in problem solving activities to find and treat the root causes of recurring issues. Also, developing a future state map to work towards will help provide focus for your business strategy and planning. If you want more information on anything that has been discussed during this session, please send your requests through to opexquery@invvestni.com and thank you for listening.

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