**Lean six sigma Green Belt**

**Philip Crosby**

1. **Quality Means Conformance to Requirements**
   * Products or services should meet clearly defined standards — no more, no less.
2. **There is No Acceptable Level of Defects**
   * Even one defect is a failure. Tolerating small errors leads to larger systemic issues.
3. **Quality Should Be Measured by the Cost of Non-Conformance**
   * Companies should track how much money is lost due to poor quality (scrap, rework, returns, etc.).
4. **Doing It Right the First Time (DIRFT)**
   * Preventing defects is more effective and cheaper than fixing them after they occur.

**Philip B. Crosby’s Four Absolutes of Quality:**

1. **Quality means conformance to requirements.**  
   → Not excellence or luxury—just meeting clearly defined standards.
2. **The system of quality is prevention.**  
   → Don’t inspect defects out—**prevent them from happening**.
3. **The performance standard is zero defects.**  
   → Aim for doing it right the first time—**no acceptable level of error**.
4. **The measurement of quality is the price of non-conformance.**  
   → Track how much poor quality costs in rework, returns, and lost business.

**🏭 Example: Appliance Manufacturer (Washing Machines)**

**🎯 Problem:**

Too many customer returns due to faulty drum motors.

**✅ Applying Crosby’s Four Absolutes:**

| **Crosby’s Principle** | **How It's Applied** |
| --- | --- |
| **1. Conformance to Requirements** | Clearly define drum motor performance specs (e.g., voltage, RPM). |
| **2. Prevention** | Train assembly workers; redesign jig to prevent misalignment. |
| **3. Zero Defects** | Introduce “Right First Time” assembly practices—no tolerance for loose bolts. |
| **4. Price of Non-Conformance** | Track return costs, warranty claims, and labor hours due to faulty motors. |

**📈 Result:**

* Defect rate drops from 4% to 0.8%
* Warranty claim costs cut by 60%
* Workers take ownership of quality
* Cost of quality visibly reduced

W Edwards Deming

**1. System of Profound Knowledge**

Deming’s framework for understanding organizations, composed of four interrelated parts:

* **Appreciation for a System** – Understand how different parts of an organization interact.
* **Knowledge of Variation** – Recognize and reduce variation in processes.
* **Theory of Knowledge** – Emphasize learning and the scientific method.
* **Psychology** – Understand human behavior and motivation.

**2. 14 Points for Management**

A philosophy for leadership and organizational transformation. A few highlights:

* Create constancy of purpose.
* Drive out fear.
* Improve constantly and forever.
* Break down barriers between departments.
* Eliminate slogans, exhortations, and numerical quotas.

**3. PDCA Cycle (Plan-Do-Check-Act)**

Deming popularized this continuous improvement model (also called the **Deming Cycle**):

* **Plan** – Identify and analyze the problem.
* **Do** – Implement a small-scale test solution.
* **Check** – Evaluate the results.
* **Act** – If successful, standardize the solution; if not, revise and try again.

**Example: Improving Quality in a Manufacturing Plant**

**🎯 Problem:**

A car parts manufacturer notices that 5% of its brake pads are being rejected due to dimensional defects.

**✅ Applying Deming's PDCA Cycle:**

**1. Plan**

* Form a cross-functional team: engineers, line workers, and quality staff.
* Analyze where variation is happening in the brake pad dimensions.
* Hypothesize that worn-out calibration in one machine is a major cause.

**2. Do**

* Test recalibrating that machine daily instead of weekly.
* Introduce a checklist for operators to ensure calibration is done.

**3. Check**

* Track defect rate over the next 2 weeks.
* Result: Defect rate drops from 5% to 1.5%.

**4. Act**

* Standardize daily calibration as a new operating procedure.
* Train all operators on the updated checklist.
* Continue monitoring for improvement.

**🧠 Deming’s 14 Points in Action (Selected Examples):**

* **Point 1 – Create constancy of purpose**: Management commits to long-term quality improvement, not just short-term profit.
* **Point 5 – Improve constantly and forever**: Uses PDCA to keep refining processes.
* **Point 8 – Drive out fear**: Operators feel safe reporting issues without blame.
* **Point 13 – Encourage education and self-improvement**: Staff is trained on root-cause analysis and quality tools.

**📈 Result:**

* Lower defect rates
* Higher customer satisfaction
* Reduced cost of non-conformance (less scrap/rework)
* Improved employee morale

Joseph M. Juran

**1. ✅ The Juran Trilogy (Three Managerial Processes of Quality):**

A systematic approach to managing for quality:

* **Quality Planning** – Identify customers, their needs, and design processes to meet those needs.
* **Quality Control** – Evaluate actual performance, compare to goals, and take action on differences.
* **Quality Improvement** – Systematically reduce chronic waste and improve performance.

**2. 🚫 Distinction Between Chronic and Sporadic Problems**

* **Chronic problems**: Persistent issues built into the system (e.g. high defect rate).
* **Sporadic problems**: Sudden issues due to special causes (e.g. a machine breakdown).

Juran emphasized **continuous improvement** to eliminate chronic problems.

**3. 📈 Pareto Principle (80/20 Rule)**

* 80% of problems come from 20% of the causes.
* Focus on the “vital few” causes to make the biggest quality improvements.

**4. 👥 Emphasis on the Human Side**

* Stressed the importance of **top management commitment** to quality.
* Advocated training, teamwork, and empowering workers to solve quality problems.
* Quality does **not happen by accident**—it must be planned and managed.

**🏭 Example (Manufacturing):**

A company faces frequent customer complaints about a washing machine.

* **Quality Planning**: Engage with customers to learn their needs (e.g., quiet operation, durability).
* **Quality Control**: Monitor production data and identify units with excessive noise.
* **Quality Improvement**: Redesign internal components to reduce vibration based on root-cause analysis.

**🔄 Comparison with Deming:**

| **Topic** | **Juran** | **Deming** |
| --- | --- | --- |
| Definition of Quality | Fitness for use | Quality is what the customer says it is |
| Focus | Planning, control, improvement | Systems thinking, variation, leadership |
| Human element | Strong emphasis | Also emphasized psychology |
| Tools | Pareto, Quality Trilogy | PDCA cycle, statistical methods |

**Kaoru Ishikawa**

#### 1. **Ishikawa Diagram (Cause-and-Effect or Fishbone Diagram)**

* A visual tool used to **identify root causes of a problem**.
* Organizes possible causes into categories like:
  + **Man**, **Machine**, **Method**, **Material**, **Measurement**, **Environment** (commonly used in manufacturing).
* Encourages **team brainstorming** and **structured problem-solving**.

#### 2. **Quality Circles**

* Small groups of employees who voluntarily meet to identify and solve work-related problems.
* Based on the idea that **workers closest to the process know it best**.
* Encouraged **bottom-up quality improvement** and employee engagement.

#### 3. **Emphasis on Company-Wide Quality Control (CWQC)**

* Believed that **quality control is everyone’s responsibility**, not just engineers or quality departments.
* Advocated training for **all employees**, from top management to shop floor workers.

#### 4. **Customer-First Philosophy**

"The customer is the next process."

* Urged people to **treat the next person in the workflow like a customer** and deliver quality at every step.

### 🏭 **Example: Using Ishikawa Diagram in a Factory**

#### 🎯 **Problem:**

High rate of defective paint finish on car doors.

#### 🐟 **Fishbone Analysis Categories:**

| **Category** | **Possible Causes** |
| --- | --- |
| **Method** | Inconsistent paint spray technique |
| **Machine** | Spray nozzle partially clogged |
| **Material** | Paint too thick or old |
| **Man** | Operator not trained adequately |
| **Measurement** | No inspection of paint viscosity |
| **Environment** | Dust in paint booth, humidity issues |

Once causes are identified, teams can **prioritize and eliminate the root cause**—e.g., filter the paint, train operators, and fix ventilation.

### 🔁 **Comparison with Other Quality Gurus:**

| **Guru** | **Main Focus** |
| --- | --- |
| **Deming** | System, variation, leadership |
| **Juran** | Planning, fitness for use |
| **Crosby** | Zero defects, cost of non-conformance |
| **Ishikawa** | Tools for root cause analysis, teamwork |

**Genichi Taguchi**

#### 1. 🎯 **Taguchi's Quality Philosophy**

“Quality is the **loss a product causes to society** after it is shipped, not just during manufacturing.”

This means **any deviation from the ideal value—even within specifications—causes loss** (e.g., waste, wear, or dissatisfaction).

#### 2. 📉 **Taguchi Loss Function**

* Traditional quality models accept variation within tolerance limits.
* Taguchi argued: even small deviations from target **result in a loss** (not just defective units).
* His **loss function** is a parabola:

**Loss = k(x − T)²**  
Where:

* + x = actual value
  + T = target value
  + k = cost coefficient

#### 3. 🛠 **Robust Design**

* Design products/processes that **perform consistently** even under noise (uncontrollable) factors like temperature, vibration, or user misuse.
* Focus on **making the design less sensitive to variation**, instead of trying to control the environment.

#### 4. 🧪 **Design of Experiments (DOE) – Taguchi Method**

* Uses **orthogonal arrays** to run fewer experiments efficiently.
* Identifies **the best combination of design factors** (like material, dimensions, settings) to improve quality and reduce variability.

### 🏭 **Example: Designing a Robust Fuel Injector**

#### 🎯 **Problem:**

A car fuel injector performs inconsistently in cold weather.

#### 🔍 **Taguchi Approach:**

1. Identify **control factors**: nozzle shape, material, spray pressure.
2. Identify **noise factors**: ambient temperature, fuel type.
3. Use a **Taguchi orthogonal array** to test combinations.
4. Analyze which control settings minimize variation **despite** noise.
5. Choose the best combination for **robust performance**.

### 🔁 **Comparison with Other Quality Gurus:**

| **Guru** | **Focus** |
| --- | --- |
| **Deming** | Variation & continuous improvement |
| **Juran** | Planning, fitness for use |
| **Crosby** | Zero defects, conformance |
| **Ishikawa** | Tools & teamwork |
| **Taguchi** | Robust design, minimizing loss |

**Evolution of Six Sigma – difference from other traditional Quality Methods**

**The origins of Six Sigma can be traced back to Johann Carl Frederick Guass,(1777 -1855) a legendary German mathematician and physicist. In 1818, he started working on the normal distribution which forms the basis of Six Sigma philosophy.**

**The person who first coined the term “Six Sigma” was Bill Cohen, an engineer with Motorola. Later, in 1986, Bill Smith, a senior scientist at Motorola, standardized the way in which defects are measured using Six Sigma. Instead of measuring defects in thousands of opportunities, Six Sigma provided the ability to measure defects in millions of opportunities – thereby providing significant improvement in quality.**

**Since that time, several companies including Motorola, Citibank, General Electric, Allied Signal etc. have achieved dramatic success by using Six Sigma methodology for improving quality and reducing costs (for example, Motorola has documented $ 16 billion in savings because of its Six Sigma efforts).**

**There are several factors that make Six Sigma a more effective quality tool when compared with other traditional quality techniques namely:**

**Comprehensive**

**Project based approach**

**Cohesive process based approach**

**Quantitative approach**

**Commitment from all levels of organization**

# Comprehensive

* Six Sigma is a very comprehensive methodology, which includes the best practices from other traditional quality techniques. The Six Sigma DMAIC Methodology looks at the whole project life-cycle including Define, Measure, Analyze, Improve and Control with well-defined tools and methodology at each stage (we will be learning more about the Six Sigma Methodology at a later stage in the course).
* It links directly to business goals and customer expectations.
* Since the Six Sigma Methodology is so comprehensive and very well defined, it can be used by
  + Companies across different business areas including Manufacturing, Finance, Technology, Construction, Engineering etc.
  + Companies of different sizes – big, medium or even small companies with less than 30 employees

# Project Based Approach

* Unlike traditional quality techniques, Six Sigma explicitly uses concepts of project management, and so enjoys several benefits of a project i.e. every Six Sigma project has a defined start date and end date, and a pre-defined project charter with goals, objectives and deliverables.
* Project planning tools like project plan, Gantt charts, PERT, planning trees etc are used for managing the project and require proper knowledge of different project management knowledge areas:
  + Project integration management
  + Project scope management
  + Project time management
  + Project cost management
  + Project quality management
  + Project human resource management
  + Project communication management
  + Project risk management
  + Project procurement management
  + Project Stakeholder management

# Cohesive Process Based Approach

* Detailed process maps created during the initial stages of a Six Sigma project provide an overview of complex processes in an organization, identify relationships and interdependencies between the processes and facilitate identification of problems.
* A Finance department is involved in estimation and validation of project financials and cost benefits from the project.
* Six Sigma methodology can evaluate different aspects within an organization including people, equipment, environment, materials etc. and identify the projects which can provide maximum benefits to the organization.
* Cohesive process based approach helps in getting a holistic view of the organization and identifying potential problem areas – Six Sigma projects can then be used to fix the problems identified.

# Quantitative Approach

* Since several traditional quality improvement approaches did not use rigorous quantitative methods, it was very difficult to measure the cost and benefits of those quality initiatives. By using rigorous quantitative and statistical techniques, Six Sigma provides mathematical analysis to determine which project offers the maximum benefit at the least cost i.e. all Six Sigma projects have measurable and quantifiable goals and associated costs.
* Following the quantitative Six Sigma concepts also helps to ensure that
  + The project goals align with the organizational goals
  + There are long-term benefits from the Six Sigma project.

# Commitment from all Levels of the Organization

* Six Sigma formalizes an organizational  structure for Six Sigma projects and ensures commitment from all levels of the organization to achieve the quality goals. All the stakeholders – customers, senior management, project team members and other employees have a vested interest in the successful implementation of Six Sigma projects.
  + Executive Management (also referred to as Deployment Champions) is responsible for sponsorship of the project and allows for commitment of organizational resources to the Six Sigma project.
  + Master Black Belts and Black Belts act as consultants and experts in Six Sigma. They are also responsible for providing guidance and  coaching to others in the organization about  Six Sigma philosophy.
  + Six Sigma Green Belts serve as a liaison between the Black Belts and the project team. They perform the operations required for the Six Sigma project and work with the project team to ensure that appropriate deliverables are met.
  + The project team works in executing the actual work of the project through guidance provided from by Six Sigma Green Belts and Six  Sigma Black Belts.
  + Subject Matter Experts in different fields (e.g. Finance, Human Resources etc.) may be involved in providing expertise wherever required.
* Proper training and motivation is provided to all the people involved in the Six Sigma project to ensure successful project implementation.
* Having a well-defined organization structure helps in creating a feeling of “shared ownership and responsibility” which can be critical in successful project implementation. More importantly, with well defined project hierarchy and pre-defined roles and responsibilities, all Six Sigma stakeholders know  their tasks and work towards successful project implementation.

### **1. Executive Leadership (Champion/Sponsor Level)**

**Responsibility:** Strategic commitment and resources

* Appoint **project sponsors** and ensure Six Sigma aligns with business goals.
* Provide **funding, time, and organizational support**.
* Remove roadblocks and help drive cultural change.

✅ Example: The CEO mandates that all divisions reduce defects by 50% over 12 months using Six Sigma.

### 🧠 **2. Six Sigma Champions**

**Responsibility:** High-level support and project selection

* Act as **bridge between leadership and project teams**.
* Identify strategic projects and allocate **Black Belts** accordingly.
* Promote **integration across departments**.

✅ Example: A VP of Operations selects Lean Six Sigma projects that align with improving customer satisfaction.

### 🥋 **3. Master Black Belts / Black Belts**

**Responsibility:** Expert-level execution and training

* Lead complex improvement projects using **DMAIC** or **DMADV**.
* Train and mentor **Green Belts and Yellow Belts**.
* Analyze data and identify root causes using statistical tools.

✅ Example: A Black Belt leads a DMAIC project to reduce cycle time in the procurement process.

### 💼 **4. Green Belts / Yellow Belts**

**Responsibility:** Project participation and support

* Apply Six Sigma tools in their day-to-day work.
* Assist Black Belts with data collection and analysis.
* Drive **localized improvements** in their functional areas.

✅ Example: A Green Belt on the customer service team identifies delays in response time and proposes a process fix.

### 👷 **5. Frontline Employees / Process Owners**

**Responsibility:** Implementation and sustainability

* Follow improved processes and provide feedback.
* Suggest practical improvements based on their work experience.
* Ensure **sustainability** of Six Sigma gains post-project.

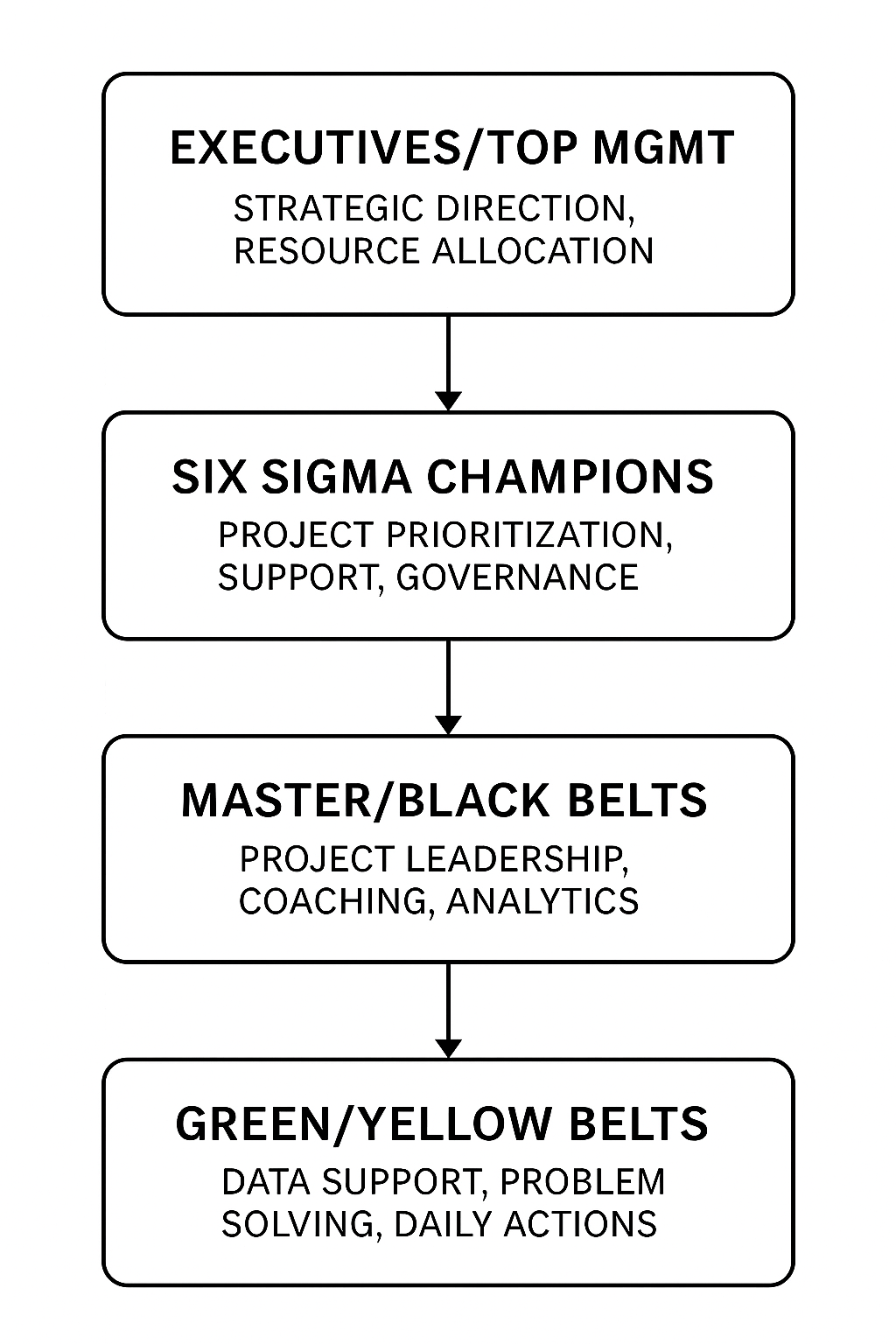
✅ Example: A warehouse worker notices repetitive packaging errors and joins a quality circle to address it.

### 📌 **Summary Table: Commitment Across Six Sigma Roles**

| **Level** | **Role in Six Sigma** | **Type of Commitment** |
| --- | --- | --- |
| Executives/Top Mgmt | Sponsor/Champion | Strategic direction, resource allocation |
| Senior Mgmt | Six Sigma Champions | Project prioritization, support, governance |
| Experts | Master/Black Belts | Project leadership, coaching, analytics |
| Middle Management/Staff | Green/Yellow Belts | Data support, problem solving, daily actions |
| Frontline Employees | Process Owners/Operators | Execute and sustain improvements |

### 🧠 Core Idea in Six Sigma:

**"Everyone plays a role in reducing variation and improving quality."**  
Without **top-down support and bottom-up participation**, Six Sigma cannot achieve lasting results.



### **What is Six Sigma?**

**Six Sigma** is a **data-driven methodology** and **management philosophy** aimed at eliminating defects, reducing variation, and improving processes in any organization.

* **Origin**: Developed by **Motorola** in the 1980s, later popularized by **General Electric (GE)** under Jack Welch.
* **Name Origin**: “Sigma (σ)” is a statistical term for standard deviation. “Six Sigma” refers to processes that produce fewer than **3.4 defects per million opportunities (DPMO)**.

### 🧠 **Six Sigma Philosophy**

1. **Customer-Centric**:

“What defines quality is what the customer says it is.”  
Focus is on meeting or exceeding customer expectations.

1. **Data and Fact-Based Decision Making**:  
   Use of **statistical tools** and **measurable data** to identify root causes and drive improvements.
2. **Process Focused**:  
   All work is considered part of a process. Six Sigma improves processes to reduce waste and variation.
3. **Proactive Management**:  
   Prevent problems instead of reacting to them. Root cause analysis and **Design for Six Sigma (DFSS)** are used early in the process.
4. **Collaboration and Teamwork**:  
   Cross-functional teams tackle complex problems using structured Six Sigma roles (e.g., Black Belts, Green Belts).
5. **Continuous Improvement**:  
   Emphasizes **Kaizen** (continuous improvement) culture with long-term gains over short-term fixes.

# Defining Six Sigma – Philosophy and Objectives

#### **Some highlights of Six-Sigma:**

* Six Sigma is a business philosophy and top management driven.
* Six-Sigma is a problem solving methodology
* Six-Sigma is a metric to measure quality and process reliability.
* Six-Sigma focuses on both customer and bottom line.
* Six-Sigma is a highly quantitative approach to fixing quality problems.

### 🎯 **Six Sigma Objectives**

| **Objective** | **Description** |
| --- | --- |
| 🎯 **Reduce Defects** | Achieve near-perfect processes (target: < 3.4 DPMO) |
| 📉 **Minimize Variation** | Use statistical analysis to reduce inconsistency |
| 🔍 **Improve Process Capability** | Increase reliability, predictability, and output quality |
| 💵 **Lower Costs** | Eliminate waste, rework, and inefficiencies |
| 😊 **Enhance Customer Satisfaction** | Deliver products and services that meet customer needs |
| 📊 **Increase Profitability** | Quality improvements lead to better business performance |

|  |  |  |
| --- | --- | --- |
| **Six Sigma Score** | **Defects per million Opportunities** | **Okay Percentage** |
| 2 | 308537 | 69.15% |
| 3 | 66807 | 93.32% |
| 4 | 6210 | 99.38% |
| 5 | 233 | 99.98% |
| 6 | 3.4 | 99.99966% |

As the Six-Sigma score improves, the variation in the processes reduce drastically, thereby increasing the reliability of the system, which  reduces the need for rework.

The reduction in amount of rework reduces cycle time and improves customer satisfaction.

# 4. Overview of Six Sigma DMAIC Process

* Six Sigma is a very comprehensive methodology, which includes the best practices from other traditional quality techniques.
* The Six Sigma DMAIC Methodology looks at the whole Six Sigma project life-cycle with well-defined tools and methodology at each stage.
* DMAIC methodology lays down tactical steps to achieve Six Sigma quality.
* The different phases of the DMAIC Methodology are as follows:
  + Define
  + Measure
  + Analyze
  + Improve
  + Control

# Define

A diagram of tools and tools

AI-generated content may be incorrect.

# 4.b Measure

A diagram of tools and data processing

AI-generated content may be incorrect.

# 4.c Analyze

A diagram of tools and testing

AI-generated content may be incorrect.

# 4.d Improve

A diagram of tools and tools

AI-generated content may be incorrect.

# 4.e Control

A diagram of a diagram

AI-generated content may be incorrect.

**Question**

**Who wrote the book "Out of Crisis" to help US companies compete with Japanese manufacturers?**

Top of Form

1. Joseph M Juran

2. Philip Crosby

3. Deming

4. None of the above

Bottom of Form

#### **Justification**

Deming wrote a book called “Out of the Crisis” which set out 14 Management Guidelines which could be used by US companies to improve quality and compete with Japanese manufacturing.

**Who proposed the "Quality Trilogy Model"?**

Top of Form

1. Joseph M Juran

2. W Edward Deming

3. Taguchi

4. Philip Crosby

Bottom of Form

#### **Justification**

Joseph Juran proposed the “Quality Trilogy Model” – this model uses Quality Planning, Quality Improvement and Quality Control for improving quality.

**According to Juran, Quality from a customer`s perspective has two aspects namely:**

Top of Form

1. Conformance to requirements and exceeding customer expectations

2. Better Product and Long lasting

3. Minimum noise and maximum price benefit

4. More Features and Freedom from trouble

Bottom of Form

#### **Justification**

Juran proposed that Quality from a customer perspective has two aspects : a) more features and b) freedom from trouble. So, improvement of quality should deliver these two aspects to customers.

**Philip Crosby used the following parameter to measure quality:**

Top of Form

1. Cost of non-conformance

2. Cost of error rectification

3. Exceeding customer expectations

4. Six Sigma

Bottom of Form

#### **Justification**

According to Philip Crosby, Measurement of quality is the cost of non-conformance.

**Which quality guru is credited with the discovery of cause and effect diagrams?**

Top of Form

1. Deming

2. Taguchi

3. Ishikawa

4. Crosby

Bottom of Form

#### **Justification**

Kaoru Ishikawa used cause and effect diagrams (also referred to as Ishikawa or fishbone diagrams) to systematically list all the causes that can be attributed to an effect (or problem).

**What can be used to quantify the decrease in perceived value of the goods by the customer once the quality decreases?**

Top of Form

1. Taguchi Robustness concepts

2. Quality Loss Function

3. Cause and effect diagrams

4. Run Charts

Bottom of Form

#### **Justification**

Taguchi devised the concept of “Quality Loss Function” to quantify the decrease in perceived value of the goods by the customer once the quality decreases

**Which quality expert proposed that systems should have “robustness” i.e. ability to function satisfactorily in spite of the noise and external disturbance.**

Top of Form

1. Taguchi

2. Ishikawa

3. Crosby

4. Deming

Bottom of Form

#### **Justification**

Genichi Taguchi : Manufacturing processes are impacted by the external disturbance i.e. noise which impacts quality of goods produced. The noise should be minimized wherever possible but some noise (e.g. bad weather) cannot be avoided. Systems should have “robustness” i.e. ability to function satisfactorily in spite of the noise and external disturbance.

**Six sigma provided the ability to measure defects in range of :**

Top of Form

1. hundreds of opportunities

2. thousands of opportunities

3. millions of opportunities

4. billions of opportunities

Bottom of Form

#### **Justification**

The person who first coined the term “Six Sigma” was Bill Cohen, an engineer with Motorola. Later, in 1986, Bill Smith, a senior scientist at Motorola, standardized the way in which defects are measured using Six Sigma. Instead of measuring defects in thousands of opportunities, Six Sigma provided the ability to measure defects in millions of opportunities – thereby providing significant improvement in quality.

**As per Six Sigma philosophy, who is responsible for project sponsorship?**

Top of Form

1. Subject Matter Expert

2. Master Black Belt

3. Executive Management

4. Six Sigma Green Belt

Bottom of Form

#### **Justification**

Executive Management (also referred to as Deployment Champions) is responsible for sponsorship of the project and allows for commitment of organization resources to the six sigma project.

**Who liaises between black belts and the project team?**

Top of Form

1. Technical Lead

2. Project manager

3. Green Belt

4. None of the above

Bottom of Form

#### **Justification**

Six Sigma Green Belts serve as a liaison between the Black Belts and the project team. They perform the operations required for the six sigma project and work with the project team to ensure that appropriate deliverables are met.

**Who liaises between black belts and the project team?**

Top of Form

1. Technical Lead

2. Project manager

3. Green Belt

4. None of the above

Bottom of Form

#### **Justification**

Six Sigma Green Belts serve as a liaison between the Black Belts and the project team. They perform the operations required for the six sigma project and work with the project team to ensure that appropriate deliverables are met.

**Which of the following is a benefit of six sigma?**

Top of Form

1. Quantitative Approach

2. Process based approach

3. Use of projects

4. All of the above

Bottom of Form

#### **Justification**

There are several factors that make Six Sigma a more effective quality tool as compared with other traditional quality techniques namely: - Comprehensive - Project based approach - Cohesive process based approach - Quantitative Approach - Commitment from all levels of organization

**Who are responsible for providing guidance and coaching others in the organization about the six sigma philosophy**

Top of Form

1. Project Champions

2. Green Belts

3. Black Belts

4. Subject Matter Experts

Bottom of Form

#### **Justification**

Master Black Belts and Black Belts act as consultants and experts in Six Sigma. They are also responsible for providing guidance and coaching others in the organization about the six sigma philosophy.

**What is the responsibility of deployment champions?**

Top of Form

1. sponsorship of the project and allowing for commitment of organization resources to the six sigma project

2. providing guidance and coaching others in the organization about the six sigma philosophy

3. performing the operations required for the six sigma project and working with the project team to ensure that appropriate deliverables are met.

4. providing expertise wherever required.

Bottom of Form

#### **Justification**

Executive Management (also referred to as Deployment Champions) is responsible for sponsorship of the project and allow for commitment of organization resources to the six sigma project.

**Six sigma refers to decreasing the number of defects to :**

Top of Form

1. 67 per thousand

2. 15 per million

3. 3.4 per million

4. 1.2 per billion

Bottom of Form

#### **Justification**

Literally, Six Sigma refers to decreasing the number of defects to 3.4 defects per million opportunities (i.e. success rate of 99.9997%).