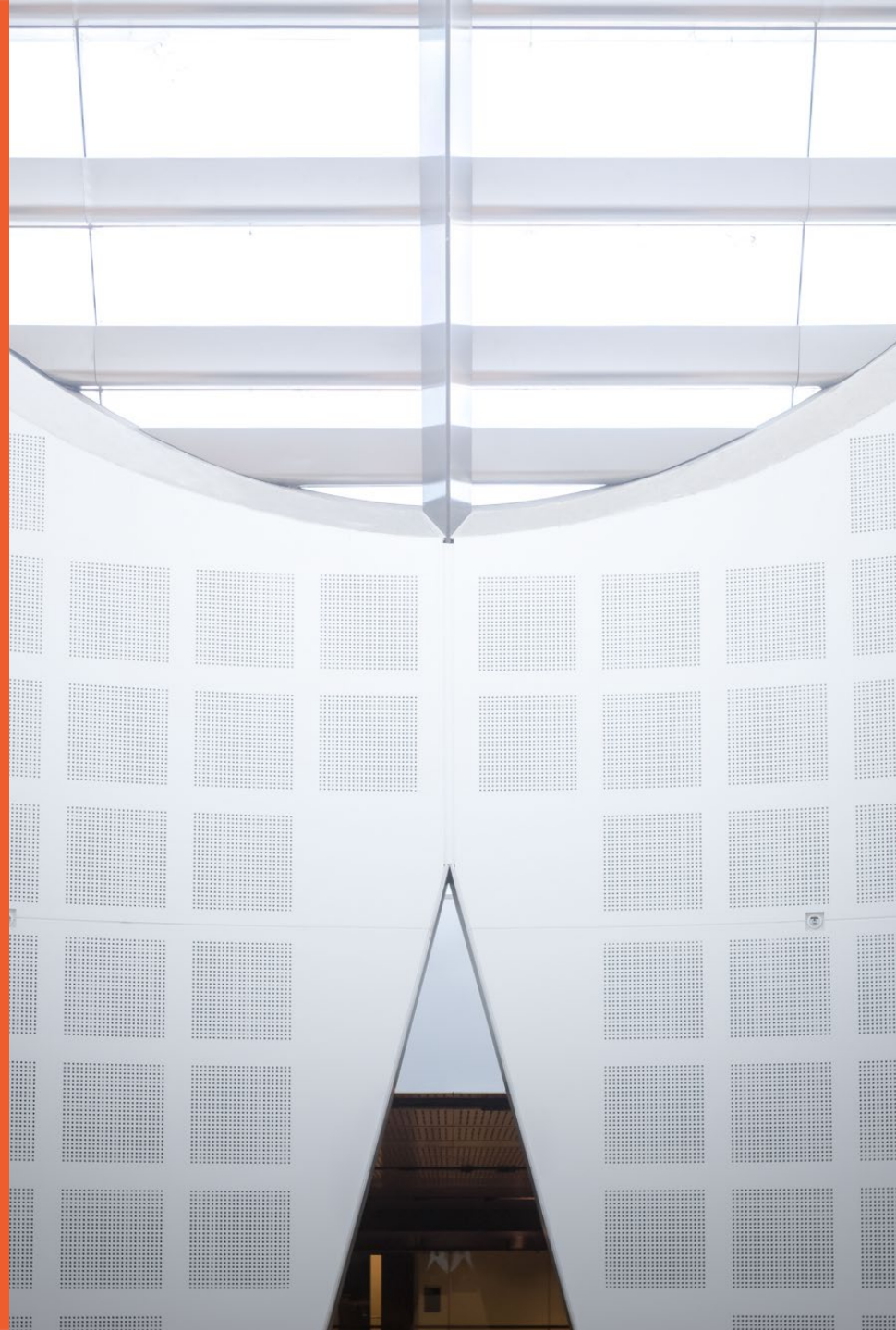# INFO6007
Project Management in IT

Lecture 5
Managing Project Quality

Semester 2, 2020

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SYDNEY

Recapture From Lecture 4

We discussed **Managing Project Cost**:

- All About Costs
- Planning Cost
- Determining Budget
- EVM

Where Are We Now ? -- Course map

Week	Topics/Activities
Week 1	Introduction to IT Project Management
	Other: Form Assignment Groups
Week 2	Managing Project Scope
Week 3	Managing Project Time
Week 4	Managing Project Cost
Week 5	**Managing Project Quality**
Week 6	Managing Project Resources
Week 7	Knowledge Test
Week 8	Project Leadership and Communication Management
Week 9	Managing Project Risk Assessment Due: Group Project
Week 10	Managing Project Procurement
Week 11	Presentation
Week 12	Course Review
Exam Period	Assessment Due: Final Exam

What Will We Do Today ?

- Lecture
  - What is Quality
  - Plan Quality Management
  - Perform Quality Assurance
  - Control Quality

- Case Study Analysis: Scope & Cost (uploaded on Canvas, week 5)

- Class activities
  - Critical Thinking / Problem Solving
  - Tools to use: https://padlet.com
    https://answergarden.ch

- Assessment
  - Test: Knowledge Test, week 7
  - Assignment:

- Announcement (if any): ?

Learning Objectives

- Discuss the concept of project quality

- Describe quality management overview

- Discuss the basic tools and techniques for quality control, Six Sigma, and Testing

- Describe how the cost of quality, organizational influences of workplace, and maturity models relate to improving quality of IT projects

Defining Project Quality

- "The degree to which a set of inherent characteristics fulfils requirements" (ISO9000:2000), defined by ISO (The International Organization for Standardization)

Understanding Quality– Expert Views

- Quality is based on:

  - **Control to requirements**: The project's processes and products meet written specifications

  - **Fitness for use**: A product can be used as it was intended

Understanding Quality– Expert Views

- Experts define quality as

  - way of life

  - continuous improvement

  - getting things right first time

  - meet or exceed clients' expectations

Understanding Quality– Expert Views

"Quality is a framework of culture, behaviours, processes and tools that support consistently meeting the commitments to my client, my corporation, my people, and myself."

Your Experience With Quality Projects?

- Name an IT project that satisfied quality requirements – from consumer perspectives

- Please write your response (ONE WORD ONLY)

at AnswerGarden: https://answergarden.ch/1431855
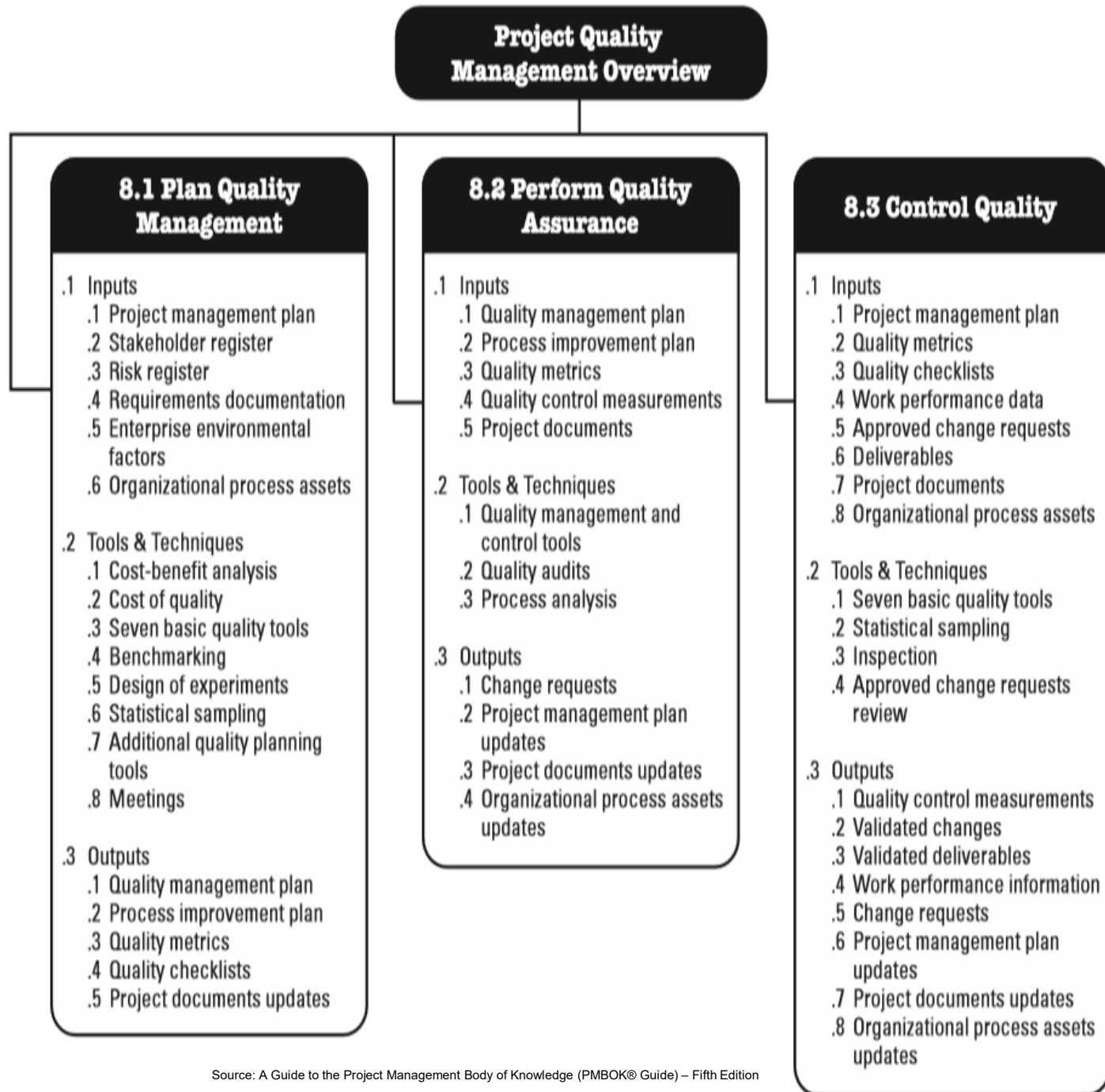
Your Experience With Quality Projects?

- Name an IT project that did NOT satisfy quality requirements – from consumer perspectives.

- Please write your response (ONE WORD ONLY)

at AnswerGarden: https://answergarden.ch/1431858

Q: How do you know?

Who to manage " Project Quality"?

- _____ is ultimately responsible for quality management in IT projects

Project Quality Management Overview

Project Quality Management Overview

8.1 Plan Quality Management

.1 Inputs
  .1 Project management plan
  .2 Stakeholder register
  .3 Risk register
  .4 Requirements documentation
  .5 Enterprise environmental factors
  .6 Organizational process assets

.2 Tools & Techniques
  .1 Cost-benefit analysis
  .2 Cost of quality
  .3 Seven basic quality tools
  .4 Benchmarking
  .5 Design of experiments
  .6 Statistical sampling
  .7 Additional quality planning tools
  .8 Meetings

.3 Outputs
  .1 Quality management plan
  .2 Process improvement plan
  .3 Quality metrics
  .4 Quality checklists
  .5 Project documents updates

8.2 Perform Quality Assurance

.1 Inputs
  .1 Quality management plan
  .2 Process improvement plan
  .3 Quality metrics
  .4 Quality control measurements
  .5 Project documents

.2 Tools & Techniques
  .1 Quality management and control tools
  .2 Quality audits
  .3 Process analysis

.3 Outputs
  .1 Change requests
  .2 Project management plan updates
  .3 Project documents updates
  .4 Organizational process assets updates

8.3 Control Quality

.1 Inputs
  .1 Project management plan
  .2 Quality metrics
  .3 Quality checklists
  .4 Work performance data
  .5 Approved change requests
  .6 Deliverables
  .7 Project documents
  .8 Organizational process assets

.2 Tools & Techniques
  .1 Seven basic quality tools
  .2 Statistical sampling
  .3 Inspection
  .4 Approved change requests review

.3 Outputs
  .1 Quality control measurements
  .2 Validated changes
  .3 Validated deliverables
  .4 Work performance information
  .5 Change requests
  .6 Project management plan updates
  .7 Project documents updates
  .8 Organizational process assets updates

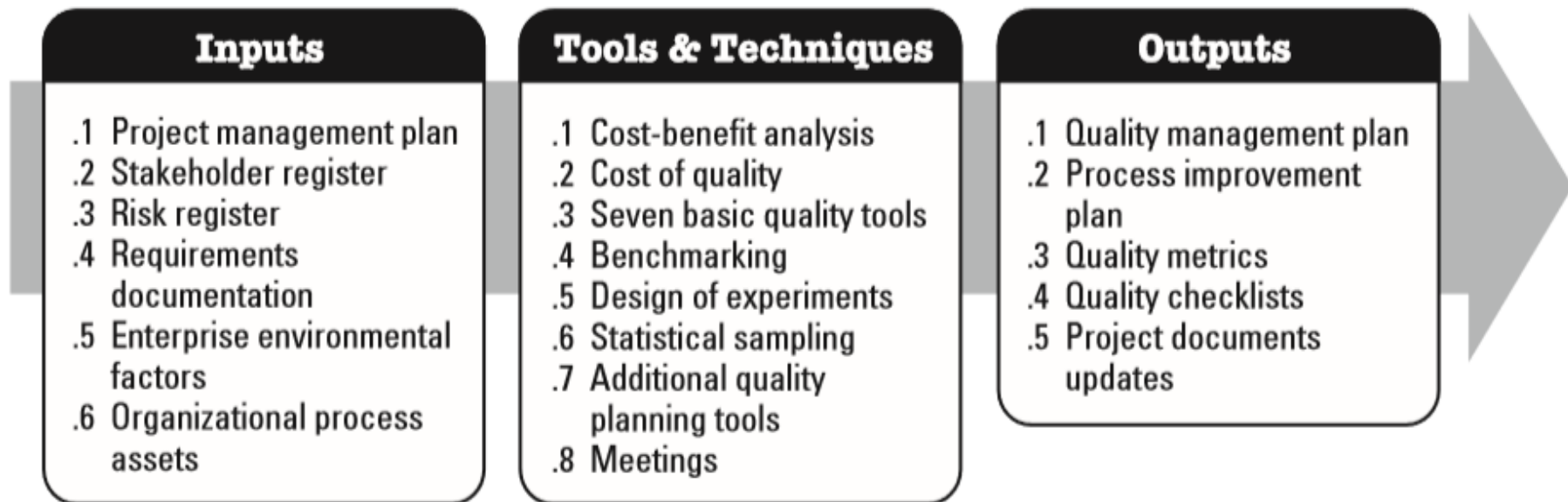Source: A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition

Project Quality Management Processes

- Processes include:
    - **Plan Quality Management:** Identifying which quality standards are relevant to the project and how to satisfy them

    - **Perform Quality Assurance:** Periodically evaluating overall project performance to ensure the project will satisfy the relevant quality standards

    - **Control Quality** : Monitoring specific project results to ensure that they comply with the relevant quality standards

Plan Quality Management

- Plan Quality Management is the process of identifying quality requirements and/or standards for the project and its deliverables and documenting how the project will demonstrate compliance with relevant quality requirements.

Inputs	Tools & Techniques	Outputs
.1 Project management plan	.1 Cost-benefit analysis	.1 Quality management plan
.2 Stakeholder register	.2 Cost of quality	.2 Process improvement plan
.3 Risk register	.3 Seven basic quality tools	.3 Quality metrics
.4 Requirements documentation	.4 Benchmarking	.4 Quality checklists
.5 Enterprise environmental factors	.5 Design of experiments	.5 Project documents updates
.6 Organizational process assets	.6 Statistical sampling	
	.7 Additional quality planning tools	
	.8 Meetings	

Plan Quality Management -- Cost-Benefit Analysis

- Meeting quality requirements include less rework, higher productivity, lower costs, increased stakeholder satisfaction, and increased profitability.

- A cost-benefit analysis for each quality activity compares the cost of the quality step to the expected benefit.

Plan Quality Management – Cost of Quality

- Software bugs cost:

    - The **U.S. economy about $60 billion each year** and that one third of the bugs could be eliminated by an improved testing infrastructure

    - How much for Australia ?

Plan Quality Management – Cost of Quality

- The Cost of Quality can be widely distributed in two categories:

    - **Costs of conformance** (costs of control)

    - **Costs of non-conformance** (costs of failure of control)

Plan Quality Management – Cost of Quality

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**

Plan Quality Management – Use Basic Quality Tools (a) Cause-and-Effect Diagram

- Also known as **fishbone** or **Ishikawa diagrams**

- **Cause-and-effect diagrams** trace complaints about quality problems back to the responsible production operations

- They help you find the root cause of a problem

Plan Quality Management – Use Basic Quality Tools
(a) Cause-and-Effect Diagram
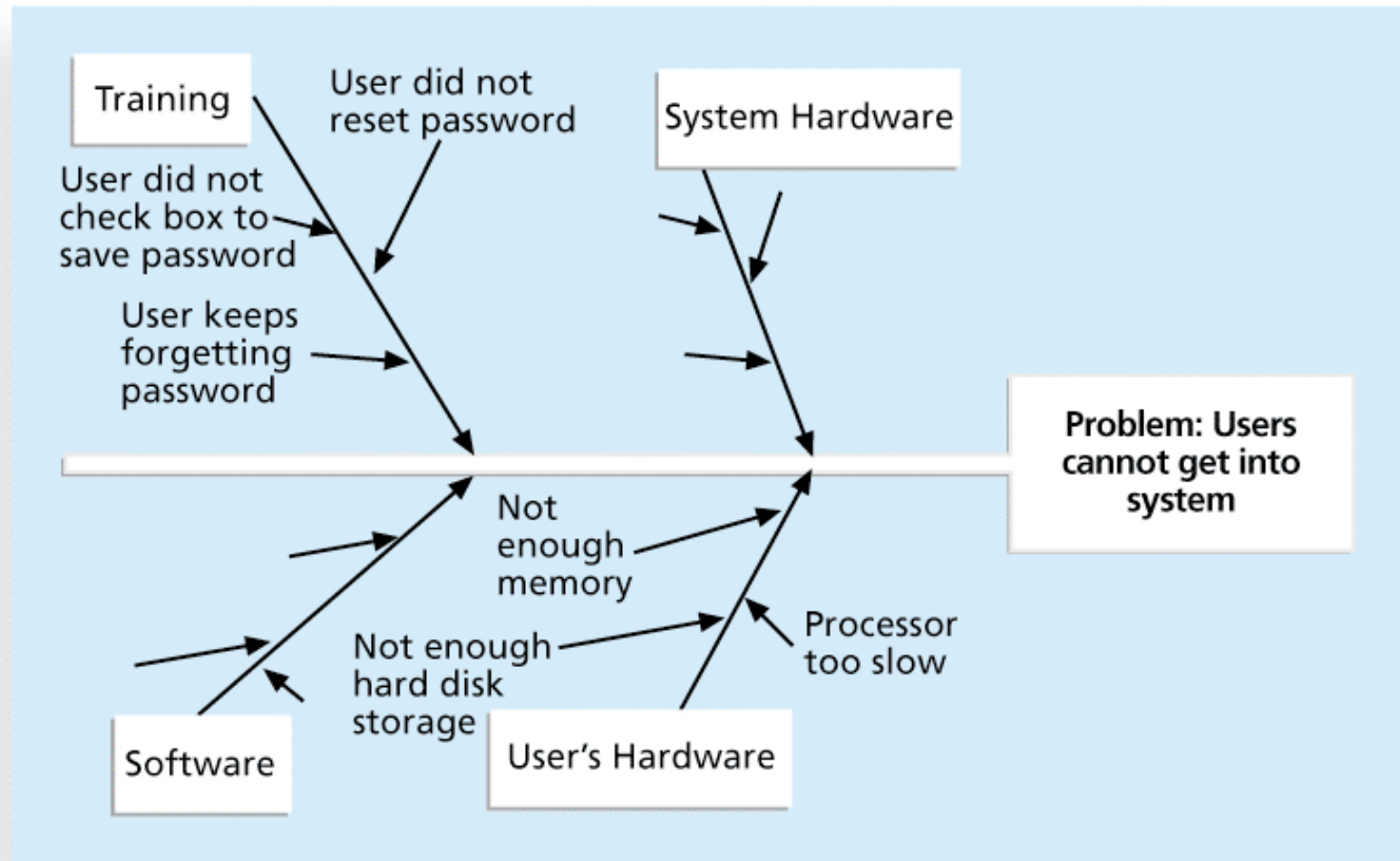
Plan Quality Management – Use Basic Quality Tools (b) Quality Control Chart

- A **control chart** is a graphic display of data that illustrates the results of a process over time

- The main use of control charts is to prevent defects, rather than to detect or reject them

- Quality control charts allow you to determine whether a process is in control or out of control

- The **seven run rule** states that if seven data points in a row are all below the mean, above the mean, or are all increasing or decreasing, then the process needs to be examined for non-random problems

Plan Quality Management – Use Basic Quality Tools
(b) Quality Control Chart

Upper Spec Limit 12.10

Upper Control Limit 12.09

Lower Control Limit 11.91

Lower Spec Limit 11.90

Mean

★ Denotes violation of 7 run rule
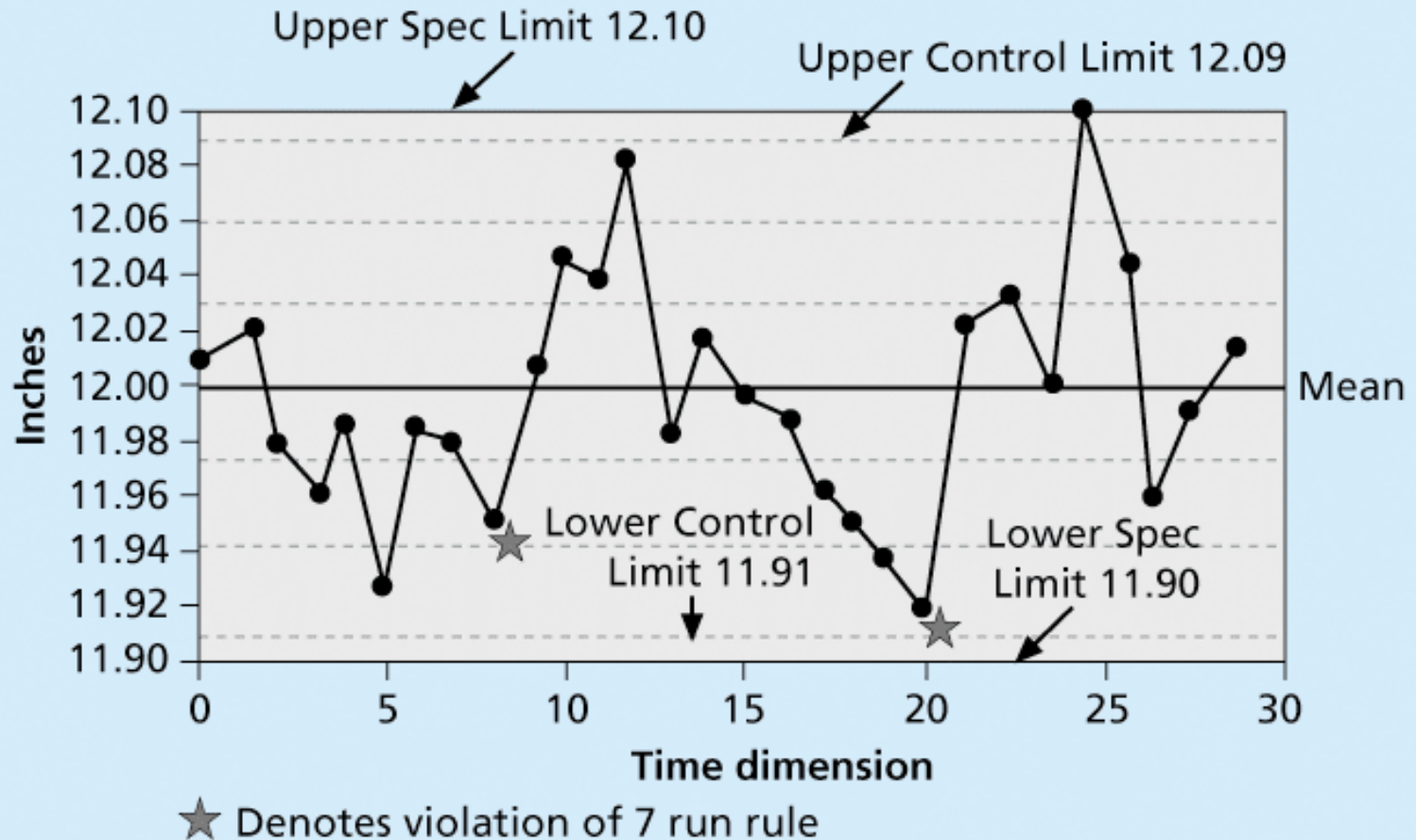
Plan Quality Management – Use Basic Quality Tools (c) Checksheet

- A checksheet is used to collect and analyze data

- It is sometimes called a tally sheet or checklist, depending on its format

- In the example, most complaints arrive via text message, and there are more complaints on Monday and Tuesday than on other days of the week

System Complaints

Source	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
Email	|||	||||			||					12
Text	卌 ||	||||	卌		|||	||||	||	|||	29
Phone call			||					||			8
Total	**11**	**10**	**8**	**6**	**7**	**3**	**4**	**49**

Plan Quality Management – Use Basic Quality Tools (d) Flowcharts

- Flowcharts are graphic displays of the logic and flow of processes that help you analyze how problems occur and how processes can be improved

- They show activities, decision points, and the order of how information is processed
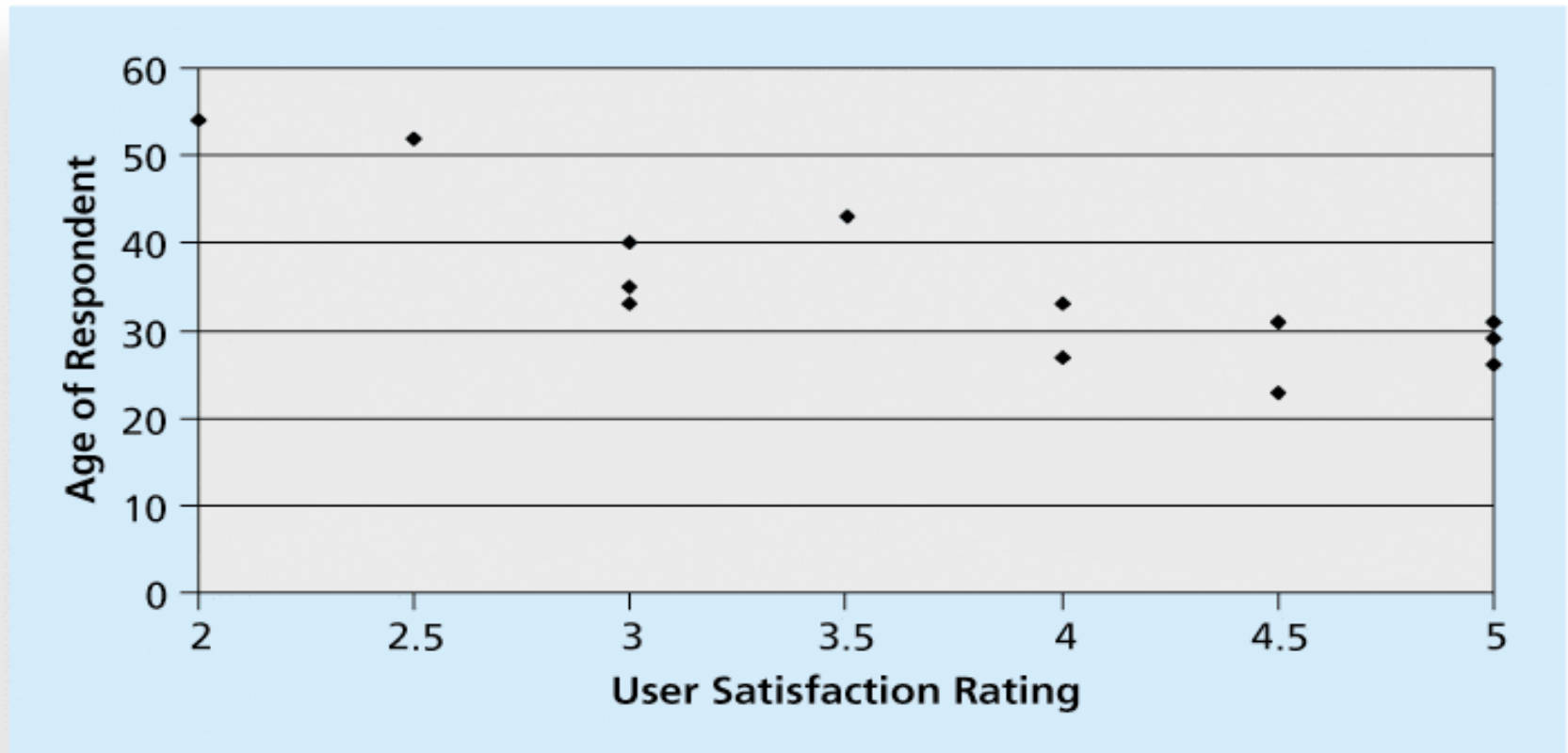
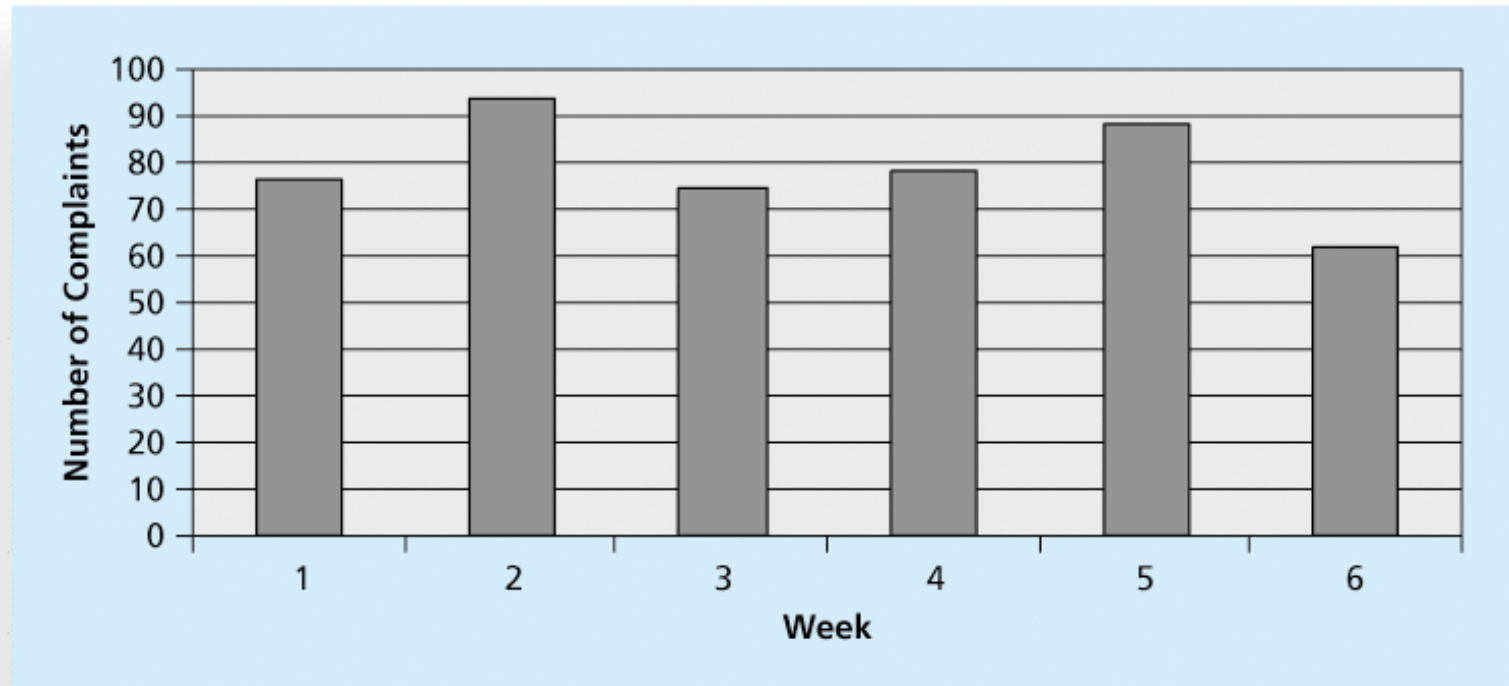# Plan Quality Management – Use Basic Quality Tools (d) Flowcharts
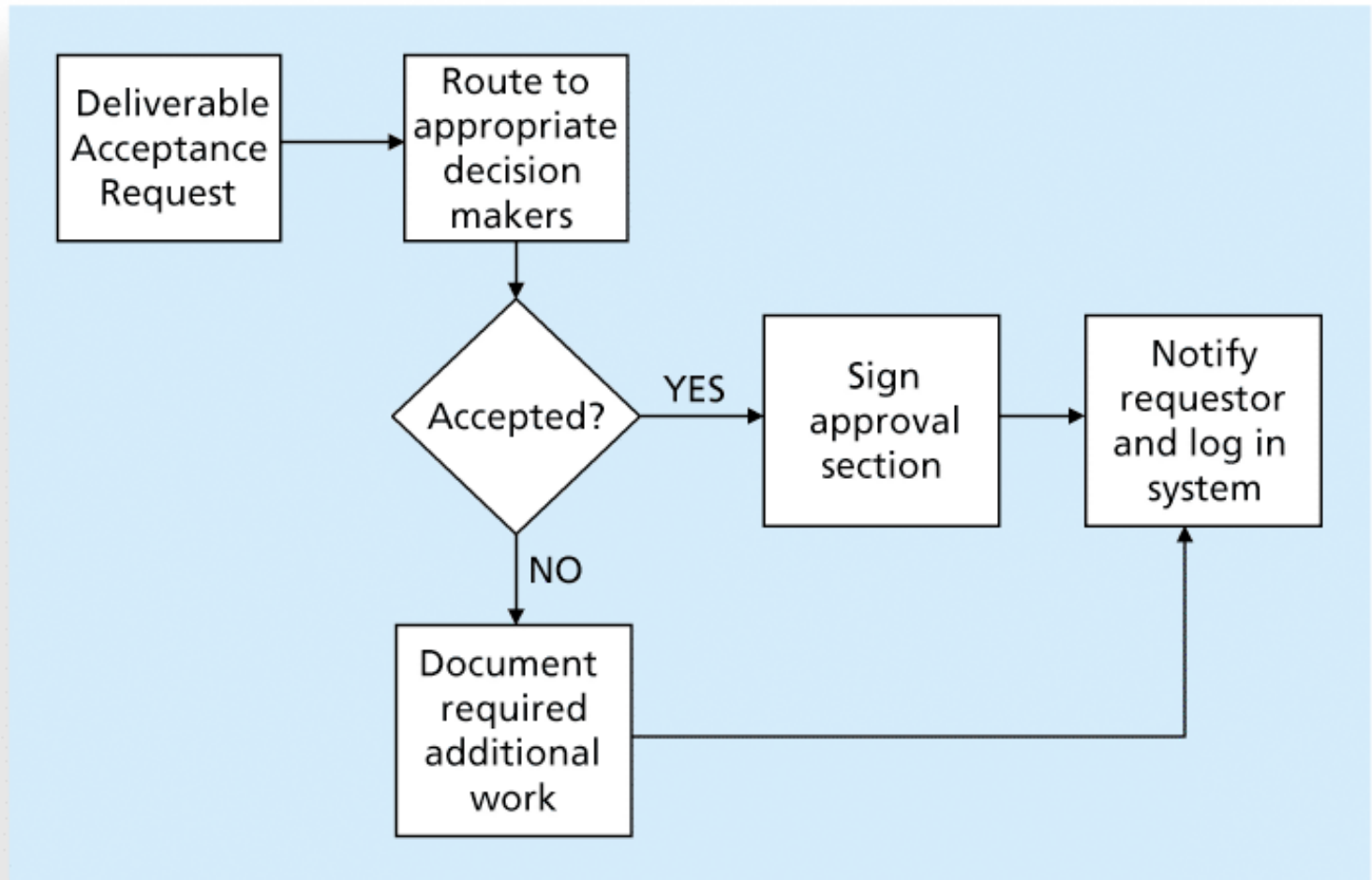
Plan Quality Management – Use Basic Quality Tools (e) Scatter diagram
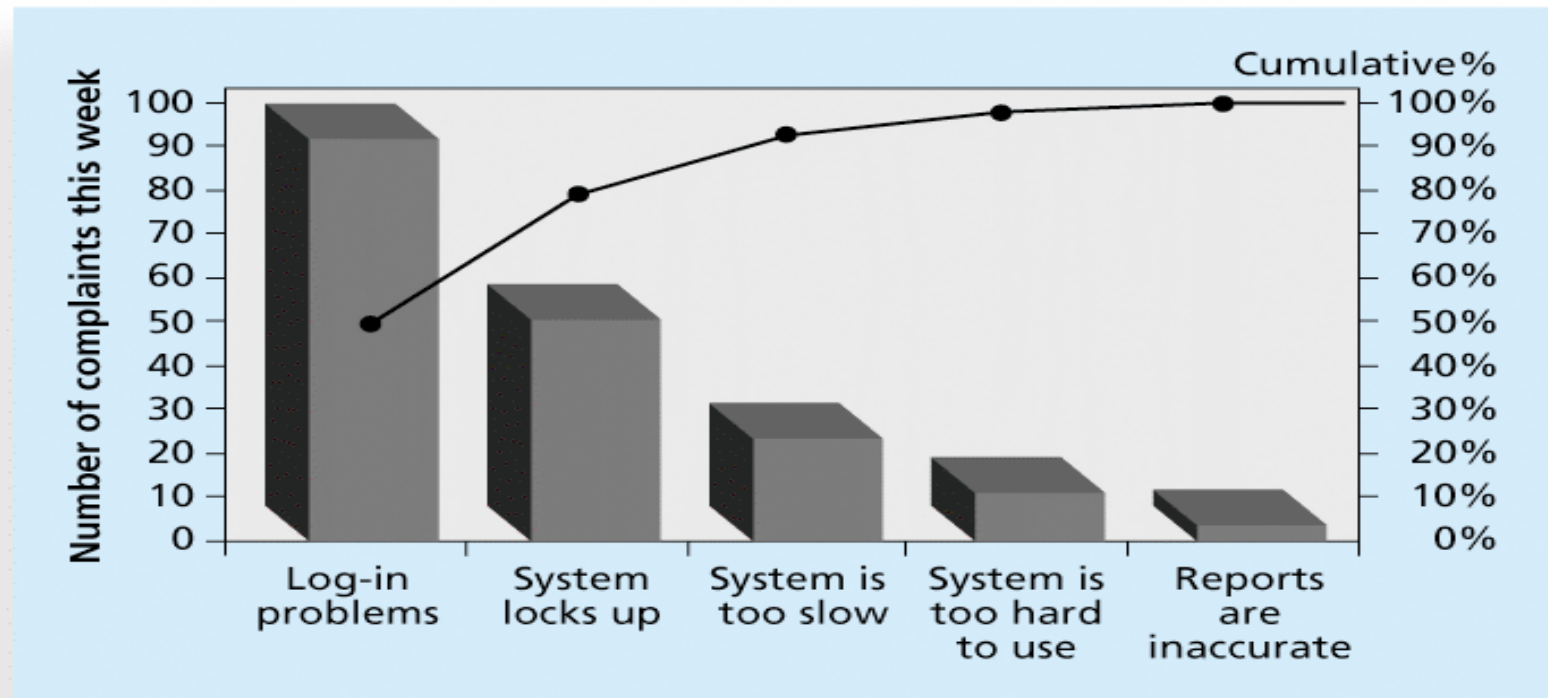
Plan Quality Management – Use Basic Quality Tools (f) Histogram

Plan Quality Management – Use Basic Quality Tools (g) Pareto Chart/Diagram

- Identify and prioritize problem areas
- **Pareto analysis** is also called the **80-20 rule,** meaning that 80 percent of problems are often due to 20 percent of the causes

Other Quality Tools — Six Sigma

- **Six Sigma** is uniquely driven by close understanding of customer needs, disciplined use of facts, data, and statistical analysis, and diligent attention to managing, improving, and reinventing business processes

- Target to achieve no more than **3.4 defects per million opportunities**

- Training and Certification follow the "Belt" system (Master Black, Black, Green, Yellow, and White Belt)
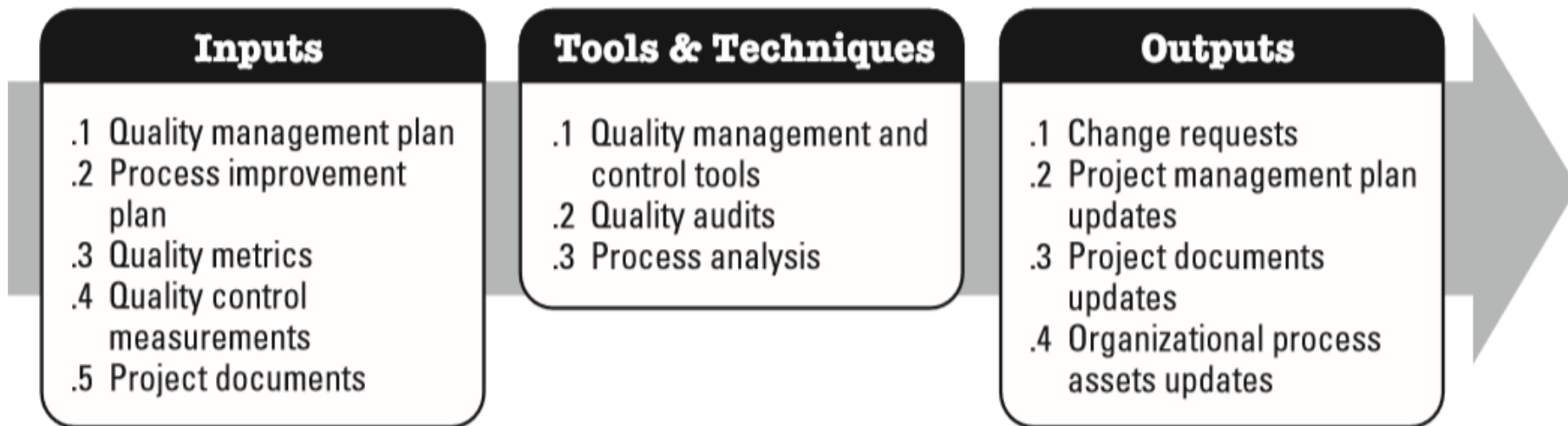
Other Quality Tools – Six Sigma

■ Six Sigma projects normally follow a five-phase improvement process called DMAIC

■ DMAIC stands for:

- **Define**: Define the problem/opportunity, process, and customer requirements

- **Measure**: Define measures, then collect, compile, and display data

- **Analyze**: Examine process details to find improvement opportunities

- **Improve:** Generate solutions and ideas for improving the problem

- **Control:** Track and verify the stability of the improvements and the predictability of the solution

Other Quality Tools – Six 9s of Quality

- **Six 9s of quality** is a measure of quality control equal to 1 fault in 1 million opportunities

- For instance -- 99.9999 % service availability for a system or *30 seconds of down time a year*

Perform Quality Assurance

- **Perform Quality Assurance** is the process of auditing the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions are used.

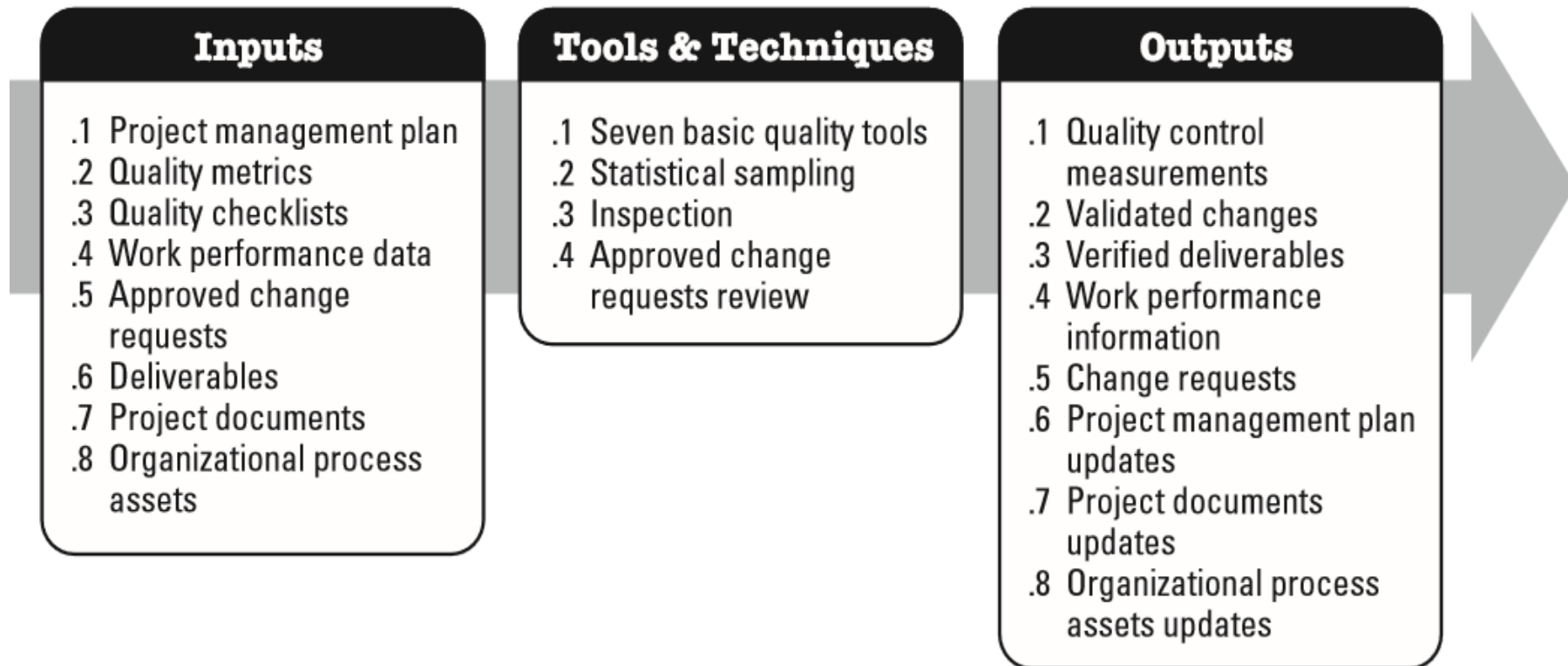| Inputs	Tools & Techniques	Outputs
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Perform Quality Assurance – Quality Audits

- A quality audit is a structured, independent process to determine if project activities comply with organizational and project policies, processes, and procedures. The objectives may include:

  - Identify all good and best practices being implemented;

  - Identify all nonconformity (unconventional), gaps, and shortcomings;

  - Share good practices introduced or implemented;

  - Proactively offer assistance in a positive manner;

  - Highlight contributions of each audit in the lessons learned repository of the organization
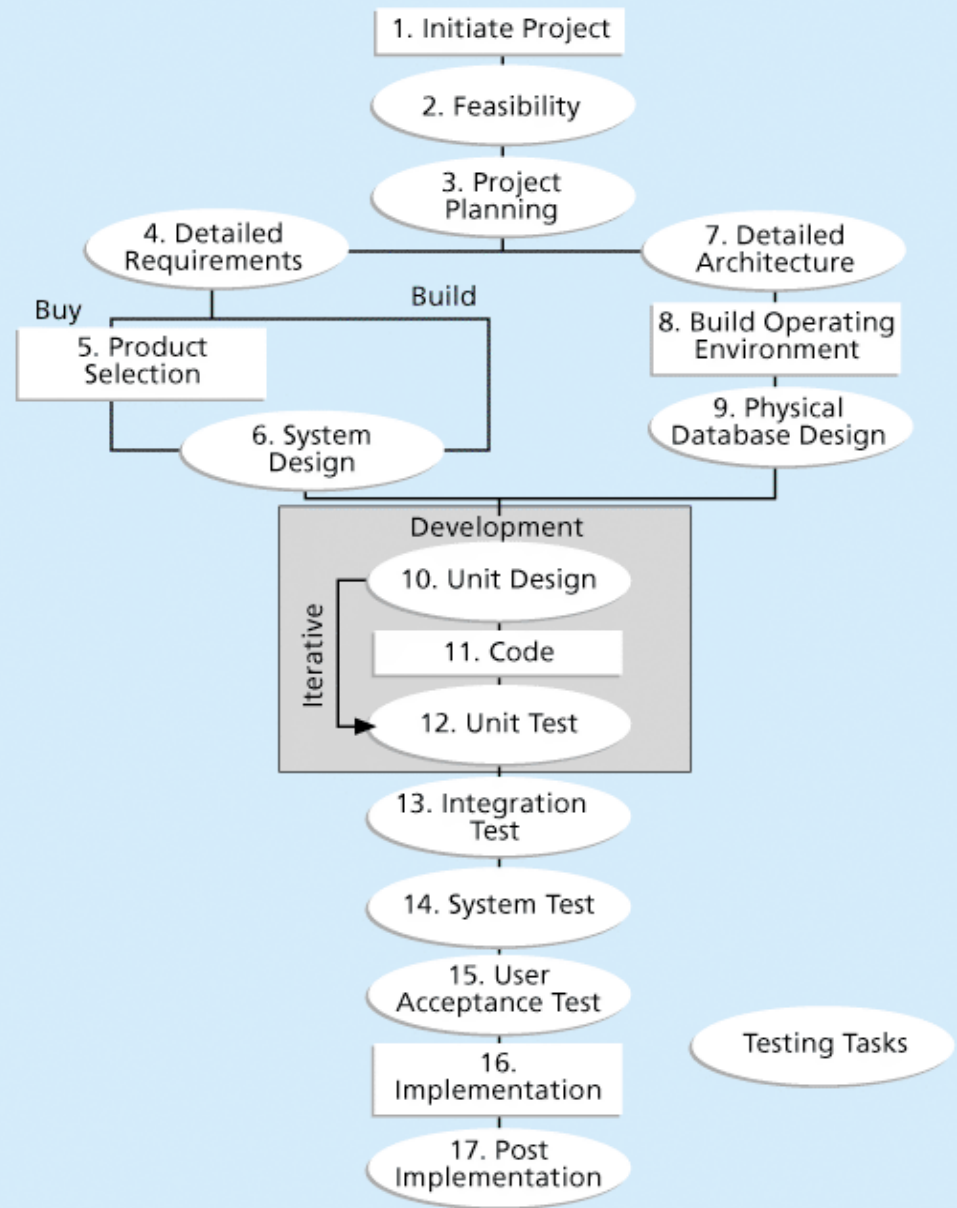
Control Quality

- **Control Quality** is the process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes.

Inputs	Tools & Techniques	Outputs
.1 Project management plan .2 Quality metrics .3 Quality checklists .4 Work performance data .5 Approved change requests .6 Deliverables .7 Project documents .8 Organizational process assets	.1 Seven basic quality tools .2 Statistical sampling .3 Inspection .4 Approved change requests review	.1 Quality control measurements .2 Validated changes .3 Verified deliverables .4 Work performance information .5 Change requests .6 Project management plan updates .7 Project documents updates .8 Organizational process assets updates

Quality Control Strategy -- Testing

- Testing should be done during almost every phase of the IT product development life cycle.

- Testing does not sufficiently prevent software defects because:

  - The number of ways to test a complex system is huge

  - Users will continue to invent new ways to use a system that its developers never considered

Quality Control Strategy -- Testing

1. Initiate Project
2. Feasibility
3. Project Planning
4. Detailed Requirements
7. Detailed Architecture
Buy
Build
5. Product Selection
8. Build Operating Environment
6. System Design
9. Physical Database Design

Development
Iterative
10. Unit Design
11. Code
12. Unit Test

13. Integration Test
14. System Test
15. User Acceptance Test
16. Implementation
17. Post Implementation

Testing Tasks

Quality Control Strategy -- Types of Tests

- **Unit testing** tests each individual component to ensure it is as defect-free as possible

- **Integration testing** occurs between unit and system testing to test functionally grouped components

- **System testing** tests the entire system as one entity

- **User acceptance testing** is an independent test performed by end users prior to accepting the delivered system

Quality Standards— ISO 9000

- **ISO 9000** is a quality system standard that:

    - Consists three-parts: continuous cycle of planning, controlling, and documenting quality in an organization

    - Provides minimum requirements needed for an organization to meet its quality certification standards

    - Helps organizations around the world reduce costs and improve customer satisfaction

Project Workplace and Quality

- No correlation between productivity and programming language, years of experience, or salary.

- A dedicated workspace and a quiet work environment were key factors to improving programmer productivity

Maturity Models – CMMI & OPM3

- **Maturity models** are frameworks for helping organizations improve their processes and systems

- The Software Engineering Institute's Capability Maturity Model Integration is a process improvement approach that provides organizations with the essential elements of effective processes

- PMI released the Organizational Project Management Maturity Model (**OPM3**) in December 2003

Maturity Models -- CMMI Levels

- CMMI levels, from lowest to highest, are:
  - Incomplete
  - Performed
  - Managed
  - Defined
  - Quantitatively Managed
  - Optimizing

- Companies may not get to bid on government projects unless they have a CMMI Level 3

Class Exercise 1:
Project Case Analysis – Transport for NSW

- Discuss the case/scenario analysis from Canvas in week 5 module

  https://canvas.sydney.edu.au/courses/25973/files/12706078?module_item_id=962104

  Transport For NSW
  Case Study -- **IT project budgets fall off the rails**

  Dubbed "Making It Work For You", the $425 million project was meant to transform the information technology systems for the state's transport agencies.

  But internal documents released under freedom of information laws show the major IT project for Transport for NSW has completed only a third of its end-user goals despite spending $348 million since

- Write your response here:

  https://docs.google.com/document/d/18qxsbHPM-pLZtZYkrwKM9hADJJcD8Gsx4WbV20yG1-E/edit?usp=sharing

Class Exercise 2:

Project Case Analysis – Transport for NSW

- Explore the site https://www.transport.nsw.gov.au/

- What did you learn from the Transport for NSW?

Answer with ONLY ONE WORD each time you enter response.

https://answergarden.ch/1431867

Class Exercise 3: IT Project for Town of Eden Bay

- Background: Eden Bay is a medium-sized municipality. The town has grown rapidly, and so has the demand for town services. Eden Bay currently own 90 vehicles, which the town's equipment department maintains. The fleet includes police cars, sanitation trucks, and other vehicles assigned to town employees. The maintenance budget has risen sharply in recent years, and people are asking whether the town should continue to perform its own maintenance or outsource it to private firms.

- **Your role:** You are assigned as an IT project manager reporting to Dawn, the town's IT manager. This morning, Dawn called you into her office to discuss the situation. A summary of her comments follows:

- "Dawn (IT manager): When I came here two years ago, I was told that Eden Bay had a computerised information system for vehicle maintenance. What I found was a spreadsheet designed by a parttime employee as a quick answer to a complex problem. It's probably better than no system at all, but what we really need is a new information system to meet our current and future needs. I want you to develop a proposal for a new system." (Case adapted from Tilley and Rosenblatt 2017)

Class Exercise 3: IT Project for Town of Eden Bay

- How would you assure the quality of the system?
- What could be the acceptance criteria for achieving desired quality for this project?
- Do you have any special needs, or suggestions to the clients to fulfill the requirements of the system's quality?

- Write your response here:

https://docs.google.com/document/d/1rQNLsKXb8AUSb949Qqz_nJMuIHYYdDc9b_eXhU41yQ8/edit?usp=sharing

Lecture Summary

- Project quality management ensures that the project will satisfy the needs for which it was undertaken

- Main processes include:
  - Plan quality
  - Perform quality assurance
  - Perform quality control

Announcement

- Knowledge Test Format (week 7, at 6:00 pm, 14 October)
    - Coverage is up to week 5, including lecture, tutorials and case studies
    - Descriptive and analytical questions (5-6, possibly with sub-questions)
    - Online knowledge test through Canvas
    - Closed-book or open-book test?
    - Duration?

- Sample project charter is available in week2, Canvas
- Brief review of the assessment guide