

# SIX SIGMA – PAST, PRESENT AND FUTURE

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## What is Six Sigma

Six Sigma is the measure of quality that strives for near perfection. It is a disciplined, data-driven methodology focused on eliminating defects. A Six Sigma defect is defined as anything that falls outside of a customer's specifications. Six Sigma is a reference to a statistical measuring system, equivalent to just 3.4 defects per every million opportunities (Snee, 2003).

## WHY SIX SIGMA

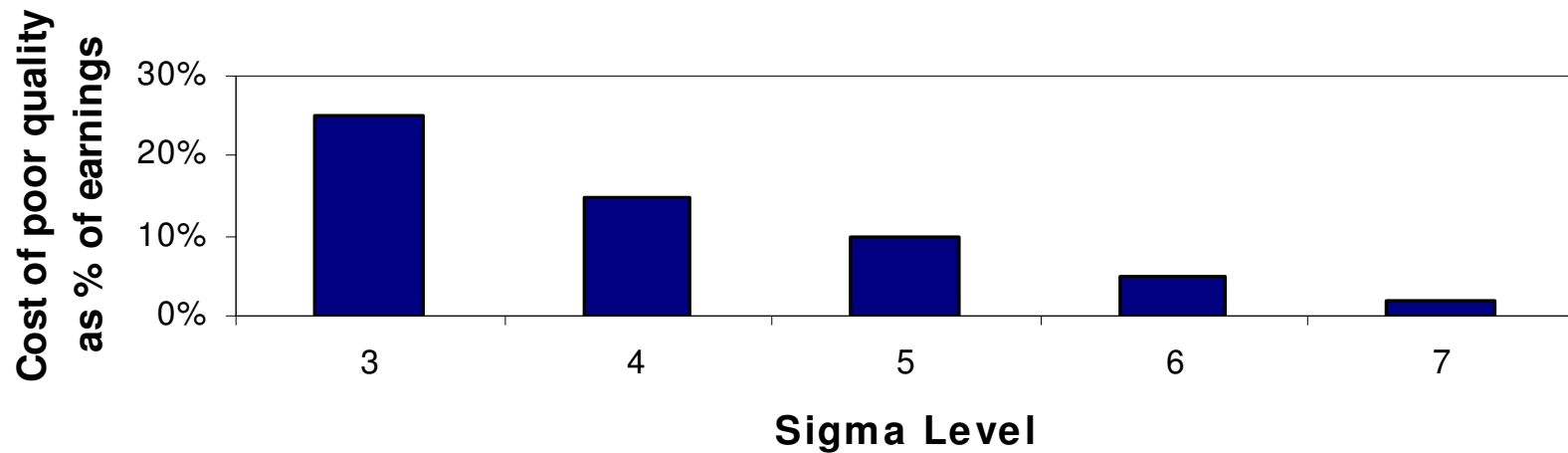
- Intense competitive pressures – especially from rapid globalization.
- Greater consumer demand for high quality products and services, little tolerance for failures of any type.
- Top management (and stockholder) recognition of the high costs of poor quality.
- The availability and accessibility of large data bases and the increasing ability to explore, understand, and use the data.

## Sigma and % accuracy

	Defects per Million Opportunities (DPMO)	% Accuracy
One Sigma	691,500	30.85%
Two Sigma	308,500	69.15%
Three Sigma	66,810	93.32%
Four Sigma	6,210	99.38%
Five Sigma	233	99.977%
Six Sigma	3.4	99.9997%
Seven Sigma	0.020	99.999998%

## Cost of poor quality

**Fig. 1 Cost of poor quality versus Sigma level**



## Inventor of Six Sigma

Motorola is known for its cool cell phones, but the company's more lasting contribution to the world is the quality-improvement process called Six Sigma. In 1986 an engineer named Bill Smith, sold then-Chief Executive Robert Galvin on a plan to strive for error-free products 99.9997% of the time. It is the origin of 'Six Sigma'.

## Six Sigma at Motorola

Motorola saved \$17 Billion from 1986 to 2004, reflecting hundreds of individual successes in all Motorola business areas including:

- Sales and Marketing
- Product design
- Manufacturing
- Customer service
- Transactional processes
- Supply chain management

## General Electric: What Is Six Sigma?

“First, what it is not. It is not a secret society, a slogan, or a cliché. Six Sigma is a highly disciplined process that helps us focus on developing and delivering near-perfect products and services”

- Saved \$750 million by the end of 1998
- Cut invoice defects and disputes by 98 percent, speeding payment, and creating better productivity
- Streamlined contract review process, leading to faster completion of deals and annual savings of \$1 million



### Honeywell: Six Sigma Plus

“Six Sigma is one of the most potent strategies ever developed to accelerate improvements in processes, products, and services, and to radically reduce manufacturing and/or administrative costs and improve quality. It achieves this by relentlessly focusing on eliminating waste and reducing defects and variations.

- Initiated Six Sigma efforts in 1992 and saved more than \$600 million a year by 1999.
- Reduced time from design to certification of new projects like aircraft engines from 42 to 33 months.
- Increased market value by a compounded 27% per year through fiscal year 1998.

## Selecting the right projects for SIX SIGMA

- Assure that the importance of the projects is evident or can be readily demonstrated.
- Assure the projects are viable and doable in a short time.
- Assure that the success of the projects can be readily quantified.

## Six Sigma – past, present and future

### Six Sigma Team

- Project owner
- Implement solutions
- Black Belt managers

*Project Champions*

*Executive Leadership*

- Own vision, direction, integration, results
- Lead change

- Part-time
- Help Black Belts

*Green Belts*

*Master Black Belts*

- Full time
- Train and coach Black and Green Belts
- Statistical problem solving experts

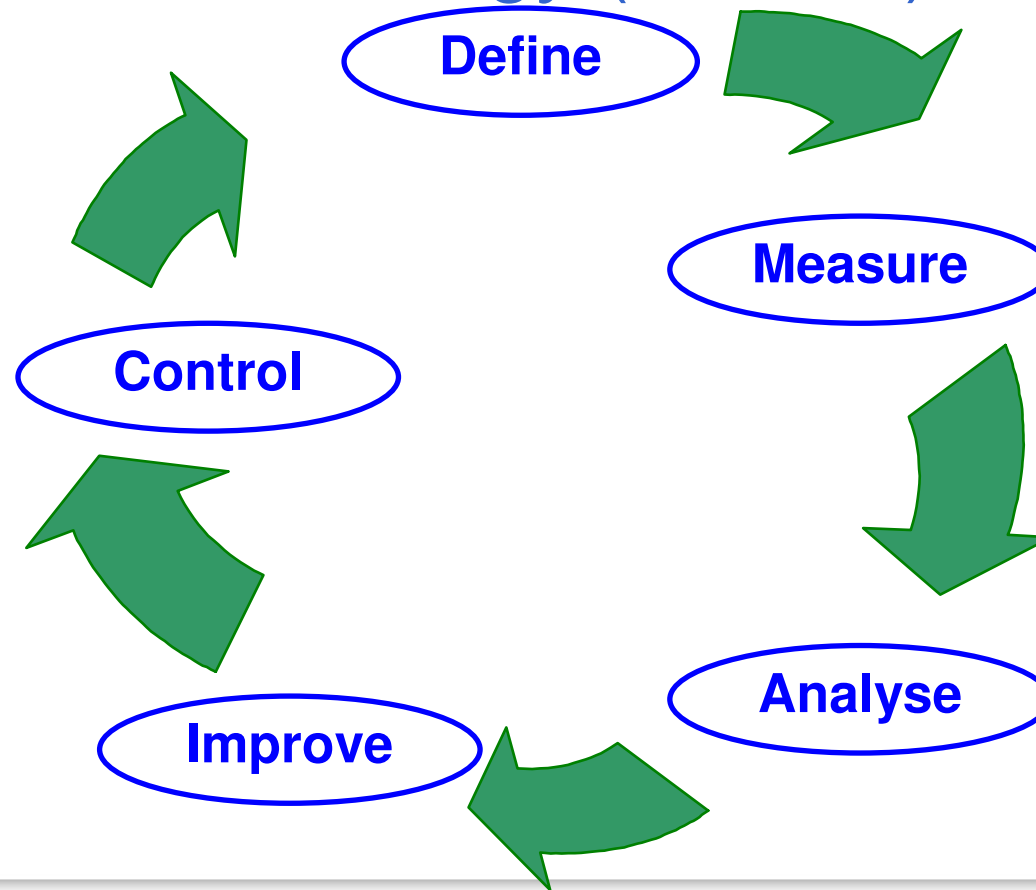
*Black Belts*

- Devote 50% - 100% of time to Black Belt activities
- Facilitate and practice problem solving
- Train and coach Green Belts and project teams

### Standards in Action

[www.bsieducation.org/standardsinaction](http://www.bsieducation.org/standardsinaction)

## Six Sigma Methodology (DMAIC)



## DMAIC Steps

### 1. Define



- Identify projects that are measurable
- Define projects including the demands of the customer and the content of the internal process.
- Develop team charter
- Define process map

## DMAIC Steps

### 2. Measure



- Define performance standards
- Measure current level of quality into Sigma. It precisely pinpoints the area causing problems.
- Identify all potential causes for such problems.

## DMAIC Steps

### 3. Analyse



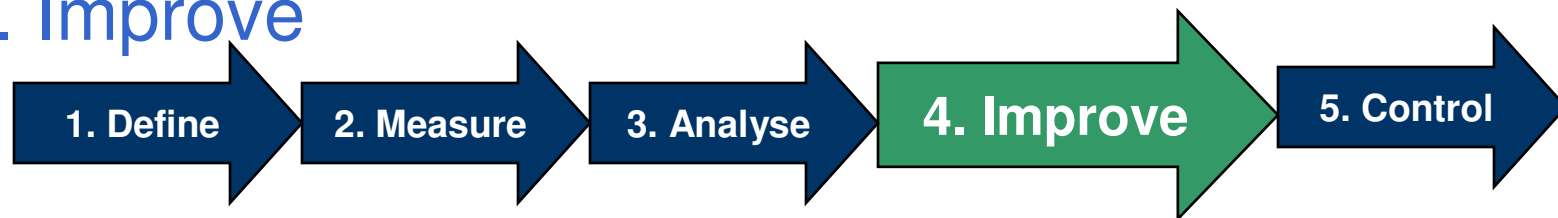
- Establish process capability
- Define performance objectives
- Identify variation sources

#### Tools for analysis

- Process Mapping
- Failure Mode & Effect Analysis
- Statistical Tests
- Design of Experiments
- Control charts
- Quality Function Deployment (QFD)

### DMAIC Steps

#### 4. Improve

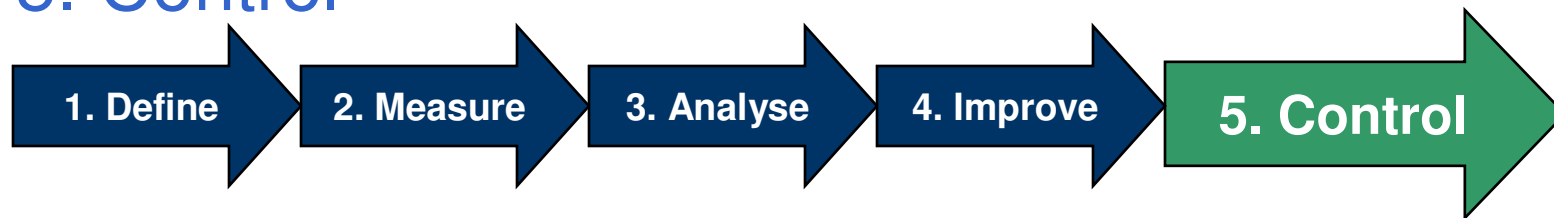


- Screen potential causes
- Discover variable relationships among causes and effects
- Establish operating tolerances
- Pursue a method to resolve and ultimately eliminate problems. It is also a phase to explore the solution how to change, fix and modify the process.
- Carryout a trial run for a planned period of time to ensure the revisions and improvements implemented in the process result in achieving the targeted values.



## DMAIC Steps

### 5. Control



- Monitor the improved process continuously to ensure long term sustainability of the new developments.
- Share the lessons learnt
- Document the results and accomplishments of all the improvement activities for future reference.

### Six Sigma – Case study

- A dabbawala is a person in the Indian city of Mumbai whose job is to carry and deliver freshly made food from home in lunch boxes to office workers.
- Dabbawalas pick up 175,000 lunches from homes and deliver to their customers everyday.
- Only one mistake is made in every 6 million deliveries.
- Accuracy rating is 99.999999. More than Six Sigma.

### Six Sigma - First Generation (SSG 1)

- The era '1986 to 1990' is referred to as the first generation of Six Sigma, or SSG 1 for short.
- Pioneered at Motorola
- Statistical approach
- Measured Defects Per Million Opportunities (DPMO)
- Focused on:
  - Elimination of defects
  - Improving product and service quality
  - Reducing cost
  - Continuous process improvement

### Six Sigma - Second Generation (SSG 2)

- In the 1990s, the focus of Six Sigma shifted from product quality to business quality. General Electric Corp. ushered in the second generation of Six Sigma, or SSG 2 as it is known.
- Six Sigma became a business-centric system of management.
- Strong measurement on bringing dollars to the bottom line.
- High potential candidates were selected as Black Belts.

### Six Sigma - Third Generation (Gen III)

- Developed after the year 2000.
- Gen III can show companies how to deliver products or services that, in the eyes of customers, have real value.
- Combines Lean Manufacturing Techniques and Six Sigma. Termed as Lean Six Sigma.
- Korean steel maker Posco and electronics maker Samsung has begun a Gen III programme.

# Conclusion

- A gauge of quality and efficiency, Six Sigma is also a measure of excellence. Embarking on a Six Sigma program means delivering top-quality service and products while virtually eliminating all internal inefficiencies (Dedhia, 2005).
- A true Six Sigma organization produces not only excellent product but also maintains highly efficient production and administrative systems that work effectively with the company's other service processes (Lucas, 2002).
- The primary factor in the successful implementation of a six sigma project is to have the necessary resources, the support and leadership of top management.

### References

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Thank You!