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The Business of Business **Fall 2022**

Process Mapping and Continuous Improvement
by Sara Hanks

Sara's career launched 22 years ago as a mechanical engineer but shifted quickly into continuous improvement when she became a Lean Six Sigma Black Belt. Early on, Sara learned the value that could be extracted from data and the importance of digitally collecting that data. After several years in manufacturing, she transitioned to leading programs and teams to do Digital Transformation. Eventually, Sara was promoted to the Senior Director of Data Analytics, leading a team of data scientists, gaining firsthand experience with machine learning and artificial intelligence. Currently, she is the Director of Continuous Improvement at Wabtec Corporation, a supplier in the Rail and Mining Equipment industries.

Sara enjoys bringing joy into the workforce by solving a problem, creating user friendly digital products, or providing easy access to data. In 2020, she launched Leverage 4 Data to provide a platform to do all three – create a solution to digitize workflows with an intuitive user interface and accessible data.

Continuous improvement in an organization requires implementing projects. Projects also mean change, which is often met with resistance. In the early stages of a project, I recommend using process mapping to facilitate effective change management.

When Lean was a corporate initiative at GE, the business planned large transactional lean events to conduct process maps in a session that was sponsored by senior leadership. Attending these events was a privilege and a great way to network with senior leaders. These sessions, often led by a trained facilitator, were highly interactive with post it notes and giant sheets of paper. Over time, the initiatives shifted, and the leaders were no longer engaged at that level. I still require my teams to conduct process maps 100% of the time.

Process mapping is a necessary step towards implementing change as it helps to understand the current state. A process map is a detailed diagram that articulates each step of a process. While these diagrams can be created by interviewing people, they are best detailed in a conference room environment with representation from each function involved in the process. With enough prework, the mapping session can be completed in 4-8 hours, depending on the complexity of the process.

Prework to the Process Mapping Session

Create a RASCI chart. A RASCI chart identifies the process steps, as well as the roles or people who need to participate in each step. RASCI stands for:

Responsible	The person who completes the step
Approver	The person who needs to approve the work conducted by the responsible person
Supporter	Roles that provide inputs to the process step
Consultant	An expert who provides expertise
Informed	The people who need to know about a process step being completed

> Note: Some sources say that the A means accountable, but I prefer approver because if a person is responsible for completing a step by default the person is accountable.

It's important to note that every step needs a responsible person or role, but the other categories are not required.

The output of the pre-work is to schedule time with the team, as well as a report out session with the relevant leaders.

Conducting the Process Mapping Session

1. Review the RASCI chart with the team. It is important to obtain consensus that the process steps are complete, as well as who is involved in the steps.
2. For each step in the process, the team will identify the following details:
   a) Inputs to the process step, as well as who provides the inputs. Sometimes the inputs are not part of the process itself but are used to decide or to harmonize information. For example, a purchasing specialist may refer to quality data before choosing from whom to buy parts.
   b) The details about what happens during the process step. If the process is a decision, what criteria is used to make the decision should be included.
   c) The time it takes to complete the step and how long people are waiting for information.
   d) The system of record for the process step – whether it is an email, an IT software system, or paper records.
   e) The outputs of the process step
3. Review the process map one final time and ensure that the times noted are reasonable.

At Learning Without Scars, we understand the importance of being inclusive and offering education opportunities to everyone, especially those with a hearing impairment.
We are now in the process of updating the video segments of our online Service classes to include Closed Captioning. We will continue this process with Parts and Sales & Marketing in the coming months.

Evaluating the Process for Waste

"If you always do what you always did, you'll always get what you've always got." -- Henry Ford

One of the biggest benefits of process mapping is that the waste in the process becomes exposed. A process mapping event is an ideal time to uncover the waste in the process that can be used to identify solutions and a future state. Before diving into how waste identification is conducted, let's examine waste in a business process.

The 8 wastes used in Lean manufacturing apply to business processes as well.

People-Based Waste

1. *Unused talent* – when people thrive, so do businesses, so under-utilizing talent within an organization can be seen as the biggest waste. Examples in a business process of unused talent include a lack of creativity to solve problems, interruptions and distractions, and a lack of focus for the organization. When an organization does not have clear objectives and job positions that align with accomplishing those objectives, people prioritize their time according to their own motivations, whether responding to the loudest need, or what interests them.
2. *Extra-processing* – extra-processing is waste caused by doing more work than required by the stakeholders. Let's say, a report is created during a crisis when it is needed, but then continues indefinitely. Reports that have outlived their need and usefulness are a waste of resources. Additional examples include re-entering data that exists elsewhere, filling out data on a form that is not used, and inspection steps that never have defects.
3. *Waiting* – the waste related to waiting in a business process is a result of both people and technology. Waiting for a computer to boot, a software system to refresh, as well as software downtime is a technology-based waste. Waiting for information from another individual or waiting for an approval are examples of waiting for a person.
4. *Motion* – physical motion to achieve a step in the process is a form of waste. In a shop environment, this can be visualized using a Spaghetti Diagram. In a business process, it may be tougher to detect. Examples include walking to a printer, or physically looking for paperwork to verify that an action is completed. Motion is virtual as well. Searching for information buried in email or a document in an unorganized folder structure is a form a motion waste.

Process-Based Waste

5. *Inventory* – inventory waste is excessive work that needs to be done throughout the process. Batch processing transactions can lead to piles of work, as does stopping a task before it is finished and moving onto another item. Ordering extra supplies or unnecessary marketing materials is another form of inventory waste in a business process.

6. *Transportation* – the movement of the work, as opposed to people-based motion. Moving files around a computer or having to retrieve data from multiple applications and screens is extra movement. The number of process steps to complete a transaction, especially if it involves multiple emails adds transportation waste. Physical movement of documents within a site or between sites is wasteful as well.
7. *Over-production* – processing information before it is needed or is never needed, is considered over-production. Email is one of the biggest sources of over-production in a process. Emails sent to people who don't need them or using large distribution lists unnecessarily interrupt people or create lengthy conversations that are best suited in a meeting. In today's digital world, data collection is another potential source of over-production.
8. *Defects* – any rework within a process is considered a defect of the process. Defects include missing data and incorrect data or inputs from other people. Defects include change requests as well. Even if the change request is initiated by a customer, it impacts the organization and is considered wasteful.

If process mapping and waste identification is new to the organization, distributing the examples of the types of waste ahead of the event may be helpful. Once the team understands what signifies waste, the next phase of process mapping is to identify the waste.

It is important that each representative in the room have an equal say at identifying the waste. Therefore, time needs to be allotted to brainstorm silently, with a minimum of 10 minutes for the team to reflect. Post-it notes and markers work wonders to capture the information quickly from the team. When the time is finished, each person should present their waste items to the group. With post-it notes, the speaker can physically place the waste item onto the process map to indicate where the waste exists in the process. Sharing continues until each person has shared.

Once the waste is identified, the team will see themes of similar waste. These can be grouped into categories and should be quantified in terms of time or cost. For example, if the average time it takes to collect payment from a customer is 80 days, then the waste is 80 days' worth of non-value add cycle time. Take pictures of the waste items as they exist in the process map for future reference and to document digitally later.

Before progressing into the proposed solution stage, it may be helpful to consolidate the grouped waste and place them on a blank wall to facilitate brainstorming and creating solutions to the wastes.

Building Solutions to Eliminate Waste

Some process mapping sessions are used to scope a previously funded project, such as investment in a digital marketplace. In these cases, the waste items and the current state process can be used to create requirements for a large investment. Other times, the team seeks incremental improvement to the current state, or prefer to invest in smaller amounts over time. For such projects, the process mapping event can be extended to create solutions and the plan. The time required to complete solutioning is approximately the same as the process mapping and waste identification, so an 8-hour process session would require a second 8-hour solution session. It is recommended that they are back-to-back.

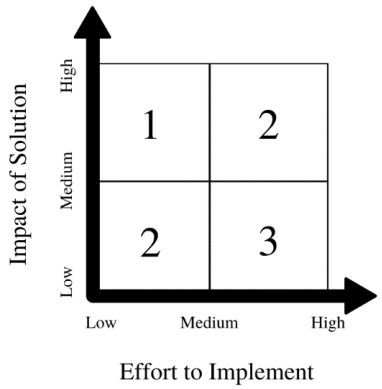
"There's a way to do it better—find it." -- Thomas Edison

Creative thinking is necessary when building solutions. Fortunately, it exists within all of us and simple exercises can invoke it. A unique way to spark creative thinking is to solution the worst possible idea first. Creating the worst idea does two things: 1) removes barriers by allowing the craziest of ideas to exist and 2) loosen up the team and help them feel more comfortable for brainstorming ideas. There are several other exercises that can help spark creativity or design thinking. Select an activity to start the solution process, keep it fun and keep it brief.

Brainstorming solutions to the waste items will take more time than generating the waste items themselves. It takes time to think through how to solve or eliminate the waste; therefore, a minimum of 30 minutes of brainstorming silently is a good rule of thumb. The team should think about solving each waste item, although a single solution can be used to solve multiple wastes. Post-it notes and group sharing, like the waste identification are helpful. In Lean, identifying 7 unique ways to solve a problem is encouraged as it stretches the mind to think beyond the obvious. At this point, there are no wrong ideas. Obtaining a large quantity of different thoughts is more important.

As the team shares ideas, similar solutions emerge, which can be combined into single solutions. Once the ideas are identified and rationalized, they need to be assessed for impact and effort. For this, use an Impact – Effort Matrix, as shown in the figure below. For each

solution, assess the level of effort and how impactful the solution will be at solving the problem. The scale is relative – so as solutions present more effort or impact than those on the matrix, move items accordingly.



The priority of solutions should be as follows: Quadrant 1 – Priority #1, Quadrant 2 – Priority #2, Quadrant 3 – don't do. Once the ideas are on the matrix, the team shall decide which solutions will be recommended to help create the future state.

The final phase of the solutions effort is to create the new process map based on the solutions provided. A RASCI chart is helpful again to define who conducts which step of the process, especially if steps have changed from the current state.

Wrapping Up the Process Mapping Event

A process mapping session should not conclude until there is a project plan, called a Kaizen Newspaper. The Kaizen newspaper summarizes each waste item, as well as the proposed solution that has been selected to execute. For each proposed solution, identify the key milestones as well as owners and estimated timing to complete the milestone. The project manager shall maintain the Kaizen newspaper after the event concludes.

When people are asked to take time out of their day to support process mapping, a report out is helpful to justify the time with their managers. In addition to the management team and the participants, any people who are approvers in the RASCI should review the outcome of the process mapping session. The report out can be summarized as a Value Stream Map, which is a high-level representation of the process and includes the cycle times. It is helpful to include the waste impact in the Value Stream Map as well. For each solution idea, summarize the before and after to help articulate the current state and future state in a tangible way for the leadership. Finally, showcase the Kaizen newspaper to communicate that the journey is just beginning, and more work needs to be done.

Solution Implementation

It would be easy to say, "implement the plan" as only action required after the process mapping event. However, most projects don't follow the original plan. Here are a few tips to improve the likelihood of a sustainable change.

Start with Pilots to Solutions

A pilot is a small, scoped experiment to test the value, feasibility, and cost of a project before scaling. The goal is to focus on learning as much as possible with minimal operational impact. Pilots should have a defined end date as well as established learning metrics. The learning metrics will help the project team understand if expanding makes sense or not and provide measures to convince the sponsor to pivot or stop if the experiment does not go as expected. At the end of the pilot, evaluate the learning metrics and inform the leadership team of the recommended go-forward action.

Integrate Final Solutions in the Quality Management System

Quality management systems are often created to satisfy a customer requirement, such as the ISO9001 standard. The standard is translated into a quality management system and sits on the shelf until a customer or an external audit is conducted. They can be used to drive sustained organizational change as well. When the future state process is actualized, document the process into the quality management documentation. Internal and external audits can reinforce adherence to the new and improved process.

When Software Is the Future State

When a process is primarily email or paper based, the plan includes moving the future state process into a software solution. Unlike 10-15 years ago when monolithic, expensive software platforms dominated the market, Software as a Service applications are available a much lower cost. Some application bolt onto existing platforms such as a customer relationship management software or an inventory management

solution, and can be purchased from a marketplace. No-code tools are gaining momentum as well for those processes that are specialized. With so many choices, it can be overwhelming.

Starting from a list of criteria and evaluating the software options against that criteria can be helpful when down-selecting solutions. Here are 8 software features that will directly reduce waste:

1. *Workflow-based software* – a workflow software solution shows progress as work moves through a process. They are a digital version of a RASCI chart, where each process step has a clear owner. Workflows remove ambiguity and wait time associated with a lack of knowing who owns the next step.
2. *Notifications* – when work proceeds to the next step, an email or text message notification can trigger the next action, which are effective at reducing wait time.
3. *Aging reports* – aging reports provide incentive to act sooner than later.
4. *Commenting within the application* – asynchronous conversations are good and help avoid meetings as opposed to email where there is a risk of losing important information as well as wasting time. Commenting on a document in an application centralizes the conversation.
5. *Action items* – ad-hoc tasks that are assigned with owners and due dates. Not all processes have a singular path of standard work. Action items in an application can drive accountability for the one-off actions.
6. *Reminders & escalations* – these are reminders for people to act. Some processes take longer than others. It is helpful to have reminders during longer cycle steps.
7. *Export to Excel* – the data in an application needs to be available for ad-hoc analysis. Emergencies happen and answers need to be retrieved quickly. By having an option to export the data, the cycle time to resolve emergencies can be reduced. Excel is a good tool to prove out a new metric as well.

Advanced Technology in Process Mapping

Here are practical applications of Industry 4.0 technology that can be used in process mapping:

Robotic Process Automation (RPA)

RPA is software that can be programmed to conduct repetitive basic tasks across different applications, just like humans do. RPA can free up talent from conducting repetitive, non-value add tasks, so they can focus on work that requires thought.

Machine Learning

Creation of models based on historic data to create predictions or prescriptions. Chat bots to help teams find answers quickly can be a solution to waste associated with searching. If the process has experts making decisions, then with enough good data, machine learning can learn from the experts and provide recommendations to less experienced people. As workforces have less experience, machine learning can be useful to retain knowledge of the experts.

Conclusion

Process mapping helps project managers understand the current state thoroughly which helps prevent issues when implementing the project. The biggest benefit of conducting the process mapping session is that it engages the stakeholders and subject matter experts. Process mapping exposes frustrations about the current state, so the subject matter experts are more likely to understand why a project is happening. Additionally, process mapping highlights what works about the current state, so the project manager can consider keeping these best practices. An impact – effort matrix can help prioritize solutions as well as articulate the cost – benefit. Using software and technology, a future state can be achieved. Likewise, integrating the future state into the quality system helps sustain to improvement.

Learning Without Scars

As a third-generation educator, it is easy to say that teaching and training are in the blood for Ron Slee. From his beginnings as a coach, through his time at McGill University, Ron developed a foundation for the work he does today.

Learning Without Scars provides comprehensive online learning programs for employees starting with an individualized skills assessment. These assessments allow us to then create a personalized employee development program. From their assessed skills, the employee is asked to select from classes designed for their skill level which allow them to address the gaps in their knowledge level. This allows the employees to move through four progressive categories of learning: Basic, Intermediate, Advanced and Expert.

Class References

Activity Based Management (Costing)
Balanced Scorecard
The Art of the Possible

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Do You Know The Answer?

What heavy lifting specialist company built the largest crane in the world known as "Big Carl"?

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