Continual Improvement

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Even if you're on the right track, you'll get run over if you just sit there.

Will Rogers
US humorist & showman (1879 - 1935)

http://www.nndb.com/people/554/000056386/

Rationale for Continual Improvement

One of the most fundamental elements of total quality is continual improvement. The concept applies to processes and the people who operate them as well as to the products resulting from the processes. A fundamental total quality philosophy is that all three—processes, people, and products—must be continually improved. This chapter provides the information needed to make continual improvements to processes and products.

Rationale for Continual Improvement

Customer needs are not static; they change continually. A special product feature that is considered innovative today will be considered just routine tomorrow. A product cost that is considered a bargain today will be too high to compete tomorrow. A good case in point in this regard is the ever-falling price for each new feature introduced in the personal computer. The only way a company can hope to compete in the modern marketplace is to improve continually.

Management's Role in Continual Improvement

Management can play the necessary leadership role—and that essentially is its role—in continual improvement by doing the following:

- ✓ Establishing an organization-wide quality council and serving on it.
- ✓ Working with the quality council to establish specific quality improvement goals with timetables and target dates.
- ✓ Providing the necessary moral and physical support. Moral support manifests itself as commitment. Physical support comes in the form of the resources needed to accomplish the quality improvement objectives.
- ✓ Scheduling periodic progress reviews and giving recognition where it is deserved.
- ✓ Building continual quality improvement into the regular reward system, including promotions and pay increases.

Essential Improvement Activities

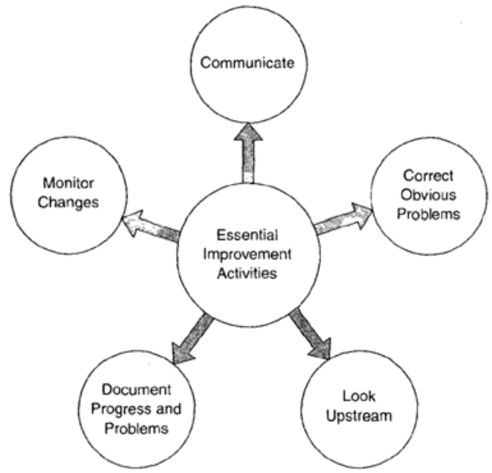

Figure 19–1
Essential Improvement Activities

Structure for Quality Improvement

Quality improvement doesn't just happen. It must be undertaken in a systematic, step-by-step manner. For an organization to make continual improvements, it must be structured appropriately, Quality pioneer Juran calls this "mobilizing for quality improvement." It involves these three steps:

- ✓Establish a quality council.
- ✓Develop a statement of responsibilities. Responsibilities that should be stated include the following: (a) formulating policy as it relates to quality; (b) setting the benchmarks and dimensions (cost of poor quality, etc.); (c) establishing the team and project selection processes; (d) providing the necessary resources (training, time away from job duties to serve on a project team, and so on); (e) implementing the project; (f) establishing quality measures for monitoring progress and undertaking monitoring efforts; and (g) implementing an appropriate reward and recognition program.
- ✓Establish the necessary infrastructure.

The Scientific Approach

The scientific approach is one of the fundamental concepts that separates the total quality approach from other ways of doing business. Scholtes and his colleagues describe the scientific approach as "making decisions based on data, looking for root causes of problems, and seeking permanent solutions instead of relying on quick fixes."

Scholtes developed four strategies for putting the scientific approach to work in a total quality setting:

- ✓Collect meaningful data.
- ✓Identify root causes of problems.
- ✓Develop appropriate solutions.
- ✓Plan and make changes.

Identification of Improvement Needs

Methodologies for identification of improvement needs were discussed previously in the course (Pareto, the Toyota Practical Problem-Solving model, and others). another approach is offered by Scholtes and his colleagues. They recommend the following four strategies for identifying improvement needs:

- ✓Apply multivoting.
- ✓Identify customer needs.
- ✓Study the use of time.
- ✓Localize problems.

Development of Improvement Plans

The first step is to develop a mission statement for the team. This statement should clearly define the team's purpose and should be approved by the organization's governing board for quality (executive steering committee, quality council, or whatever the group is). After this has been accomplished, the plan can be developed. Scholtes and his colleagues recommend five stages for developing the plan:

1. Understand the process.
2. Eliminate errors.
3. Remove slack.
4. Reduce variation.
5. Plan for continual improvement.

Common Improvement Strategies

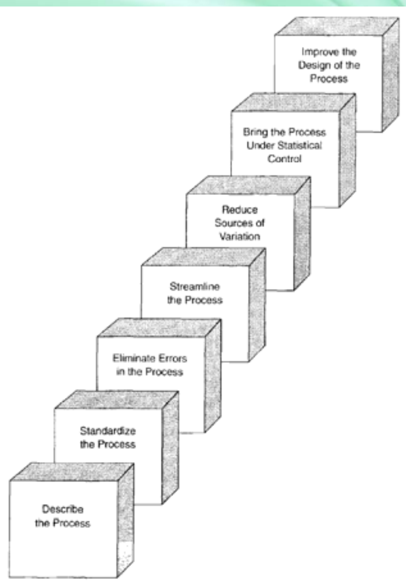

Figure 19–2
Standard Process Improvement Strategies

Additional Improvement Strategies

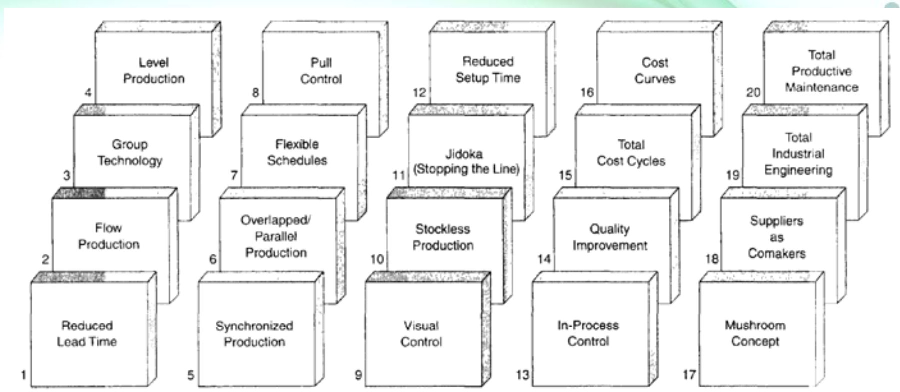

Figure 19–3
Strategies for Continual Improvement

The Kaizen Approach

Kaizen is the name given by the Japanese to the concept of continual incremental improvement. Kai means “change” and zen means “good.” Kaizen, therefore, means making changes for the better on a continual, never-ending basis. The improvement aspect of kaizen refers to people, processes, and products.

- ✓Kaizen value system.
- ✓Role of executive management.
- ✓Role of middle managers.
- ✓Role of supervisors.
- ✓Role of employees.
- ✓Kaizen and quality.

The Kaizen Approach

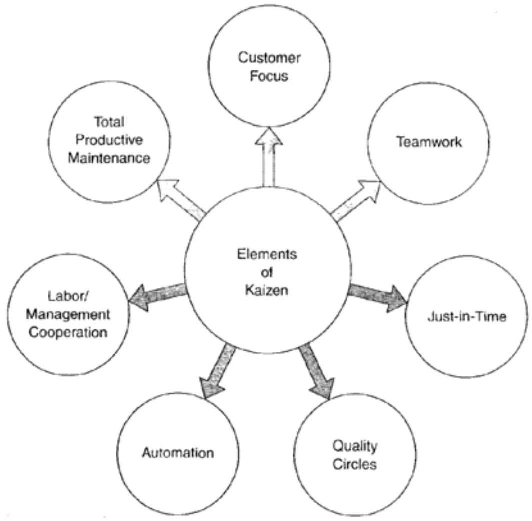

Figure 19–4
Elements of Kaizen

The Kaizen Approach

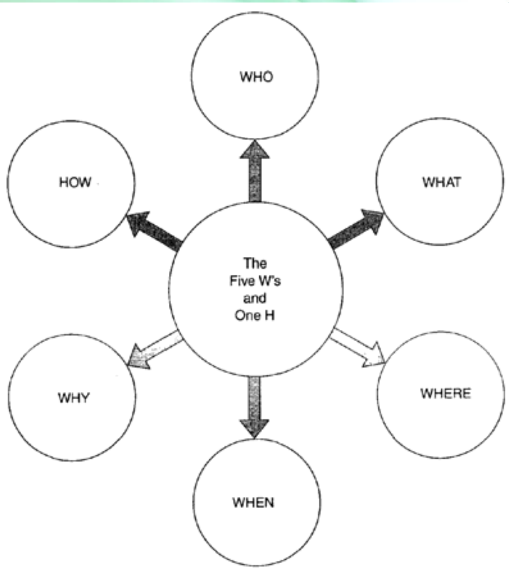

Figure 19–6
The Five W's and One H

The Kaizen Approach

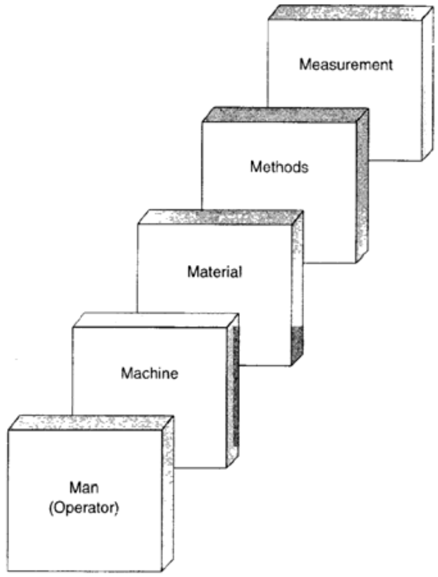

Figure 19–7
The Five M's of Processes

Goldratt's Theory of Constraints

Eliyahu M. Goldratt developed the Theory of Constraints as an approach to managing that helps organizations improve continually. Goldratt describes his theory: "The Theory of Constraints is an intuitive framework for managing an organization. Implicit in the framework is a desire to continually improve performance to have a process of ongoing improvement. It starts, as it must, with clearly defining the goal of the organization and establishing measurements to determine the impact of any action on the goal."

http://www.business-improvement.eu/toc/Goldratt_The_Choice.jpg

Goldratt's Theory of Constraints

Goldratt's theory is based on the assumption that every organization faces constraints. However, the constraints that have the greatest negative impact on performance are policies as opposed to such physical entities as materials and resources. Goldratt defines a constraint as "anything that limits an organization from achieving higher performance vis-à-vis its goal." The Theory of Constraints is applied in the following steps:

- ✓Identify.
- ✓Exploit.
- ✓Subordinate.
- ✓Eliminate constraints/overcome inertia.

The CEDAC Approach

CEDAC is an acronym for cause-and-effect diagram with the addition of cards. It was originally developed by Dr. Ryuji Fukuda of Sumitomo Electric, a Japanese manufacturing firm. Its purpose is to facilitate continual improvement in the workplace.

CEDAC is based on the supposition that three conditions must exist in order for continual improvement to occur:

- ✓A reliable system.
- ✓A favorable environment.
- ✓Practicing as teams.

The CEDAC Approach

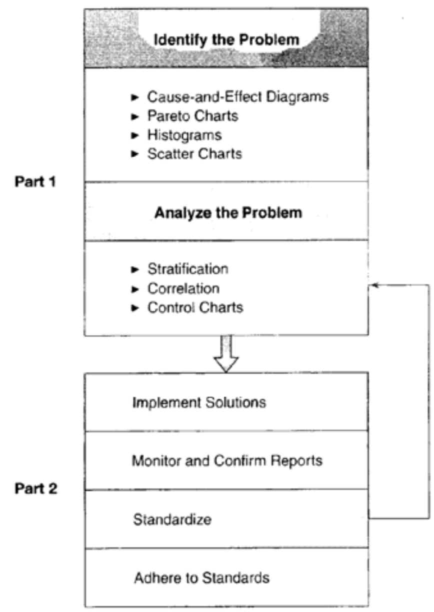

Figure 19–9
CEDAC System

Six Sigma Concept

One of the most innovative developments to emerge out of the total quality movement is the Six Sigma concept, introduced by Motorola in the mid-1980s. The purpose of Six Sigma is to improve the performance of processes to the point where the defect rate is 3.4 per million or less. It was designed for use in high-volume production settings. Consequently, the concept is more appropriately used in a manufacturing rather than a service organization. Modern manufacturing systems have many built-in opportunities for defects. This can lead to a high defect rate, one of the principal costs of poor quality. Motorola won the Malcolm Baldrige National Quality Award in 1988 for its pioneering efforts in the development of the Six Sigma concept.

Six Sigma Concept

The central core of the Six Sigma concept is a six-step protocol for process improvement. The six steps are as follows:

1. Identify the product characteristics wanted by customers.
2. Classify the characteristics in terms of their criticality.
3. Determine if the classified characteristics are controlled by part and/or process.
4. Determine the maximum allowable tolerance for each classified characteristic.
5. Determine the process variation for each classified characteristic.
6. Change the design of the product, process, or both to achieve a Six Sigma process performance.

Six Sigma Concept

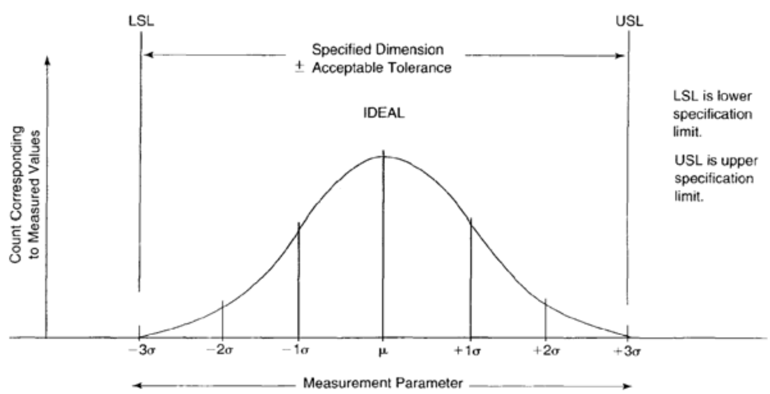

Figure 19–13
Histogram of a 3-Sigma Process
Note: Requirements match ±3σ values; 99.73% of product with fall within the specified limits.

Six Sigma Concept

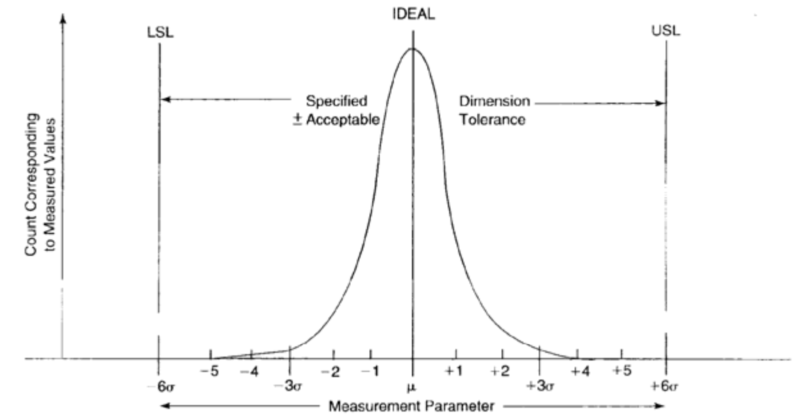

Figure 19–14
Histogram of a 6-Sigma Process
Note: Requirements match ±6σ values. Note that requirements are the same as in Figure 19–13, but the process is improved; 99.9999998% of product produced will fall within the specified limits.

Six Sigma Concept

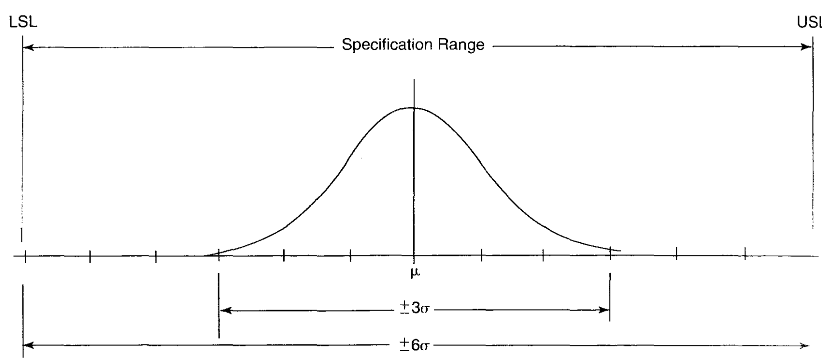

Figure 19–15
This histogram shows a 6-sigma process achieved by broadening the specification range for product acceptability.

Six Sigma Concept

Sigmas	Nonconformances (Statistical)	% Acceptable (Statistical)	Nonconformances (Motorola)	% Acceptable (Motorola)
1	317,400	68.26	697,700	30.23
2	45,400	95.46	308,733	69.1267
3	2,700	99.73	66,803	93.3197
4	63	99.9937	6,200	99.38
5	0.57	99.999943	233	99.9767
6	0.002	99.9999998	3.4	99.99966
7	0.000003	≈ 100	0.019	99.9999981

Nonconformances per Million Opportunities in a Six Sigma Setting

Figure 19–16
Sigma Quality Levels, *npmo*

Lean Operations

Lean was originally developed as a manufacturing concept and, as such, was often referred to as lean manufacturing. However, as has happened with so many quality-management—related concepts, the service sector—impressed with the results enjoyed by practitioners of lean manufacturing—began to adopt and adapt the concept to this sector. Consequently, we use the term lean operations in this course to convey the message that the concept can be applied with good results in the manufacturing and service sectors. The purpose of adopting Lean as a business improvement method is to produce better products or deliver better services using fewer resources. If the concept had a motto, it would be this: *doing more with less and doing it better*.

Lean Operations

The reduction of waste approach to Lean implementation grew out of Toyota's desire to eliminate waste in manufacturing processes. Lean focuses on reducing and, ideally, eliminating the following types of waste:

1. Overproduction waste.
2. Inventory waste.
3. Motion waste.
4. Transportation waste.
5. Overprocessing waste
6. Defects waste.
7. Waiting waste.
8. Underutilization waste.

Lean Operations

The tools and techniques of Lean will be familiar to students of quality management. In fact. most of these tools have already been explained at different places in this course. However, Lean is not just about the application of these tools. It is also about how they are applied and in what order. The tools and techniques most commonly associated with Lean are as follows:

- ✓Five-S workplace organization.
- ✓Visual workplace systems.
- ✓Layout.
- ✓Standardized work (SW).
- ✓Point of use storage (POUS).
- ✓Batch size reduction.

Lean Operations

- ✓Quick changeover (QCO).
- ✓Poka-yoke.
- ✓Self-inspection.
- ✓Autonomation.
- ✓Pull systems/kanban.
- ✓Cellular and flow.
- ✓Just-in-time (JIT).
- ✓Total productive maintenance (TPM).
- ✓Value Stream Mapping (VSM).
- ✓Change management.
- ✓Teamwork.

Lean Six Sigma

Six Sigma is a continual improvement method that focuses on identifying the key factors that determine the performance of a process, getting those factors established at the best possible level, and keeping those factors at that level. Lean is a continual improvement method that focuses on reducing waste and improving process flow. Lean Six Sigma combines the best of these two concepts by linking the tools that are used in each in a systematic way and in a specified sequence.

Lean Six Sigma

DMAIC Roadmap

The nucleus of Lean Six Sigma is the Define, Measure, Analyze, Improve, and Control or DMAIC Roadmap. although the five phases of the roadmap concept are constant, the steps. tools, and outputs of each phase can vary slightly, depending on the type of organization and the exigencies of that organization.

References

Quality Management for Organizational Excellence: Introduction to Total Quality, 6th Edition, David Goetsch and Stanley Davis, copyright 2010, Pearson, ISBN: 978-0-13-501967-2.

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