

PLAYBOOK FOR COMPLETING A CONTINUOUS IMPROVEMENT PROJECT

Introduction

The City of Tulsa delivers hundreds of services and products to thousands of customers every single day. We serve internal customers for the departments who use our work to deliver their services. And we serve Tulsans every day in delivering quality drinking water, emergency response, quality parks and entertainment options and hundreds of other services as we build the foundation upon which our residents build their lives.

Every work group knows that perfection is unattainable. But if we strive to continuously improve our services and products we can increase the satisfaction of our customers. We don't want to perfect a process. We want to build a culture where the people who manage and contribute to processes take ownership of the responsibility to continuously improve.

This guide is designed to help you continue to use the tools you have learned as you work with team members and customers to evaluate and improve City services and products. The process laid out will follow that of LEAN/Six Sigma. However, this process is like many other methodologies used to improve and design services. No single approach should be viewed as superior. You should adopt tools that help you to achieve your goal of improvement.

Creating or Improving Services

From time to time a group will be tasked with offering a new service to customers. The tools in this playbook can help

create a service or from scratch or improve an existing service or product.

Some common language

VOC = Voice of the Customer

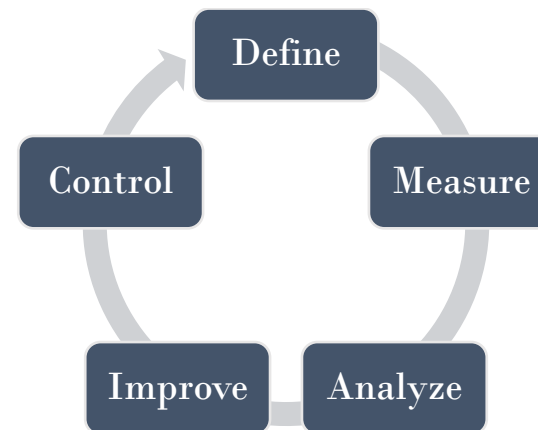
SIPOC = Suppliers, Inputs, Process, Outputs, Customers

5S = Sort, Set in order, Shine, Standardize, Sustain

RACI = Responsible, Accountable, Consulted, Informed

LEAN/Six Sigma Methodology

LEAN/Six Sigma is process or method for improving services and products or creating products and services. The method requires following a 5-step process which is:



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DEFINE – Understand and define your problem

With stretched resources and long to do lists, teams should not embark upon change just for the sake of change. To see lasting impactful change, we must have an agreement among stakeholders that there is a need for change. And we must have an agreed upon measurement for success in the future.

By the end of the Define phase a team should be able to answer the following questions:

- (1) Who is our customer?
- (2) What do they require from our service/product?
- (3) How does leadership think we are failing to meet requirements?
- (4) What are the realistic goals for this project to move us closer toward customer requirements?

To identify answers to these key questions, teams can complete the items in this checklist during the Define Phase:

- ☐ Identify the Project Team
- ☐ Draft Project Charter including schedule for project milestones

- ☐ Written Project Communication Plan/RACI Chart
- ☐ Define Critical customer requirements (CTXs)
- ☐ High level process flowchart
- ☐ SIPOC

High Level Process Map

A high-level process map can help especially with team members who are not that familiar with the product or service being improved. The team should aim to keep the steps for this level of a map to 10 steps or less. Here's an example of a high level process map:



Voice of the Customer (VOC)

VOC is another way to describe what a customer expects, prefers, and dislikes about a product or service. If it were as simple as asking customers “What do you require?” then more businesses and work groups would succeed at delivering what is expected. But customers cannot always articulate what they expect or require. Sometimes they can only tell you what they do not want or what failure is to them. It’s our job to translate what customers can share with us into measurable requirements for managers and process owners.



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Typically, we need to do several things to provide a comprehensive VOC assessment. A team can start with some

standard understanding of customers. Customers can be segmented by how they interact with the City.

Customer Segments & Expectations

Segment	Definition	Expectations	Shared Expectations
Clients	Individuals or entities who fund the services or programs provided by the City	Fiscal responsibility Program effectiveness Actions reflect policy intentions	Quality Responsiveness
Compliers	Those individuals or entities on the receiving end of enforcement activities	Consistent application of rules Fair penalties	Transparency Accuracy
Consumers	The end users of a City program, service, or information	Flexibility User-friendly services	Consistency Respect
Constituents	The individuals and groups who have some vested interest in the work done by the City	Program focus reflects their particular political or programmatic point of view	Timeliness

Once you've identified what segment of customer you are dealing with and the expectations they have, you can use more tools to gather more details about their requirements. For example, you want to move from "Responsiveness" as an expectation to "Respond within 10 minutes" as a requirement. You can use Interviews, Surveys, Human Centered Design, and Benchmarking or Industry Research to gather more details on what customers expect and need from a product or service.



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There are multiple ways to listen to customers. Each method for has its benefits and limitations, so your team will need to decide which is best for your circumstances.

VOC Method	Pros	Cons
Human Centered Design	Allows team to see the customer's experience with a process. Takes into consideration elements that aren't part of the process (how customer arrives, signage, why they are seeking the service, etc.).	Takes time. Takes resources to complete. Can be difficult to translate information into design.
Interviews (focus groups or one on one)	Helps build trust among customers. Helps gain a more in-depth customer point of view. Helps learn things you might not have thought to ask in a survey.	Requires time and resources. Limits the number of customers able to be reached.
Surveys	Easier to conduct electronically. Practical. Speedy results. Ability to reach broader audience. User anonymity.	Potential misunderstanding of questions. Lacks ability to convey feelings and emotions. May not provide actionable information.
Industry Research	Customers in different regions might not be that different. Reduces costs associated with answering questions another team has already researched. Helps identify realistic industry benchmarks.	Reduced buy-in from teams that think their process or customers are dramatically different.



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All these activities should be conducted with the purpose of better understanding who customers are and what they require from a service or product. Based upon time and available resources, the team might elect to use only one or several of these tools.

SIPOC – With a VOC and Process map you have 2/5th of your SIPOC complete. Use this information to fill in the “P” or Process portion and “C” or Customer Requirements portion of the SIPOC. The team should then identify the Inputs that go into the process and the suppliers of each input. Finally, the team should identify the outputs of the process.

EXAMPLE SIPOC DIAGRAM				
Suppliers	Inputs	Process	Outputs	Customers
Applicant	Information	Permit request ↓	Permit	Business Owner County Health Department
Finance	Confirmation of financial ability	Financial Review ↓		
Legal	Confirmation meets legal requirements	Legal Review ↓		
Applicant	Adequate funds	Payment ↓		
Permit Department	Information (e.g. expiration date, limitations, etc.)	Permit Issue		



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Wrapping Up Define - Once the team is confident they've identified the key customers and key customer requirements they probably have an idea of how the process is failing to meet those requirements. With that information, the team should review and update the project charter and complete any necessary communications with stakeholders (e.g. let them know what the team learned and planned next steps).

MEASURE – Understand how bad the problem is

Once the team has identified the problem to be addressed, it will be important for them to gather data on the product or service that relates to the problem. By the end of the Measure phase a team should be able to answer the following questions: (1) How far away are we from customer requirements? (2) How far is a realistic goal for this project?

To identify answers to these key questions, teams can complete the items in this checklist during the Define Phase:

- ☐ Identify the relevant data you need to gather and the location of the data
- ☐ If no data exists, develop a data collection plan
- ☐ Begin data collection/sampling
- ☐ Evaluate data against benchmarks & against customer requirements

- ☐ Central Tendency
- ☐ Calculate current Sigma level
- ☐ Draft detailed process map

When the team starts a project, they have an *idea* of what they expect to find. Gathering data is a way to validate the anecdotal signals the team started with at the beginning and uncover other discoveries.

Where might you find data?

If all else fails and no data exists, come up with an inexpensive way to gather data for a short period of time that will help you measure performance. If customers need services delivered in 10 days or less and no one has tracked dates from start to finish, identify a simple way to measure how close to this target the team currently is. Some great places to start in looking for data include: (1) Historical reports, (2) Existing software, (3) Physical records.

Convert information to measurements – Once data is gathered you want to turn it into meaningful insights. Look at the data from the lens of customer requirements and in a variety of ways. If customer requirement is accurate information, what percentage of cases met this requirement. If customer requirement is arrival within 10 minutes, what is your average arrival and what percentage of arrival times fall within 10 minutes?



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Metric	Helps to answer...
Standard Deviation	Whether your process is under control (whether you can consistently deliver the same results).
Mean, Median Mode vs. CTXs	Whether you're meeting customer requirements as frequently as expected.

Calculate Sigma Level – If you look at outputs of a product or service many of them can have more than one defect (e.g. on time, accuracy, quality). If you're able to calculate the total number of defects in a product or service then you can calculate the defects per million opportunities (DPMO) and convert to a sigma level.

$$\text{DPMO} = (\text{Total defects observed} / \text{Total opportunities for a defect}) \times 1,000,000$$

If you look at outputs from only one lens (e.g. on time delivery) then you can calculate (Total defects/total units) to reach a yield. For example, if 99 out of 200 services were delivered on time then the yield would be 49.5%.

Sigma Level	DPMO	Yield
1 σ	690,000	30.85%
2 σ	308,000	69.15%
3 σ	66,800	93.32%
4 σ	6,210	99.38%
5 σ	230	99.97%
6 σ	3.4	99.9997%

Based upon the chart it could be estimated that the Sigma Level is approximately 1.3.

Where possible, looking at outputs and calculating the more detailed sigma level based upon all customer requirements is ideal. It provides more opportunities for defects which can have a positive impact on the overall sigma level.

For example, if you deliver 1000 newspapers with 3 customer requirements (timely, correct address, & dry) and can measure results on each you would have 3000 opportunities for a defect. Therefore, if you have 15 defects then your DPMO is 5000. The sigma level is approximately 4.1.

If you have the same situation but only measure timely delivery and all 15 defects are related to timeliness, then you



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have 1000 opportunities for a defect and 15,000 DPMO which leads to a sigma level of 3.7.

Moral of the story: Count as many opportunities for a defect as you can possibly measure. It provides a more accurate sigma level for the product or service.

Wrapping Up Measure – Once the team is confident they have a clear picture of the current state they can proceed to analyze and identify root causes to problems. The team should re-evaluate the project charter and make any updates with more accurate information gained during this phase.

ANALYZE – Understand what causes problems

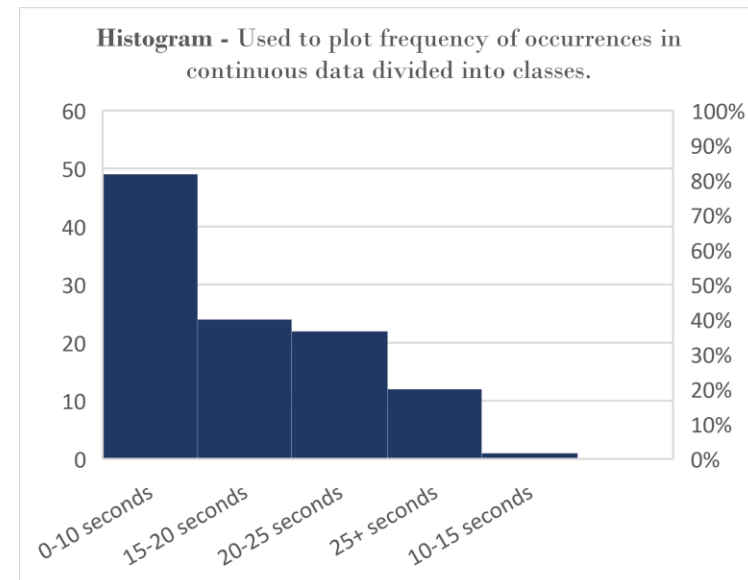
By the end of the Analyze phase a team should be able to answer the following questions: (1) What factor(s), when modified, will positively change the results to customers? (2) What factors are within the team's control? (3) What factors are within the team's influence? (4) What factors are entirely out of the team's sphere of control or influence?

To identify answers to these key questions, teams can complete the items in this checklist during the Analyze Phase:

- ☐ Histogram and/or Pareto Chart
- ☐ Box Plot/Scatter Plot
- ☐ Regression Analysis

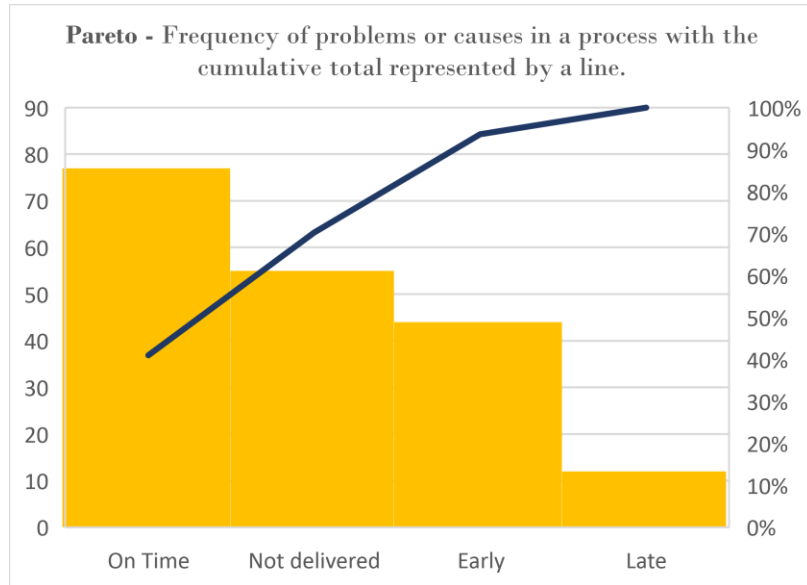
- ☐ Fishbone/Cause and Effect Diagram
- ☐ 5 Why's
- ☐ Process Map Review & Analysis (Gemba Walk)
- ☐ Hypothesis Testing

Create a Histogram and/or Pareto chart - Histograms and Pareto Charts can provide a valuable visualization of the data available. For example, they can help quickly identify outliers in data that could be skewing the measurements. This provides a helpful direction for where to look more closely at the data.

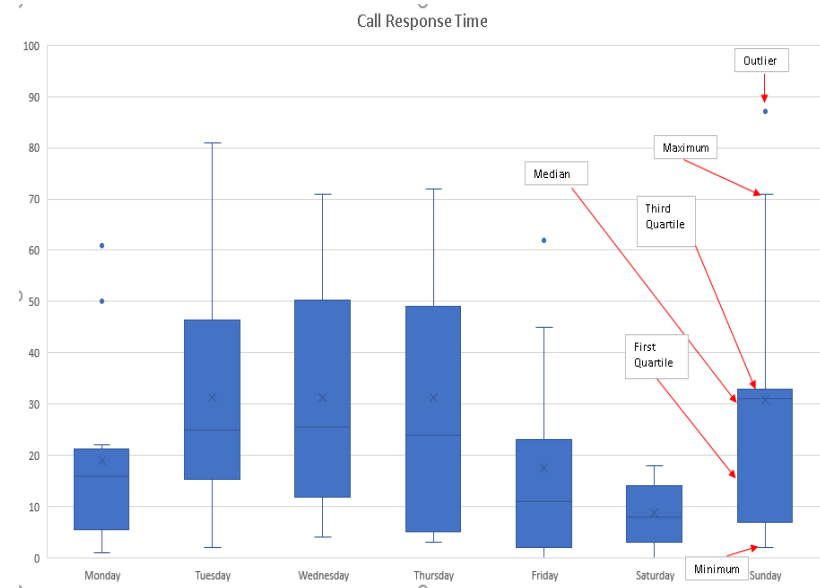


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With the pareto chart a team can see the most frequently occurring problem or cause of problems. This can help the team limit their project scope to the most important problems or causes.

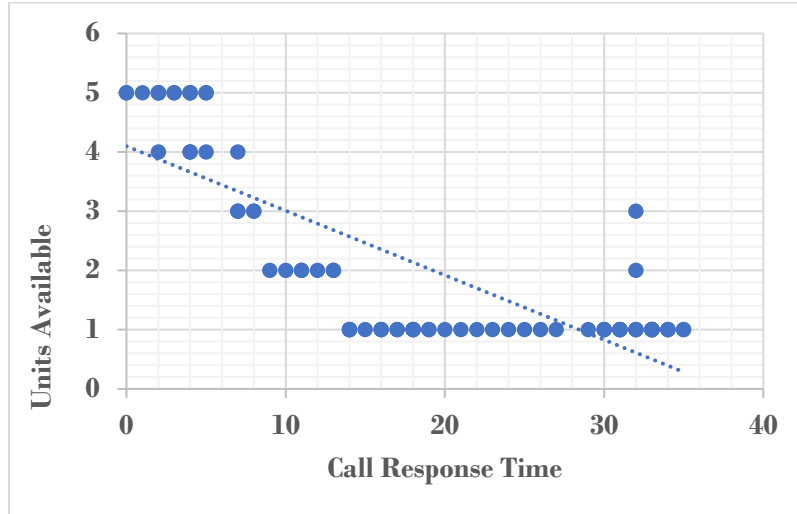


Boxplot – This tool helps to visualize the range by providing the minimum and maximum of the data along with the dispersion of the data around the median. It can also help to identify outliers that exist.



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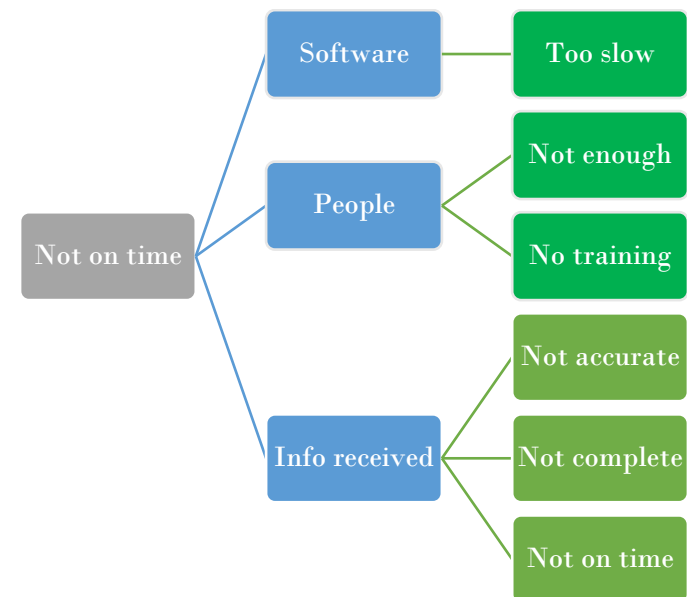
Scatter Plot - Scatter plots are used to show the relationship (aka correlation) between two variables. Once a team has focused in on a specific problem and identified a potential cause, they can use a scatter plot to see if there is a relationship among the potential cause and the problem.



For example, in the previous boxplot example above for call response times if the team believes that the number of agents is the cause and they can identify the number of units available to respond during each call in the data they could plot those two variables – the number of agents & call response time. If the scatter plot shows a clear relationship, the team can further investigate whether the units available is a root cause of increased call response times.

Fishbone/Cause and Effect Diagram - Teams don't always have enough data to analyze with detailed charts. However, there is almost always a wealth of information and ideas available from the people most closely related to the process. Creating a fishbone diagram can provide a structured approach to obtain these ideas and sort them into useful categories. A team should use the fishbone diagram to begin brainstorming potential causes.

Simple Fishbone Example



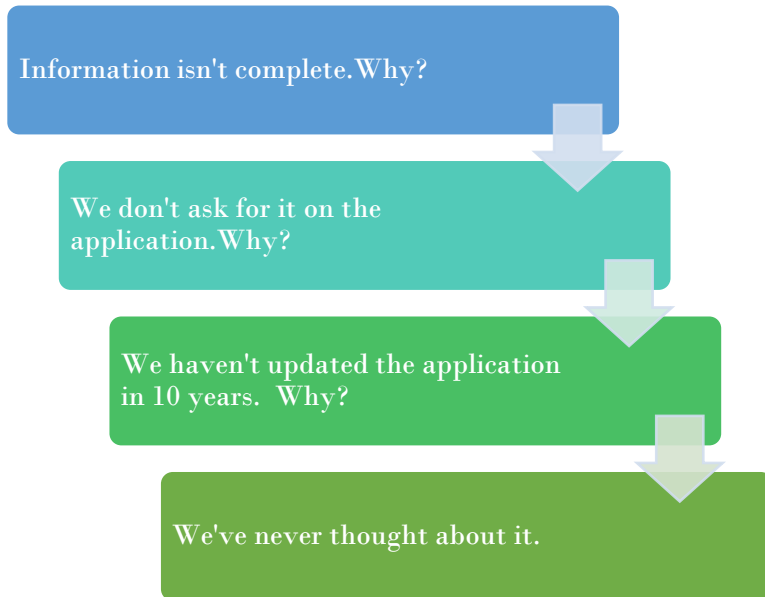
5 Why's - Once the team has a list of potential causes they can then perform more in-depth root cause analysis on one or more of these by conducting a 5 Why's analysis. As shown



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below, a team doesn't always need to ask 5 questions and at times might need to ask more than 5. The purpose of the exercise is to identify the issues that, if corrected, would decrease or eliminate the problem from occurring.

Example 5 Why's Analysis



Process Map Review/Gemba Walk - The process map is helpful at this point in the project for identifying steps where root causes might occur. If possible, the team should go to Gemba and walk the process as it's been mapped. Remember that GEMBA stands for:

G	Go and see
E	Engage. Understand and ask about issues. Use the 5 Why's.
M	Muda (Japanese for Waste). Visually look for types of waste.
B	Be respectful. Ask questions from a place of empathy and not criticism.
A	Analyze and assess the data you gathered. Include the people working the process.

Hypothesis Testing – Where sufficient data is available, teams can benefit from hypothesis testing. The team should identify potential factors that cause the problem. The team then likely has a theory as to the relationship between the factor and the dependent variable. There might be multiple theories and the team can list all of those to conduct statistical tests. Once the hypotheses are listed the team can conduct the appropriate statistical test and determine if the data supports the theory. This analysis should be conducted with a Black Belt trained in running statistical tests.

Wrapping Up Analyze – Once the team is confident they have identified the root cause(s) they should again review their project charter and make any updates based upon information gained in the analyze stage. It is very likely that some root causes will not be entirely in the business unit's



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sphere of control or influence. The team should be sure to articulate what level of control exists for each root cause identified.

Sphere of control	Inputs, activities, outputs. Things the business unit/process owner has direct control over.
Sphere of influence	Behavioral changes. Things the business unit/process owner can attempt to impact but does not have control over (e.g. another department's behavior, customer behavior).
Outside control & influence	The business unit has no control over the behaviors or inputs (e.g. weather, political views, seasonal illnesses, Federal/State laws etc.)

The team will then work to identify potential improvements and a way to test those ideas.

IMPROVE – Develop and Test Solutions for the Problem

By the end of the Improve phase a team should be able to answer the following questions: (1) What improvements are most likely to have a positive impact? (2) How can those solutions be implemented at a larger scale? (3) How might these improvements impact the overall business?

To identify answers to these key questions, teams can complete the items in this checklist during the Improve Phase:

- ☐ Brainstorming solutions
- ☐ Solution Selection Method
- ☐ Failure Modes & Effects Analysis (FMEA)
- ☐ 5S/Future State Process Flow
- ☐ Plan for testing out solutions (aka Design of Experiment)

Brainstorming Solutions – As tempting as it is to go with the first idea that comes to mind, it's important that the team consider a wide variety of possible fixes. Brainstorming is a process for generating creative ideas (notice the “S” on “idea”. You want multiple ideas). Brainstorming does not include: (1) analysis, (2) discussion, or (3) criticism of the suggested ideas. Some useful techniques for brainstorming include:

- **Brain Writing** – leader shares the topic and members individually write down their ideas before sharing with the larger group.
- **Figure Storming** – the team thinks about how someone like a boss, famous celebrity, or a famous president would handle the situation. For example, “What would Abraham Lincoln do?”
- **Online Brainstorming** – Create a central online location where team members can share ideas as they come up



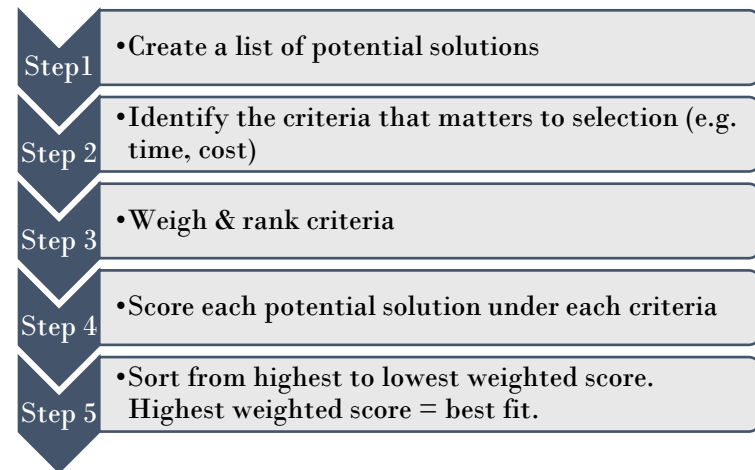
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- **Rapid Ideation** – Set a time limit (e.g. 30 minutes) and individuals or teams come up with as many ideas as possible. Set a goal of 200 ideas and see how many each has. Remind participants of the time limit and the target. Typically, after the first 15-20 ideas they write down they will start to come up with more creative ideas.

At the end of your brainstorming session be sure to make time to analyze and discuss at least some of the ideas. Obviously not all ideas will work for the team, but Innovation Champions should allow time and space for the team to consider what elements of the “wilder” ideas should be further discussed and adapted for the problem.

Solution Selection – In the event there is a long list of potential solutions and/or disagreement on the best solution, the tool to help the team evaluate the best fit idea is the Selection Matrix. This is a tool that can take a significant amount of time to complete and requires much thought.

Steps to complete a Solution Selection Matrix:



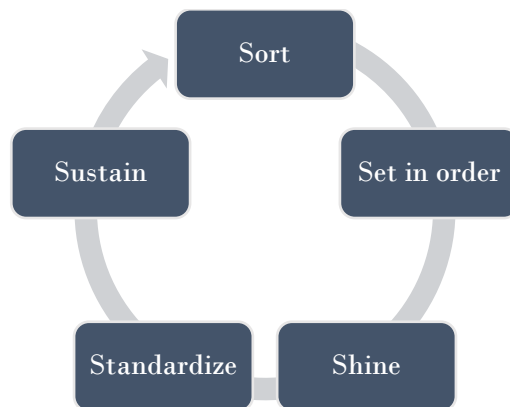
Failure Modes & Effect Analysis (FMEA) – Once a solution is agreed upon this tool helps the team identify what could possibly go wrong with the solution and what can be done by the team to mitigate any risks. This will help the team prevent or minimize the likelihood their tested solution will fail. The steps of an FMEA should be conducted in order.



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- | |
|---|
| 1. Identify all potential failures |
| 2. List effect of each failure |
| 3. Rank the severity of each failure |
| 4. Rate likelihood of failure occurring |
| 5. Rate the likelihood of detecting the failure |
| 6. Calculate RPN |
| 7. Develop action plan |
| 8. Take action |
| 9. Evaluate actual RPN score |

5S – This is a workspace organization method. In the event that the process or the space is a root cause of problems, a team can utilize the 5S steps. Every 5S project must incorporate the people who utilize the space being improved in each of the 5 steps.



Before getting started on the five steps, the team should agree upon the following: (1) the purpose of the space in relation to a process, (2) how the current state of the space contributes to problems, (3) any pre-established highest and best use or layout of the space. The answers to these questions must come from someone in a leadership role and must be clearly articulated to the people who utilize the space.

Future State Process Map – If the steps in the process itself are creating problems, the team must identify the ideal process and provide a visualization of that future state. Here are some tips for future state maps:

1. Use a different color for steps that are new or changes (e.g. if the existing steps are blue boxes, make modified steps red boxes) so that changes are clear to others.
2. Include the process owners and users of the process in creation of the future state map.
3. Prototype or test out how the new process will flow if possible.

Plan for Testing Solutions – When resources and time allows, a team can pilot or test a solution before making full-scale changes to the entire process. A pilot is a short term, small-scale experiment to help learn how full-scale implementation might work. For success, time must be devoted to creation of a pilot project plan. At a minimum, the pilot plan should include:

1. Activities to be completed with deadlines
2. Who's responsible for each activity



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3. Purpose of the pilot
4. What group(s) will participate
5. Communication plan for pilot purpose, information for groups participating, and results of the pilot
6. Goals of the pilot with specific metrics if possible
7. Timeline- start to finish
8. Measurement plan
9. How to evaluate effectiveness of the pilot

With a plan in place, the team must execute and complete the pilot and evaluate effectiveness. If the project team including the sponsor agree the improvement should be taken full scale, the team will move into the control phase. If not, the team will need to continue to iterate and test solutions until there is agreement on the best future state.

CONTROL – Implement and Sustain the Solution

Hopefully during the project, the team has maintained the goal of eventually delivering a positive improvement that can be sustained by the sponsor and process owner going forward. This is the phase where the team finishes up their work and hands off to the process owner the information and tools that will help make that a reality. By the end of the Control phase the team should be able to answer the following questions: (1) What improvement(s) work for this process to increase the ability to meet customer requirements? (2) What does the process owner need to help sustain the changes made?

To identify answers to these key questions, teams can complete the items in this checklist during the Define Phase:

- ☐ Forecasted Process Sigma Calculation
- ☐ Cost Savings Calculations
- ☐ Control Plan (Action Plan for Deployment, Training Plan, Communication Plan)
- ☐ Project Summary
- ☐ Celebration/Acknowledgement of Success

Forecasted Process Sigma & Cost Savings- Based upon the historical data reviewed in the Measure phase and the results of the Pilot program the team should be able to estimate a process sigma for the new process. The estimate will be based upon multiple factors including whether the team is confident they've addressed every root cause to process problems or they are aware that future work will need to happen and estimated time for full implementation. Cost savings might have been estimated during the solution selection phase. If so, these metrics can be updated based upon pilot results.

Control Plan – A control plan is a method to document the elements of quality control that are necessary to ensure standards are met for the product or service. To ensure a smooth transition, the team should provide their sponsor and process owner:

1. Customer requirements of the service/process
2. Overview of the input and output of the service/process
3. Processes involved



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4. Frequency of reporting & sampling methodology
5. Identification of where reports will be stored
6. Corrective Actions to be taken when problems are detected with reporting
7. Individual(s) responsible for ensuring quality is sustained.

A control plan can take the form of a Standard Operating Guideline. These can act as great tools for training new employees and re-aligning existing employees if problems begin to recur.

Project Summary – An executive summary can help the sponsor and process owner communicate about the project in the future. This can include the purpose of the project, team members, methods used, data gathered, causes identified, improvements tested and selected, and overall results of the project. It can be helpful to include what the team was not able to address during the project as well.

Celebration/Acknowledgement of Success – By the end of a project a team might be ready to move on. However, there should be time devoted to identifying important people in the success of the project and telling them “thank you” for their contribution. Few if any projects succeed without encountering a roadblock along the way. People who help move past this by providing additional information, or showing up for a all-hands-on-deck request to deal with a quick fix, or just historical information about what has been tried and failed are vital to the team’s success. Each situation

will be different so be sure that you celebrate in a way that is meaningful to the people on your team and in the process.

