



**HIGH PERFORMANCE**  
s o l u t i o n s i n c

# Automation Assessment

**Why would I want to look at Lean Thinking?**

**What is in it for me (\$) and how is this going to help me run my business better?**

**How do I start applying the thinking?**

**Created by High Performance Solutions Inc and in partnership  
with Alberta Agriculture and Rural Development**

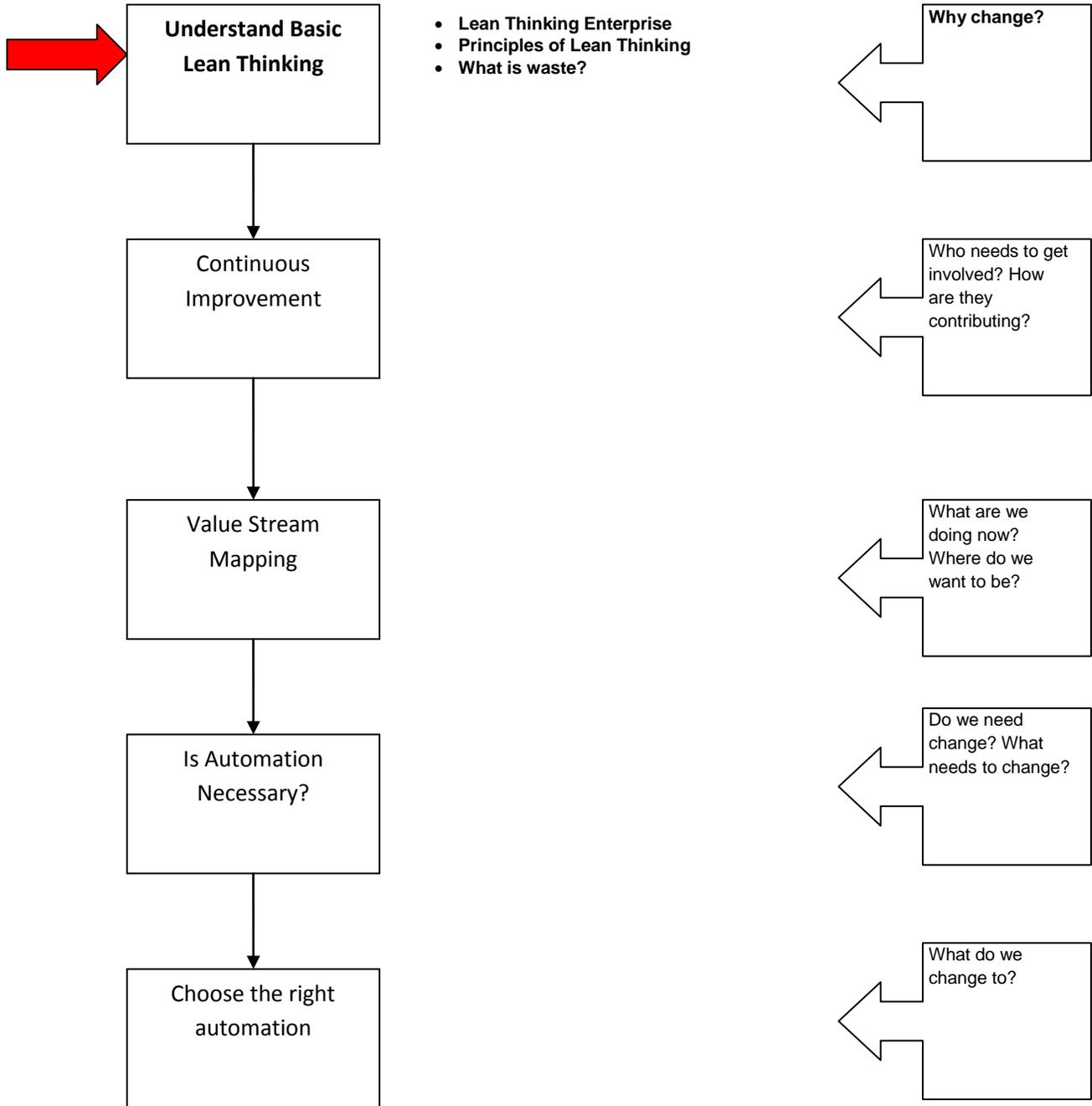
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# Steps to consider



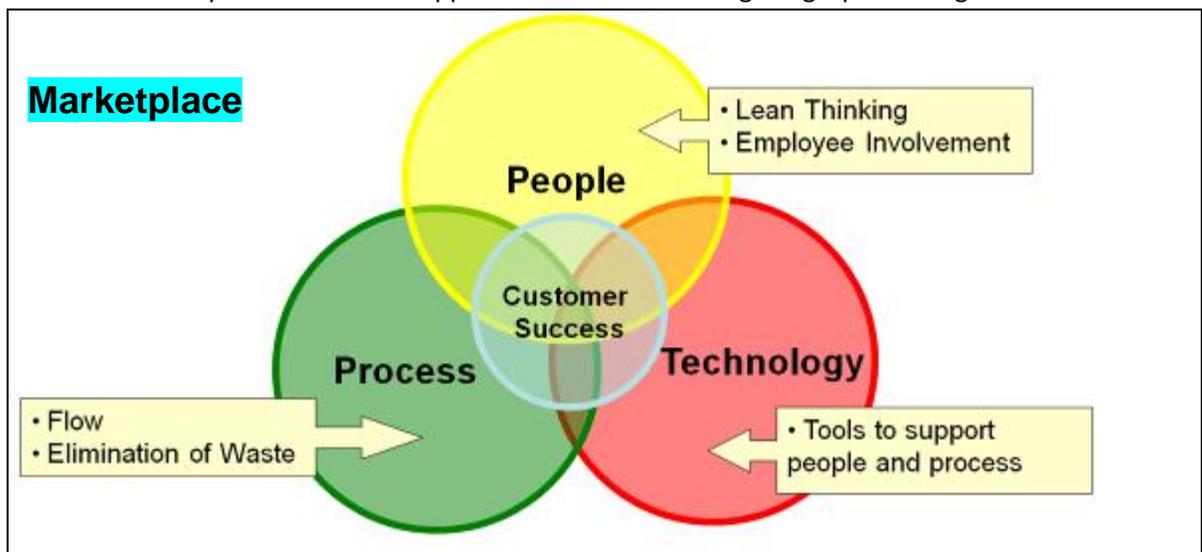
# What is Lean Thinking?

	<p>Why is this important in making an automation decision?</p>	<p>In order to change the way we do things, we need to adjust our thinking process. No longer is it acceptable to say, "That's the way we have always done it"</p>
	<p>What are the benefits to the automation decision?</p>	<p>If we change to lean thinking, we can save money and not overspend in making the RIGHT automation decision.</p>
	<p>What happens if we do not consider this during the automation process?</p>	<p>We will jump to conclusions that automation is necessary without justification.</p>

Lean Thinking is a systematic approach to identify and eliminate waste while focusing on adding value to our internal and external customer.

Lean Thinking should not be seen as a set of tools to be applied, but rather embracing a new way of thinking. While it is important to understand the tools, it is critical to understand their application and how to create a culture that will embrace and sustain the thinking.

There are five key elements to the application of Lean Thinking in agri-processing:



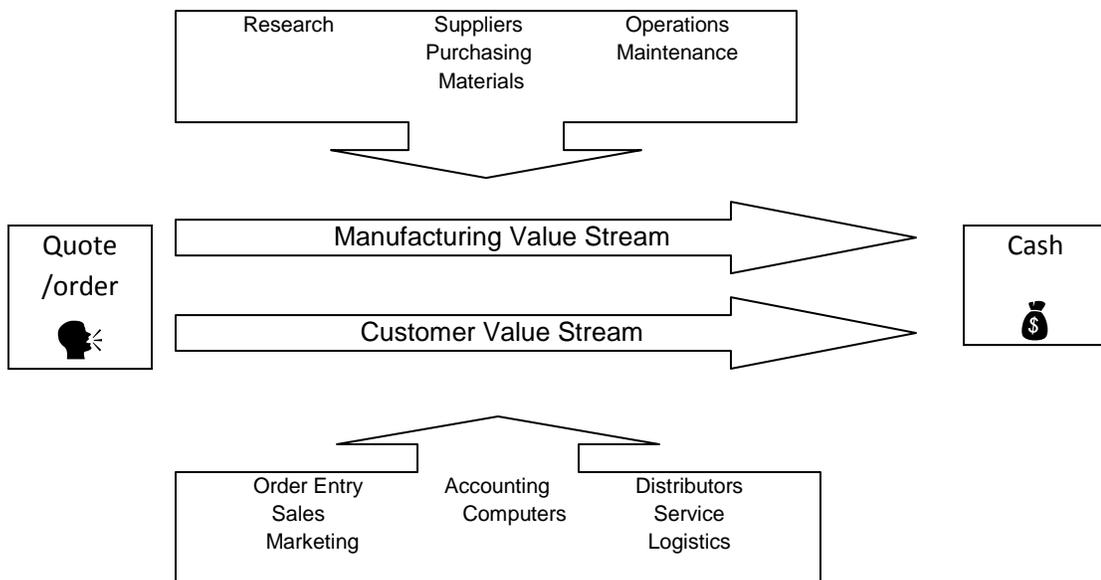
1. **People.** Challenge the way people think and to involve them in the process to improve the organization. People should be viewed as your organization's most valuable asset. Without people, we can not deliver value.
2. **Process.** Focus on the flow of product and information. If products or information stop flowing, this is waste. The focus of the people is to identify the waste and work towards eliminating the waste. Process is how people deliver value and ultimately how the company flows its cash from 'quote to cash' (from initial job / product quotation to when cash is received for services rendered or products delivered).

3. **Technology** – Technology is applied to help people with processes to add value to the customer. Technology should be seen as a way to help people, not replace them. Technology should be applied after following these steps: identify what needs to be done, simplify what needs to be done, and then automate where required. Failure to simplify will result in inappropriate processing or waste.
4. **Focus on Customer Success** – Always focus on providing value to both internal and external customers. Identify what your customers need by asking them and developing a long term trusting relationship.
5. **Marketplace** – When lean thinking is applied and result in increased plant capacity this creates an opportunity for new or expanded customer relationships and markets to be developed. Therefore a market survey and assessment may be required to ensure increased production does not just result in the waste of increased inventory.

## What is a Lean Thinking Enterprise?

Having a Lean Thinking Enterprise is having all people and processes focused on improving the way we do our work in order to eliminate waste or non value added activities throughout the entire operation.

The entire organization should be thinking “quote to cash”. Our job is to get a quote in the door and turn it into cash as quickly as possible. In some cases, the customer may start the process with an order. The following diagram illustrates how a lean enterprise should look.



In reality, our customers want to pay for one thing, product or direct service. The only time we add value in our organizations is when we change form, fit or function to product. The only group that generates true value in our organization are those people that change the form fit or function of our products, the people who process the product.

The key is to understand who your customer is and what value you provide for them.

# What are the principles of Lean Thinking?

The following is an overview of the principles of Lean Thinking.

**Lean Principle - Define value from the customer's perspective.**

What does your customer value? All activities in the company should be placed in three categories, value add, non value add and non value add but necessary. Value add is typically viewed as the 'touch time' to deliver products and services or the time to change the 'form, fit or function' of parts and information. All other activities should be identified as waste or non value added activities and actions should be developed to reduce the waste. The third category, non value added but necessary are activities that are necessary but your customer is not willing to pay for. An example of a non value added but necessary could include mandatory HACCP inspections.

## Calculating Value Added time

An example of how to view value from the customer's perspective can be seen in the purchase of an electronic consumer product such as a cell phone. On review, for a cell phone manufacturer, the actual 'touch time' or value added time to produce one cell phone was under 5 minutes. The full lead time, or 'quote to cash time' from order to ship was 90 days. The typical selling price for the phone was \$400.00.

To determine value from the customer's perspective, answer the following questions:

	Lean thinking answers...
How much time did you pay for?	90 days This includes the non-value added, non-value added but necessary, and the value added
How much time do you WANT to pay for?	5 minutes. The value added time.
What percentage of the time spent is value added?	Less than 1% 5 minutes compared to the 43,300 minutes total (90 days)
Where do we usually focus our improvement efforts on?	We usually focus on the 5 minutes of "touch" time.
Where should we focus on?	The non-value added time

# What is waste?



<p>Why is this important in making an automation decision?</p>	<p>There is waste everywhere. Many times we do not see the waste because we have been accepting the way things are done. Typically, waste is 50-80% of the time we spend.</p>
<p>What are the benefits to the automation decision?</p>	<p>Important to drive out waste in a process to simplify before making any decisions about automation.</p>
<p>What happens if we do not consider this during the automation process?</p>	<p>May automate and create more waste.</p>



Waste is what makes up most of our activities. In order to eliminate waste, we must teach ourselves how to see waste. In order better see waste we define it in different categories. Waste is defined as follows:

**Overproduction**

**Waiting**

**Transportation**

**Defects**

**Unnecessary Motion**

**Inappropriate Processing**

**Unnecessary Inventory**

Wastes:

- Overproduction – producing more/sooner than the internal or external customer needs.
- Waiting – long periods of inactivity for people, information, machinery, or materials
- Transportation – excessive movement of people, information or materials
- Inappropriate Processing – using the wrong set of tools, procedures or systems
- Unnecessary Inventory – excessive storage and delay of information or products
- Unnecessary Motion – any motion that does not add value to the product or process.
- Defects - frequent errors in paperwork, product resulting in scrap, rework, or repair
- Untapped human potential

**Lean Principle - Identify the Value Stream.** The value stream is defined as all the steps value add, non value add and non value added but necessary to produce products or information. The typical tool used to identify the value stream is a value stream map

**Lean Principle - Make the Process Flow.** Once you have identified the value stream, the people that perform the process are engaged to identify the waste and determine appropriate solutions to reduce the waste to help products flow.

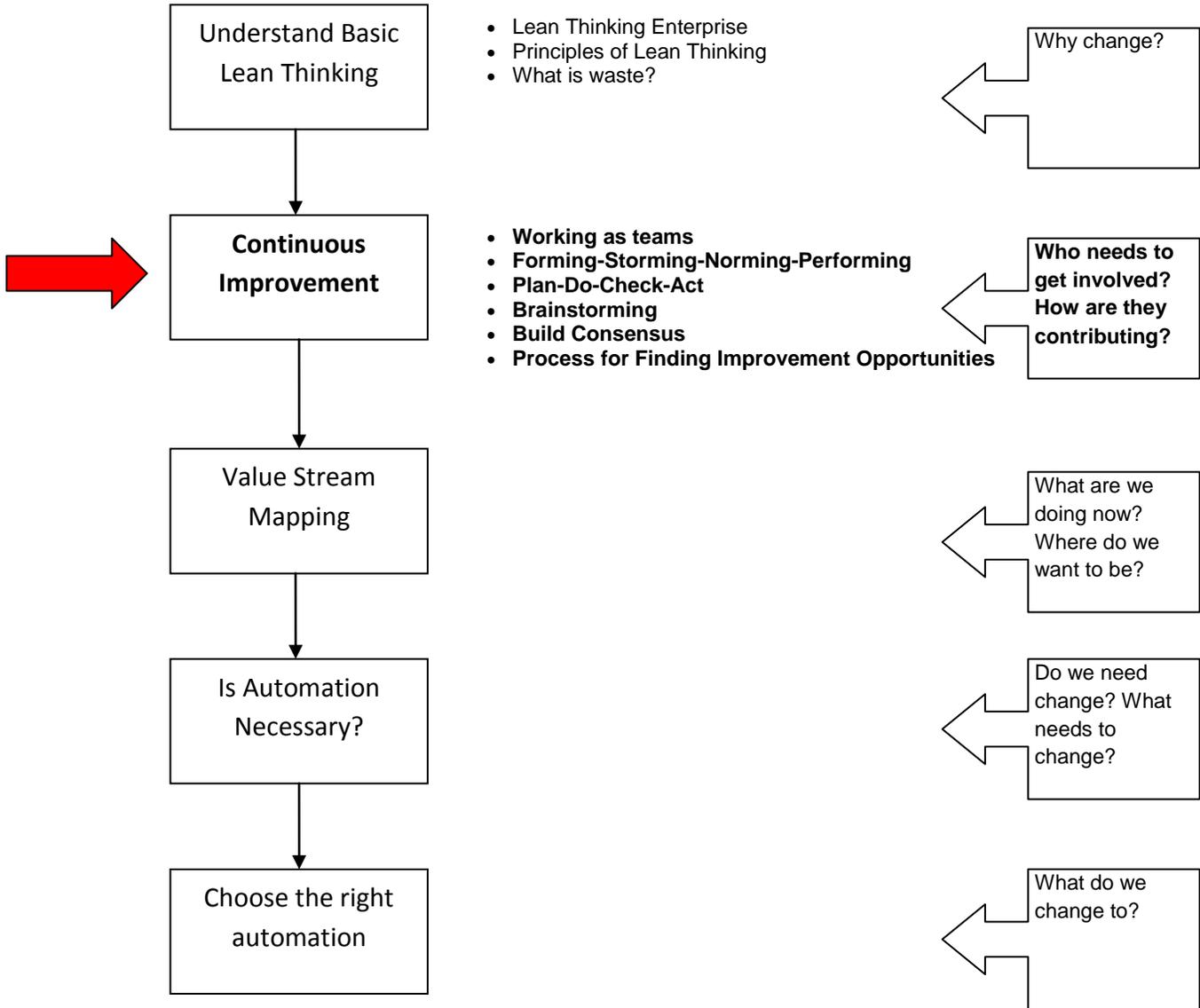
**Lean Principle - Pull From the Customer.** Lean Thinking teaches us to pull or produce when our customer tells us or signals us that they require more products or information.

**Lean Principle - Head Towards Perfection.** This is the development of a Continuous Improvement culture that focuses on always identifying and making further improvements.

## Lean – what it is and what it is not

Lean is about growth and about improving flow. It is not about head count reduction. Lean is about continuous improvement, about always improving. If you improve a process and as a result, eliminate people, the remaining people will no longer engage in improvements because they no longer feel safe.

# Steps to consider



# Continuous Improvement – Working as Teams



Why is this important in making an automation decision?	In order for good decisions to be made, people need to have the tools and know how to use them. People need to understand how teams work together to make the right decisions.
What are the benefits to the automation decision?	A decision that has buy-in and sustainability.
What happens if we do not consider this during the automation process?	No buy-in from employees and poor decisions made.

While most companies say they work in teams, most of the people work as individuals on tasks and do not work together. Working as a team is something that needs to be learned and developed.

This is typically reflected in the way we reward people. We usually reward individual efforts, whether formally or informally, but rarely do we celebrate a team’s achievements.

Teams need to learn how to manage both relationships and tasks, how to develop as a team, what the ‘rules’ are for the team, what the roles are in the team and how to improve as a team.

Teams manage relationships and tasks.

## *Teams Must Manage Relationships*

Teams must manage the following aspects of relationships or how we get along.

- ✓ How will we work together?
- ✓ How will we solve problems?
- ✓ What tools will we need?
- ✓ What must we learn?
- ✓ How do we meet individual needs?

## *Teams Must Manage Tasks*

Teams must also manage tasks or what we need to get accomplished and how we will get it done.

- ✓ What do we need to accomplish?
- ✓ What problems do we need to solve?
- ✓ What are we accountable for that we control?
- ✓ What do we need to do to achieve results?

## How a Team Develops

A team will go through four basic stages when it is developing.



### *Stage 1 - Forming*

The group needs to get together to understand its direction, understand the rules for the team, and learn the other member's behaviors.

### *Stage 2 - Storming*

The group gets to work, which is a lot less fun than the forming stage taking about vision and direction. The team members begin to 'challenge' each other's behaviors and roles. There is more stress put on the team as they are now expected to perform. The social dynamics of the team are starting to form.

### *Stage 3 - Norming*

This is when the team develops its personality. Team members have developed a way of dealing with each other and the 'rules' of the team on how we behave, our roles and how we accomplish tasks. The social dynamics of the team are set.

### *Stage 4 - Performing*

Based on the rules that have been established in the norming stage, the team's level of performance will be set. If the norm is positive, the team will be effective. If the norm is negative then the team will not be effective and will fail.

ASK YOURSELF WHICH STAGE YOUR TEAMS SPEND MOST OF THEIR TIME!

# Continuous Improvement - Plan-Do-Check-Act



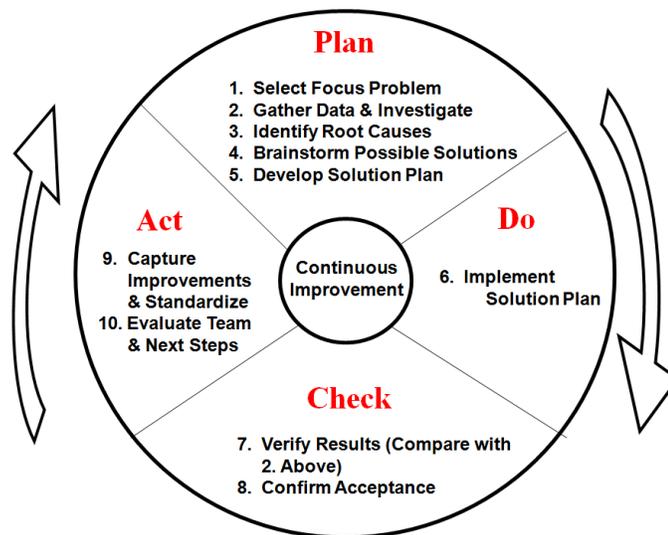
<p>Why is this important in making an automation decision?</p>	<p>Changes that are made need to be validated to determine that they yield the desired results</p>
<p>What are the benefits to the automation decision?</p>	<p>If we use this tool, we are ensuring that everyone involved is in agreement with decisions made</p>
<p>What happens if we do not consider this during the automation process?</p>	<p>We will waste time and money making band-aid decisions</p>



Continuous improvement (CI) focuses on solving problems by identifying root causes and solutions, in order to prevent them from reoccurring. The foundation for our systematic approach is based on W. Edwards Deming's Improvement Cycle (PDCA).

## PLAN-DO-CHECK-ACTION (P-D-C-A)

- Plan**                    The team does extensive planning based on facts and data. It gathers data about the major problems or opportunities for improvement, analyzes the root cause, develops solutions, and plans for implementing a solution.
- Do**                        The team implements its chosen solution and ensures that the needed education and information is provided.
- Check**                    The team verifies the results through a series of checks with the data collected during the 'Plan' stage.
- Act**                        Work procedures are rewritten and reliable methods are put in place to capture the gains to make them permanent.



It means agreeing to make decisions based on facts and data rather than emotions. The need for teams to look for root causes of problems, rather than react prematurely to put band-aids on symptoms is one of the fundamental principles of establishing reliable methods by use of a systematic method.

The goal here is to seek permanent solutions rather than to rely on quick fixes. This will allow for the long-term gains, but requires some initial efforts and additional resources. The quick fix method may be attractive because it implements a solution quickly yet its long term effects are normally very poor.

To understand where to apply this systematic approach you must first understand what causes problems in the process and how they surface. Many times the root cause is buried deep in the procedures or processes, which we have become so comfortable with. The problem source is usually hidden under layers of band-aids that have been implemented over years of fire fighting.

Typically, complexity arises when people repeatedly try to improve a process without a systematic plan. Complexity is a general term for unnecessary work. Anything that makes a process more complicated without adding value is too complex. Normally, people try to solve one piece of a problem by adding or rearranging steps, not realizing that they are really distorting other parts of the process.

**It is important to understand that in the majority of instances it is not people who cause the problems.**

**The true problem source lies in the systems or procedures which surround the process.**

# Brainstorming



<p>Why is this important in making an automation decision?</p>	<p><b>Need to get input from everyone who is important to the process</b></p>
<p>What are the benefits to the automation decision?</p>	<p><b>We get changes that everyone believes in and will support</b></p>
<p>What happens if we do not consider this during the automation process?</p>	<p><b>There will be people who do not support the decision and implementation will be less effective since there is not buy-in to the change</b></p>

Brainstorming is an effective - and fun - way to develop options or alternatives to meet our problem-solving objectives. It has been shown to generate more good ideas in less time than are developed through traditional methods.

People are full of good ideas, and brainstorming helps us to draw out the creative energy of each individual, as ideas for creative solutions are generated. The group environment stimulates this creative process as people build or ‘piggy back’ on each other’s ideas. Many ideas occur to people as they are working. What they often lack is a system of sharing their ideas with others. As a result many good ideas go to waste; they simply are never heard.

Brainstorming is not just a way to make everybody feel good before you go ahead with your own ideas. In brainstorming, every idea gets equal consideration whether it comes from the highest or the lowest level in the organization. Brainstorming is not just a bull session, it is a serious effort to tap the creative potential of the work force and it can be fun.

Brainstorming Can Be Used In Two Ways:

**1. Structured**

In this method every member of the team must give an idea as their turn arises in rotation or say “pass” until the next round. It often forces even shy people to participate, but can also create a certain amount of pressure to contribute.

**2. Unstructured**

In this method, team members simply give ideas as they come to mind. It tends to create a more relaxed atmosphere but also risks domination by the most vocal members.

In both methods, the general rules are the same. The generally accepted guidelines are as follows:

1. Never criticize ideas — it’s a no-blame or safe environment.

2. Write every idea on a flip chart or blackboard. Having the words visible to everyone at the same time avoids misunderstanding and reminds everyone of the new ideas.
3. Ensure everyone understands and agrees on the question or issue being brainstormed. Write it down.
4. Record on the flip chart in the words of the speaker. Don't interpret or use abbreviations.
5. Do it quickly. Don't hesitate and discuss. The intention here is to write all ideas as quickly as possible; the process provides lots of time for explanation later. The pace you set is a contributing factor to the generation of ideas as people's minds are stimulated with the adrenaline created by the team play.

### Ground Rules for Effective Brainstorming

1. Be sure each brainstorming session has a focus and everyone is clear about that focus - write it on a flip chart or board.
2. Explain that any idea is acceptable and that no comments, judgments or discussions are allowed until the conclusion of the brainstorming session.
3. Give some indication of the next step so that people will know what will happen to their ideas.
4. Facilitate participation. Be sure that everyone's ideas are heard, ask specific questions to stimulate more ideas and encourage hesitant people to express their thinking.
5. Clarify some of the ideas shared to confirm your understanding of what others have said.
6. Write down every contribution to the satisfaction of the person who has expressed the idea.

Encourage an open freewheeling atmosphere.

# Build Consensus



<p><b>Why is this important in making an automation decision?</b></p>	<p><b>We need everyone to support a decision, whether that decision is to automate or not to automate</b></p>
<p><b>What are the benefits to the automation decision?</b></p>	<p><b>There is no finger pointing and blame</b></p>
<p><b>What happens if we do not consider this during the automation process?</b></p>	<p><b>There will be resentment and second guessing on decisions made</b></p>

It is important to build consensus and approval by all the stake holders for the solution of the problem. Consensus allows for quick implementation of ideas because the solutions are widely accepted and agreed upon and will result in limited resistance during implementation. Consensus though does not always mean full agreement to decisions, but rather full agreement to support a decision.

Consensus building is based on questioning and review of the possible solutions for the problem by many people. Consensus is gained through circulating the ideas through a broad range of stake holders to insure that everyone’s issues and perspectives have been heard and that they either agree to the changes or a least can live with and support the changes.

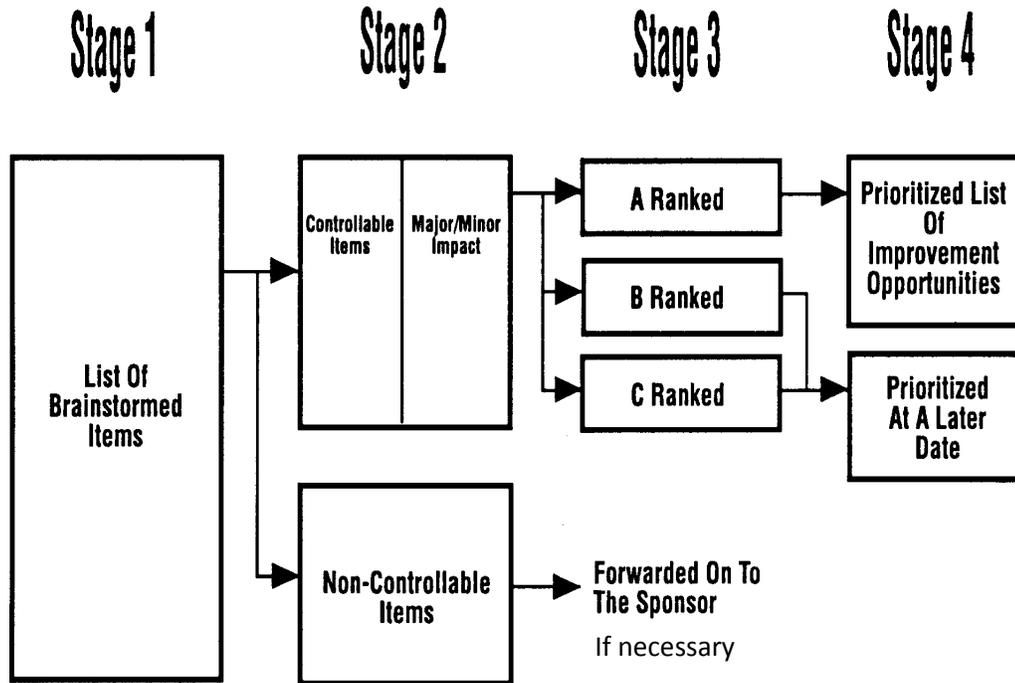
Consensus is particularly important in a multiple shift operation. For example, if a solution is developed by one of the shifts, the solutions will affect all the other shifts when implemented. If the other shifts are not included in the decision, they may not accept the solution, even though it may benefit them. While it takes longer to get a final decision by gaining consensus, the solution will be implemented quicker as there will be limited resistance by the other shifts.

Consensus building typically takes the following steps.

1. Ask for feedback – provided details on the proposed actions or implementation plan. This can be done through posting a plan or asking for feedback by a defined time or through a short meeting.
2. Discussion – provide a forum for discussion on the feedback including rational for why the changes can or can not be incorporated. Insure that the discussion occurs in a ‘no blame’ environment

Decision – based on the feedback make a final decision. For the affected parties the decision can take three possible routes, agree, disagree ‘but can live with’ or disagree and can not live with. For the last route further discussion should occur, but what ever the final decision is, all parties affected have to agree to support the decision in order to allow for quick implementation of ideas and limited resistance during implementation.

## Process for Finding Improvement Opportunities



Structured brainstorming sessions typically generate between 35-75 preliminary problems.

A review is conducted to identify which items can be controlled (solved) by the team and those uncontrollables (team lacks the authority) which are forwarded to the team Sponsor for follow up.

The impact of each controllable item on the organization is rated as either major or minor.

A simple A-B-C Ranking method is used. Usually this is:

A - Customer service  
Product quality  
Safety

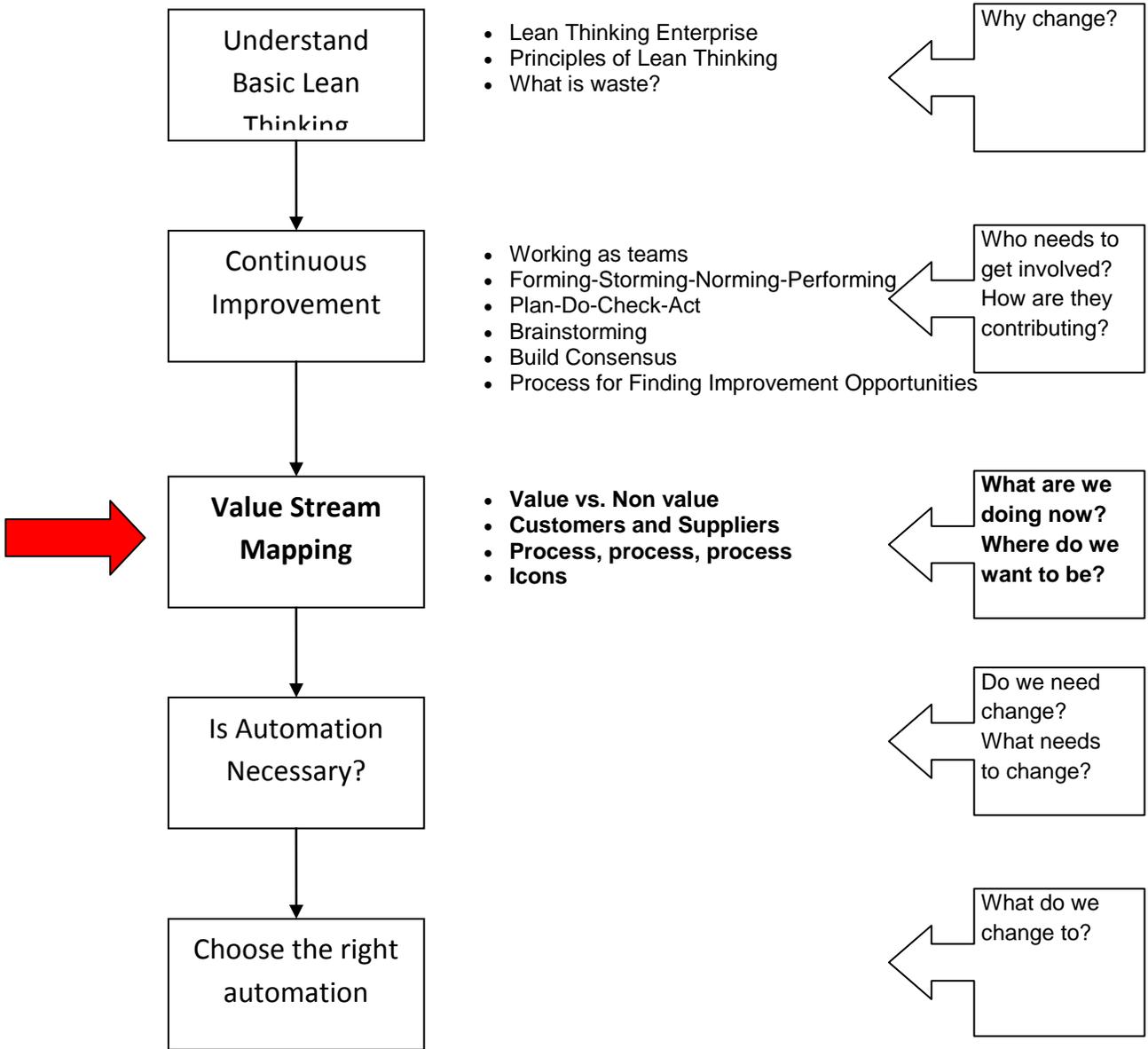
B - Productivity  
Cost Savings

C - Personal convenience

You can define your own ranking Systems

The final stage involves prioritizing the A-Ranked items & suspending the B and C-Ranked items until the A-Ranked items are resolved.

# Steps to consider



# Value Stream Mapping



<p>Why is this important in making an automation decision?</p>	<p>To have process owners visualize and document the various steps throughout the process of producing a product or providing a service. This helps to identify bottlenecks and other problem points</p>
<p>What are the benefits to the automation decision?</p>	<p>Get the people examining the process together and determine what is going on and where the problems are</p>
<p>What happens if we do not consider during the automation process?</p>	<p>We will assume that automation is necessary and create bottlenecks, inventory, and frustration</p>



A Value Stream Map is a tool that is used to identify all the steps, both value add and non-value add to bring a product or information from a ‘supplier’ to a ‘customer’.

**Value Add** – as defined by the customer, what the customer values or wants to pay for. In simple terms, if you grow potatoes, the customer only wants to pay for the actual growing of the potato and not all the handling, transportation, and extra processes.

**Non Value Add** – as defined by the customer, what the customer does not want to pay for. Non Value Add is also referred to as waste. In order to better identify waste, it is been categorized into 8 main forms:

- Overproduction
- Waiting
- Transportation
- Inappropriate Processing
- Unnecessary Inventory
- Unnecessary Motion
- Defects
- Untapped Human Potential

**Supplier** – In a value stream a supplier is defined as the company, department or operation that provides the input for the value stream. In an agri-processing value stream, a supplier could be the company that provides seeds for a process or it could be the activity prior to the current one.

**Customer** – In a value stream a customer is defined as the company, department or operation that is receiving the ‘value add’ produced or generated by the value stream. In a manufacturing value stream, a customer could be the company that receives finished product from a process

## Types of Maps

**Current State Map** – A current state map represents the data on how a value stream or process currently works.

**Future State Map** – A future state map is the future plan of how a value stream is going to work.

## What is the process?

- **Provides common understanding of all activities within the current process.**
- **Provides insight beyond the single-process level.**
- **Highlights obstruction to flow and sources of waste.**
- **Presents a blueprint for creating flow and implementing lean concepts and techniques.**
- **Provides a basis for getting to the Desired Future State (Continuous Improvement).**

1. Identify the Scope of the Value Stream Mapping Exercise and Form Team

2. Collect Data

*Go to the actual place where the process is performed and observe. Talk to the actual people involved in the process and get the real fact. Reality is invariably different from perception, few processes work the way we think they do. The purpose of process mapping is to identify waste, not to develop the perfect process map.*

3. Map the Current State

*Map the process by hand using symbols; don't waste time trying to make it look pretty on the computer. Map the activities in process sequence. Use actual times (not standard times). Capture existing flow and how the system operates.*

4. Create the Spaghetti Chart

*Get a layout. Select a product, product family or paperwork and walk the flow and mark it on the layout.*

5. Categorize Each Process Step as Value, Non-value but necessary or Waste

6. Create a Time Value Analysis Chart

7. Brainstorm Improvement Ideas

8. Categorize Improvement Ideas as Immediate, Short Term or Long Term

*Immediate – Idea can be immediately implement*

*Short Term – Idea can be implemented within the next 90 days*

*Long Term – Idea will require significant capital investment or will take longer than 90 days to implement*

9. Rank Short Term and Long Term Improvement Ideas

*From most important to least important as determined by the team*

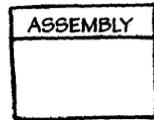
10. Develop the Future State Value Stream Map

*Develop the future state value stream map assuring that all immediate and short term improvement ideas are incorporated*

11. Create an Action Plan

# Sample VSM and icons

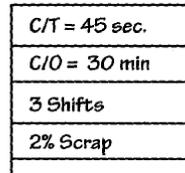
## MATERIAL FLOW ICONS



Manufacturing Process



Outside Sources

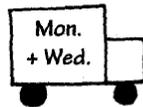


Data Box

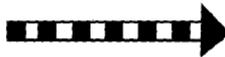


300 pieces  
1 Day

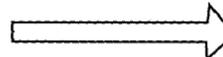
Inventory



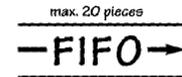
Truck Shipment



PUSH Arrow



Finished Goods to Customer



First-In-First-Out Sequence Flow

## GENERAL ICONS



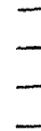
Kaizen Lightning Burst



Buffer or Safety Stock



Operator

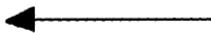


Supermarket

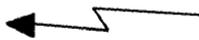


Withdrawal

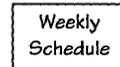
## INFORMATION FLOW ICONS



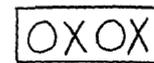
Manual Information Flow



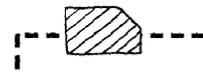
Electronic Information Flow



Schedule



Load Leveling



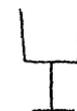
Withdrawal Kanban



Production Kanban



Signal Kanban



Kanban Post



Sequenced-Pull Ball

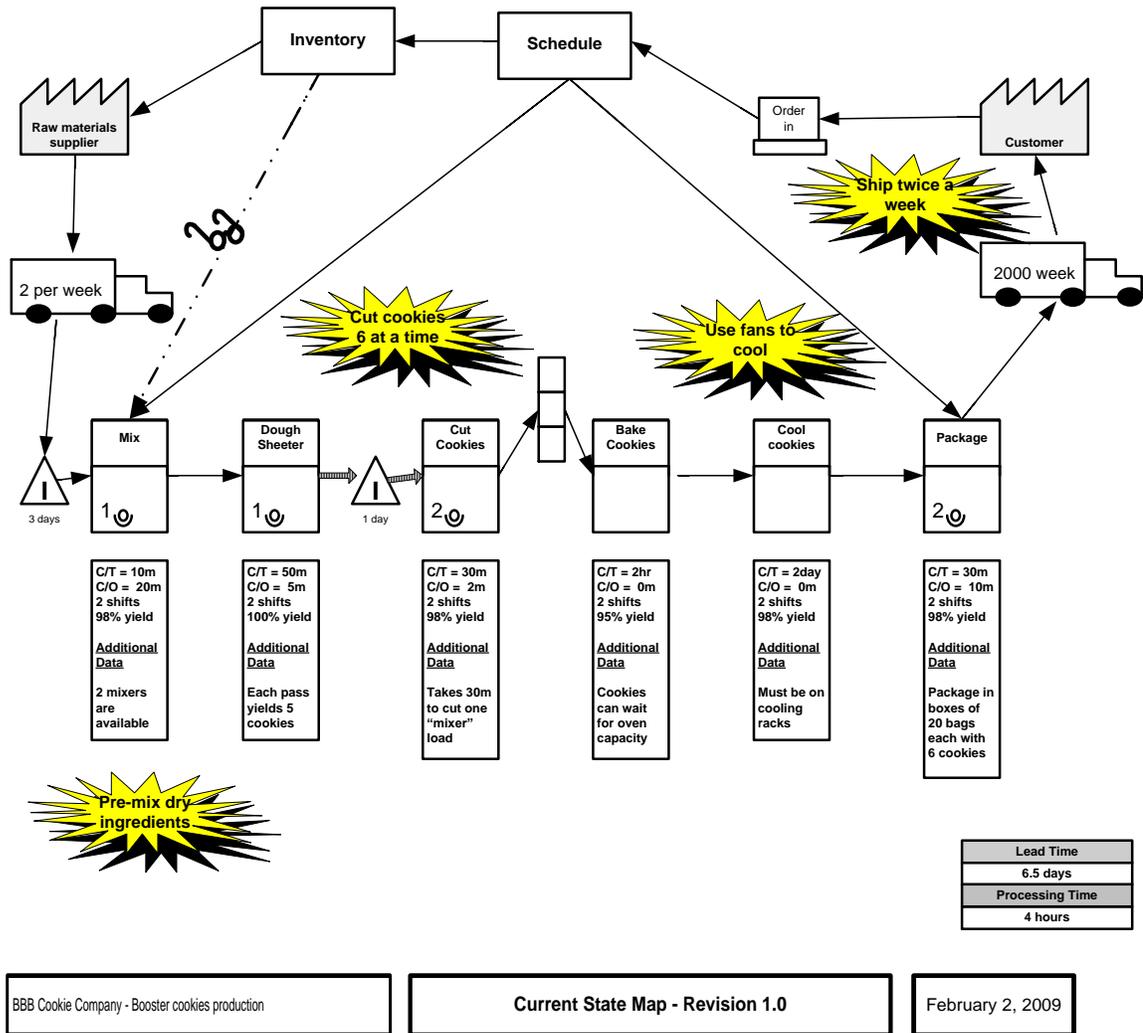


"Go See" Scheduling



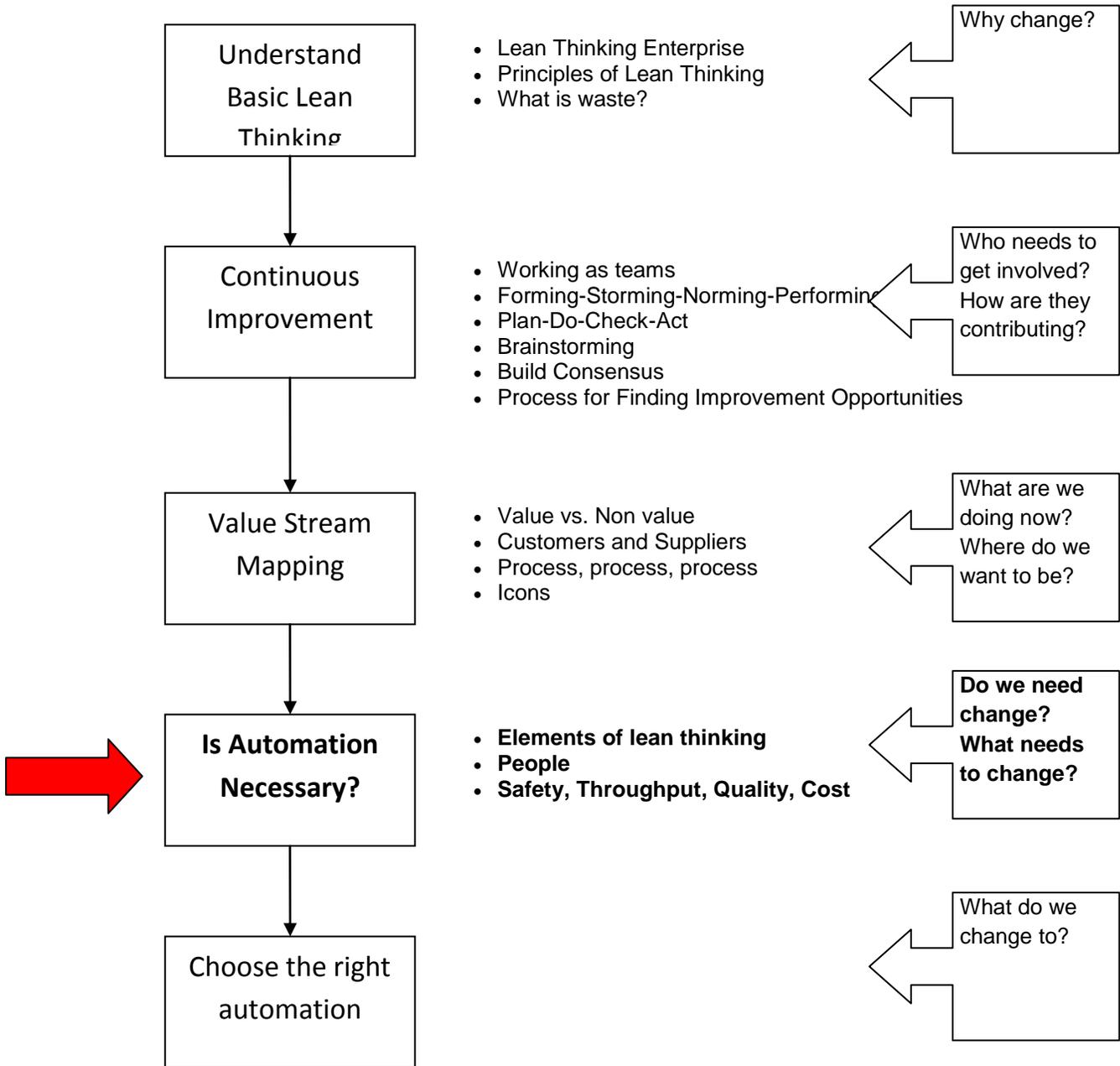
Kanban Arriving in Batches

# Sample VSM



Ensure to include process owners in the review of the current state map and brainstorming session to determine the future state. Consider the "ideal" state as well – what would the process look like if all waste could be eliminated.

# Steps to consider



# Automation (technology) Decision Making



<p>Why is this important in making an automation decision?</p>	<p>Use the information that we have gathered to make a sound business decision</p>
<p>What are the benefits to the automation decision?</p>	<p>For sustainability, we need to ensure that a proven and successful process is followed</p>
<p>What happens if we do not consider this during the automation process?</p>	<p>If we do not follow a tried and true automation assessment decision process, we may jeopardize many improvements we have made and may even cause the collapse of the company</p>



In particular we want to focus on when and where to use automation and why we use automation, ensuring that automation does not have a negative impact on our people or processes. Focus on making sure that whatever automation we utilize, the automation will allow us to provide additional value to our customers and does not distract us from our pursuit of eliminating waste and creating value for our customers.

Finally, it stresses the importance of selecting the appropriate automation when developing new products or processes.

The key components are as follows:

1. Use automation to support people, not to replace people. Often it is best to work out a process manually before adding automation to support the process.
2. Use Lean Thinking to identify and implement new automation.
  - ✓ New automation is often unreliable and difficult to standardize and therefore endangers flow. A proven process that works generally takes precedence over new and untested automation.
  - ✓ Conduct actual tests before adopting new automation in business processes, manufacturing systems, or products.
  - ✓ Reject or modify technologies that conflict with your culture or that might disrupt stability, reliability and predictability.
  - ✓ Encourage your people to consider new technologies when looking into new approaches to work.
  - ✓ Quickly implement a thoroughly considered automation if it has been proven in trials and it can improve flow in your processes.
3. Base automation decisions on the best balance between short term and long term decision making including a balance between stakeholders, customers and employees. This should also include the decision criteria based on financial burden versus benefit, progress towards innovation and volume and risk return.

Automation can take many forms. It can be thought of as new equipment or machinery. It can be thought of as lifting devices to help make employees tasks easier. It can be computer systems. It is how we turn our innovation into action to help our people that is important.

## Automation and the Elements of Lean Thinking

Automation is applied to help people with process to add value. Automation should be seen as a way to help people, not replace them. Automation should be applied after following these steps: Identify what needs to be done, simplify what needs to be done, and then automate where required. Failure to simplify will result in inappropriate processing.

Focus on Customer Success – Always focus on providing value to both internal and external customers. Identify what your customers need by asking them and developing a long term trusting relationship.

## Automation and People

Automation is all about supporting our innovation. Our innovation comes from our people. If you use your automation to replace your people, you are losing your ability to innovate.

As a constant theme, the principles stress that your people are your number one asset. So what do people have to offer that automation or machines don't? People think, machines process. Machines are designed to do a certain job and that is all they do. What if it is not the best way to do the job? What if there is an easier way to do the job? Does the machine have the ability to tell you what is wrong and how to improve it? We can build intelligence into equipment, but one thing we can not build in is rational thinking and common sense.

Lean is built on thinking. Lean is built on engaging people in finding a better way. The best ideas come from the people that do the work. Innovation is built on engagement of people. People will only be engaged if you provide them with a safe culture. Safety in this sense means that people can innovate without the fear of losing their jobs. If people are afraid of losing their jobs to automation, they will not provide the basis for innovation and in many cases will 'fight' automation and be part of the reason for its failure.

The labour market needs to be considered as well. If the value stream map of the process or a market research has shown that there is a diminishing labour market for a particular industry, automation may be a key addition to survival and growth of the company.

One of the key values of Lean Thinking is valuing people over automation and using automation to help people, not to distract them with making poor automation work.

## Automation and Customer Value

Automation is all about supporting your customers and providing them with value. When considering automation the consideration should be 'does it add value to the customer?' including both internal and external customers.

For example, we may purchase equipment that increases the process capabilities of one part of the operation but it does not consider that downstream operations can not support the increased volume. In this case, it does not add value to the customer as it actually decreases flow and could result in increased product lead times.

## Automation and Lean

**Safety** – Automation should be designed to have an employee’s safety in mind. This should include safety items such as guarding and light curtains to insure that employees can not access equipment when it is running. It should also include the proper mechanics for lock out when equipment is being serviced. It should also be designed and implemented with employee ergonomics in mind. This includes material lifting, assisted change over equipment etc.

**Through Put** –Automation should be designed to improve through put. Automation needs to support employees in value added activities and not distract them. Automation should be highly intuitive and easy to use, including the use of screens and controls. Automation should not require additional effort or waste for employees by having to do additional change overs, extra programming or data entry.

Automation must be reliable. If you constantly loose time due to machine failure, your through put will be affected. Automation should be designed and implemented with preventative maintenance in mind.

Automation must be flexible. In particular, if you are in a high volume – low mix environment, you must be able to adapt to both internal and external customer demand quickly with limited effort.

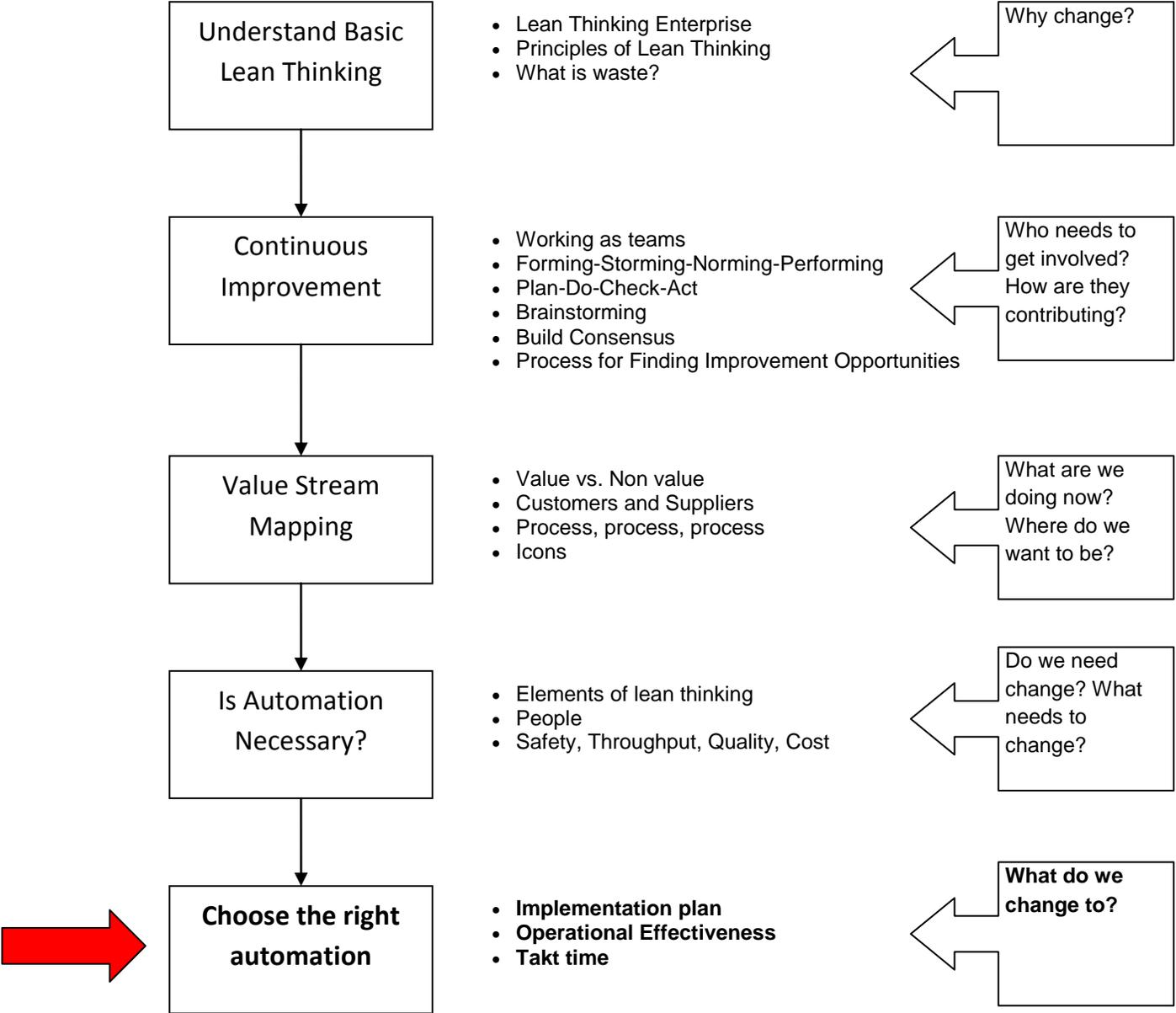
Automation must be stable. Automation must be consistent on how it runs. If there are constant changes and adjustments that need to be made, you will not get a consistent out put which will affect the evenness and leveling of your flow.

**Quality** – Quality should be built into automation. We need to build a culture that stops and fixes problems. Part of fixing problems is seeing them. Equipment should be designed to build quality product as well as provide visibility for employees to see problems so they can address them. Mistake proofing should be part of the design.

**Cost** – Equipment should be designed to be cost effective. This should include the total of cost of operating equipment such as support; impact on through put, quality and environmental costs such as energy use.

When deciding on automation, whether for a new product or process or to improve an existing one, it is important to utilize Lean Thinking and get the employees engaged early in the development process. Employees that work in the area will provide the input required to design the automation in order to eliminate additional waste. As well, with employees involved in the process, there will be less employee resistance as they will have developed ownership. Finally, there should be less disruption when implementing the automation as many of the employee and production issues will have been addressed.

# Steps to consider



# Developing a plan to Implement Automation



<p>Why is this important in making an automation decision?</p>	<p>Decisions need to be converted effectively into implementation actions.</p>
<p>What are the benefits to the automation decision?</p>	<p>Make sure that there are actions that are accountable to realize the gains determined</p>
<p>What happens if we do not consider this during the automation process?</p>	<p>The decisions that we have made will not be done in a timely, effective manner. Frustration of the team due to poor communication and follow through will mount, and gains never realized</p>



Automation should be thought of as a tool for improving your processes. During process improvement, all forms of automation should be considered. Continuous Improvement should be the driver or reason for change, not automation.

In order to develop a plan for automation implementation, it is important to develop an understanding of the current state of the operation. It is important that the employee that actually performs the work is part of the data collection and decision making process. It is also important to understand the impact that the new automation will have on the existing process. The following are the steps to consider when planning for new automation.

1. **Identify (Plan)** – Go, see and identify the actual value added work that is being done in the area being considered for new automation. Value Stream Mapping is a good tool to use for this process.
2. **Simplify (Do)** – Look for opportunities to eliminate the waste from the process and even out the flow. At this point, a plan should be developed to eliminate the additional waste using the existing equipment, automation and people. A pilot should be run to determine the impact that the changes will have.
3. **Automate (Check)** – At this point, a determination can be made if the automation is appropriate or required. This process should include the following considerations:
  - ✓ Does it eliminate further waste from the process?
  - ✓ Is there consensus with the people that are engaged in the process that the automation is a fit?
  - ✓ What is the impact on stability, reliability and flexibility?
  - ✓ What is the impact on safety, throughput, quality and cost?
  - ✓ Does the automation support the value added work of the employee?
  - ✓ Does the automation add value to both the internal and external customers of the process?
  - ✓ Will automation increase overall plant capacity and meet customer needs?

If the automation does not match with these criteria, then it should be re-evaluated through further testing, or if changes cannot be made to have the automation match the criteria, then it should be rejected.

4. **Act** - Once you have gone through this process thoroughly, you can then implement the automation quickly with limited disruption and resistance.



## Operational Effectiveness (OE)

OE is a "best practices" way to monitor and improve the efficiency of processes (i.e. machines, manufacturing cells, assembly lines) and confirms the requirement for and impact of automation.

OE is simple and practical. It takes the most common and important sources of productivity loss, places them into three primary categories and puts them into metrics that provide an excellent gauge for measuring where you are .

OE considers the following:

Loss	OE Factor
<b>Planned Shutdown</b>	<ul style="list-style-type: none"> <li>Not part of the OE calculation.</li> </ul>
<b>Down Time Loss</b>	<ul style="list-style-type: none"> <li><i>Availability</i> is the ratio of Operating Time to Planned Production Time</li> <li>100% <i>Availability</i> means the process has been running without any recorded stops.</li> </ul>
<b>Speed Loss</b>	<ul style="list-style-type: none"> <li><i>Performance</i> is the ratio of Actual Run Rate to Ideal Run Rate.</li> <li>100% <i>Performance</i> means the process has been consistently running at its theoretical maximum speed.</li> </ul>
<b>Quality Loss</b>	<ul style="list-style-type: none"> <li><i>Quality</i> is the ratio of Good Product to Total Product.</li> <li>100% <i>Quality</i> means there have been no reject or rework pieces.</li> </ul>

### World Class OE

OE is essentially the ratio of Fully Productive Time to Planned Production Time. In practice, however, OE is calculated as the product of its three contributing factors:

$$OE = Availability \times Performance \times Quality$$

This type of calculation makes OE a severe test. For example, if all three contributing factors are 90.0%, the OE would be 72.9%. In practice, the generally accepted World-Class goals for each factor are quite different from each other, as is shown in the table below.

OE Factor	World Class
<b>Availability</b>	90.0%
<b>Performance</b>	95.0%
<b>Quality</b>	99.9%
<b>Overall OE</b>	85.0%

The beauty of OE is not that it gives you one magic number; it's that it gives you three numbers, which are all useful individually as your situation changes from day to day. And it helps you visualize performance in simple terms and contributes to effective decision making.

# TAKT TIME

From your value stream map, you will have considered Takt Time. This is a key component to your automation decision and selection. Takt time is the rate at which your customer requires product. It is a simple formula that is:

$$\text{TAKT TIME} = \frac{\text{AVAILABLE TIME}}{\text{CUSTOMER DEMAND}}$$

For example,

If your customer requirement is 24,000 turkeys per day to be delivered, and you were running a process that operates 16 hour days, then you would need to have a process that operates at Takt time of 2.4 seconds. (16hrs=57600secs) Takt time = 57600/24000 = 2.4

Therefore if you were to automate to a process that processed the turkey in 1.0 second, you would be causing flow issues and possibly “over-automating” which often costs money.

# Applying Lean to the Atlantic Clamming Industry

## Case Study

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*Change the thinking and the processes will look after themselves*

*... if it can work on a clam boat, it can work anywhere!*

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*As Written by David Hogg for the HPM Weekly Update*

*April 2003*

It happened, folks. The North Sea and Bob Kerr, a Senior Partner with the Lean consulting company of High Performance Solutions coexisted for a week... and now the clamming industry may never be quite the same again.

How it all started: Over the last three years Bob has been delivering his hands-on “Intro to Lean Principles 101” workshop from Newfoundland to British Columbia. Last year several sailors from Clearwater Seafood’s Ltd. attended - and the sailors themselves will tell you that “The lights came on.” They saw the relevance to one piece flow, to plant layout, to Value Stream Mapping (VSM) and more. The discussion on flow and VSM really got them thinking about how it could apply to their industry.

### **The Project:**

Value Stream Map the clam harvesting process ... Convinced that there was a better way, Clearwater’s Gene King and Paul Norris talked to Bob about applying Value Stream Mapping to their ‘factory’ – and remember, their factory is just under 200 feet long and continuously rolls 5-10 degrees back and forth, back and forth – I suspect you get the picture. That simple fact alone means that everything they do and every piece of equipment and every process must be adapted to that environment in the same way a chicken or furniture processor/producer must adapt his/her world. Clearwater’s factory is a boat that has three focus factories within its hull – one for harvesting, one for processing, and one for freezing the clams (in less than 1 hour after harvesting) and packaging the clams right into the containers that will take them all over the world immediately upon docking.

### **The Process:**

Day one was a day that Bob will not forget as he was constantly reminded not to lie down but to keep walking until he got his ‘sea legs’ – and his food to stay down. “Toast and I became good friends for the first two days,” Bob comments.

## **The Steps:**

*Step 1:* Once stabilized – you begin as you would any VSM, any Kaizen startup, or any PDCA initiative. You begin by going to the Gemba (where the rubber hits the road) – it's where the action occurs which is where you watch, listen and ask many questions.

*Step 2:* Carefully map every single step in the value stream with direct input from those doing the job.

*Step 3:* Look at every step and ask the question 'would the customer pay for what is happening in this step?' The answer to that question determines whether the step was non-value-adding or value-adding.

*Step 4:* Armed with all the new knowledge, put this 'Current State Map' together and share it with the folks who understand the process and listen to what they say, now that the value stream is visible.

*Step 5:* Develop the Future State Map in conjunction with the process owners within the map.

*Step 6:* Implement the Future State Map by involving the process owners and their ideas.

*Step 7:* Continuously improve

## **The Results?**

SPECTACULAR. We will not provide the numbers because they are proprietary. But here are some of the realities: In the clam business it is reasonable to say that a high percentage of the meat that is harvested is lost during the process – a number that is not that unusual when you look at the total enterprise and all wastes therein. Keep in mind that some 55% of all books printed in North America are shredded, which is one heck of a lot of trees. As it turns out the entire project had the company looking for a 50% reduction in wasted clam meat and a huge increase in the product brought back to the dock.

The Gemba Thinking: The biggest benefit and impact upon everyone was the change in thinking that occurred. The change was simple & profound – here's a little of it:

**Questions/Answers:**

Q: Is everyone on the same page in the process?

*A: No, but they'd like to be, because it is awfully difficult to be proud of what you do when there is mass confusion*

Q: Does everyone think the same about what they're to do?

*A: Heck NO! So let's test it and see---*

Q: "Why does the boat go to sea?"

*A: To harvest clams. NO, that's Wrong Thinking as it does not focus on the highest value activities.*

The boat goes to sea to bring back the largest quantity of product – not just to harvest clams. When you focus on fishing, or sales, or clamming, with all your might - and bonus your folks accordingly, it is the same as providing incentives for folks to keep machines running even when there is no customer for the product. The result is accumulated materials that are often sold at fire sales - if sold at all. But if the focus was on bringing back the maximum amount of product, they would look at the entire flow and think about where the bottlenecks were.

In this case, the focus for years has been on harvesting the clams. But upon careful inspection of what was really going on, the internal processes in the floating factory (the boat) could not handle the peaks which caused clam meat to overflow and be expelled by the bilge pumps and thus completely lost. By slowing the rate of harvesting (A shocking mindset change), far less was wasted. At the end of the trip, a lot more product was available for sale in the same amount of time at no more expense for fuel.

*"And that was a tremendously hard habit for us to break," commented a Sr. Clearwater Seafoods leader.*

**The Result:**

The VSM exercise has opened eyes. It enabled people, who have fished all their lives, for the first time, to actually see the flow of the value stream. And once visible, they needed little further help from that point on. For this reason, the U.S. is training many people to Value Stream Map manufacturing operations - just to make the value streams clear that common sense can take over. Our congratulations go out to Clearwater for having the vision, the courage – and the follow-through to deliver increased capabilities to their people and to their company that will enhance their already world-leading competence. Their thinking is one reason why they are the world leaders right now when it comes to clam fishing.

*As for Bob, he is not unhappy that the land he now walks upon no longer rolls beneath his feet.*



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## Additional Information

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PEOPLE make the PROCESSES successful ... and our success has come from our guiding principles to help change the thinking and coach to competence in our client organizations.

At High Performance Solutions, we provide coaching (not consulting) in Lean and World Class performance. Our delivery methods include facilitation of workshops, team implementation, shop floor coaching, and self-assessments and benchmarking.

Our team consists of former practitioners who are experts in their respective specializations, which include world class concepts, continuous improvement, supply chain management and analysis, team building, and leadership. The development of CONSORTIUMS and Leveraged Learning Networks we are involved with brings companies together to share knowledge, discuss such items as people management and cost issues which helps each individual company become better and more successful.

The PASSION and growing focus of our organization lies in the initiation and growth of learning networks and consortiums for aspiring World Class manufacturers and achievers.

The team at HPS has implemented World Class concepts in over 100 different companies around the world. Our coaches are themselves all former practitioners and have held positions at their respective former organizations from Tool and Die Maker to Vice President of Operations. Together, our team brings over 150 years of experience in the manufacturing industry.

Our success has come through achieving sustainable, positive results in organizations across Canada and around the world. We focus on improvements at the work site by involving the people, the process owners. Our guiding principles:

Change the thinking ... get the right vision and the driving measures in place.

Coach to competence ... we do not want to be in a company for too long. We want to teach people how to USE the tools, so the improvement process resides with the people doing the job.

## **Our Clients**

Our clients include a wide range of companies from around the world, who want to attain High Performance levels through people, whose values match HPS, and who will commit to achieving results.

## **Our Services**

We offer a broad spectrum of facilitation services as well as the ability to work with the people on the shop floor to help your company implement change. Visit our website for a complete list of current offerings, or call our office and we would be glad to discuss your specific needs.

*And ...*

As part of our commitment to lifelong learning, we work with associates across the globe to provide Canadian manufacturers with the most up-to-date information and resources. We work with some of the world's top experts as exclusive Canadian distributors for lean learning materials.

## Current Available Training

The following lists training available through High Performance Solutions Inc.

**5S and the Visual Factory**  
**5S and the Visual Factory Simulation**  
**5S Auditing for a Lean Enterprise**  
**Achieving Results through People**  
**Autonomous Maintenance**  
**Cellular Manufacturing - Introduction**  
**Continuous Improvement through Teamwork (C.I.T.T.)**  
**Effective Lean Management Skills**  
**Effective Office**  
**Front Line Leadership Skills**  
**Green Principles**  
**Lean Principles 101**  
**Lean Principles 101 – High Mix Low Volume – 1 Day**  
**Lean Product & Process Design**  
**Lean Purchasing**  
**Plant Layout for Agile Continuous Flow**  
**Pull Systems - Introduction**  
**Rapid Improvement Process (Kaizen Blitz)**  
**Senior Leadership Skills for a Learning Environment**  
**Set-Up Reduction Principles**  
***Six Sigma – Green Belt Training***  
**Standard Work**  
**Total Productive Maintenance- 2 Days**  
**Value Stream Mapping Experience-Introduction**  
**Value Stream Mapping Experience- 2 Days**  
**World Class Fundamentals**

~ A detailed list is available on our website at [www.hpsinc.ca](http://www.hpsinc.ca) ~



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