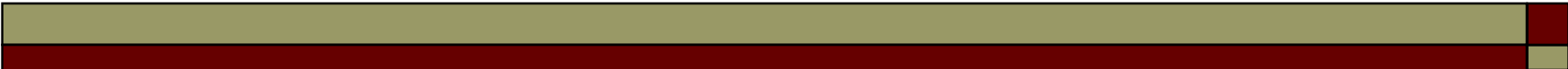




Total Quality Management (TQM)

By
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Total quality management is defined as managing the entire organization so that it excels on all dimensions (performance, features, reliability, durability, serviceability, perceived quality, aesthetics) of products and services that are important to the customer

Mahatma Gandhi on Customer

- A customer is an important visitor on our premises, he is not dependent on us. We are dependent on him. He is not an interruption in our work .He is the purpose of it. He is not an outsider in our business. He is the part of it. We are not doing favor by serving him. He is doing favor by giving us an opportunity to do so.

MEASURES

DIMENSION	PRODUCT EXAMPLE: LASER PRINTER	SERVICE EXAMPLE: CHECKING ACCOUNT AT A BANK
Performance	Pages per minute Print density	Time to process customer requests
Features	Multiple paper trays Color capability	Automatic bill paying
Reliability/durability	Mean time between failures Estimated time to obsolescence Expected life of major components	Variability of time to process requests Keeping pace with industry trends
Serviceability	Availability of authorized repair centers Number of copies per print cartridge Modular design	Online reports Ease of getting updated information
Aesthetics	Control button layout Case style Courtesy of dealer	Appearance of bank lobby Courtesy of teller
Perceived quality	Brand name recognition Rating in <i>Consumer Reports</i>	Endorsed by community leaders



Goal OF TQM

- Careful design of a product or Service.
- Ensuring that the organization's systems can consistently produce the design.



Costs of Quality

- Appraisal Costs
- External Failure Costs
- Internal Failure Costs
- Prevention Costs



Six Sigma Quality

- ❑ **A philosophy and set of methods companies use to eliminate defects in their products and processes**
- ❑ **Seeks to reduce variation in the processes that lead to product defects**
- ❑ **The name, “six sigma” refers to the variation that exists within plus or minus three standard deviations of the process outputs**

Six Sigma Quality (Continued)

- ❑ Six Sigma allows managers to readily describe process performance using a common metric: **Defects Per Million Opportunities (DPMO)**

$$DPMO = \frac{\text{Number of defects}}{\left[\begin{array}{l} \text{Number of} \\ \text{opportunities} \\ \text{for error per} \\ \text{unit} \end{array} \right] \times \text{No. of units}} \times 1,000,000$$

Six Sigma Quality (Continued)

Example of Defects Per Million Opportunities (DPMO) calculation. Suppose we observe 200 letters delivered incorrectly to the wrong addresses in a small city during a single day when a total of 200,000 letters were delivered. What is the DPMO in this situation?

So, for every one million letters delivered this city's postal managers can expect to have 1,000 letters incorrectly sent to the wrong address.

$$DPMO = \frac{200}{[1] \times 200,000} \times 1,000,000 = 1,000$$

Six Sigma Quality: DMAIC Cycle

- ❑ **Define, Measure, Analyze, Improve, and Control (DMAIC)**
- ❑ **Developed by General Electric as a means of focusing effort on quality using a methodological approach**
- ❑ **Overall focus of the methodology is to understand and achieve what the customer wants**
- ❑ **A 6-sigma program seeks to reduce the variation in the processes that lead to these defects**
- ❑ **DMAIC consists of five steps....**

Six Sigma Quality: DMAIC Cycle

1. Define (D)

Customers and their priorities

2. Measure (M)

Process and its performance

3. Analyze (A)

Causes of defects

4. Improve (I)

Remove causes of defects

5. Control (C)

Maintain quality



Example to illustrate the process...

- We are the maker of this cereal. Consumer reports has just published an article that shows that we frequently have less than 16 ounces of cereal in a box.
- What should we do?



Step 1 - Define

- What is the critical-to-quality characteristic?
- The CTQ (critical-to-quality) characteristic in this case is the weight of the cereal in the box.



2 - Measure

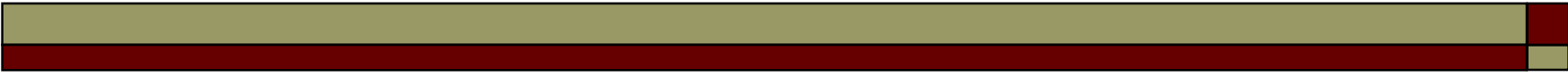
- How would we measure to evaluate the extent of the problem?
- What are acceptable limits on this measure?

2 – Measure (continued)

- Let's assume that the government says that we must be within ± 5 percent of the weight advertised on the box.
- Upper Tolerance Limit = $16 + .05(16) = 16.8$ ounces
- Lower Tolerance Limit = $16 - .05(16) = 15.2$ ounces

2. Measure (continued)

- We go out and buy 1,000 boxes of cereal and find that they weight an average of 15.875 ounces with a standard deviation of .529 ounces.
- What percentage of boxes are outside the tolerance limits?



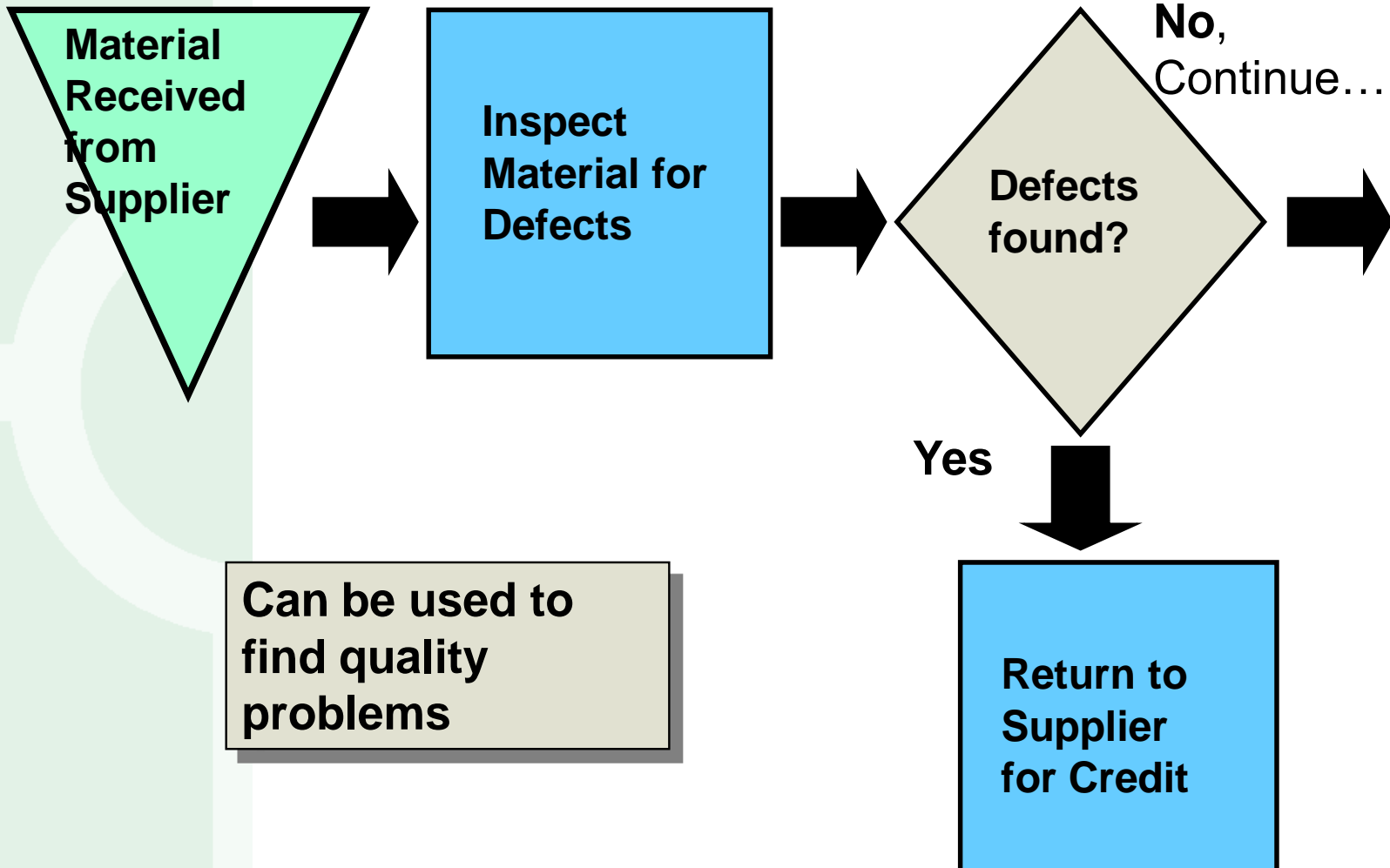
Step 3 - How can we improve the capability of our cereal box filling process?

- Decrease Variation
- Increase Specifications

Step 5 – Control

- Statistical Process Control (SPC)
 - Use data from the actual process
 - Estimate distributions
 - Look at capability - is good quality possible
 - Statistically monitor the process over time

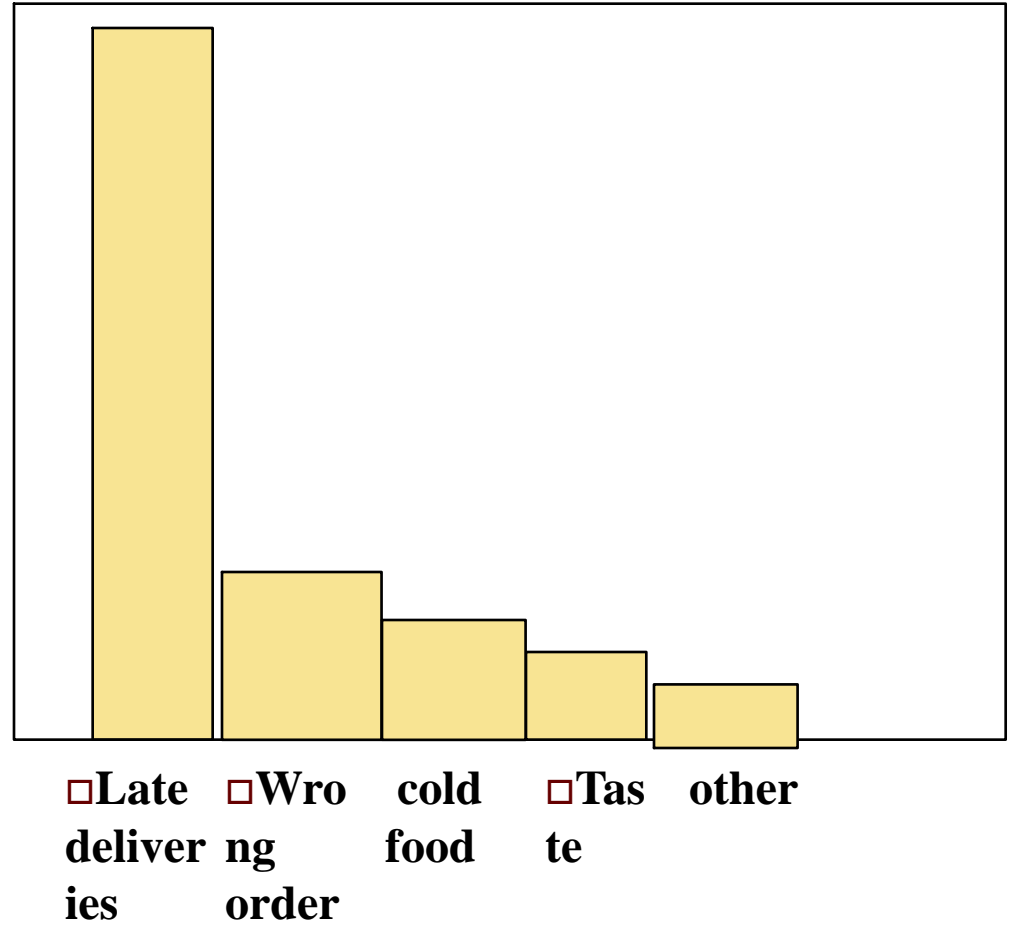
Analytical Tools for Six Sigma and Continuous Improvement:
Flow Chart



Analytical Tools for Six Sigma and Continuous Improvement: Pareto Analysis

Can be used to find when 80% of the problems may be attributed to 20% of the causes

T # of customers Complaints



Analytical Tools for Six Sigma and Continuous Improvement: Run Chart

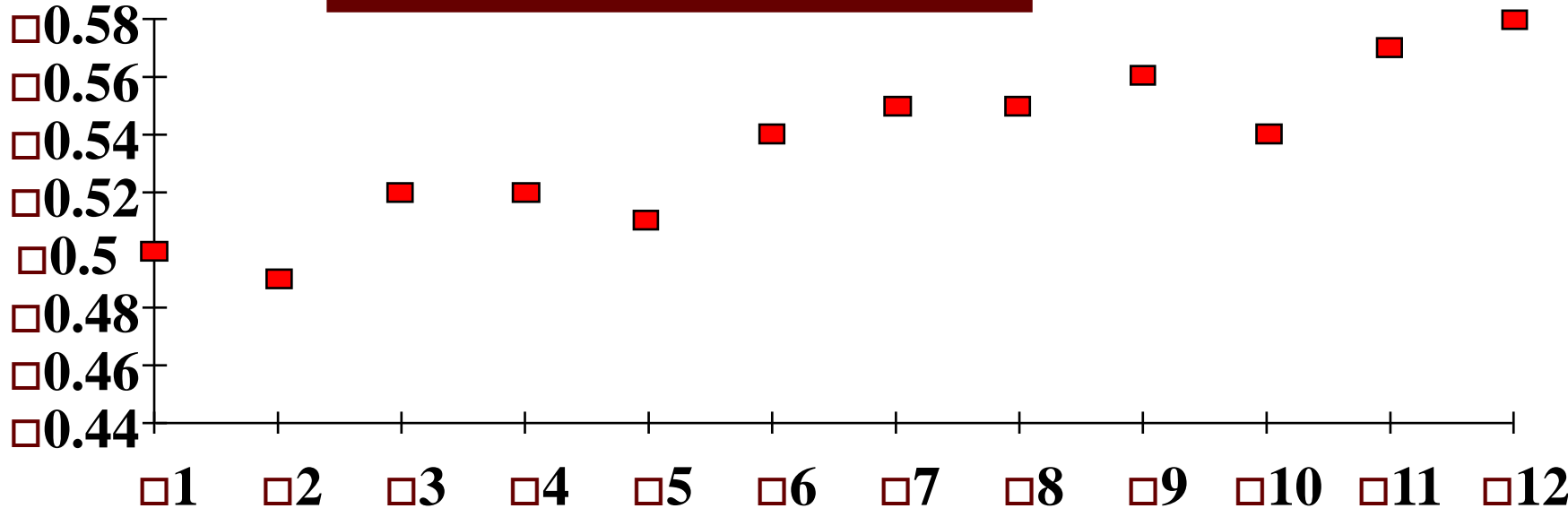
Can be used to identify when equipment or processes are not behaving according to specifications

Diameter

- 0.58
- 0.56
- 0.54
- 0.52
- 0.5
- 0.48
- 0.46
- 0.44

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Time (Hours)



Analytical Tools for Six Sigma and Continuous Improvement: Checksheet

Can be used to keep track of defects or used to make sure people collect data in a correct manner

Monday

Billing Errors

Wrong Account

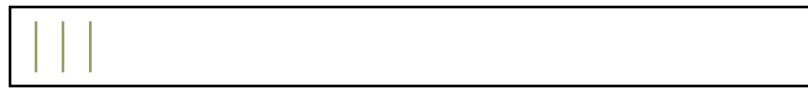


Wrong Amount

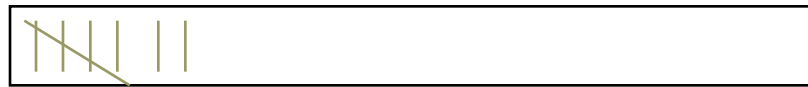


A/R Errors

Wrong Account

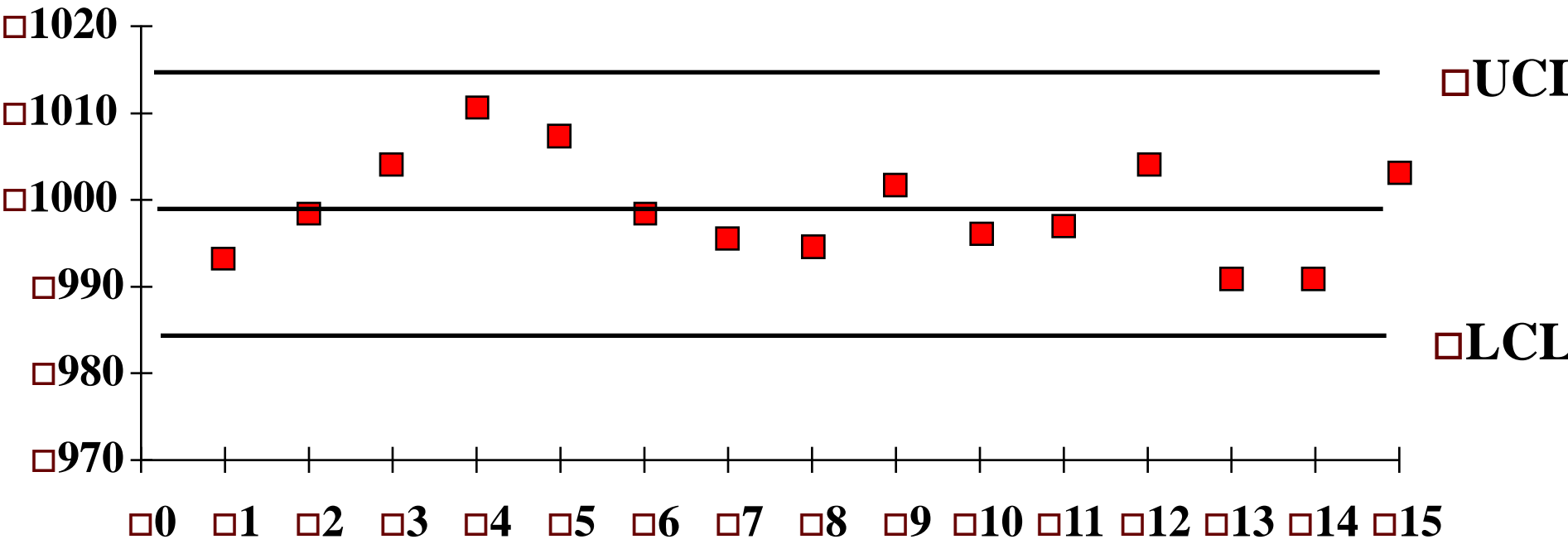


Wrong Amount



Analytical Tools for Six Sigma and Continuous Improvement: Control Charts

□ Can be used to monitor ongoing production process quality and quality conformance to stated standards of quality



Six Sigma Roles and Responsibilities

- ❑ **Executive leaders must champion the process of improvement**
- ❑ **Corporation-wide training in Six Sigma concepts and tools**
- ❑ **Setting stretch objectives for improvement**
- ❑ **Continuous reinforcement and rewards**

ISO 9000

- ❑ **Series of standards agreed upon by the International Organization for Standardization (ISO)**
- ❑ **Adopted in 1987**
- ❑ **More than 100 countries**
- ❑ **A prerequisite for global competition?**
- ❑ **ISO 9000 directs you to "document what you do and then do as you documented"**



Three Forms of ISO Certification

- ❑ **1. First party: A firm audits itself against ISO 9000 standards**
- ❑ **2. Second party: A customer audits its supplier**
- ❑ **3. Third party: A "qualified" national or international standards or certifying agency serves as auditor**

Sources

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- Russell, Roberta S. and Taylor, Bernard W., Operations Management along the supply chain, John Wiley and Sons (Wiley India).



Thank you