

11. Kaizen

In this chapter, we will investigate how to put continuous improvement into practice using a structured problem-solving method.

Kaizen is the Japanese word for continuous improvement using small, incremental changes. It translates as change for the better. When applied to the workplace Kaizen means continuous improvement involving everyone, managers and workers alike, every day, providing structure to process improvement.

Most importantly, the Lean paradigm calls for the dual focus of doing the work and improving the work every day in parallel to incrementally increasing overall business performance. The preference for gradual change stems from the fact that smaller gradual changes are easier to incorporate to the way of working.

We identify two types of Kaizen: **Daily Kaizen** and **Improvement Kaizen**. Daily Kaizen focuses on carrying out small improvements on a daily basis that are aimed at making work simpler, quicker or more pleasant. For a more detailed discussion of Daily Kaizen, please refer to the Lean IT Association Lean IT Kaizen and Lean IT Leadership Publications. Generally, the problems solved are uncomplicated, but cause waste in the value stream. Improvement Kaizen deals with larger problems for which more research needs to be done. Improvement Kaizen is carried out in Kaizen Events.

First, we will discuss what the intent is of improving business performance and doing it continually. Next, we will discuss Kaizen Events and Kaizen Teams.

11.1 Continuous Improvement

The main objectives for improving the performance of IT are:

1. To deliver value better: better quality of service; easier to use by identifying and removing the causes of incidents and minimizing variation in the delivery of services
2. To deliver value faster: faster time to market and innovation, earlier customer feedback to drive further improvements, improve competitive advantage of customers of IT
3. To supply services cheaper: to increase profitability through lower costs of IT services.
4. To create more meaning in our work: pride of workmanship; motivate, and retain the best employees, create a safe environment
5. To leave a healthier environmental footprint: responsibility to society, next generations, and all life on the planet

There is always a trade-off decision. In order to maximize our effectiveness, we need to be aware of the consequences of our balancing act between the five basic objectives. Lean, in essence, encourages us to continually strive to improve performance.

Kaizen Events are used for intensive projects where employees are taken away from their regular jobs for a focused improvement initiative. Kaizen teams are a key part of any Lean initiative. The team gets engaged in a Kaizen event or rapid improvement workshop.

The event is a powerful engine for change as cross-functional teams of people with deep and distinct process knowledge are brought together for a highly focused period to analyze their processes and realize improvements. Kaizen events may also be used as an action-oriented method to systematically deploy the organization's strategy; they have the greatest impact when they are linked to an organization's overall strategic direction.

The Kaizen team is a cross-functional group of people, (often 5 to 8, including the Kaizen Lead and Kaizen Sponsor) working together to implement meaningful improvements to a value stream. The Kaizen team uses the creativity of people working in the value stream, independent of place in the organization, to take a fresh objective look at current performance and the value that is actually desired by customers. Kaizen teams tend to use visual observations and simple data gathering tools to identify and drive waste out of processes.

11.2 Kaizen Event

While everything should be questioned and anything could be improved, only a few key things are important to improve at any given time. Generally, if a project is important, the organization has an easier time providing appropriate resources to work on the project. Unfortunately, resources are not unlimited. So on most projects, there are some things that cannot be changed at that point in time.

Typical exclusions from Kaizen Events include: Large capital expenditures, adding people to processes, spending more than 3-5 days on one event. Kaizen is a low-cost solution. Projects are usually broken into smaller parts to maintain focus and deliver improvements as quickly as

possible. Although the Kaizen event lasts for a few days, preparation can take place over several weeks prior to the activity.

If you are going to do a **Kaizen Event** and want to assemble a team, you first need a problem to solve or an opportunity to take advantage of. There are three basic qualifications for a Kaizen Event to take place:

1. There is gap between current and desired performance
2. The cause of the problem is not clearly understood
3. The solution is not predetermined nor is the optimal solution apparent

11.3 Selecting a subject for a Kaizen event

Good Kaizen event selection can be a key to early success. The selection results in a Kaizen event rationale which serves as a starting point for the Kaizen team, and includes a description of the issue or concern, the focus of the Kaizen event, a broad goal or type of results to be achieved and an overview of the value of the effort.

Deciding on which of the best candidate Kaizens to implement first and allocate resources to, involves a strategic decision about what is most important to the customers and the company, and a check on feasibility. The best Kaizen selection is based on identifying the ones that best align with the organization's current needs, capabilities and objectives. Target areas are usually identified by looking at three categories to answer the question whether the initiative is meaningful and manageable: Results for the customer or business benefits, feasibility and organizational impact

The rationale strikes a balance between giving

clear guidelines to a team on Kaizen event direction and expectations, while not overly narrowing options or dictating solutions. Ensuring support and buy-in for the Kaizens you select means providing a good rationale for your priorities. Common results that can be achieved include:

- Throughput time reduction of 50%
- Productivity improvement of 25%
- Work in progress reduction of 40%
- Defect reduction of 80%

11.4 Roles in a Kaizen Event

Kaizen Events demand certain roles are present on the team:

- **Kaizen Sponsor.** The sponsor is responsible for selecting the initiative, facilitating the selection of a team, deciding on resources required, sponsoring the team towards achieving success, removing roadblocks for the team and reviewing the event.
- **Kaizen Leader.** The leader clarifies the Kaizen rationale with the sponsor, develops a Kaizen charter, selects and supports the team members, maintains the Kaizen approach and schedule, supports the transfer of new solutions to ongoing operations and helps the team towards success by providing the skills, knowledge, and tools to achieve meaningful improvement.
- **Kaizen Team Member.** Team members provide brains and muscle behind the problem definition, measurement, analysis, and improvement of a process.

It is acceptable to adjust the members of the Kaizen team over the course of the event, especially in the transition from developing solutions to implementing them, as long as it does not disrupt the cohesiveness of the group. Different skills and talents often are needed to make process improvements work

successfully. Often, a team member who understands the problem but who is less familiar with the value stream may contribute largely by asking insightful questions and forcing other team members to really clarify the issue at hand or the logic of a solution. The Kaizen Leader and Kaizen Sponsor remain the same throughout the event. Ideally, Kaizen Team Members are chosen based on the following criteria:

- Who has the best knowledge of the process being improved and/or contact with the customer?
- Who has the most knowledge about the problem, and/or the best access to data?
- What key skills or perspectives will be needed throughout the course of the Kaizen event and who has these?
- What groups of functions will be most directly affected by the project and who will represent?

11.5 Running a Kaizen Event

Kaizen events follow three stages: Preparing for the Kaizen event, the Kaizen event itself, closing the event and follow-up activity.

Preparing for a Kaizen event is almost more important than the event itself. Poor preparation strongly relates to whether or not the event will drive successful outcome.

Before the Kaizen Event takes place, typical activities are:

- The Kaizen Sponsor clearly defines the Kaizen rationale
- Select the Kaizen Leader
- Select the Kaizen Team Members (people who are intimately acquainted with the problem to be investigated) and complete logistics planning (schedule event, meeting area, workshop materials). Arrange for a

meet and greet with all participants

- Arrange for coverage during participants' absence from their workplace and/or during disruptions
- Assemble background information and draft the Kaizen charter. This document sets objectives and scope for the event, targets for improvement, process start and end points, and lists all participants and their roles
- Perform a Lean assessment of the area and gather data on process attributes such as takt time, cycle time, staff numbers, overtime, process flows, demand data, backlog data and current standard operating procedures
- Select and prepare the appropriate Lean training materials (as required by the event objectives and train the team upfront in the probable methods and tools that will be utilized during the event if required)

During the Kaizen Event, the Kaizen team should follow a disciplined methodology to go from a problem to implemented solution. For the purpose of process improvement, we recommend DMAIC as a five-phase improvement cycle:

- **Define:** clarify the problem and break it down if needed, define requirements, set target and objective
- **Measure:** validate the process, refine the problem, measure inputs, key steps and outcomes
- **Analyze:** develop cause and effect relationships, identify the vital few root causes, validate hypotheses
- **Improve:** develop ideas to remove root causes, test solutions, standardize solutions and measure results
- **Control:** establish standard operating procedures to communicate the way of working and maintain performance, correct problems as needed, present result to the

sponsor, and start the next iteration

After the Kaizen Event, the improvements that were made during the Kaizen need to be sustained and further cycles of improvement need to be initiated. A verification that the claimed cost savings are real may be a key success factor for future Kaizens. Just as important as the actual physical results from the event is the way people have developed and grown as leaders as a result of their participation in a Kaizen event.

11.6 A3

Information is generated throughout the Kaizen event. A highly effective way of capturing and presenting this information is by using the A3 Method. This is a method for structured problem-solving in which the Kaizen team is challenged by the scarcity of space (an A3-sized piece of paper) to record the key elements of the Kaizen event concisely and succinctly. The aim is to facilitate the communication of improvements to others within the organization.

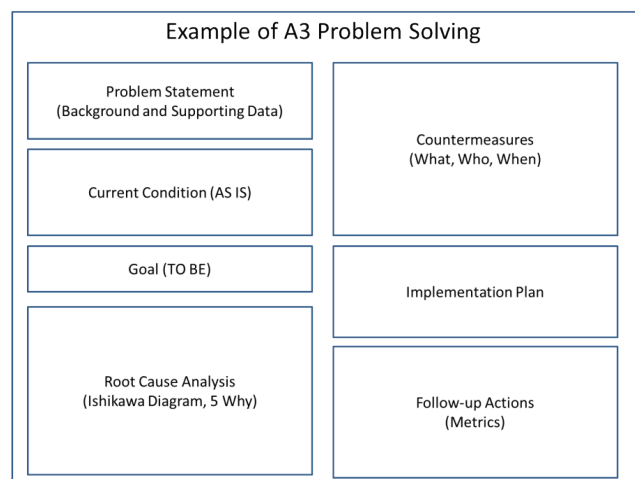


Figure 9: Example of an A3 template

We will now take a closer look on the Five Phases in the Improvement cycle: Define, Measure, Analyze, Improve, and Control.

11.7 Define

The starting point is the problem description. The complication is that the early definition may sometimes be focusing on a symptom rather than on the key-issue. The challenge is to find the key issue. Remember that the initial attempt to formulate the problem may not be exactly right and might need to be revisited throughout the Kaizen event. Working with DMAIC is an iterative exercise.

The problem statement details when the problem has been identified, what the problem is, what its magnitude is, and its impact or consequence. The problem statement does not go into possible causes or solutions.

Once the problem is clarified, it is often broken down in its contributing parts. It's important to keep focusing on customer-centric values. Put the customer first in your problem solving activity. If you have a hard time defining a problem, looking at a process area from a Muri, Mura or Muda perspective will be helpful. Where is the overburden, where is the variation, and where is the waste? In this regard, it is important to note that waste is always a symptom of a problem and not the problem itself.

The purpose of the define phase is to have the team and the sponsor reach agreement on the scope, goals, and financial and performance targets for the Kaizen event.

The results of the **Define** phase consists of four deliverables:

1. A completed Kaizen charter covering the problem statement, business impact, goal statement(s), scope, defined team which is presented to the sponsor and stakeholders. The team should try to capture their

communication towards stakeholders on one A3 and use an updated version to visualize their problem solving effort. This way, the team limits itself to the essentials, also making it easier for others to understand what they are trying to solve. Next to a general identification of the Kaizen, we describe the problem, the background, the current condition, the target condition, the countermeasures, the plan to implement them and possible follow-up actions. The relevant elements should be captured on the A3;

2. Documentation showing what customers are affected by this Kaizen and what their needs are;
3. A map of the process that captures the boundaries and scope of the process to be improved (SIPOC). This map helps the team to verify what the inputs of the process are and if they match the outputs of the supplying upstream process, and what the process outputs are and if they match the expectations of the customers of the downstream process;
4. Rules of engagement of the team and an understanding of their way of working throughout the rest of the event

11.8 Measure

In the Measure Phase, the Kaizen team provides factual evidence that a problem or an opportunity actually exists. The starting point is the question: "What is our performance?" Most of the Kaizen team's metrics tend to be process-centric and time-oriented. Process times should be captured for each step of the process. This is the actual elapsed time for each step in the process and it includes:

- **Lead Time:** is the total elapsed time between the customer placing an order and the delivery of the product or service.

- **Cycle Time:** is the time per unit of work in the value stream or total cycle time is the time from start of the value stream to its conclusion. Cycle time is impacted by wait or setup time as well as the capacity and throughput at the limiting work station, constraint or bottleneck in the process. A key element to remember is that the process cannot produce faster than the limiting work station or constraint.
- **Machine Time:** for the automated portion of the process
- **Queue Time:** time while materials or information wait in queues

The Kaizen team should visually display their measurement results using histograms, Pareto diagrams and other simple data displays. Once the information gathered looks useful for analysis and decision making purposes, the team is ready to move on to the next phase.

It is possible in this phase that quick win improvements are identified. During the Measure phase, the first concrete insights are gained into the nature of the problem. It may be that certain necessary, easy-to-implement improvements related to this problem statement are very clear. These should be implemented as soon as possible, preferably before moving on to the Analyze phase.

The purpose of the Measure phase is to thoroughly understand the current state of the process and collect reliable data on process speed, quality, and costs that you will use to expose the underlying causes of problems. Therefore, the deliverables of this phase are:

- A Value Stream Map that displays baseline measures on time, quality, and cost. The map should show the main process steps relevant to the project scope, customer demand rate, and cycle times for those steps. Supplier and customer loops need to be clearly identified and input and output clearly understood by the team

- An updated Kaizen charter or A3 which is presented to the Kaizen sponsor

11.9 Analyze

The **Analyze** Phase is where the team determines the key improvement opportunities. Analysis builds on the work started in the Define and Measure phases. At this stage, teams should not try to justify or improve, but merely capture the ideas and use their best judgment to describe potential opportunities. Every process step does not need to have improvement potential. The team should focus on those where meaningful improvement exists. Value added steps typically change the form, fit, function, or information content of the IT service, and these steps tangibly contribute value in the customer's eyes. Non-value adding steps are waste, all of which should be targeted for potential elimination, if possible.

From an analysis standpoint, the Kaizen team is seeking to balance the rate of production to the customer's rate of demand in order to establish flow. Bottlenecks and constraints in the process have a negative impact on the process throughput and possibly the ability of the process to meet demand.

The observed effects all have a cause. Drilling deep to the root cause is often supported by the "5 Why" technique, to prevent the team from being satisfied with superficial answers that won't fix the problem in the long run. It is the team's challenge to identify the root cause of process effects and define which will be targeted for improvement in the next phase.

The team answers 4 questions:

1. What are the causes?
2. What are the effects?

3. What is the relationship between causes and effects?
4. How important is each cause regarding the problem?

Often, the causes and effects are visualized in an Ishikawa or Fishbone diagram to provide structure in the team effort uncovering cause and effect relationships. The diagram is also to ensure a balanced list of ideas has been generated during brainstorming or that major possible causes are not overlooked.

The purpose of the analyze phase is to pinpoint and verify causes affecting the key input and output variables tied to the goals of the Kaizen. The primary deliverables typically include a list of improvement opportunities, data analysis that describes a 'before' and proposed 'after' state, identification of the problem's root causes and their priority. An updated Kaizen charter or A3 should, again, be presented to the Kaizen sponsor.

11.10 Improve

In the **Improve** Phase, the team has validated the causes of the problems in the process and is ready to generate a list of solutions for consideration. They will answer the question "What needs to be done?" As the team moves into this phase, the emphasis goes from analytical to creative. The first task in this phase is to develop ideas for improving the process. Often, ideas are generated by use of brainstorming. Ideas can also be generated using other tools. For every situation, people have assumptions about what can or cannot be done. Reversing the assumption, or modifying it, may help the team think of new ways to do the process.

After a list of solutions has been developed, the team will need to select the desired

solution that will be presented to the Kaizen sponsor. The team could take each solution, one at a time, and determine what current business conditions would be obstacles to implementation versus what would be beneficial to the implementation. The solutions are prioritized by assessing the impact and feasibility of each opportunity. Each solution could also be compared by ranking them against the others, to help clarify priorities and give structure to making decisions in the team.

However, finding a good solution is not enough. A solid cost/benefit analysis, and the presentation to the sponsor are important to convince others in the organization. Often, the precise value of the financial impact is not known, and neither are the direct and indirect costs. For example, at times it may be difficult to determine how an anticipated improvement in customer satisfaction of a given item will translate into financial benefits. In these cases, a range of values can be used, of what can be reasonably expected. This analysis attempts to understand the total range of variation associated with the 'most likely' situations. By displaying the total range of variation, the decision-maker is more equipped to understand the risks associated with the proposed solution. This way, even if the benefit cannot be quantified, it is still made visible in the decision-making process. By running a pilot implementation, the team reduces risk of failure and tests the validity of the solution, even though running a pilot causes a delay to full scale implementation and realization of benefits.

The purpose of the improve phase is to learn from pilots of the selected solutions and execute a full-scale implementation. The primary deliverables typically include an evaluation, selection and optimization of the

best solution, the execution of a pilot and full-scale implementation plan and, as a result, an improved process that is stable, predictable and meets customer requirements. Again, the updated Kaizen charter or A3 should be presented to the Kaizen sponsor.

11.11 Control

In the **Control** Phase, the emphasis is on a successful implementation and maintaining the gains achieved. The question the team is trying to answer is, "How can we guarantee performance and ensure that the improvement is sustainable?" The team needs to ensure that the success they have seen from the Improve Phase will continue. This includes transferring the responsibilities to the process owner, for instance by leaving tools and knowledge to help the owner manage the process after the team has gone. Tools help monitor and control the process and they need to be institutionalized. The team created 'as-is' performance measures in the Define phase. In the final phases of the Kaizen event, these measures need to be updated and they should indicate the effect of the implemented solution in the target area.

Often, a new way of working will help sustain the implemented solution. The team should capture this in a **Standard Operating Procedure**, preferably created together with the people responsible for working in that area.

One of the powerful aspects of running Kaizens in an organization is to take successful implementations and expand them across the entire organization. Replication is taking the solution from the team and applying it to the same type or a similar type of process. Standardization is

taking the lessons learned from the team and applying those good ideas and solutions to other processes. The team should consider standardization and replication opportunities to significantly increase the impact on the business to far exceed anticipated results by the pilot and solution implementation.

Ensuring that people use new ways of working is always difficult. Lean includes the concept of **Poka Yoke**. This is all about making it impossible to make mistakes. Literally, Poka Yoke means to prevent unintended mistakes. Examples are designing processes or products so that there is only one, preferably easy, way to use the process or product. For each solution that we aim to implement we must ask ourselves whether it is poka yoke.

When the Kaizen event is officially over, a team evaluation may be done to assess how each individual did as a team member. Management may devise rewards to recognize the work of the team, and the team may share the knowledge gained with others.

The purpose of the Control phase is to complete Kaizen work and hand off the improved process to its owner, with procedures for maintaining the gains. The primary deliverables typically include the before and after data on process metrics, operational training on Standard Operating Procedures and a completed Kaizen charter, including lessons learned and recommendations for further opportunities.

11.12 Kaizen Tools

A variety of tools can be useful to the Kaizen team:

- 1. The Kaizen Charter / A3 Visualization:** Next to a general identification of the Kaizen, the team, and the process area, its content is: the problem, the background, the current condition, the target condition, the countermeasures, the plan to implement them and possible follow-up actions. This tool is used throughout the Kaizen event to record the results.
- 2. The Pareto Diagram:** A type of chart that contains both bars and a line graph, where the cumulative total is represented by the line. The purpose of the Pareto chart is to highlight the most important root causes of the problem among a (typically large) set of factors. This tool is mainly used in the Analyze phase.
- 3. The Value Stream Map:** A method for analyzing the current state and future state for the series of events that take a product or service from its beginning through to the customer. Key metrics associated with value stream mapping are value adding times and no value adding times. The VSM is developed in the Analyze phase.
- 4. The 5 Why Technique:** An iterative question-asking technique used to explore the cause-and-effect relationships underlying a particular problem, used in the Analyze phase. The primary goal of the technique is to determine the root cause of a defect or problem
- 5. The Fishbone or Ishikawa Diagram:** A type of relationship diagram that shows the causes of a specific event usually grouped into major categories to identify sources of variation. Categories most commonly used in Lean IT are People, Process, Policy and Technology. This tool is mainly used in the Analyze phase.
- 6. The Solution Matrix:** A matrix, used in the Improve phase, in which solutions are plotted after an impact and feasibility analysis, to visually demonstrate which solution should be pursued with the highest priority.

11.13 Kaizen Pitfalls

Experienced Kaizen leaders have identified the key factors for running a successful Kaizen and the common pitfalls to avoid. We will discuss these briefly.

Common pitfalls and the associated steps to rectify the situation are:

Phase	Pitfall	Countermeasures for pitfall
Define	Too much detail in the process map	Strive to cover about 80% of all possibilities
	The scope is too big	Use data and a refined SIPOC to re-scope; use a Pareto chart to identify and select the biggest cause of the problem

Measure	Too much data	Use the cause and effect diagram to find the data that should be analyzed
	The measurement system is not valid	Study the process to better understand it and to design a collection plan that result in representative data points
Analyze	The assumptions were not checked	Verify assumptions with a variety of stakeholders
	Jumping to conclusions	The team should always use a selection of appropriate graphic tools to endorse its analysis
Improve	A preferred solution is pushed	Use a structured decision-making technique to select the best quantified solution that all team members can support
	The impact of the change on people in the process is underestimated	Give proper attention to communicating the solution to all stakeholders by relating to all interests and objections
Control	Early finish	The team needs to define tools to monitor the process and appropriate actions to be taken
	Poor benefit realization	The team should always consider opportunities for replication and standardization by use of Standard Operating Procedures

The DMAIC methodology is a powerful five-phase approach to addressing a process that needs improvement. The keys to having a successful Kaizen Event are:

- Establishing that the project is a business priority
- Understanding the true requirements for the process
- Using data to tell the story
- Picking the right tool for the right situation
- Communicating the Kaizen goals, accomplishments and successes
- Building credibility and support for the Kaizen