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Computing 3 Management

Lecture 5

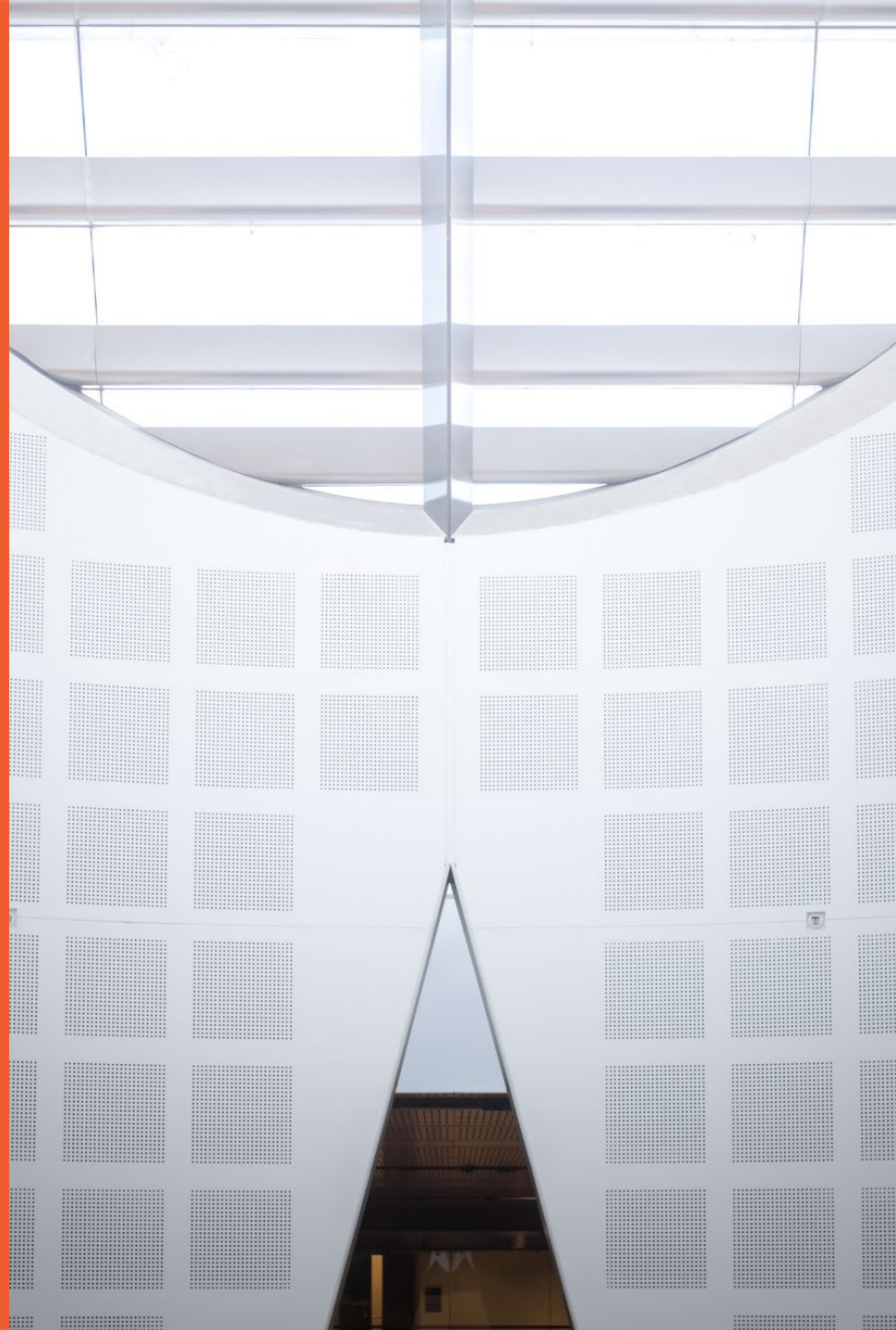
Managing IT Project: Quality

Semester 1, 2021

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SYDNEY



Recapture From Lecture 4

We discussed **Managing IT 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
Week 2	Managing IT project: requirements and scope
	Other: Form Assignment Groups
Week 3	Managing IT project: time
Week 4	Managing IT project: cost
Week 5	Managing IT project: quality
Week 6	Managing IT project: risk
Week 7	Managing IT project: communication, leadership and governance
Week 8	Introduction to services model and services management
	Submission due for Group Assignment
Week 9	IT service management functions and processes
Week 10	IT service lifecycle
Week 11	Knowledge Test
Week 12	IT service delivery tools, standards, and practices
Week 13	Course Review

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:
 - 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

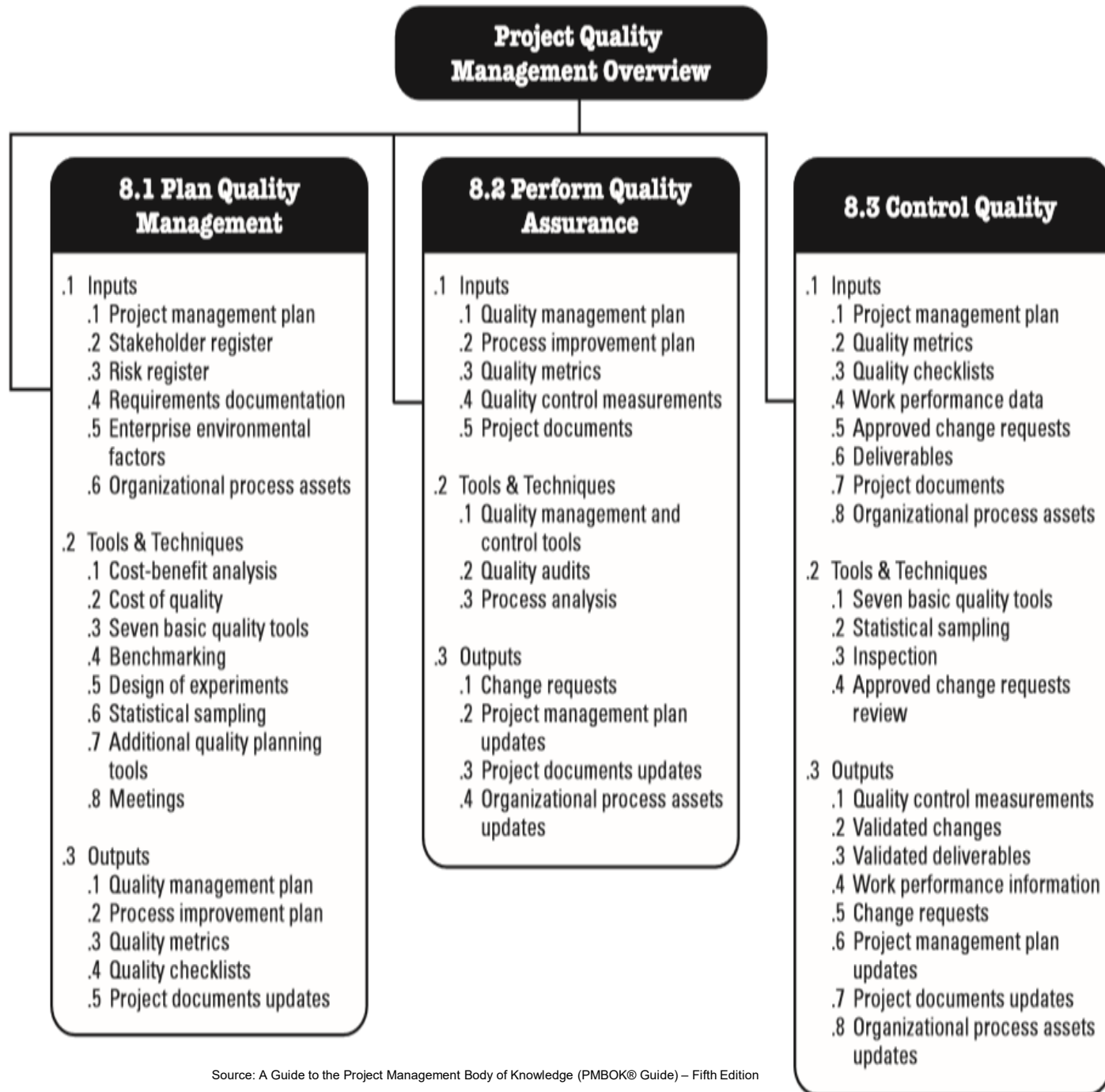
Understanding Quality— Expert Views

“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.”

Who to manage “ Project Quality”?

- _____ is ultimately responsible for quality management in IT projects

Project Quality Management Overview

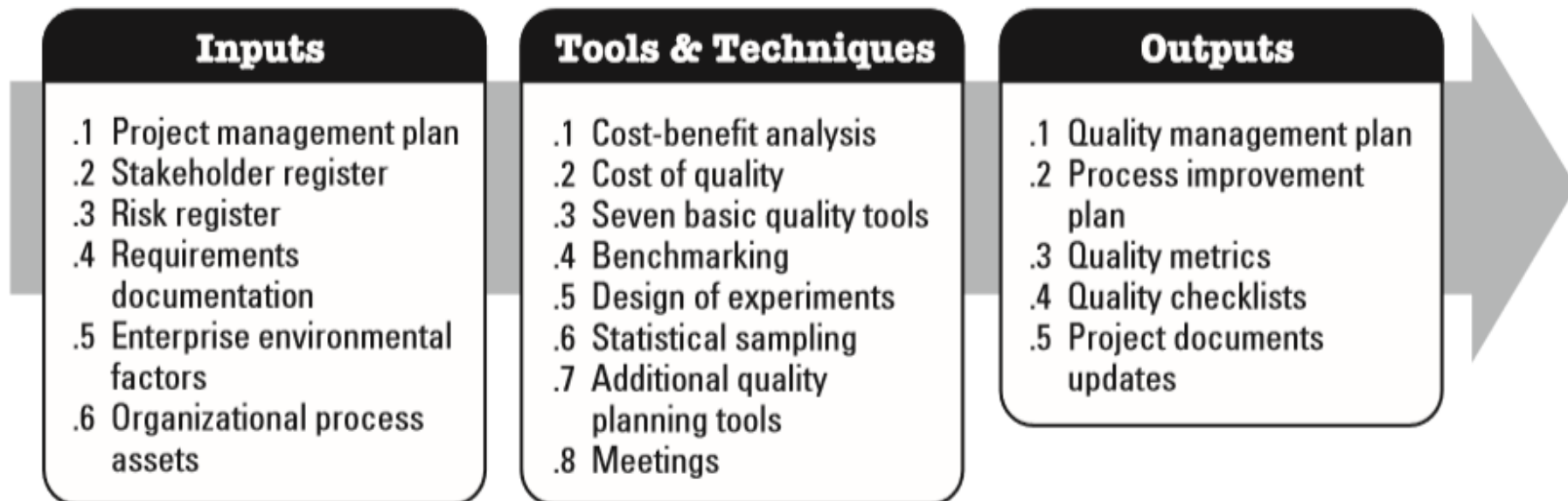


Project Quality Management Processes

- 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.



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 cost 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**

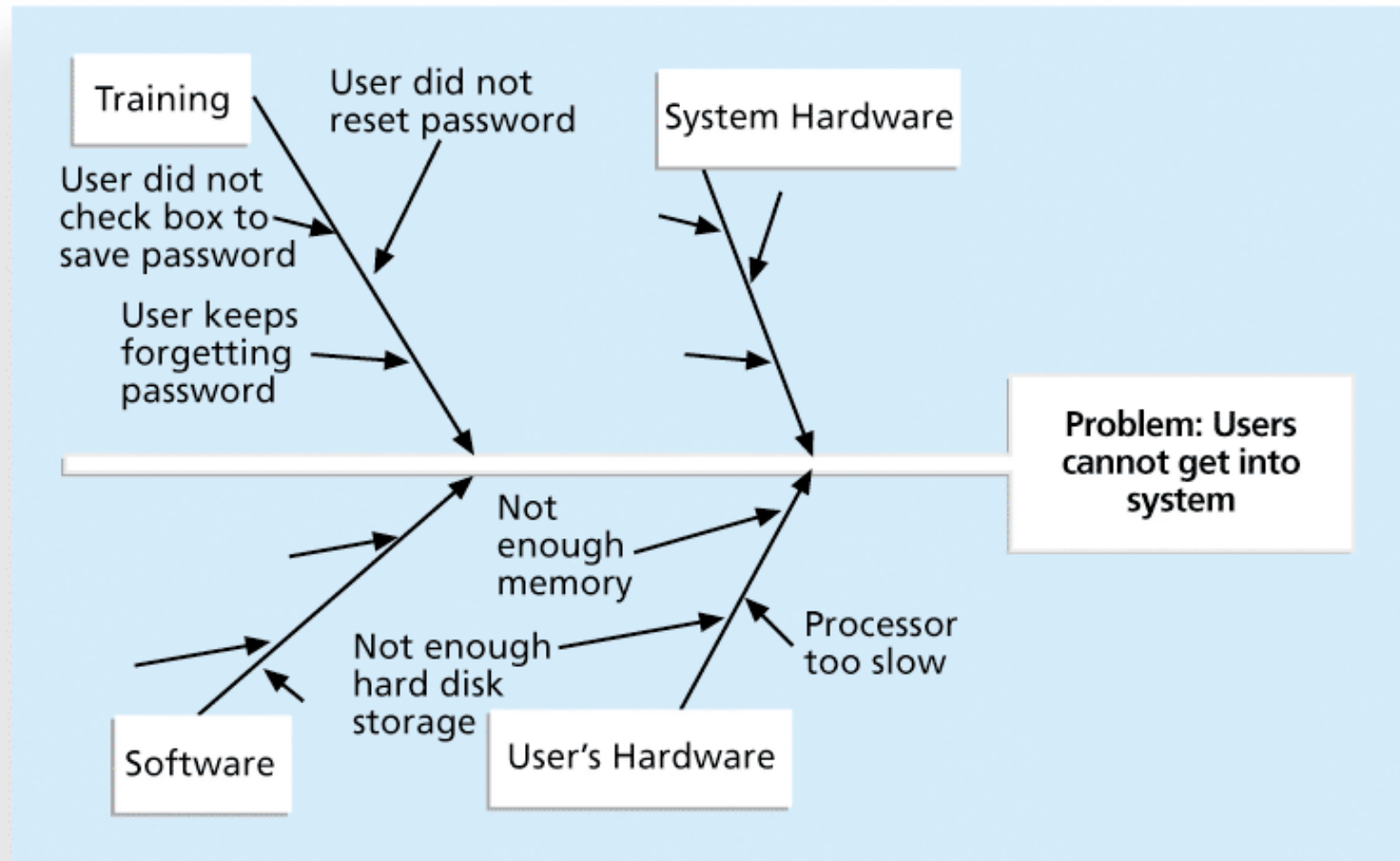
Plan Quality Management – Use Basic Quality Tools

(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



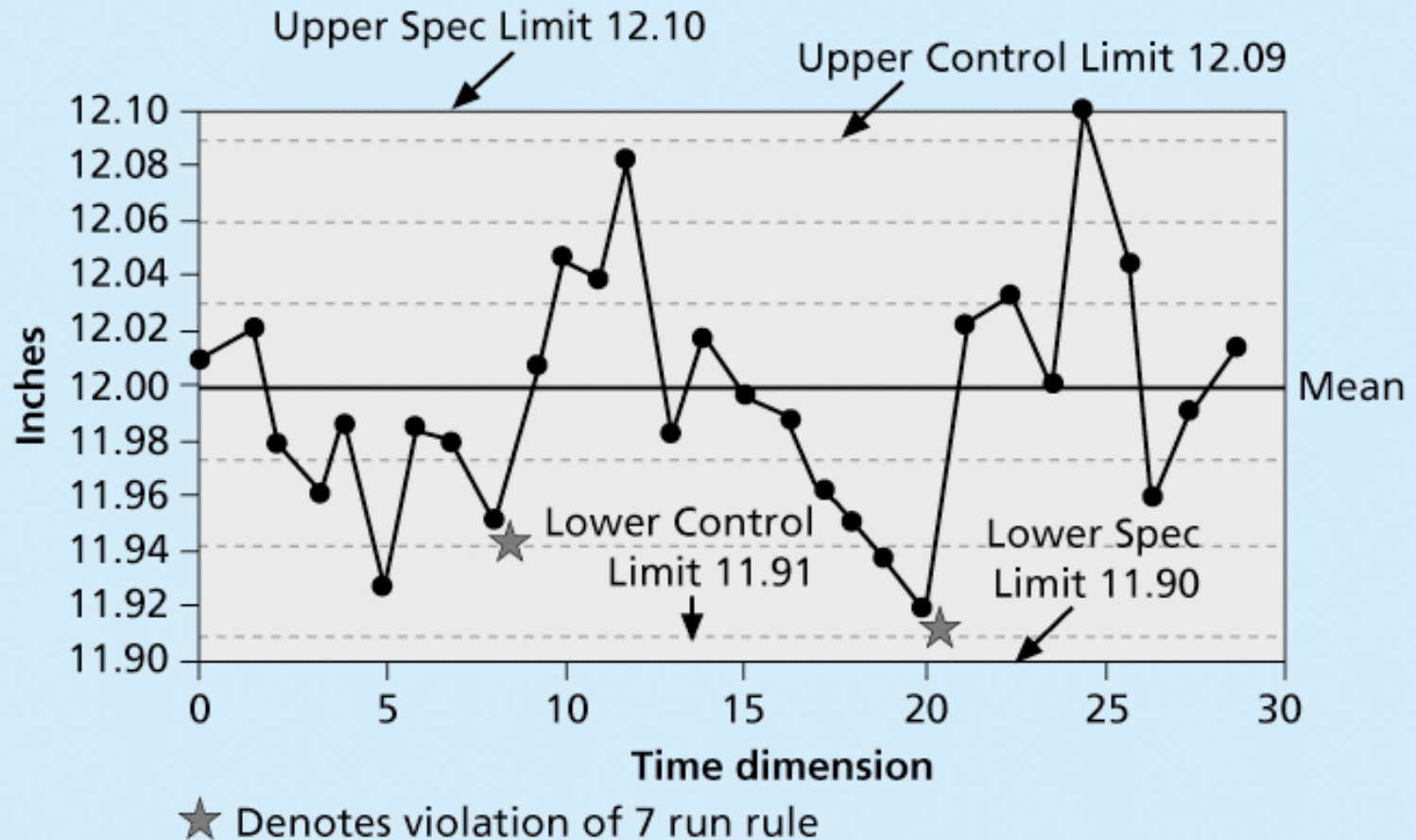
Plan Quality Management – Use Basic Quality Tools

(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



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

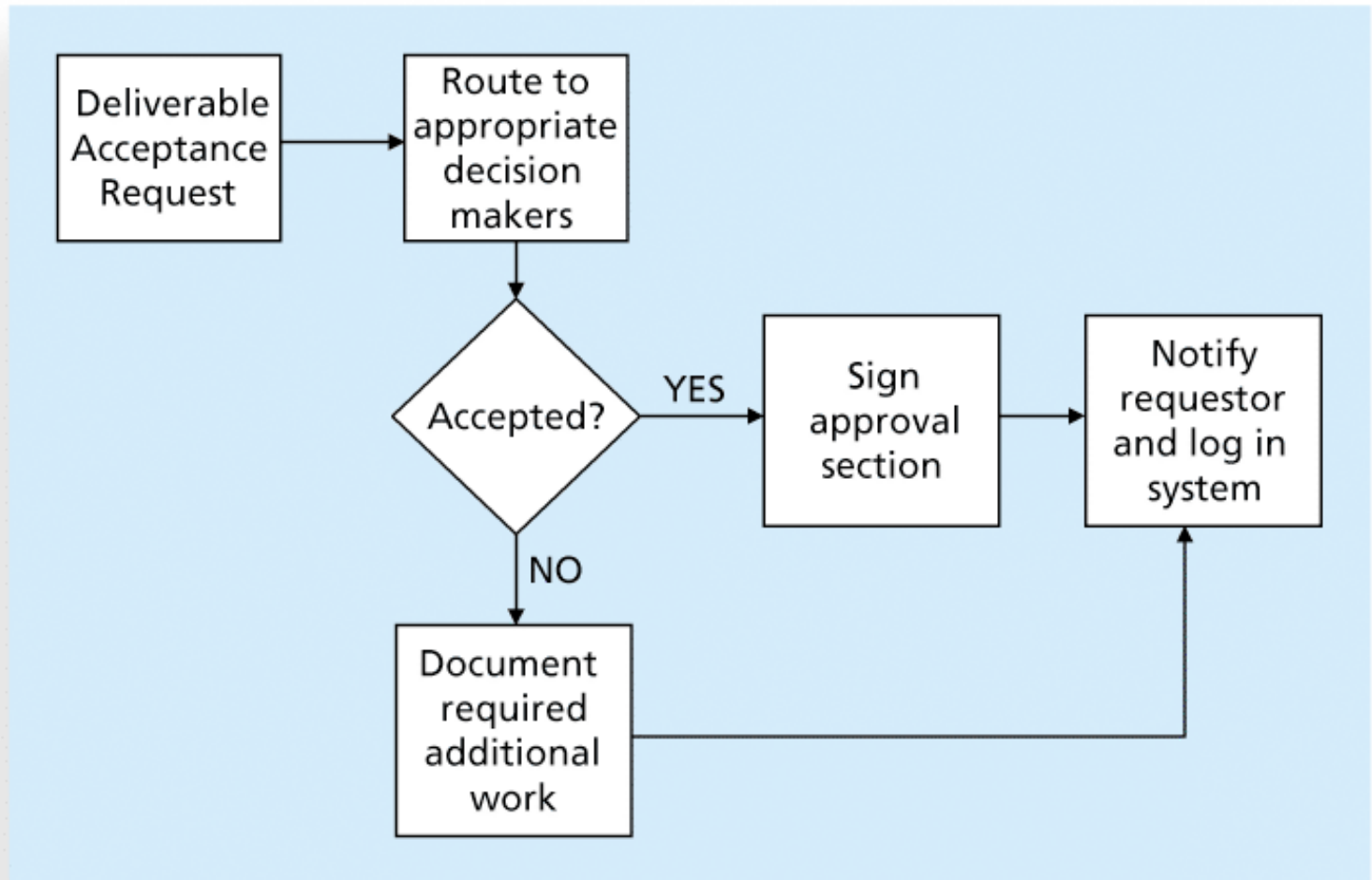
Plan Quality Management – Use Basic Quality Tools

(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

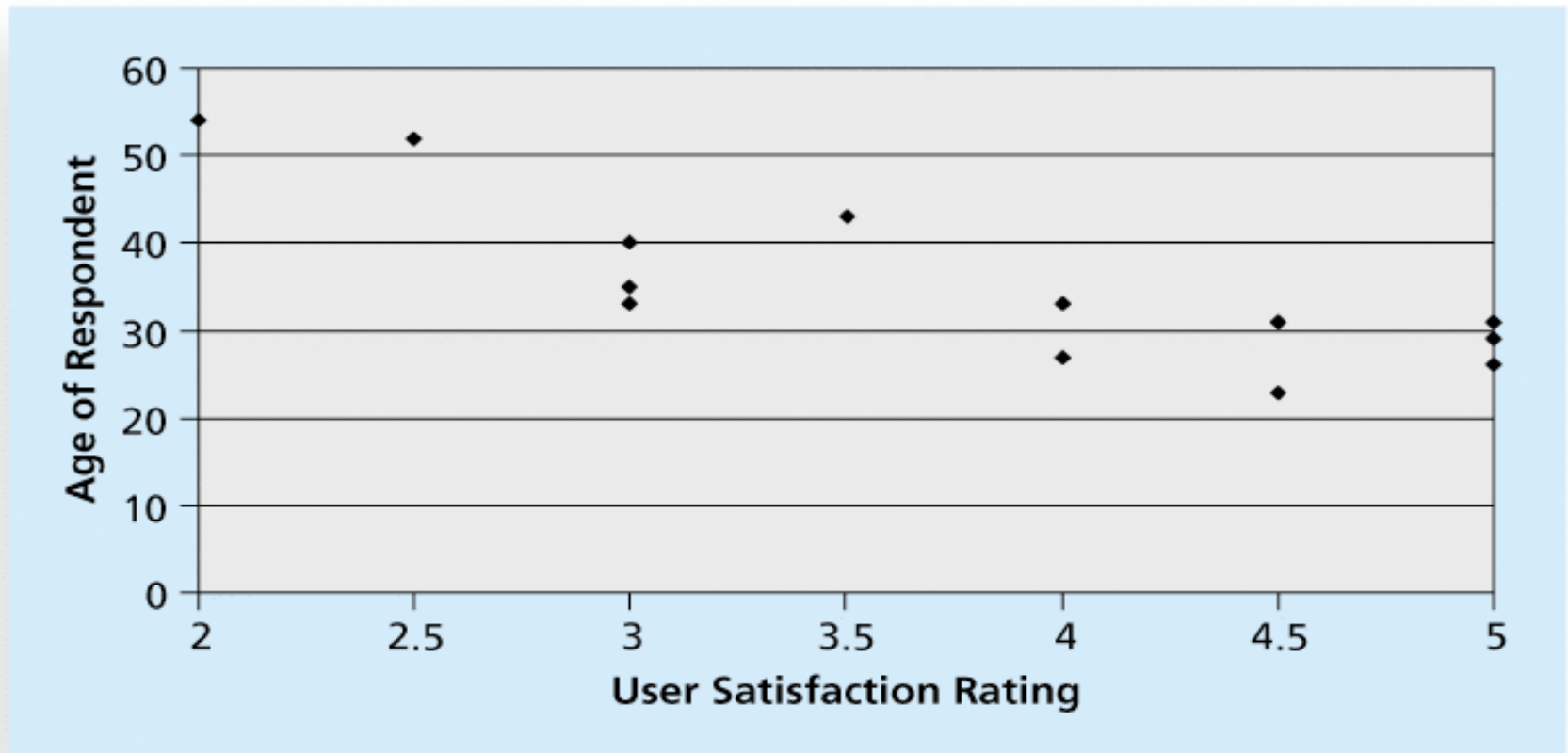
Plan Quality Management – Use Basic Quality Tools

(d) Flowcharts



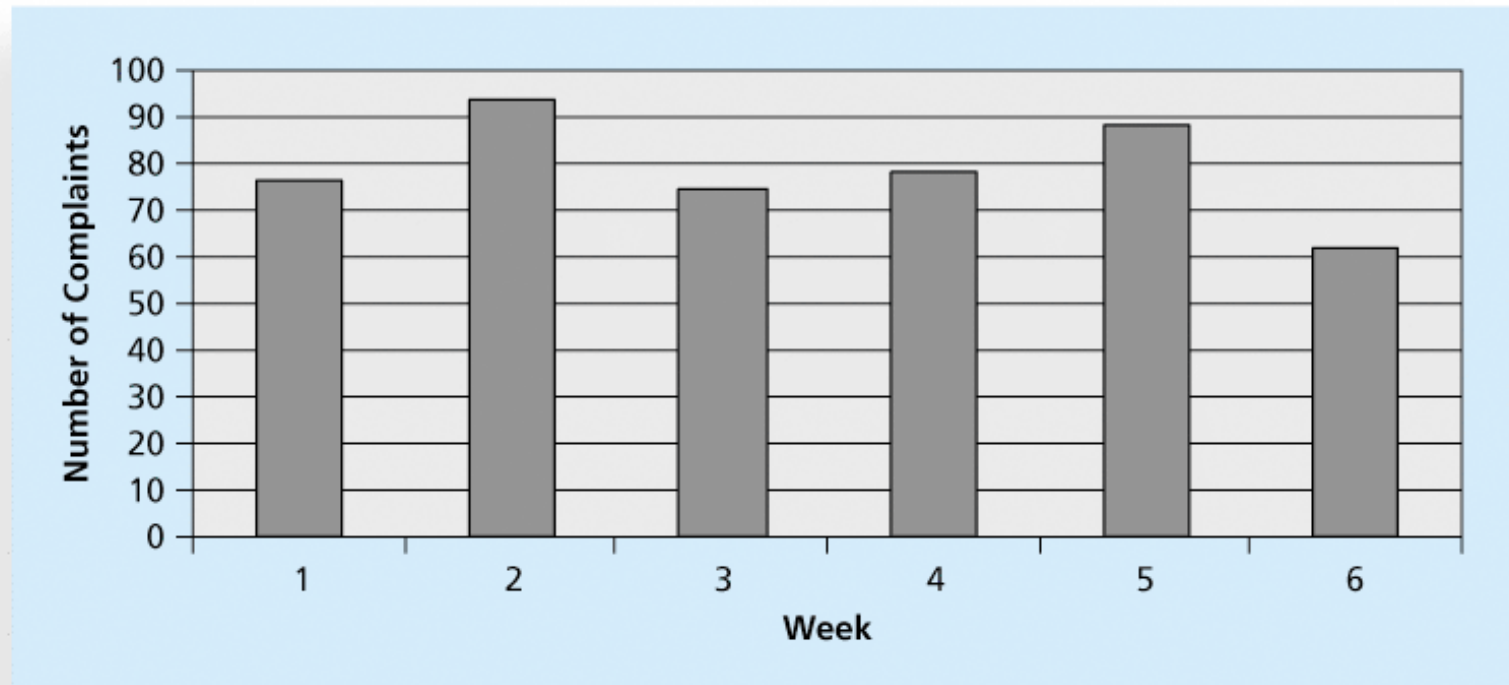
Plan Quality Management – Use Basic Quality Tools

(e) Scatter diagram



Plan Quality Management – Use Basic Quality Tools

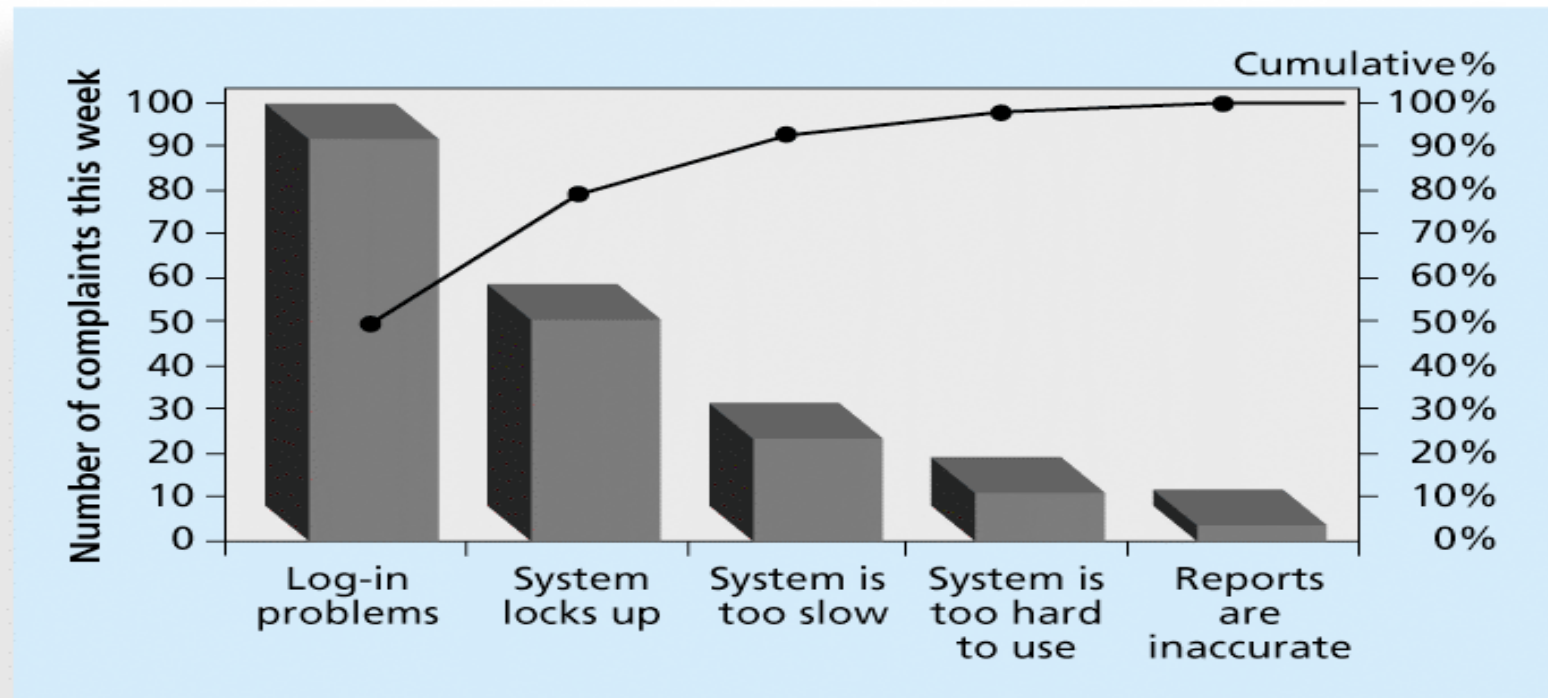
(f) Histogram



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.



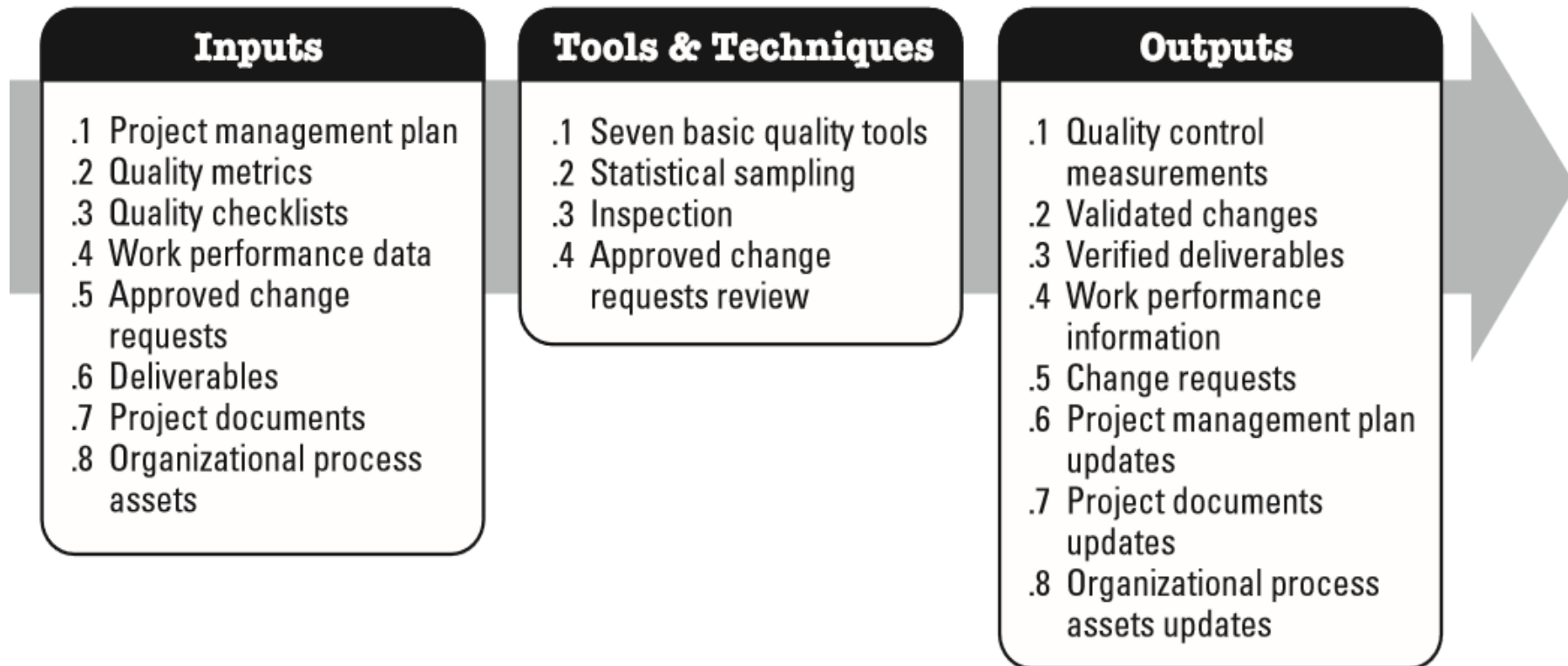
Perform Quality Assurance – Quality Audits

- 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

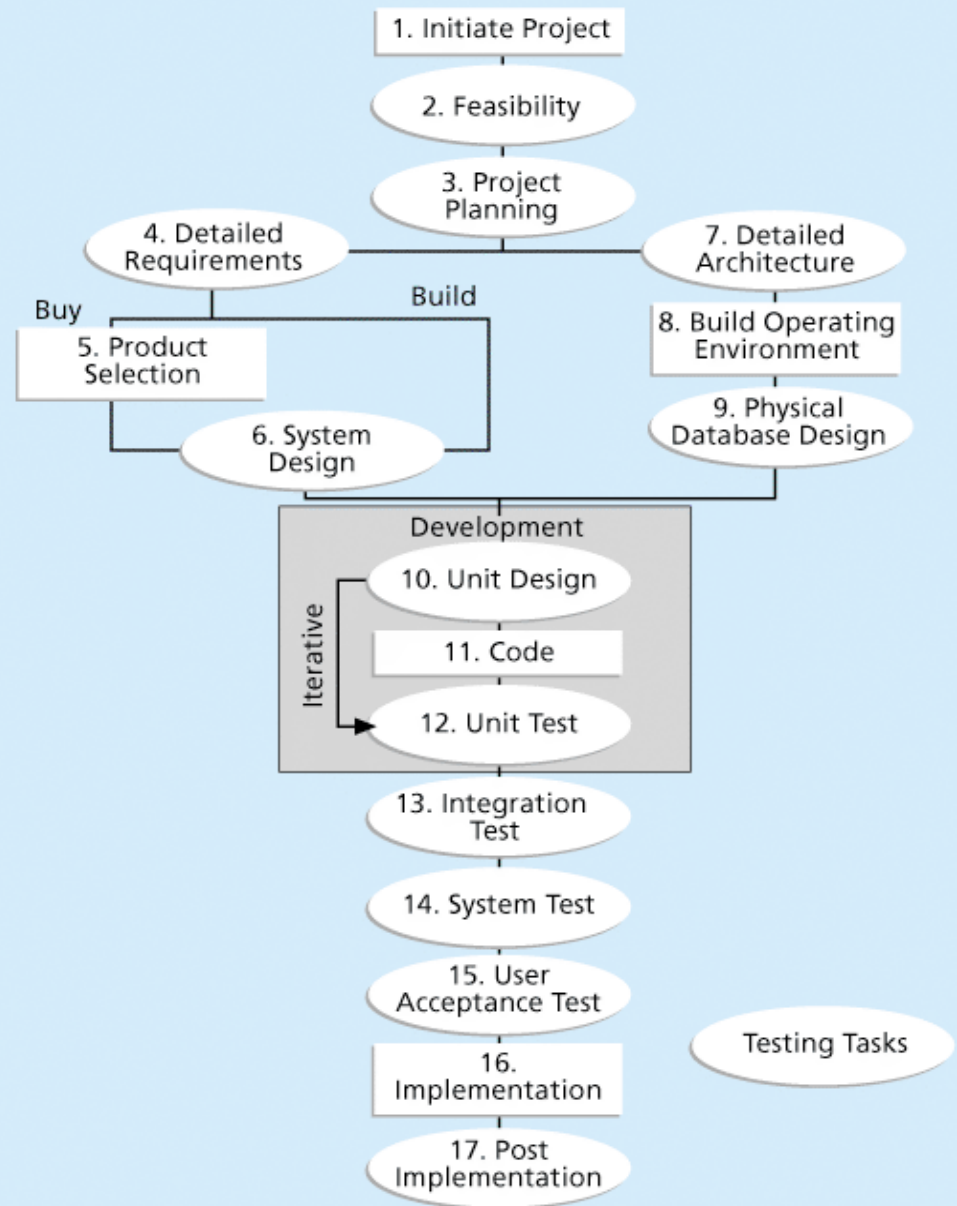
- **Control Quality** is the process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes.



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



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 (CMMI) 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

- Case study/scenario analysis from Canvas in week 5 module

https://canvas.sydney.edu.au/courses/31328/files/15740281?module_item_id=1153070

Q: What did you learn in terms of project cost management?

Q: What did you learn in terms of project scope management?

- Room 1 response:

<https://docs.google.com/document/d/1TC08IIaVuElEuTuul6ZZsEO4QzOHijPFN2q6CrITlqw/edit?usp=sharing>

- Room 2 response:

https://docs.google.com/document/d/1Cg2FZ9ugYLRXpnceT-ntjJBHbhNbQ_Za8cle67l3a5U/edit?usp=sharing

Class Exercise 2:

Project Case Analysis – Transport for NSW

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

Q: What did you learn from the Transport for NSW in terms of IT projects?

Room 1 response

https://docs.google.com/document/d/1tX_MRRW4lqnXKzsbrk2ZVZuXaevVMV0k8z85NoNVWlo/edit?usp=sharing

Room 2 response

<https://docs.google.com/document/d/1Wvllcb-xKcCwFd9XRgfh4nkil9cYxCzXMxzguwxjqnQ/edit?usp=sharing>

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 part-time 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

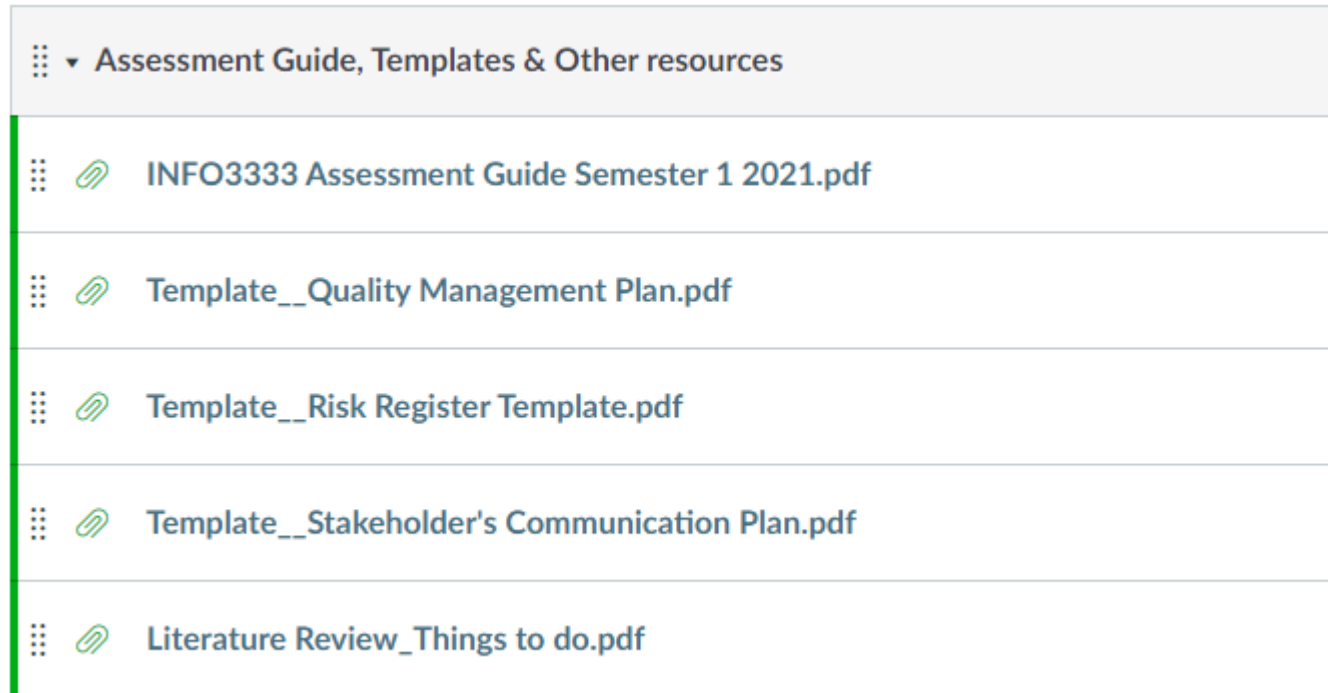
- How would you assure the quality of the system?
- What could be the acceptance criteria for achieving the desired quality of this project?

- Write your response here:

https://docs.google.com/document/d/1xFG_17GjbXn4Q3FWw2IH-MrvQ2B3PsiE-O-Kmk_fu5Y/edit?usp=sharing

Announcement

- All templates were uploaded on Canvas last week



Discussion on Group Projects

4.5. MARKING CRITERIA

Assessment Element	Sub-Elements	Weight
1. Project Charter	<ul style="list-style-type: none"> Project details (Brief background and objectives) Project deliverables Project cost (Total cost) Project time (Total time) Roles and responsibilities of each student 	/10
2. Scope	<ul style="list-style-type: none"> Project scope statement Milestones 	/10
3. Literature Review	<ul style="list-style-type: none"> Appropriate literature selection Identification of knowledge gaps Analysis and consolidation Summary of literature review Citation (appropriate, extensive use) 	/15
4. Work Breakdown Structure (3 level)	<ul style="list-style-type: none"> Work Packages/ Activities/Tasks Provide a brief description of each of the activities 	/10
5. Project Schedule/Time Modeling	<ul style="list-style-type: none"> Detailed schedule (Gantt chart) Proper sequencing and task Dependencies 	/10
6. Cost Modeling	<ul style="list-style-type: none"> Detailed budget table Identify cost types and briefly describe them Direct or indirect project costs Detailed cost baseline 	/10
7. Communication	<ul style="list-style-type: none"> Communication plan 	/10
8. Quality Management	<ul style="list-style-type: none"> Quality management plan 	/10
9. Risk Management	<ul style="list-style-type: none"> A brief risk register, see the example provided on Canvas 	/10
10. Reflections of leadership practices on teamwork	<ul style="list-style-type: none"> Briefly describe how each member played a leadership role in the teamwork. Provide 1-2 sentences from each team member while keeping them anonymous (e.g., member A, member B, etc.). 	/5
Total		/100

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