Info6007
Project Management in IT

Lecture 9 – Quality and Procurement

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Lecture Materials

- Required Readings
  - Schwalbe 7th and 8th Ed: Chapters 8 and 12
- Practice Questions
  - Schwalbe 8th Ed:
    - Ch. 8, Discussion Questions 1 & 2
    - Ch. 12, Discussion Questions 5 & 6
  - Schwalbe 7th Ed:
    - Ch. 8, Discussion Questions 1 & 2
    - Ch. 12, Discussion Questions 4 & 5
- References
  - Schwalbe, K. 2015, *Information Technology Project Management* (8e) Cengage Learning
  - Slack, Chambers, Johnston, 2010. *Operations Management*, 6th edition, Prentice Hall.
  - Larson, E. & Gray, C. 2011, *Project management: the managerial process*, 5th Ed.

Learning Objectives

- Describe Quality and Project Quality Processes
- Describe and Compare Quality Methodologies, Standards, and Maturity Models.
- Describe and Analyse Quality Processes as part of Software Engineering
- Describe, Evaluate and Apply Project Procurement processes
- Analyse and Evaluate the option of outsourcing parts of a project
- Describe and compare the different types of contracts for outsourcing

Agenda

- Quality
  - Quality
  - Quality Management
  - Quality Assurance in Development Projects
  - Quality Methodologies, Standards, and Maturity Models.
- Procurement
  - Procurement & IT Outsourcing
  - Procurement Management
  - Conducting Procurements

Defining quality

○ Write a short definition of quality

○ Consider:

- If I asked you to recommend a good quality PC – would your recommendation be the same if I wanted it for writing and printing vs. using graphics packages/playing realistic games

What Is Project Quality?

○ The International Organization for Standardization (ISO) defines **quality** as "the degree to which a set of inherent characteristics fulfils requirements" (ISO9000:2000)

○ Other experts define quality based on:

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

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

Fitness for use

- Quality means meeting or exceeding <u>customer</u> requirements
  - Fit for use: delivers customer benefits/satisfaction
  - Determined by the <u>customer</u>
- Achieved through
  - Quality of design
  - Conformance quality
  - Reliability and maintainability
- Cannot say "our quality is great" if the customer honestly doesn't think so

The Cost of Quality

- The **cost of quality** is the cost of conformance plus the cost of nonconformance
  - **Conformance** means delivering products that meet requirements and fitness for use
  - **Cost of nonconformance** means taking responsibility for failures or not meeting quality expectations
- A study reported that software bugs cost the U.S. economy $59.6 billion each year and that one third of the bugs could be eliminated by an improved testing infrastructure

Cost Categories Related to Quality

- **Prevention cost**: Cost of planning and executing a project so it is error-free or within an acceptable error range
- **Appraisal cost**: Cost of evaluating processes and their outputs to ensure quality
- **Internal failure cost**: Cost incurred to correct an identified defect before the customer receives the product
- **External failure cost**: Cost that relates to all errors not detected and corrected before delivery to the customer

Increased quality can lower costs
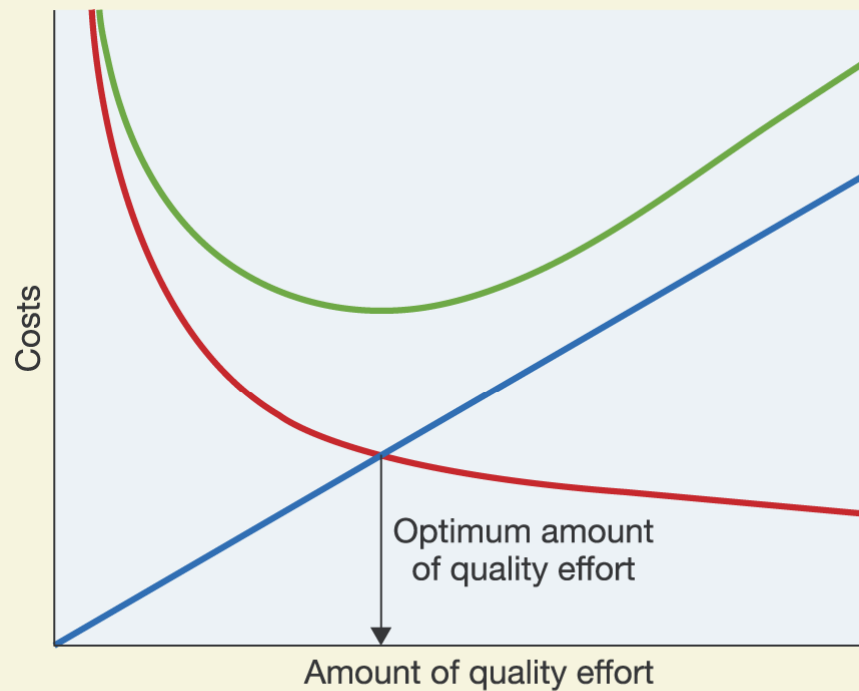
Slack et al, 2009, Figure 12.5
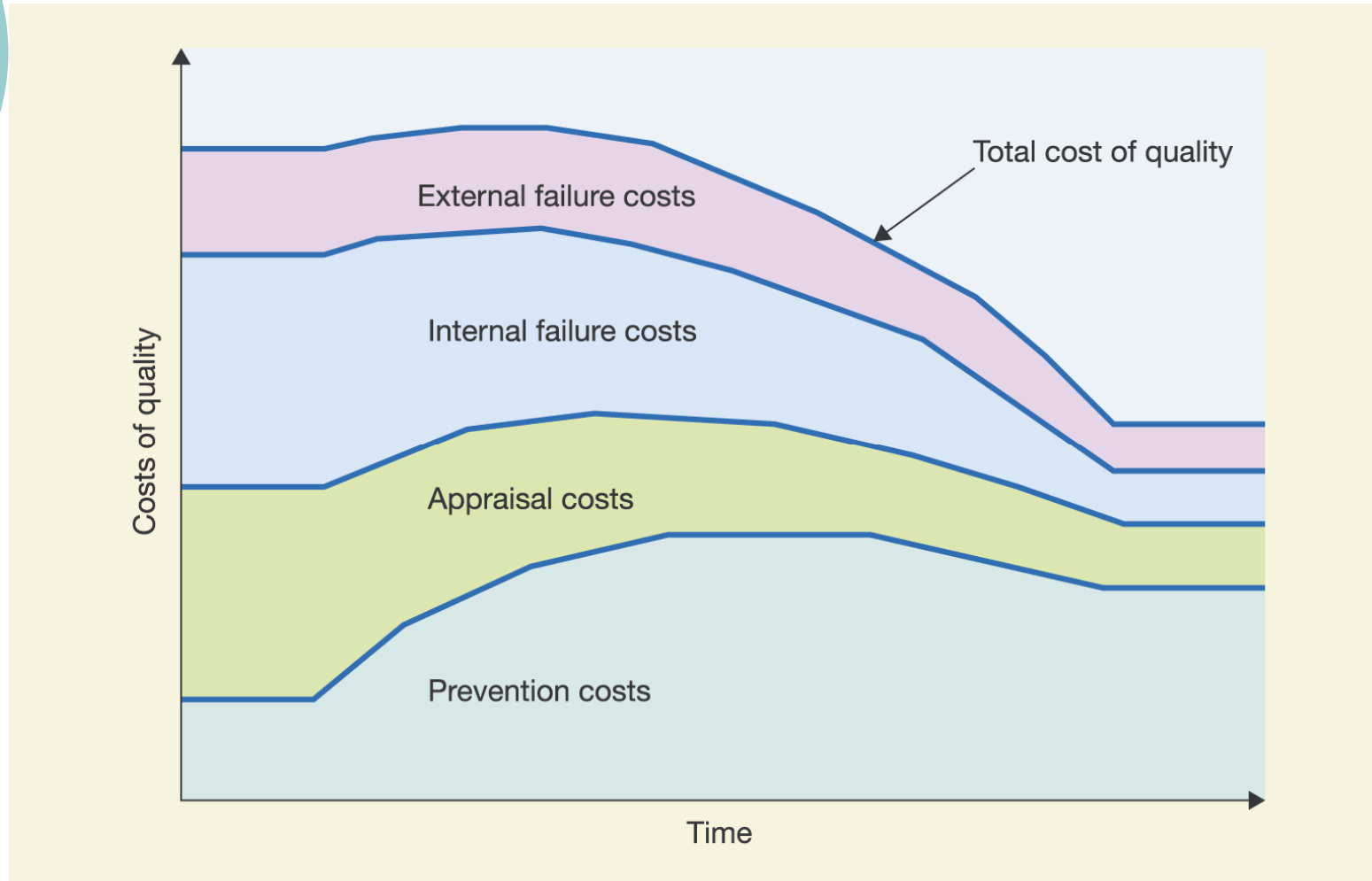
Increased quality can increase revenues

- Quality reduces churn and lost business
  - Many businesses have customers who stay with them over a long period, but may switch after one or two bad experiences.
  - Bad experience can also generate large numbers of negative word of mouth communications
- Organizations that offer higher quality products or services can charge more
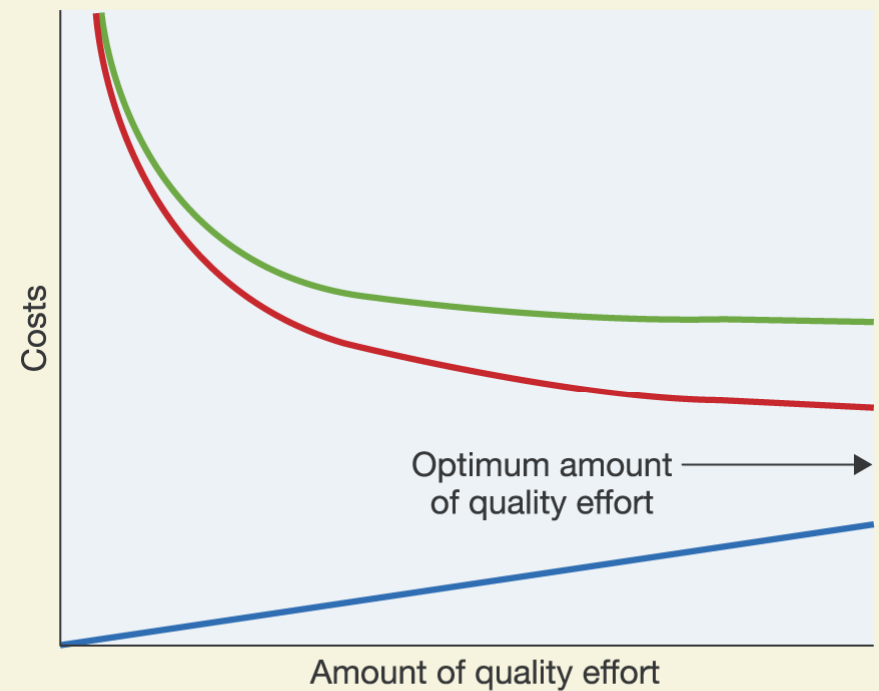
  → Quality can increase revenue and reduce cost

To a limit?

Importance of measurement

- "You can't control what you can't measure": Tom DeMarco
  - Track, set objectives, monitor performance, and base rewards on actual results
  - He actually changed his mind.
- Evidence based decisions, not acting on gut instinct and self preservation.
- What we decide to measure will often determine what we pay attention to.
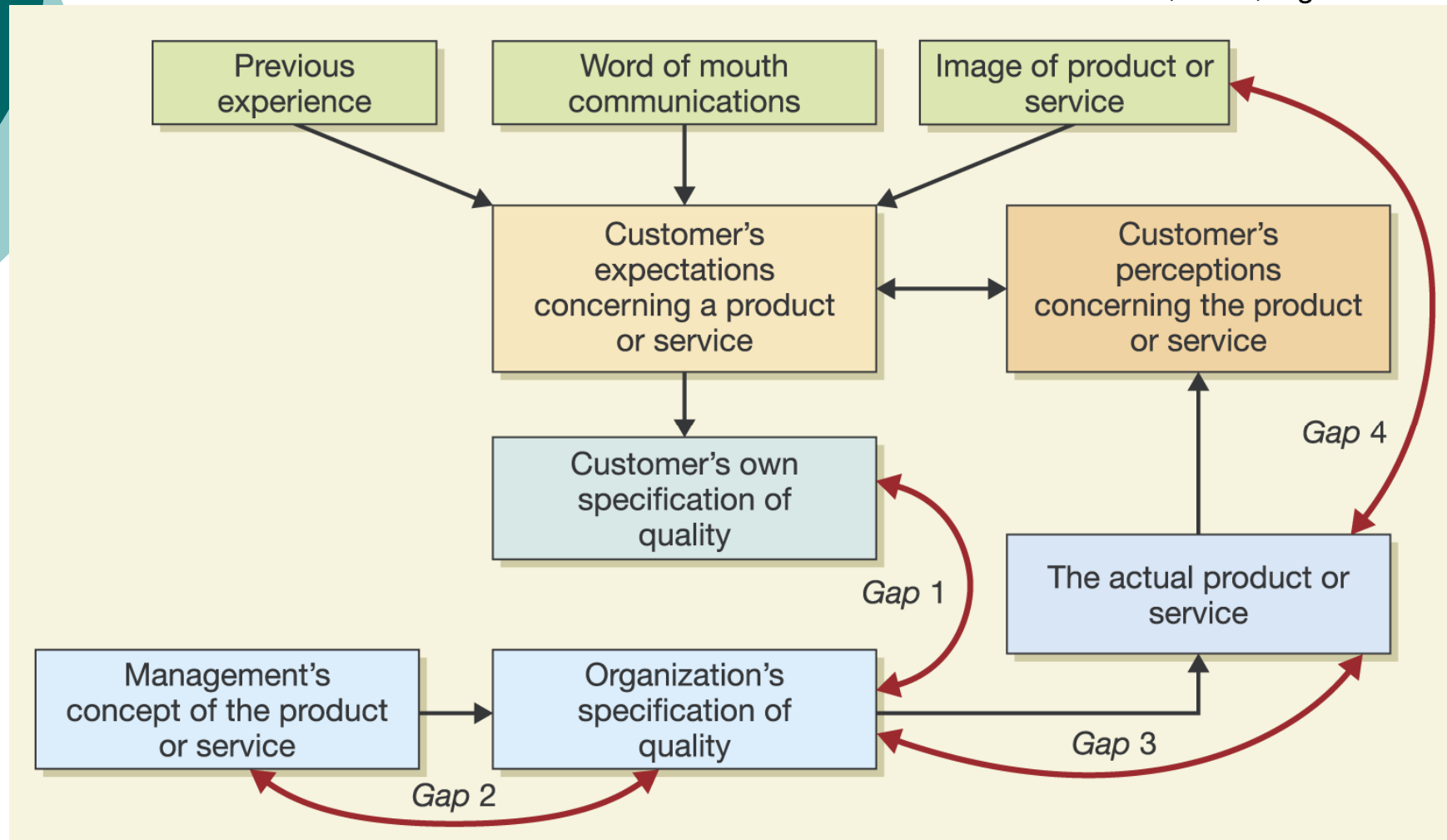
Types of quality measurement

- Outcome measures ('Let the customer decide')
  - Direct, but there may be a delay
  - Using outcome and customer-facing measures will help to drive a customer focus in the organisation.
- Process measures ('Track what we are doing')
  - Quick reaction, but we may measure the wrong thing

- Quiz: Give some examples that you have personally experienced

Measurement Gaps

Previous experience → Customer's expectations concerning a product or service

Word of mouth communications → Customer's expectations concerning a product or service

Image of product or service → Customer's expectations concerning a product or service

Customer's expectations concerning a product or service ↔ Customer's perceptions concerning the product or service

Customer's expectations concerning a product or service → Customer's own specification of quality

Gap 1

Gap 4

The actual product or service

Management's concept of the product or service → Organization's specification of quality

Gap 2

Gap 3

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- **Quality**
  - Quality
  - **Quality Management**
  - Quality Assurance in Development Projects
  - Quality Methodologies, Standards, and Maturity Models.
- Procurement

Project Quality Management

- **Project quality management** is a pro-active approach that ensures the right philosophies, processes and techniques are in place to deliver quality products and service to the project's customers.
- Processes include:
  - **Planning quality management**: Identifying which quality standards are relevant to the project and how to satisfy them; defining metrics and standards of measurement
  - **Performing quality assurance**: Evaluating project performance and deliverables to ensure the project satisfies the relevant quality standards
  - **Performing quality control**: Monitoring specific project results to ensure that they comply with the relevant quality standards and processes; and taking appropriate actions when they do not.

Planning Quality

- Important to prevent defects by:
  - Selecting proper materials
  - Training and indoctrinating people in quality
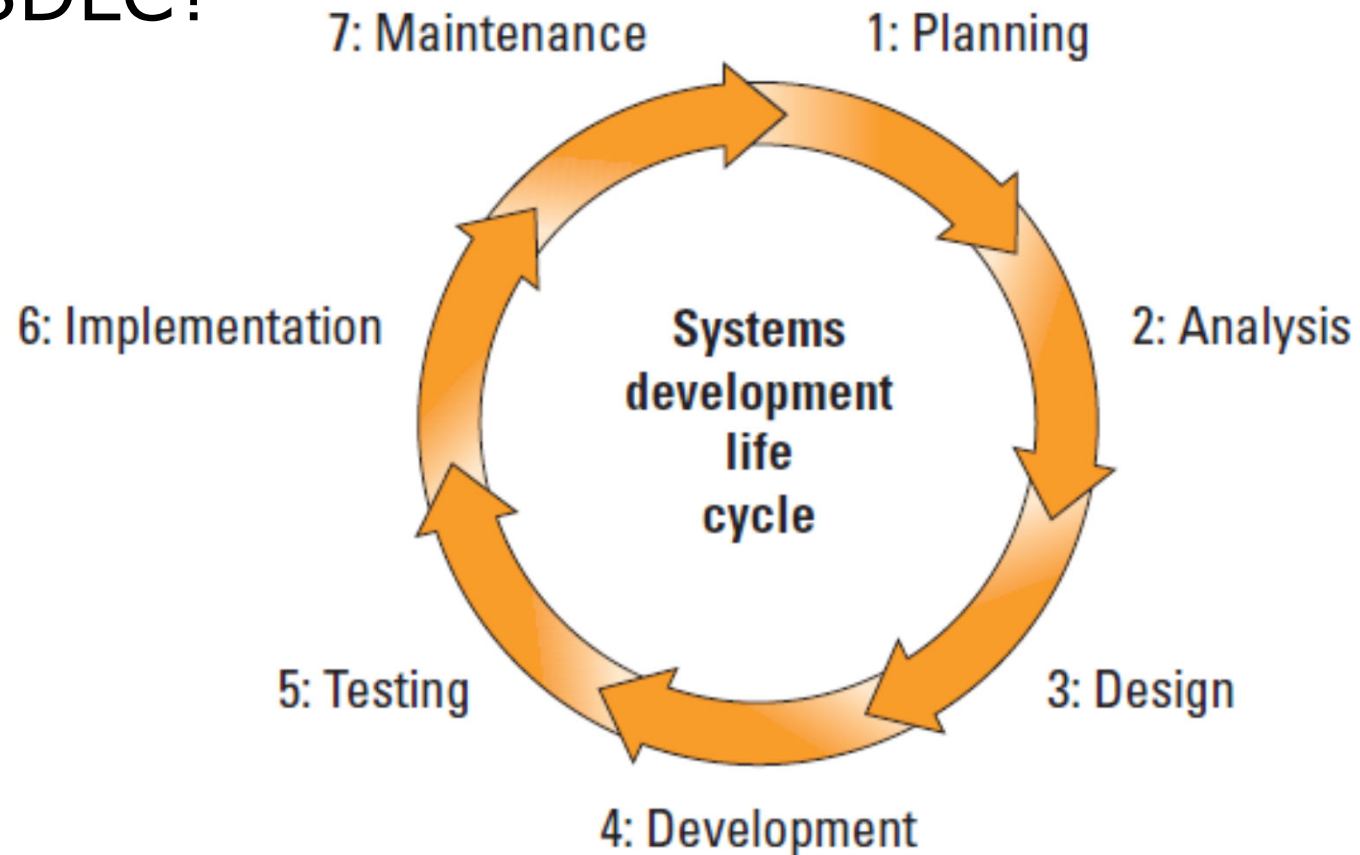 - Planning a process that ensures the appropriate outcome

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SDLC Quiz:

○ Where is Quality Assurance in the SDLC?

7: Maintenance   1: Planning

6: Implementation   2: Analysis

Systems development life cycle

5: Testing   3: Design

4: Development

QA is in/after all phases

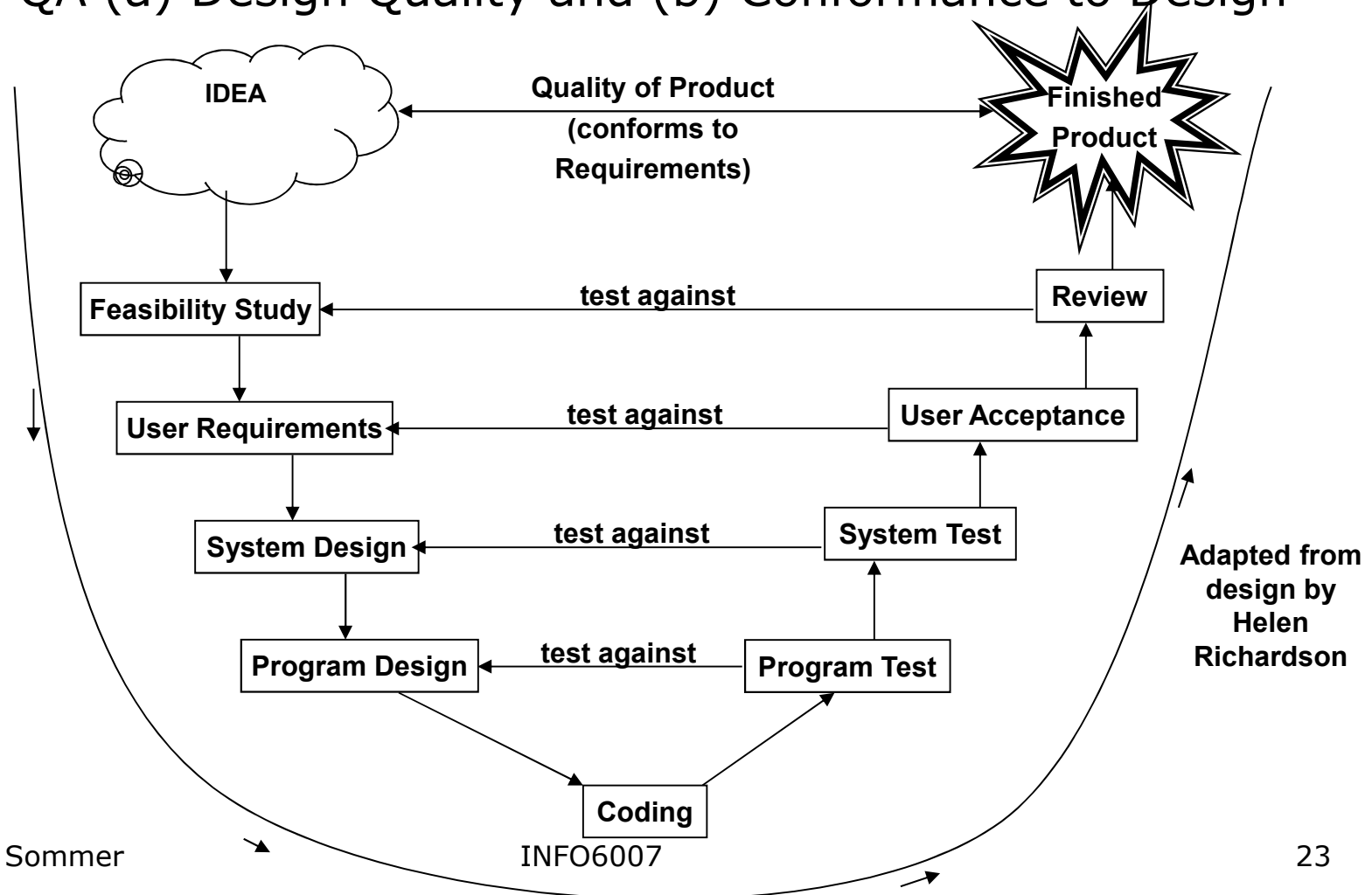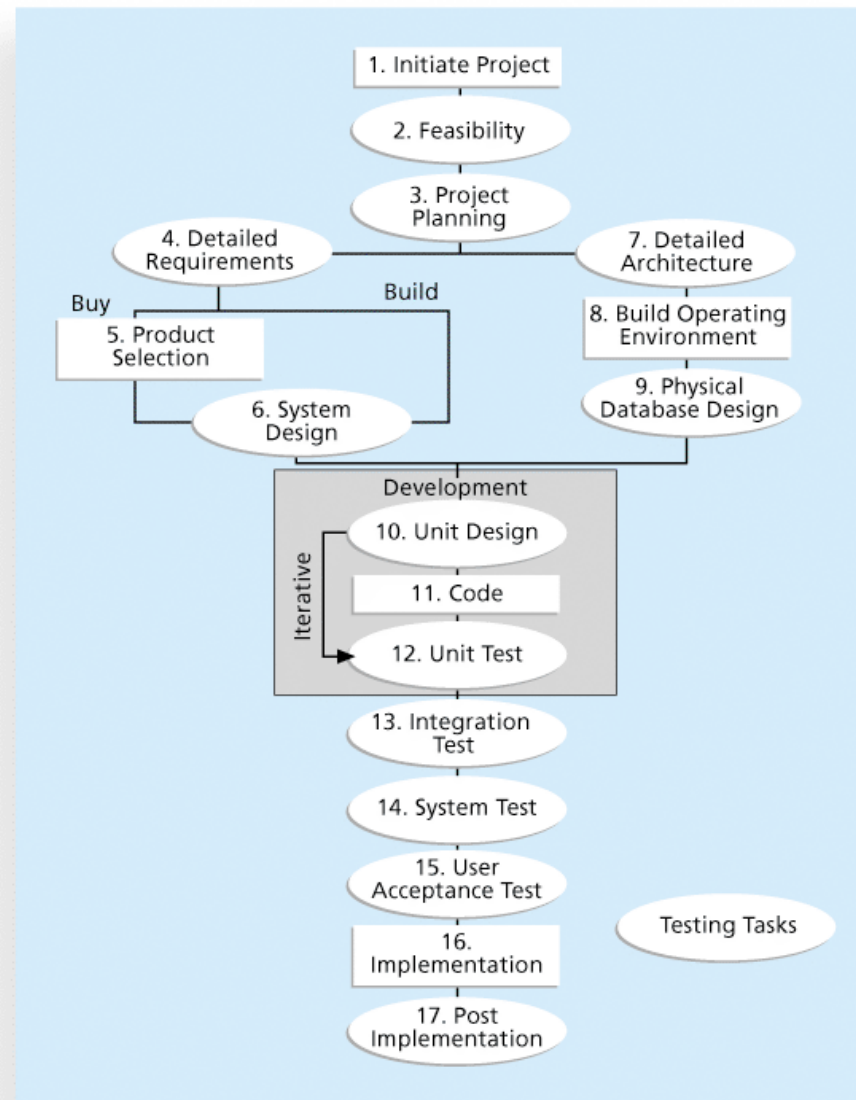| Phase	QA
Planning	Business Case
Analysis	Requirements review and signoff
Design	Design Review and signoff
Development	Unit Test, Integration Test, Systems Test, User Acceptance Test, Performance testing
Implement / Deploy	Project Review Business Benefit Realisation Analysis
Maintain	Unit Test, Integration Test

Types of Tests

- A **unit test** is done to test each individual component (module) to ensure it is defect free
- **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 the end user prior to accepting the delivered system

QA Applied Twice

- QA is applied (a) when the entity is formulated and (b) when it is built
- QA (a) Design Quality and (b) Conformance to Design

IDEA

Quality of Product (conforms to Requirements)

Finished Product

Feasibility Study ← test against ← Review

User Requirements ← test against ← User Acceptance

System Design ← test against ← System Test

Program Design ← test against ← Program Test

Coding

Adapted from design by Helen Richardson

Testing Tasks in the SDLC

Schwalbe 2013.
Figure 8-11.

Agenda

○ Quality

- Quality
- Quality Management
- Quality Assurance in Development Projects
- **Quality Methodologies, Standards, and Maturity Models.**
  - a) **TQM**
  - b) **Six Sigma**
 - c) **ISO Quality Standards**
  - d) **Maturity Models**

○ Procurement

a) Total Quality Management

○ **Total quality management** (TQM) is a philosophy that stresses three principles for achieving high levels of process performance and quality:

1. Customer satisfaction
2. Employee involvement
3. Continuous improvement in performance

○ TQM and Lean Systems have influenced one another – they have many concepts in common

TQM Wheel
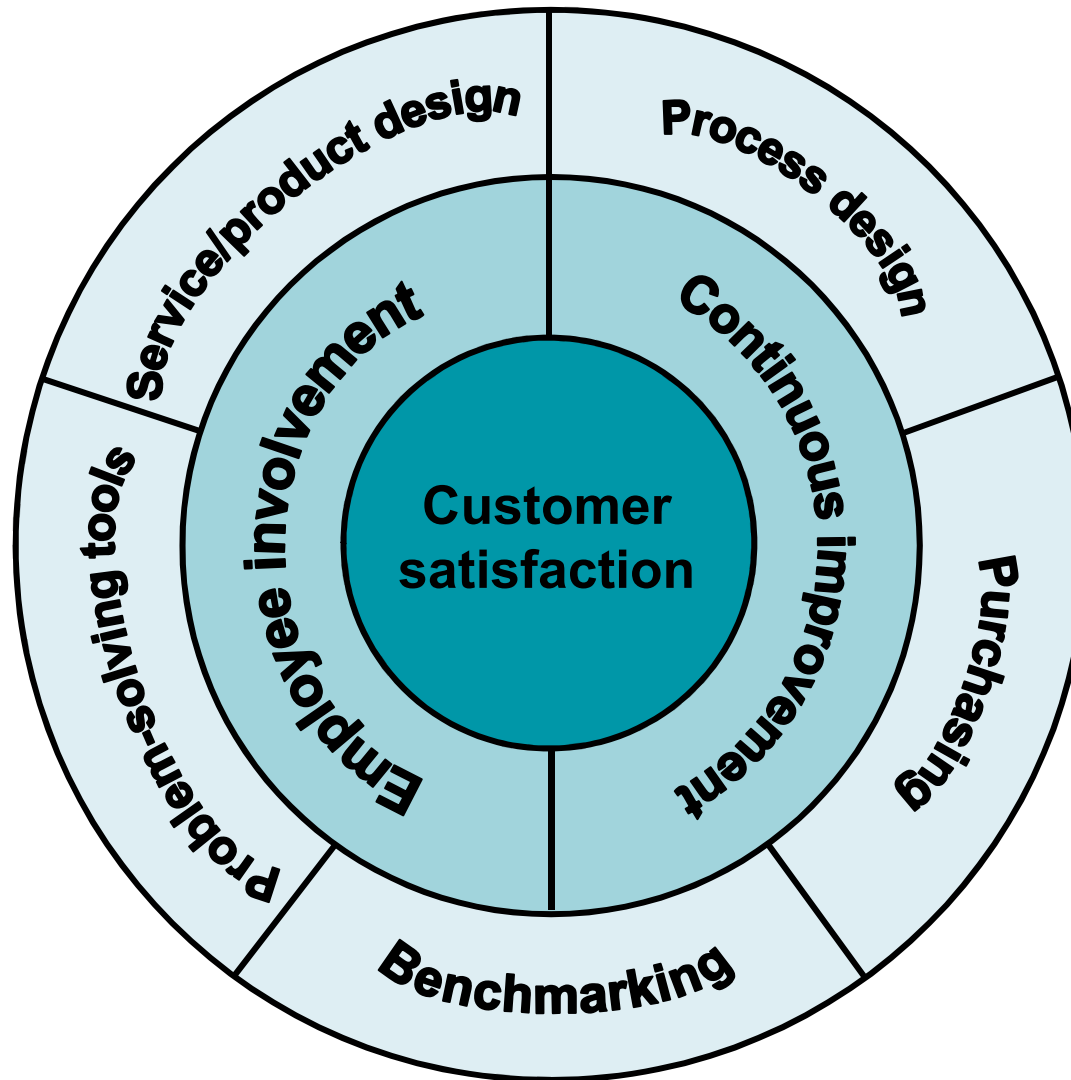
Customer Satisfaction

- Customers, internal or external, are satisfied when their expectations regarding a service or product have been met or exceeded.
- Conformance: How a service or product conforms to performance specifications.
- Value: How well the service or product serves its intended purpose at the price the customer paid.
- Fitness for use: How well a service or product performs its intended purpose.
- Support: Support provided by the company after a service or product has been purchased.
- Psychological impressions: atmosphere, image, or aesthetics

b) Six Sigma

- **Six Sigma** is a comprehensive and flexible system for achieving, sustaining, and maximizing business success by minimizing defects and variability in processes.
- It relies heavily on the principles and tools of TQM.
- It is driven by a close understanding of customer needs; the disciplined use of facts, data, and statistical analysis; and diligent attention to managing, improving, and reinventing business processes.
- It requires organisational wide-commitment
- It aims for a defect rate of less than 3.4 defects per million opportunities.

Six Sigma Improvement Model

1. Define: Determine the current process characteristics critical to customer satisfaction and identify any gaps.
2. Measure :Quantify the work the process does that affects the gap.
3. Analyse: Use data on measures to perform process analysis.
4. Improve: Modify or redesign existing methods to meet the new performance objectives.
5. Control: Monitor the process to make sure high performance levels are maintained.

Six Sigma Education

- **Green Belt**: An employee who achieved the first level of training in a Six Sigma program and spends part of his or her time teaching and helping teams with their projects.

- **Black Belt**: An employee who reached the highest level of training in a Six Sigma program and spends all of his or her time teaching and leading teams involved in Six Sigma projects.

- **Master Black Belt**: Full-time teachers and mentors to several black belts.

c) ISO Standards

- **ISO 9000** is a quality system standard that:
  - Is a three-part, 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
- See www.iso.org for more information

Maturity Models

- **Maturity models** are frameworks for helping organizations improve their processes and systems
  - The **Software Quality Function Deployment Model** focuses on defining user requirements and planning software projects
  - The Software Engineering Institute's **Capability Maturity Model Integration (CMMI)** is a process improvement approach that provides organizations with the essential elements of effective software engineering processes
  - PMI released the **Organizational Project Management Maturity Model** (OPM3). It addresses standards for excellence in project, program, and portfolio management best practices and explains the capabilities necessary to achieve those best practices

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Procurement

○ What is Procurement?

- **Procurement** means acquiring goods and/or services from an outside source.

○ What is IT Outsourcing?

- **IT outsourcing** is the utilization of external organizations for provision of information technology services.

Why outsource?

Benefits

- May* reduce costs
- Allow the client organization to focus on its core business
- Access skills and technologies
- Provide volume flexibility
- Increased accountability
- Share the risk

Risks

- Coordination breakdowns
- Loss of control
- Conflict
- Security

Outsourcing Best Practices

Larson and Gray 2011, p423

- Well defined requirements and procedures
- Extensive training and team building activities
- Well-established conflict management processes in place
- Frequent review and status updates
- Colocation when needed
- Fair and incentive-laden contracts
- Long term outsourcing relationships

Project Procurement Management Processes

- **Project procurement management**: Acquiring goods and services for a project from outside the performing organization
- Processes include:
  - **Planning procurement management**: Determining what to procure and when and how to do the procurement
  - **Conducting procurements**: Obtaining seller responses, selecting sellers, and awarding contracts
  - **Controlling procurements**: Managing relationships with sellers, monitoring contract performance, and making changes as needed
  - **Closing procurements**: Completing and settling each contract or agreement, including resolving of any open items

Agenda - Conducting Procurements

1. Deciding whom to ask to do the work
2. Sending appropriate documentation to potential sellers
3. Obtaining proposals or bids
   - (Seller prepares it)
4. Selecting a seller
5. Awarding a contract

1. Deciding who to ask

○ Organizations can advertise to procure goods and services in several ways:

- Approaching the preferred vendor
- Approaching several potential vendors
- Advertising to anyone interested

○ A bidders' conference can help clarify the buyer's expectations

○ Engage consultants to assist in entire process if outside area of expertise

2. Procurement Documents

- **Request for Proposals**: Used to solicit proposals from prospective sellers
  - A **proposal** is a document prepared by a seller when there are different approaches for meeting buyer needs
- **Requests for Quotes**: Used to solicit quotes or bids from prospective suppliers
  - A **bid**, also called a tender or quote (short for quotation), is a document prepared by sellers providing pricing for standard items that have been clearly defined by the buyer

Request for Proposal (RFP) Template

Request for Proposal Template

I.   Purpose of RFP

II.   Organization's Background

III.   Basic Requirements

IV.   Hardware and Software Environment

V.   Description of RFP Process

VI.   Statement of Work and Schedule Information

VII.   Possible Appendices

        A. Current System Overview

        B. System Requirements

        C. Volume and Size Data

        D. Required Contents of Vendor's Response to RFP

        E. Sample Contract

**Schwalbe 2013.
Figure 12-4.**

Statement of Work (SOW) Template

Statement of Work (SOW)

I. **Scope of Work:** Describe the work to be done in detail. Specify the hardware and software involved and the exact nature of the work.

II. **Location of Work:** Describe where the work must be performed. Specify the location of hardware and software and where the people must perform the work.

III. **Period of Performance:** Specify when the work is expected to start and end, working hours, number of hours that can be billed per week, where the work must be performed, and related schedule information.

IV. **Deliverables Schedule:** List specific deliverables, describe them in detail, and specify when they are due.

V. **Applicable Standards:** Specify any company or industry-specific standards that are relevant to performing the work.

VI. **Acceptance Criteria:** Describe how the buyer organization will determine if the work is acceptable.

VII. **Special Requirements:** Specify any special requirements such as hardware or software certifications, minimum degree or experience level of personnel, travel requirements, and so on.

Schwalbe 2013. Figure 12-3.

3. Suppliers

- To be invited to Tender:
  - Marketing develop relationships with customers
  - Companies must be on the approved suppliers list if they want to be considered for Government work
- Answering proposals is costly
  - Not all proposals are answered
- If company decides to respond
  - Team assigned
  - Lead usually goes to main sales area

Supplier: Proposal development process

- Large services companies have :
  - Templates to follow
  - Processes for proposal development
  - Rigorous approvals: QA and pricing
- Short timeframe to develop
- To win they need to:
  - Understand what is driving the customer's requirement
  - Have the best solution at a competitive price

Supplier: Proposals contains

- Cover Letter – this is a marketing document
- Executive Summary
  - Fundamental nature of project
  - Benefits expected
- Detailed answers to all questions
- Approach to resolving technical problem
- Plan for implementing if the proposal is accepted
- Plan for logistics and admin support
  - Demonstrate ability to supply equipment/people
- Description of the group doing the work
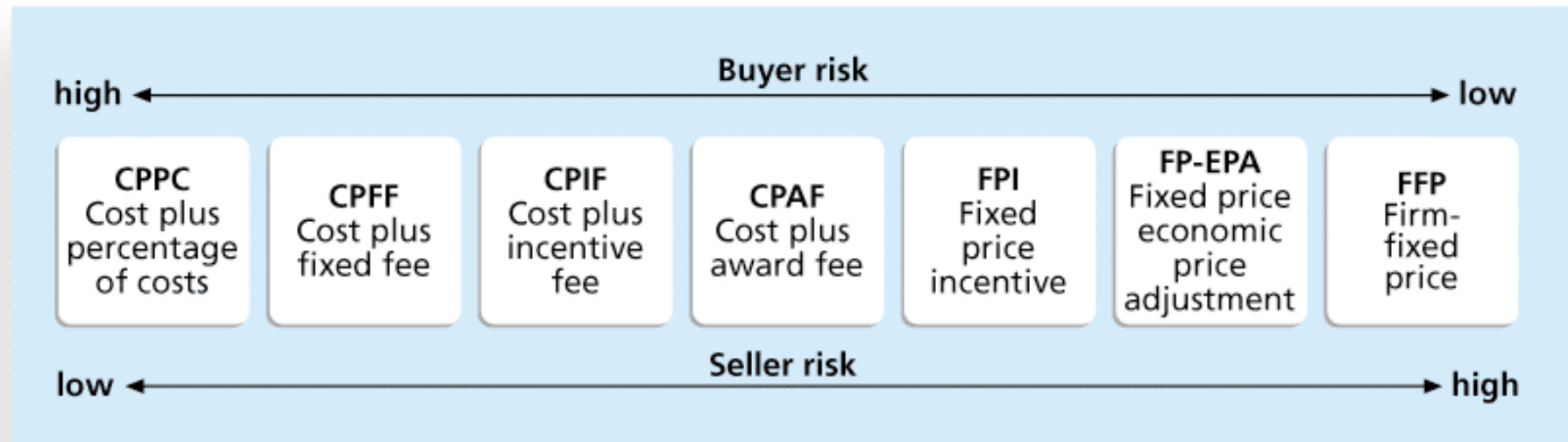- Pricing

4. Seller Selection

- Organizations prepare weighted evaluation criteria, preferably before they issue a formal RFP or RFQ than they then use to rate or score proposals.
- Organizations often do an initial evaluation of all proposals and bids and then develop a short list of potential sellers for further evaluation
- Sellers on the short list often prepare a best and final offer (BAFO)
- Final output is a contract signed by the buyer and the selected seller

**Schwalbe 2013.
Figure 12-5.**

Criteria	Weight	Proposal 1		Proposal 2		Proposal 3, etc.	
		Rating	Score	Rating	Score	Rating	Score
Technical approach	30%						
Management approach	30%						
Past performance	20%						
Price	20%						
Total score	**100%**						

5. Contracts

○ Contract Types Versus Risk

Buyer risk — high ← → low

| CPPC Cost plus percentage of costs | CPFF Cost plus fixed fee | CPIF Cost plus incentive fee | CPAF Cost plus award fee | FPI Fixed price incentive | FP-EPA Fixed price economic price adjustment | FFP Firm-fixed price |

Seller risk — low ← → high

Schwalbe 2013.
Figure 12-2.

Cost Reimbursable Contracts

- **Cost plus percentage of costs (CPPC)**: The buyer pays the supplier for allowable performance costs plus a predetermined percentage based on total costs

- **Cost plus fixed fee (CPFF)**: The buyer pays the supplier for allowable performance costs plus a fixed fee payment usually based on a percentage of estimated costs

- **Cost plus incentive fee (CPIF)**: The buyer pays the supplier for allowable performance costs plus a predetermined fee and an incentive bonus

- **Cost plus award fee (CPAF)**: The buyer pays the supplier for allowable performance costs plus award fee based on satisfaction (like a tip).

Exercise in 3 parts

1. For your wedding projects, write an RFP for a videographer, then issue it to 2 separate teams.
   - 30 mins
2. Now as the supplier: apply to two RFPs
   - 20 mins
3. **Now as the buyer:**
   - Define your evaluation criteria.
   - Apply your evaluation criteria to the responses, and select one.
   - Award the contract
   - 15 mins

Summary

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    - TQM
    - Six Sigma
    - ISO Quality Standards
    - Maturity Models

- Procurement
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  - Conducting Procurements
    - Deciding whom to ask to do the work
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