IT Project Management

CIS 8000

Session 9: IT Project Quality Management

Yi-Sen An
Dept of Computer Information Systems

Learning Objectives

- Describe project quality management (PQM) in terms of planning for quality, quality assurance, and quality control to continuously improve the project's products and supporting processes.
- Identify several quality gurus or founders of the quality movement, and their role in shaping quality philosophies that can be applied to project management.
- Define process capability and maturity defined under a quality management system called the capability maturity model integrated (CMMI).
- Distinguish between validation and verification activities and how these activities support project quality management.
- Apply the quality concepts, methods, and tools introduced in this chapter to develop a project quality plan.

Yi-Sen An
Dept of Computer Information Systems

What is Quality?

- "an inherent or distinguishing characteristic; a property," or "having a high degree of excellence."

- In the business context
  - "fitness for use" – delivery a product or system that meets customer's needs
  - "conformance to requirements" – meeting a set of standards or specifications

What is the difference between Quality and Grade?

Yi-Sen An
Dept of Computer Information Systems

Which suits you best?

$4,999

$5,495

Quality vs. Grade

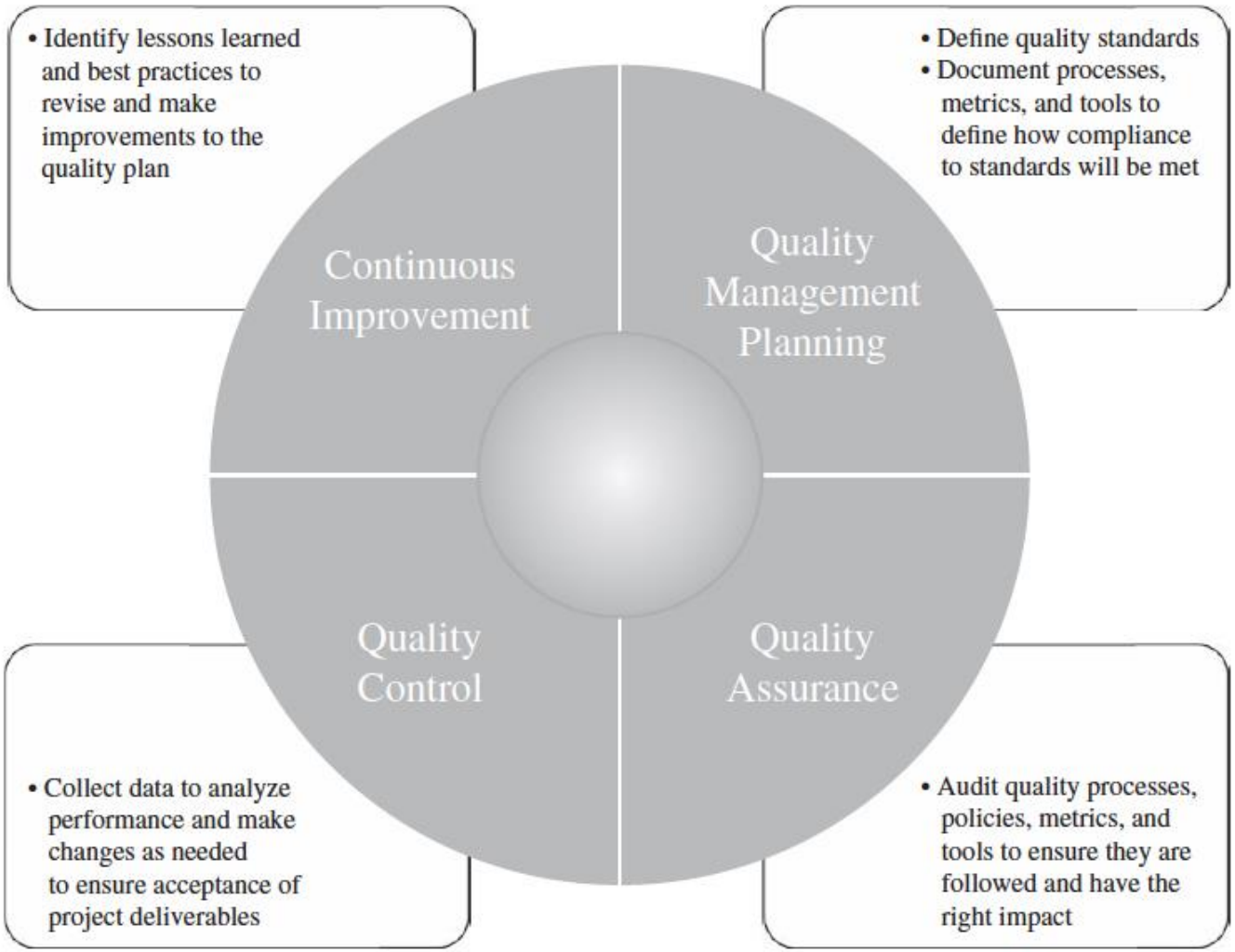
- Grade
  - "Intent of the design"– Functionalities/Features

=> ***"What requirements does it supposed to have?"***

- Quality – "Something having a high degree of excellence"
  - "fitness for use" – Delivering a product that meets customer's needs
  - "conformance to requirements" – meeting a predefined set of standards

=> ***"How well does it perform in meeting the requirements?"***

Project Quality Management (PQM)



Yi-Sen An
Dept of Computer Information Systems

PQM (Project Quality Management) Focuses on

product

- Business Case
- The IT Solution / System
- Product quality & grade

project

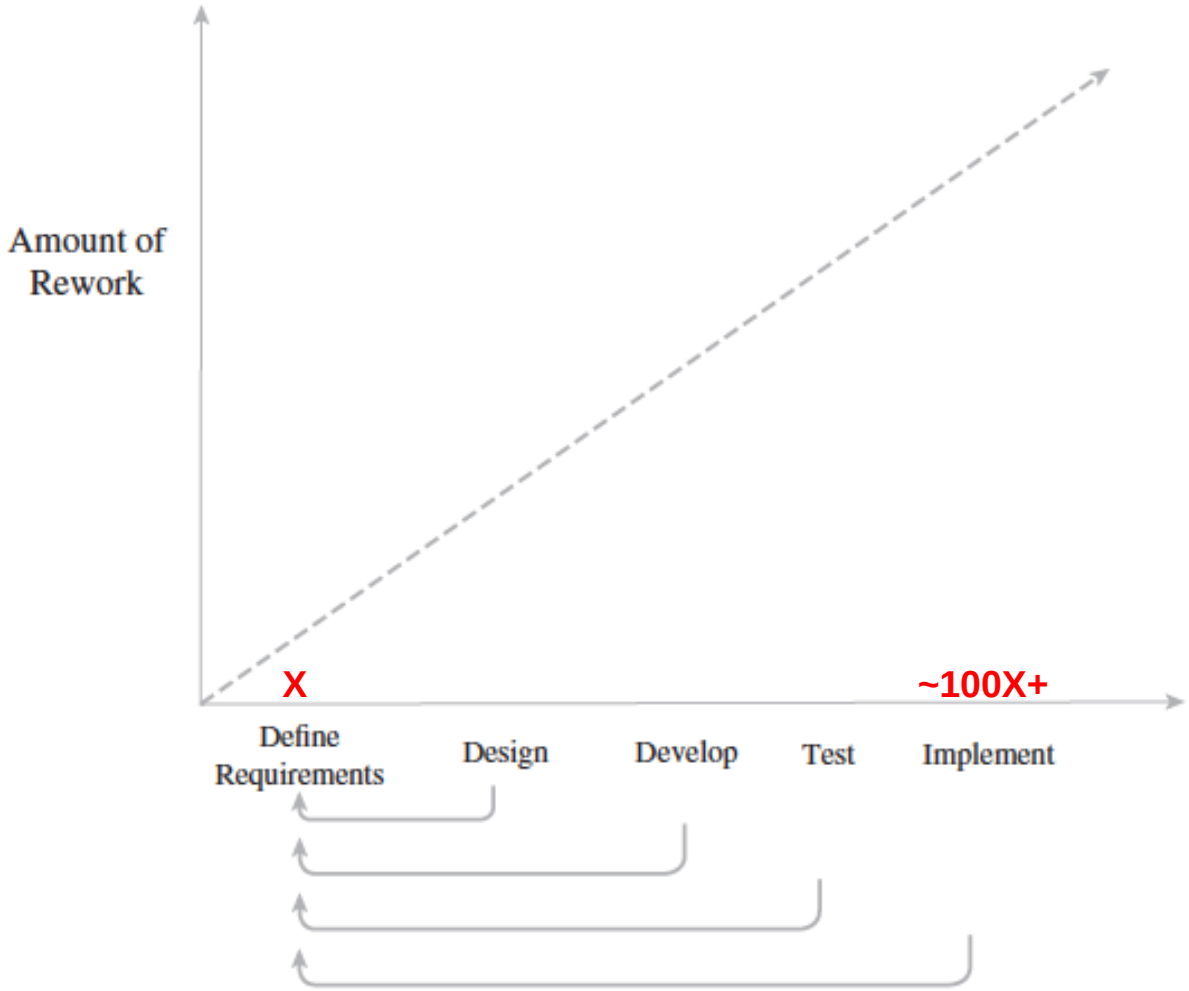
- Budget
- Schedule
- Scope management

processes

- Risk management
- Communication management
- Stakeholder management
- Resource management
- Implementation

Yi-Sen An
Dept of Computer Information Systems

The Impact of Rework



Yi-Sen An
Dept of Computer Information Systems

Truck Load Optimization Example

- Optimize the truck without overweight or compromising safety
- Reduce dwell time at the facility
- Multiple forklifts loading simultaneously

Initial implementation didn't work, why?

Yi-Sen An
Dept of Computer Information Systems

A Framework for the Project Quality Management Plan

Yi-Sen An
Dept of Computer Information Systems

1. Quality Philosophies

- Craftsmanship – deep knowledge of craft, high standards, attention to detail, work done using best materials available (Guild – master, apprentice, journeyman)
- Scientific Management - Frederic W. Taylor – Breakdown a task into subtasks and identify the best way to do each subtask.
- The Total Quality Management (TQM) Gurus
  - W. Edwards Deming – 14 Points – emphasize value and importance of people (10-minute Video)
  - Joseph Juran – Quality trilogy: quality planning, quality improvement, and quality control
  - Phillip Crosby – defines quality as conformance to requirements based on customer's needs and advocated a top-down approach - management's responsibility to set the quality example for others to follow.

1. Quality Philosophies

- W. Edwards Deming – emphasize value and importance of people; Main Ideas:
  - Organization must have constancy of purpose to be competitive, stay in business, and provide jobs
  - Leadership is critical
  - Don't rely on mass inspection of the end product. Build quality into the processes and product along the way
  - Train and educate people, drive out of fear, and let people take pride in their work
  - Always strive to improve the quality and productivity associated with the manufacturing process or services provided
  - Improve communication among departments and business units
  - Eliminate slogans, work quotas, and management by numbers
  - Quality is the responsibility of everyone in the organization
- Joseph Juran – Quality trilogy:

Quality Planning	Quality Improvement	Quality Control
• Quality Planning • Identify the customer • Determine the customer's needs • Be sure to understand those needs • Develop a product that meets the customer's needs • Ensure that the product meets the customer's needs as well as the needs of the organization	• Design a process that can product the product • Optimize the process	• Provide evidence that the process can produce the product • Operationalize the process

- Phillip Crosby –
  - Quality defined as conformance to requirements based on the customer's needs.
  - Top-down approach - management's responsibility to set the quality example for others to follow.
  - Advocated "Doing it right the first time" and "zero defects"
  - Quality is free and nonconformance to requirements costs money

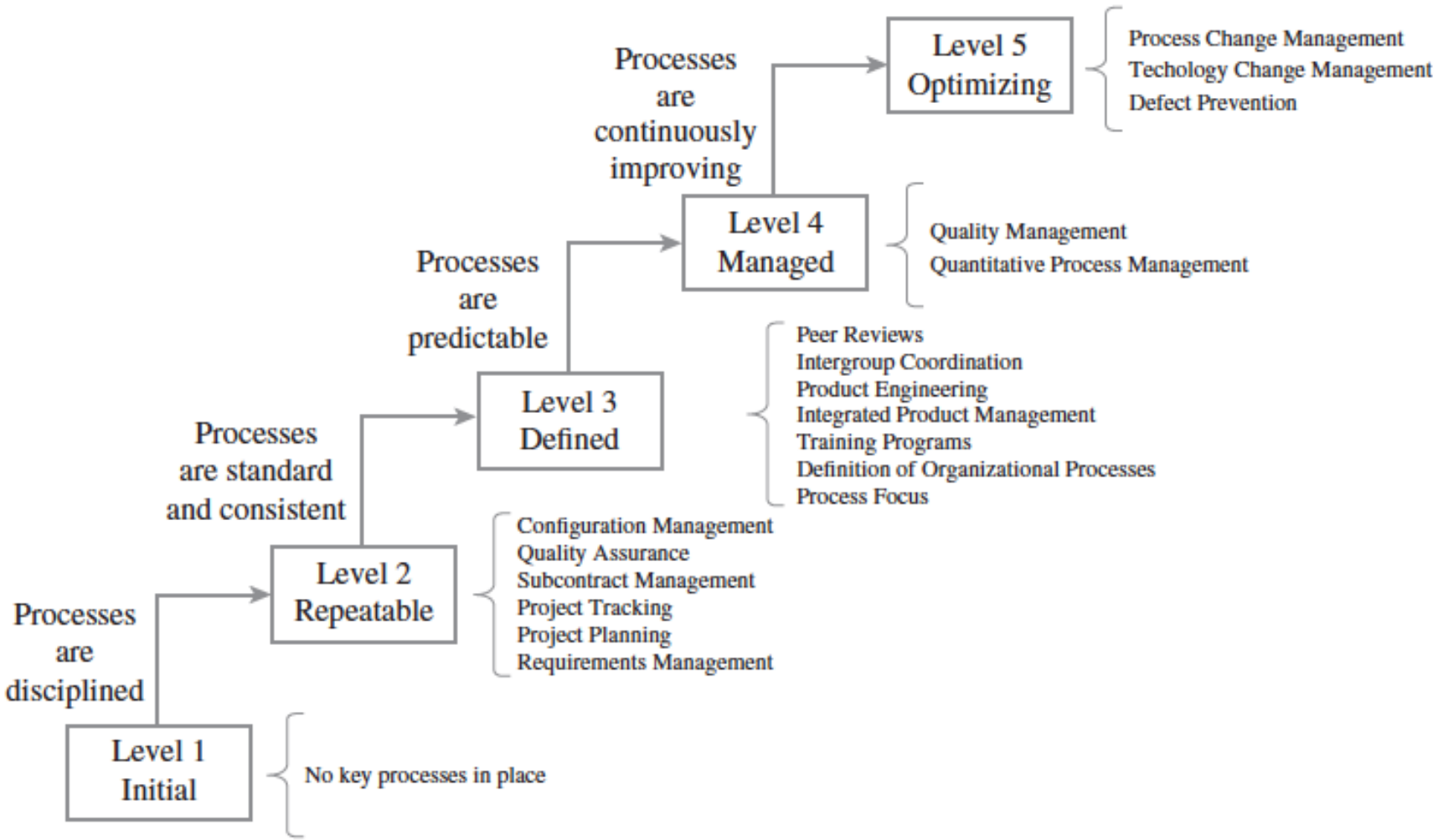
Modern Quality Philosophies and Principles *(Common Themes)*

1. Focus on Customer Satisfaction
2. Prevention, not Inspection
3. Improve the Process to Improve the Product (project's deliverables)
4. Quality is Everyone's Responsibility
5. Fact-based Management

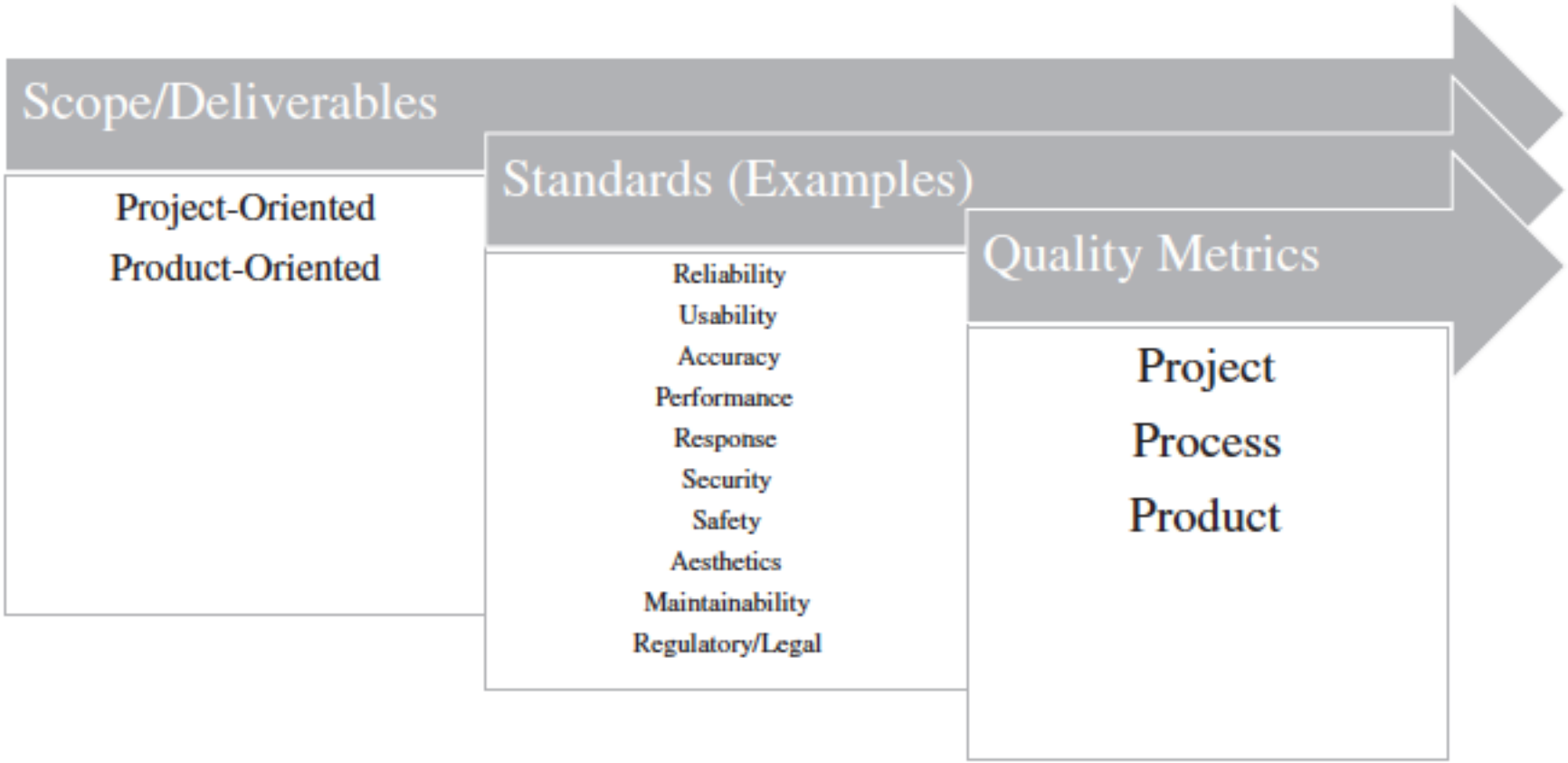
CMMI Concepts

- **Process**
  - A set of activities, methods, or practices and transformations used by people to develop and maintain a product or system and the deliverables associated with project. Included are such things as project plans, design documents, code, test cases, user manuals, and so forth.
- **Process capability**
  - The *expected* results that can be achieved by following a particular software process. More specifically, the capability of an organization's processes provides a way of predicting the outcomes that can be expected if the same processes are used from one project to the next.
- **Process performance**
  - The actual results that are achieved by following a particular process. Therefore, the actual results achieved through process performance can be compared to the expected results achieved through process capability.
- **Process maturity**
  - The extent to which a particular process is explicitly and consistently defined, managed, measured, controlled, and effectively used throughout the organization.

CMMI Process Maturity and Key Process Areas



2. Project Standards and Metrics



Process, Product, & Project Metrics

Examples

Type	Metric	Description
Process	Defect Arrival Rate	The number of defects found over a specific period of time.
	Defects by Phase	The number of defects found during each phase of the project.
	Defect Backlog	The number of defects waiting to be fixed.
	Fix Response Time	The average time it takes to fix a defect.
	Defective Fixes	The number of fixes that created new defects.
Product	Mean Time to Failure	Average or mean time elapsed until a product fails.
	Defect Density	The number of defects per lines of code (LOC) or function points.
	Customer Found Defects	The number of defects found by the customer.
	Customer Satisfaction	An index to measure customer satisfaction – e.g., scale from 1 (very unsatisfied) to 5 (very satisfied)
Project	Scope Change Requests	The number of scope changes requested by the client or sponsor.
	Scope Change Approvals	The number of scope changes that were approved.
	Overdue tasks	The number of tasks that were started but not finished by the expected date or time.
	Tasks that should have started	The number of task that should have started but have been delayed.
	Over budgeted tasks	The number of tasks (and dollar amount) of tasks that have cost more to complete than expected
	Earned Value	SV, CV, SPI, CPI, ETC, EAC
	Over allocated Resources	The number of resources assigned to more than one task.
	Turnover	The number of project team members who quit or terminated.
	Training Hours	The number of training hours per project team member.

3. QUALITY ASSURANCE (QA)

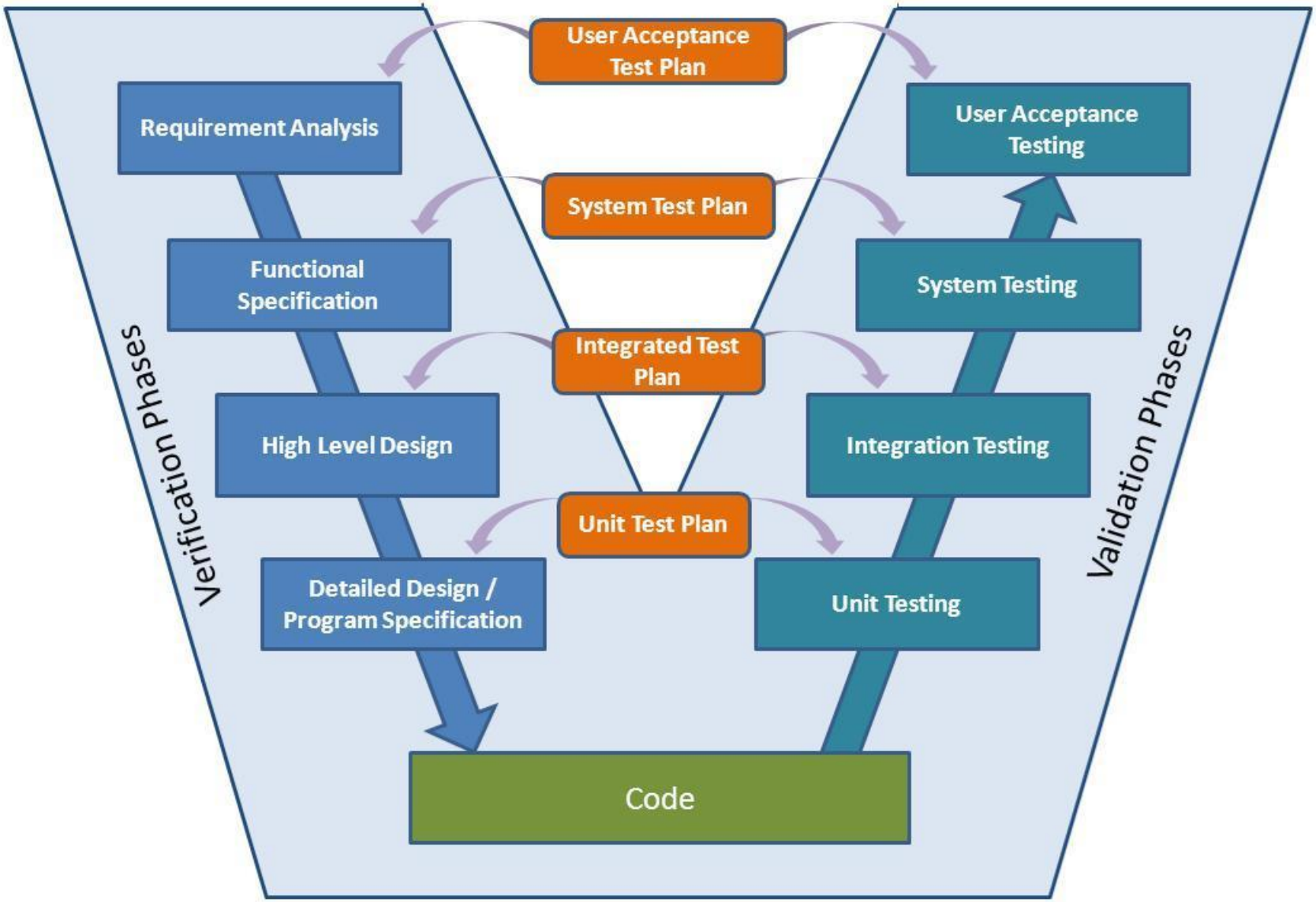
Verification & Validation

What is the difference?

QUALITY ASSURANCE

- Verification –
  - Process-related activities to ensure that the products & deliverables meet specified requirements before final testing begins.
  - Does the system conform to requirements.
  - *Does the system contain all of the intended functions?*
- Validation – testing
  - Product-oriented activities that attempt to determine if the system or project deliverables meet the customer or client's expectations.
  - Is the system fit for use?
  - *Does the system work well in targeted settings? (Does it pass all of the tests?)*

Software Testing Approaches



Quality Assurance (QA)

- **Verification** – focuses on process-related activities of the project –
  - **Technical reviews** including "walk-throughs" – ensure that the product / system will conform to specified standards
  - **Business Reviews** – ensures that the product / system provides the required functionality specified in the project scope
  - **Management Reviews** – ensures that the project meets scope, schedule, cost and quality objectives

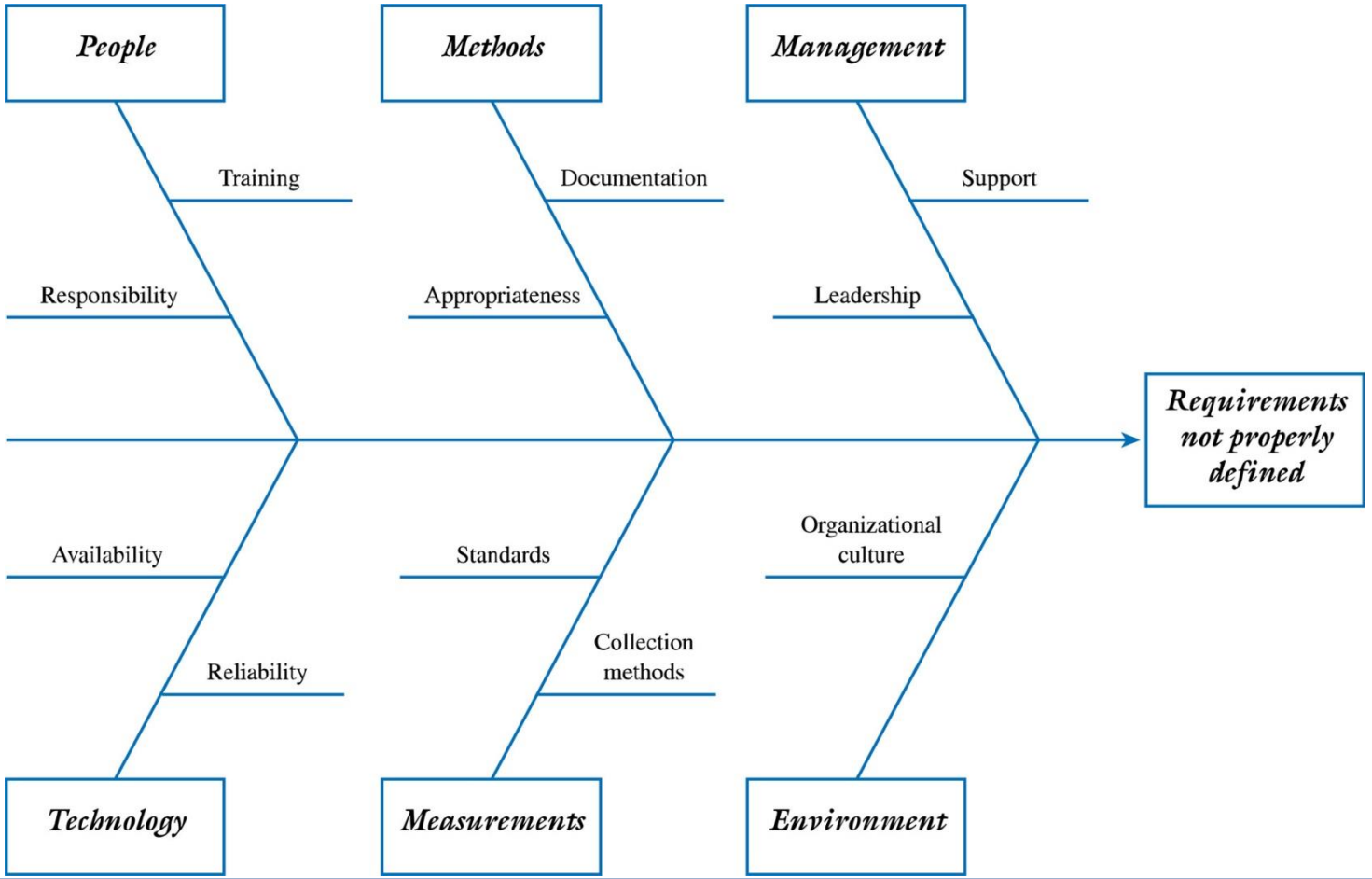
4. QUALITY CONTROL

Focuses on monitoring the activities and results of the project to ensure that the project complies with quality standards.

- Cause & Effect Diagrams (Fishbone Diagrams)
- Control Charts
- Pareto Charts
- Flow Chart

Yi-Sen An
Dept of Computer Information Systems

Tools: Ishikawa, or Fishbone Diagram

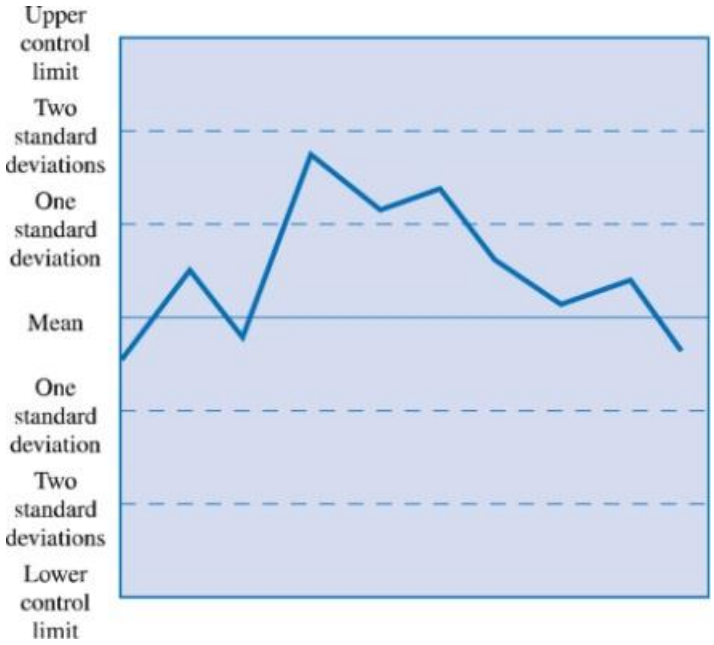


Team Assignment 7

- Discuss as a group potential problems associated with your project (Husky Air or Martial Arts Academy) and choose one.
- Create a fishbone diagram on PowerPoint.
- List the problem/issue to be studied on the "head" of the fish.
- Label each "bone" of the fish. The major categories often utilized are: (can combine them or make up your own)
  - The 4 M's: Methods, Machines, Materials, Manpower
  - The 4 P's: Place, Procedure, People, Policies
  - The 4 S's: Surroundings, Suppliers, Systems, Skills
- Write the names of team members participated
- Turn in the assignment before midnight today.
- Select a spoke person (3-minute max presentation)

Control Charts

- Brings statistical theory to control production processes
- Can be applied to other activities where reliable measures are available.
- Common Causes vs. Assignable Causes

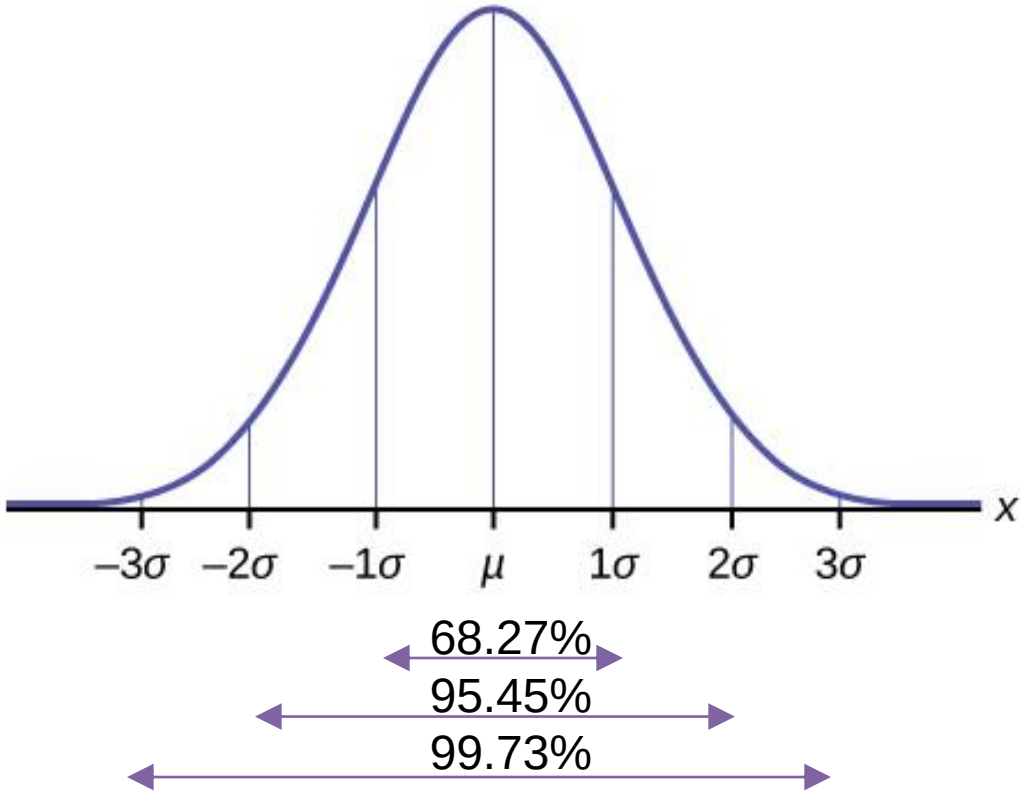


Yi-Sen An
Dept of Computer Information Systems

6-Sigma

- Originated by Motorola in Schaumburg, IL
- Based on competitive pressures in 1980s – “Our quality stinks”

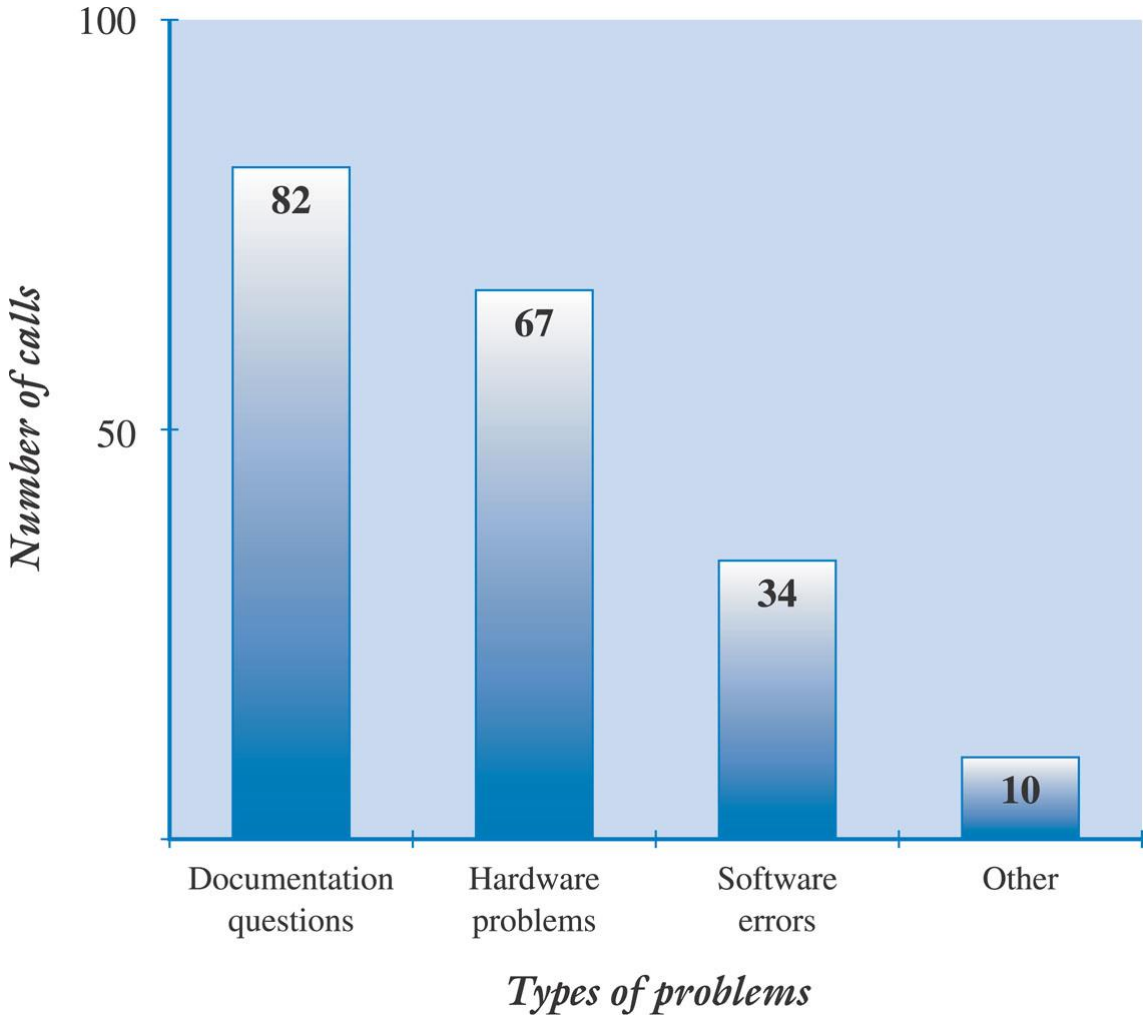
Sigma	Defects Per Million
1 δ	690,000
2 δ	308,537
3 δ	66,807
4 δ	6,210
5 δ	233
6 δ	3.4



3-Sigma & 6 Sigma
(What's the big deal?)

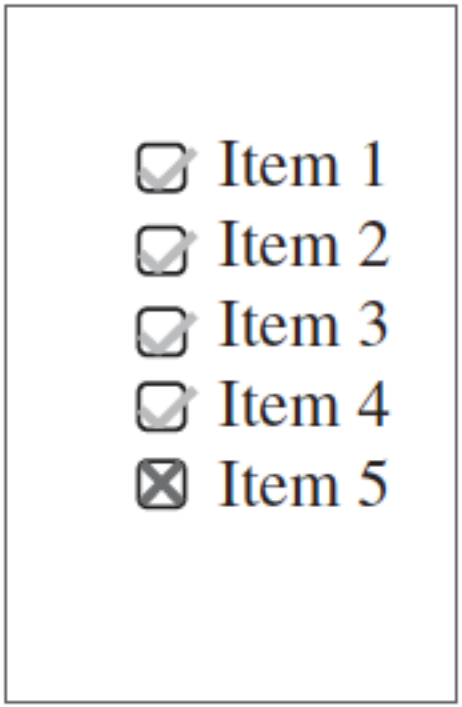
3 δ	6 δ
Five short or long landings at any major airport	One short or long landing in 10 years at all airports in the US
Approximately 1,350 poorly performed surgical operations in one week	One incorrect surgical operation in 20 years
Over 40,500 newborn babies dropped by doctors or nurses each year	Three newborn babies dropped by doctors or nurses in 10 years
Drinking water unsafe to drink for about 2 hours each month	Drinking water unsafe to drink for 1 second every 6 years

Pareto Chart

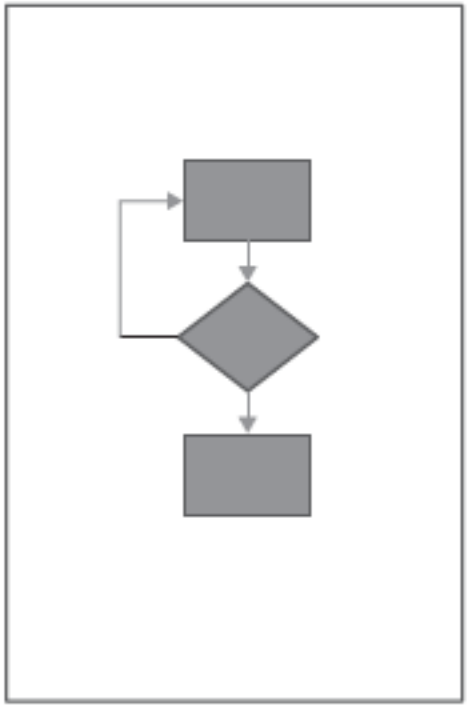


Some Additional Quality Control Tools

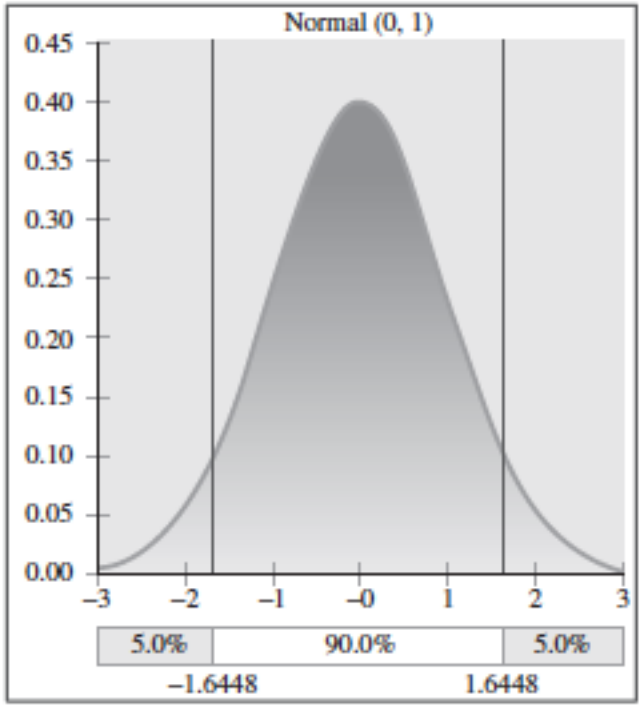
Checklists



Flowcharts/
Process Maps



Statistical
Analysis



Yi-Sen An
Dept of Computer Information Systems

5. Continuous Improvement

- Use knowledge management as a tool for organizational and team learning and identifying best practices.
- Document and disseminate lessons learned.
- Continual improvement – incremental way make a process more efficient, effective, stable, mature, and adaptable.
- Project Quality plan should support the organization in searching for ways to build a *better* product or system.