

# Project Management Professional - PMP

## Chapter 6: Project Quality Management



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# Agenda

- Overview
- Plan Quality - Planning
- Perform Quality Assurance - Execution
- Perform Quality Control - M & C
- Lessons Learned - Q & a

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# Overview

# Project Quality Management

## Quality Management:

- The processes involved in determine quality policies, objectives, and responsibilities so that the project will satisfy the needs.
- It's implemented through policies, and procedures with continuous process improvement to eliminate risks.
- Lack of attention to quality, means more rework or defects, the more time and cost
- Quality achieved if we have all stated and unstated requirements
- Complete the project with no deviations from requirements



**Quality is the degree to which the project fulfils requirements (Memorize This)**



**For Exam: focus on meeting requirements even if some companies in real life give extras to achieve quality**

# Project Quality Management

Quality Management	Process Groups
<b>Plan Quality</b>	<b>Planning</b> – What quality and how ensure it ?! Find standards – Create additional standards – What work will meet standards – determine how will measure work against standard ? – Create Quality Plan
<b>Perform Quality Assurance</b>	<b>Execution</b> – Are we following standards ?! Use measurements – perform continuous improvement – is it complied ?! – find and share good practices with organization & others
<b>Perform Quality Control</b>	<b>M &amp; C</b> – Are we meeting the standards ?! Measure quality – Identify improvement – validate deliverables – complete checklists – Update lesson learned – submit change request Update PMP plan and project documents

# Project Quality Management

## Quality in PMP Exam:



**PM should always recommend improvements to organization's OPA and continuously improve processes**



**Quality should be considered when changing any work  
Quality must be checked before an activity is completed**



**PM must make sure authorized approaches are followed  
Some of quality activities may be done by QC Dept**



**Always compare quality to requirements – not to what you think or real world need**

# Quality Concepts

## Gold Plating

- Giving extras to customers
- In PMP and Exam: NO Gold Plating is allowed

## Prevention over Inspection

- It's better to prevent problems in first place instead of inspect them.
- Quality MUST BE PLANNED IN – NOT INSPECTED IN

## Marginal Analysis:

- Cost of achieving quality = revenue / outputs of performing quality
- Stop improving quality if costs higher than outcomes.



# Quality Concepts – Cont'd

## Continuous Improvement (or Kaizen):

- Continuously looking for small improvements in quality
- US/Europe -> improvements are big, Japan -> are small

## Just In Time (JIT)

- Getting materials/stocks just in time instead of inventory them
- JIT forces attention to quality to avoid reworks since NO Stock

## Total Quality Management:

- Philosophy to encourage companies and employees to find ways to continuously improve the quality.

# Quality Concepts – Cont'd

## Quality Responsibility:

- PM responsible for the ultimate quality of project or product
- Team member responsible for quality of his work
- Senior Management responsible for quality for the whole organ.

## Impact of Poor Quality

- Low quality means:
  - > Increased costs, Low morale, Low customer satisfaction, Increased Risk
  - > More reworks, Schedule Delays ..etc

## Grade

- Category assigned to products or services having same functional use but different technical characteristics

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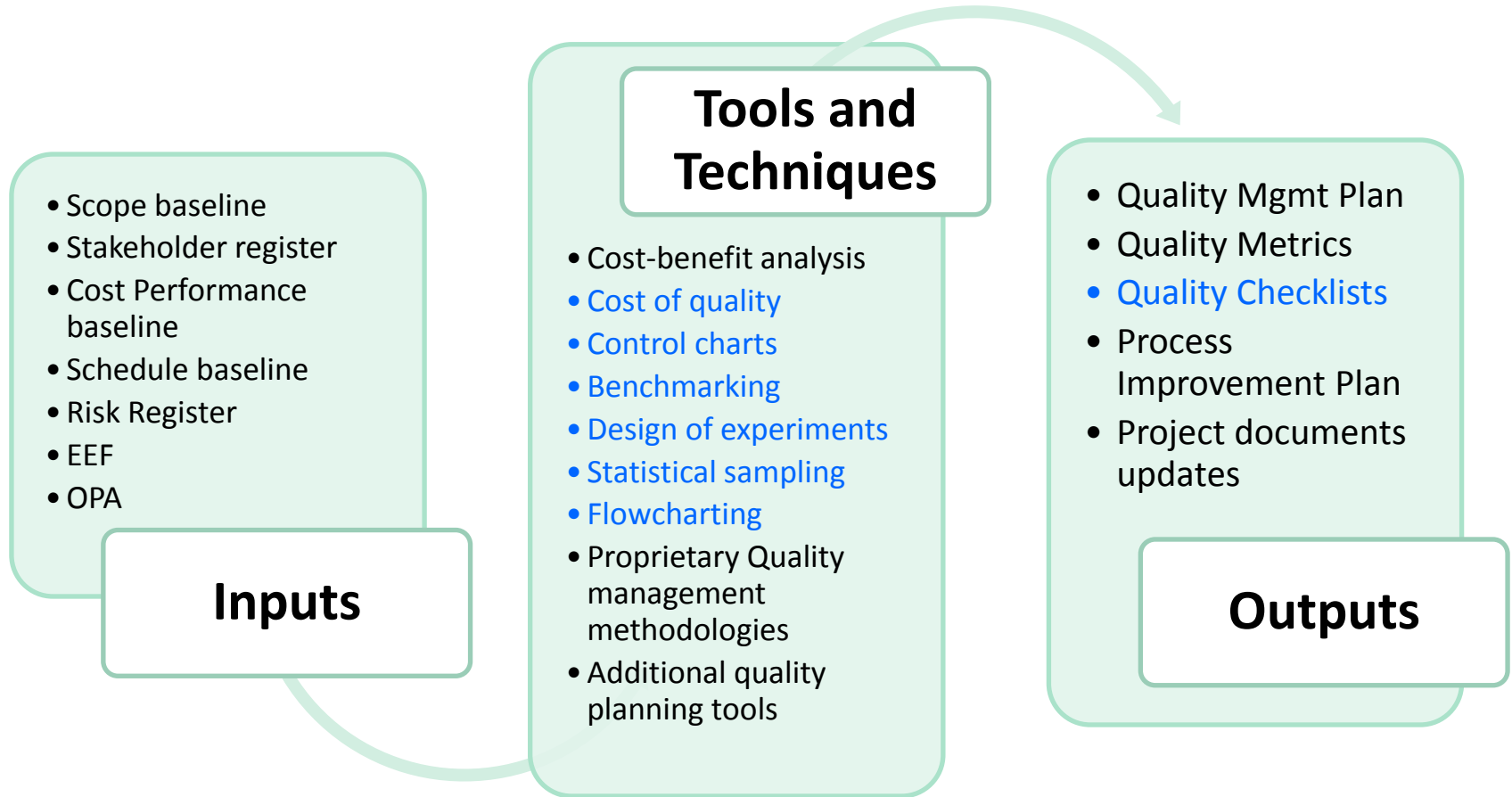
# **Plan Quality Planning Process**

# Plan Quality Process

## Plan Quality:

- Process of identifying quality requirements and/or standards for the project and product and documenting how the project will be complied!
- Project must comply with any standards required, if no standard, PM must create a project specific standard.
- After specifying standard, Plan Quality will specify how to measure against this standard! To ensure compliance
- While planning, quality must be balanced with other constrains.

# Plan Quality Inputs, Tools, Techniques and Outputs



# Plan Quality Tools and Techniques:

## Cost of Quality:

- Cost of conformance should be less the cost of non-conformance

Prevent to avoid

### Cost of Conformance

#### Prevention Costs

(Build a quality product)

- Training
- Document processes
- Equipment
- Time to do it right

#### Appraisal Costs

(Assess the quality)

- Testing
- Destructive testing loss
- Inspections

Money spent during the project  
to avoid failures

### Cost of Nonconformance

#### Internal Failure Costs

(Failures found by the project)

- Rework
- Scrap

#### External Failure Costs

(Failures found by the customer)

- Liabilities
- Warranty work
- Lost business

Money spent during and after  
the project **because of failures**

Inspect and Fix

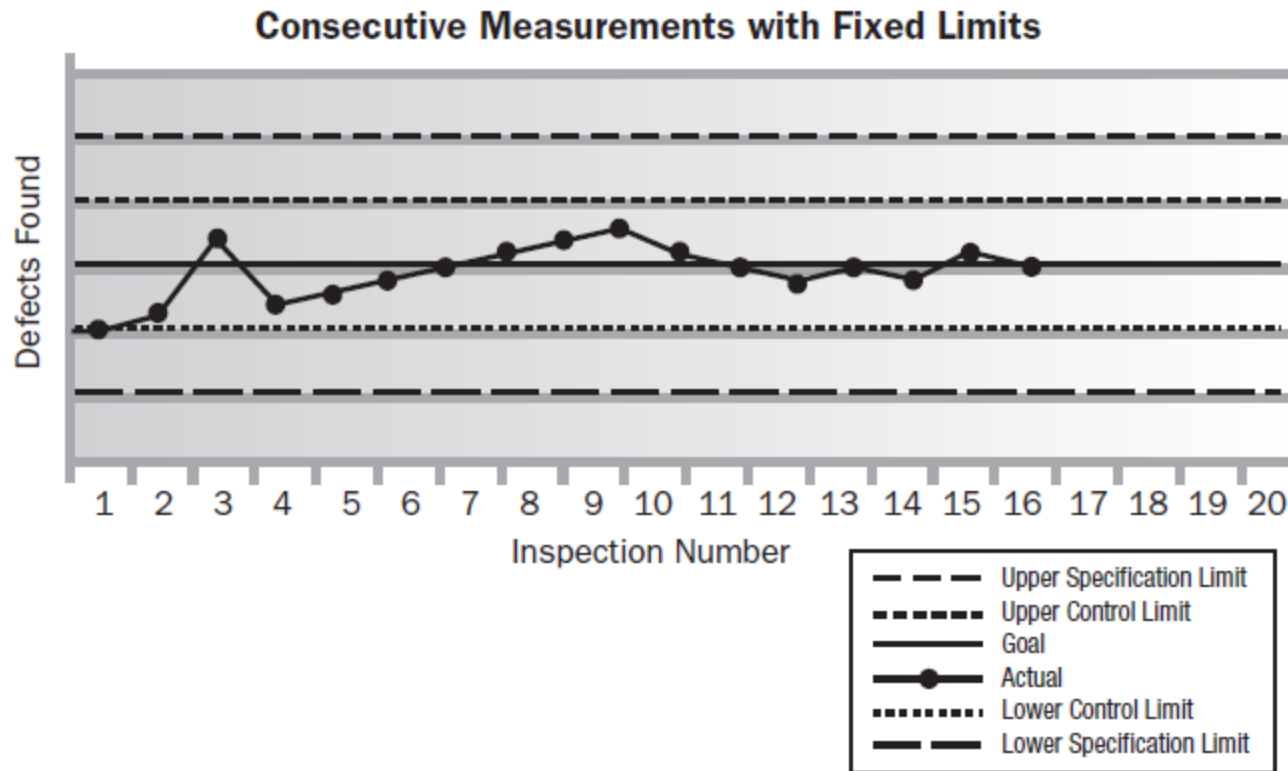
# Plan Quality Tools and Techniques – Cont'd

## Control Charts:

- Created during *Plan Quality*, Utilized in *Perform Quality Control*
- **Upper & Lower Control Limits:** used to define the acceptable deviations (Data points should be between upper/lower limits)
- **Mean:** line in the middle shows the middle of the acceptable range
- **Specifications Limits: “Represent Standards”**
  - > Limits represent the customer expectations or contractual requirements
  - > They are not calculated, they are inputs from the customer
  - > Control Limits must be stricter than Specifications Limit to ensure meet the needs
- **Out of Control:**
  - > Data point outside the upper/lower limits or Rule of Seven (non-random points)
- **Assignable Cause/Cause Variation:** Point or Rule-of-Seven that requires investigation.

# Plan Quality Tools and Techniques – Cont'd

## Control Charts:



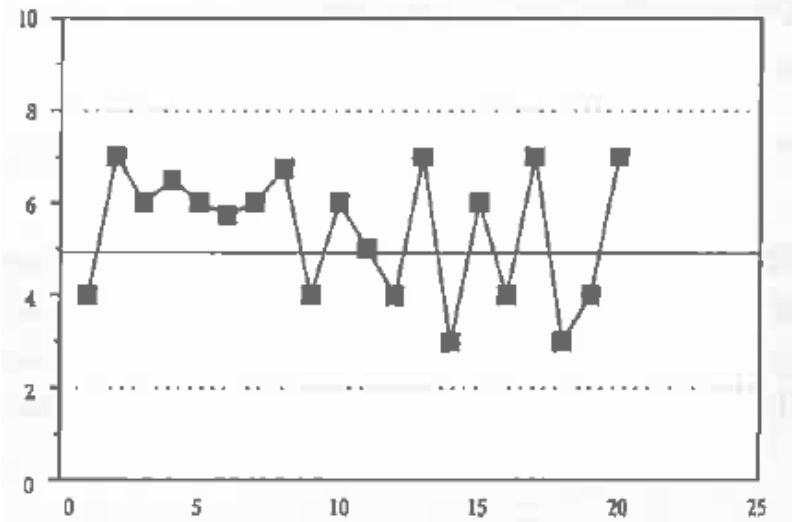
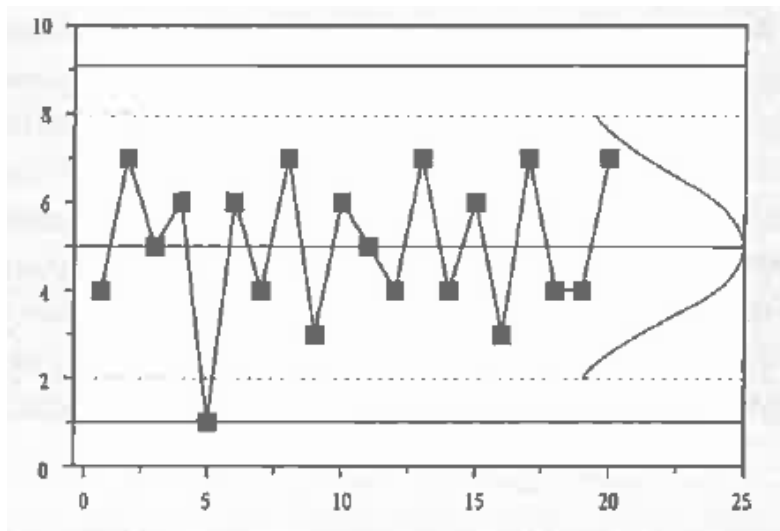


# Plan Quality Tools and Techniques – Cont'd

## Control Charts Example:

Find the following on the charts below:

1. Upper control limit
2. Lower control limit
3. Assignable cause/Special cause
4. The process is out of control
5. Normal and expected variation in the process
6. Rule of seven
7. Specification limits
8. Three sigma
9. Six sigma
10. Normal distribution curve



# Plan Quality Tools and Techniques – Cont'd

## Benchmarking:

- Looking at past projects for ideas and basis for measurement

## Design of Experiments (DOE):

- Change all important factors in a process and see which combination has a lower impact on the project
- Identify the factors that influence particular variables of a product.

## Statistical Sampling:

- Better to use samples instead of testing all to save time and cost.

## Flowcharting:

- Shows how a process or system flows from beginning to the end

# Plan Quality Outputs

## Quality Management Plan:

- Determine what quality is and put a plan to manage quality.
- Includes:
  - > Standards applied, who when and what in managing quality, Review of earlier decisions, meetings held, reports address quality, metrics will be used to measure quality, what part of project and when will be measure!

## Quality Metrics:

- Operational definition that describe in specific terms, a project or product attribute and how Quality Control Process will measure it.

## Quality Checklists:

- Structured tool, usually components specific used to verify a set of required steps has been performed.

# Plan Quality Outputs – Cont'd

## Process Improvement Plan:

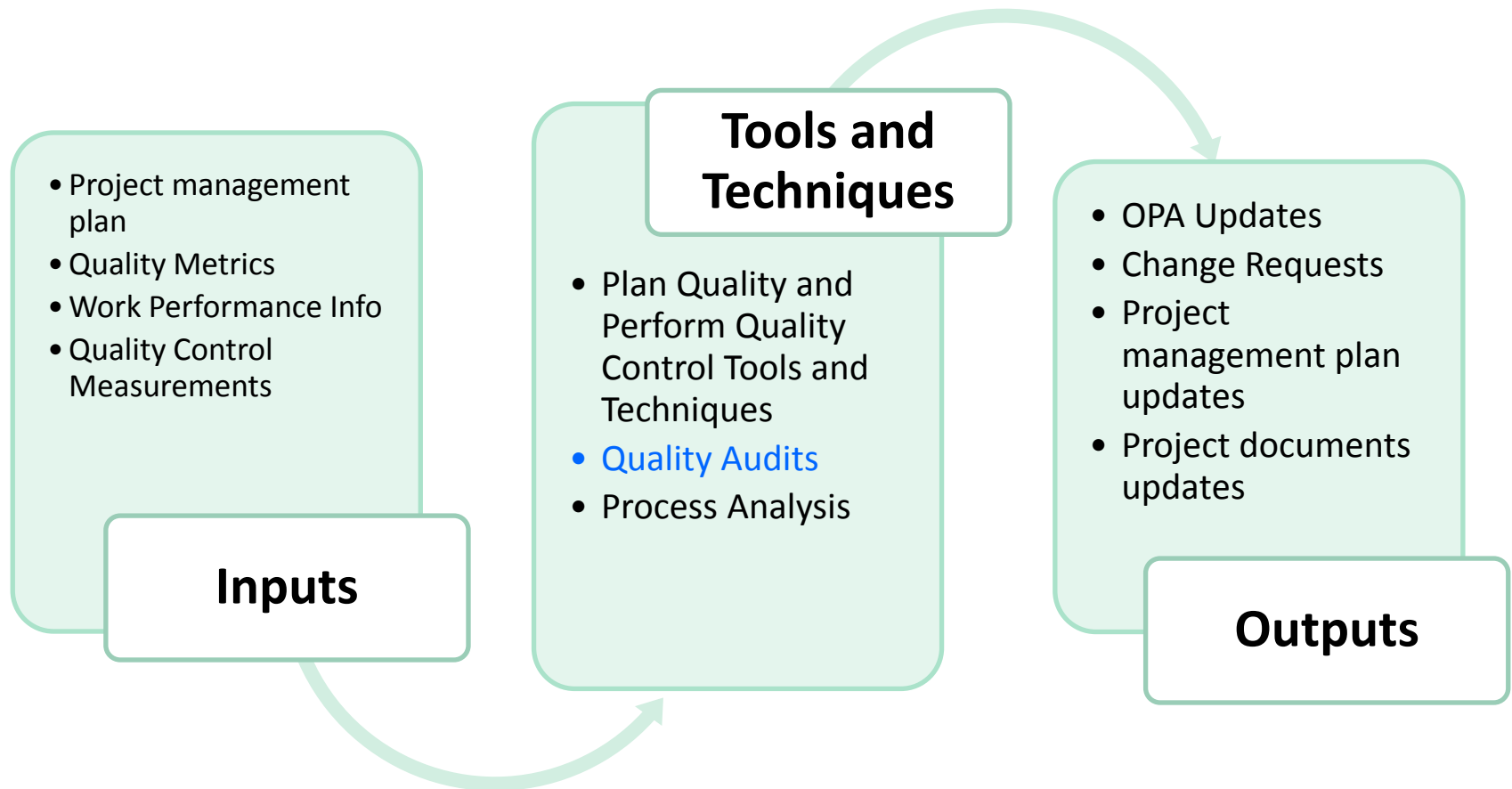
- Subsidiary of Project Management Plan that analyzes activities to enhance their values. Areas to include:
- Process Boundaries
- Process Configurations
- Process Metrics
- Targets for Improved Performance

## Project Documents Updates.

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# **Perform Quality Assurance Execution Process**

# Perform Quality Assurance Inputs, Tools, Techniques and Outputs



# Perform Quality Assurance - Planning

## Perform Quality Assurance:

- Process of [auditing](#) the quality requirements and the results from quality control measurements to ensure appropriate quality standards and operational definitions are used.
- Replies to questions “Are we **using** the standards?!” , “can the standards be improved and better ?!”
- **Perform Quality Assurance** process uses **Plan Quality** and **Perform Quality Control** tools and techniques
- **Quality Audits**
  - > performed to ensure projects are complied with company’s procedures, policies and standards.
  - > Usually done by Quality Assurance Dept. If not exist, done by PM
- **Process Analysis:** done neutrally by continuously improve the repeated process. Should be planned at certain project points.

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# **Perform Quality Control Monitoring and Controlling Process**



# Perform Quality Control

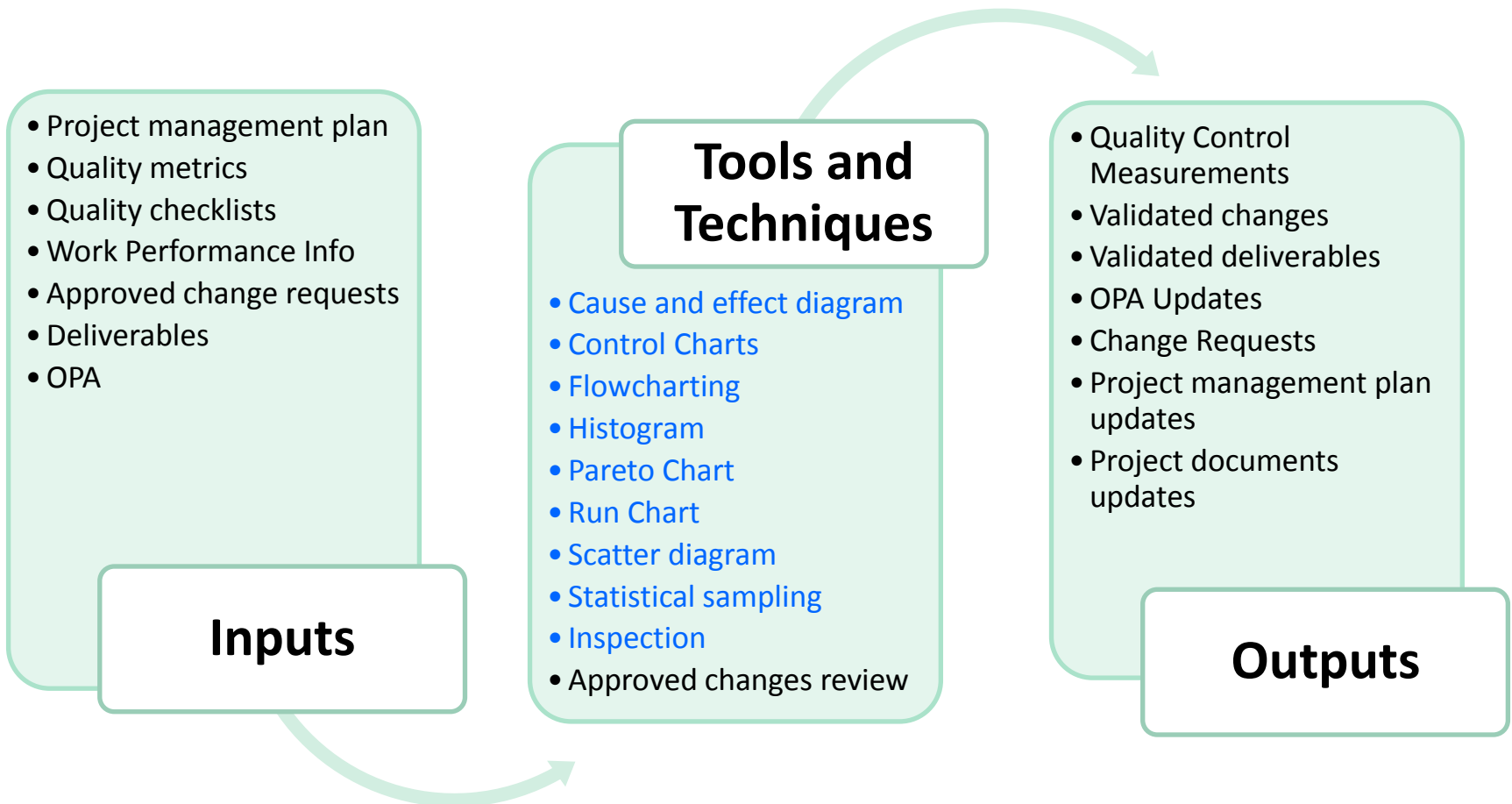
## Perform Quality Control:

- Process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes.
- Ensuring a certain level of quality in a product or service.
- Usually performed by Quality Control dept. If not exist by PM
- Actually Quality Control occurring during project life, much of it occurs during M & C
- Replies to questions “Are we meet standards ?!”, “what changes?”



- Control in exam means Measure and Measure and Measure
- If question in form of future - > Plan Quality Process
- If question in form of Past -> Quality Control Process

# Quality Control Inputs, Tools, Techniques & Outputs



# Quality Control Terms

## **Mutual Exclusivity:**

- Two events that cannot occur in a single trial

**Probability:** likelihood of something could occurs

## **Normal Distribution:**

- Most common probability density distribution chart
- Used to measure variations and it's the shape of a bell curve

## **Statistical Independence:**

- Probability of one event occurs, doesn't effect the probability of another event occurring.

# Quality Control Terms – Cont'd

## Standard Deviation (Sigma)

- Measure of range in its standard deviation (how you far from mean)

## 3 or 6 Sigma: (Sigma = Standard Deviation)

- Represent level of quality that company decided to achieve
- 6 Sigma represents higher quality than 3 Sigma
  - > +/- 1 Sigma equals 68.26%
  - > +/- 2 Sigma equals 95.46%
  - > +/- 3 Sigma equals 99.73%
  - > +/- 6 Sigma equals 99.99985%
  - > Sigma is taken both sides of the mean

# Quality Control Tools and Techniques

## Seven Basic Tools of Quality (Ishikawa's Seven)

– Seven tools used for quality control:

- > Cause and Effect Diagram
- > Flowchart
- > Histogram
- > Pareto Chart
- > Run Chart
- > Scatter Diagram
- > Control Chart

# Quality Control Tools and Techniques – Cont'd

## Cause and Effect (Ishikawa Diagram = Fishbone Diagram)

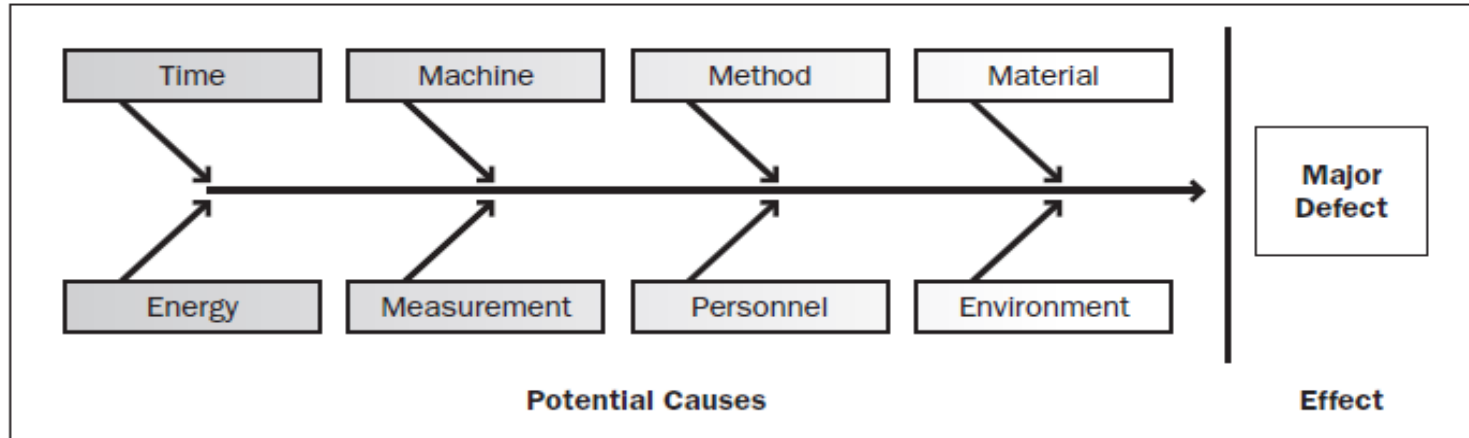
- Shows root causes of the defects
- Used in Quality Control to help project manager look backward at what has contributed to quality problems on the project
- A creative way to look at the causes of a problem
- Help Stimulate thinking, organizes thoughts & generate discussions
- Can be used to explore factors that will result in a desired future outcome



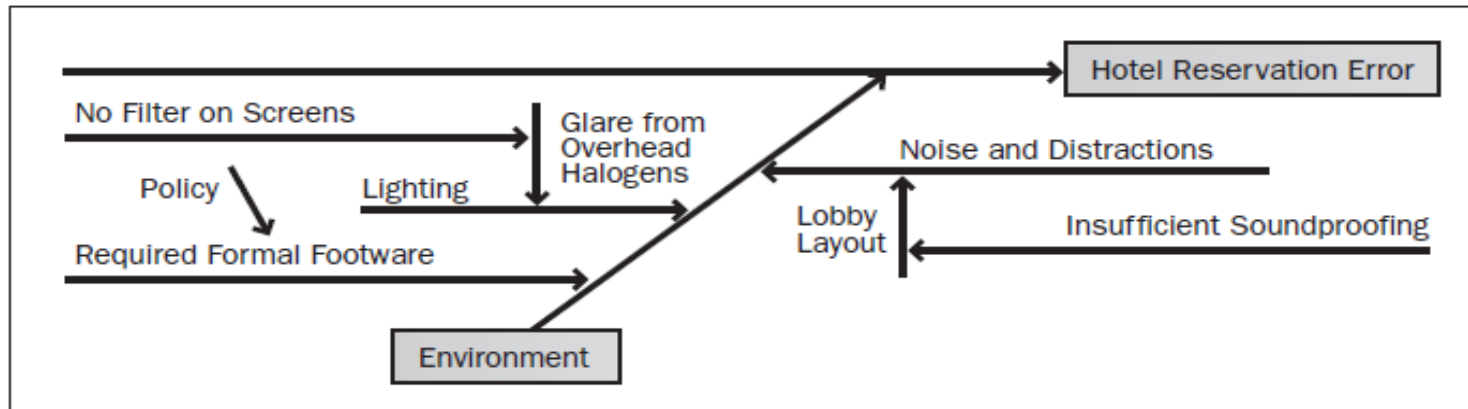
**Histogram:** Displays data in form of columns or bars.

# Quality Control Tools and Techniques – Cont'd

Copied from PMBOK



## Classic Sources of Problems to Consider



## Environment Bone Expanded by Brainstorming

# Quality Control Tools and Techniques – Cont'd

## Pareto Chart

- Histogram that displays data from most **frequent** to least **frequent** to identify root causes in problems.
- Help focus attention on the most critical issues
- Prioritize potential causes of the problems
- Separate the critical few from uncritical many



## Run Chart

- Looks at history and see pattern of variation

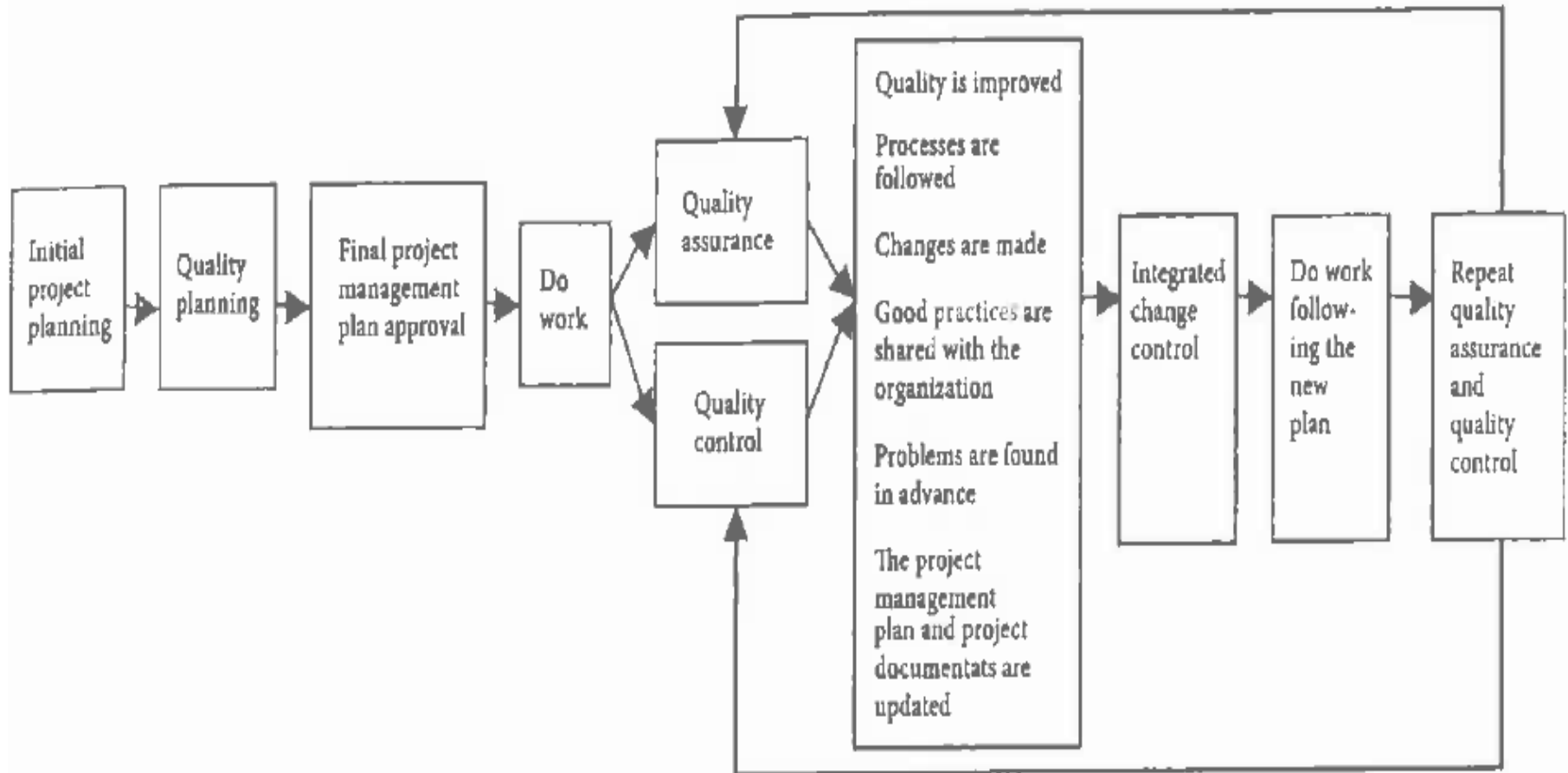
## Scatter Chart

- Track two variables to see if they are related



# Put All Together:

Copied from Rita's Book



**Assurance** -> Audits  
Preventive Actions  
Corrective Actions  
Change Requests  
Defect Repair

**Control** -> Measurements  
Standards  
Requirements  
Areas need correction or prevention

# Lesson Learned

## Practice Exam Questions

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*Thank You ..*

*Q & A*

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