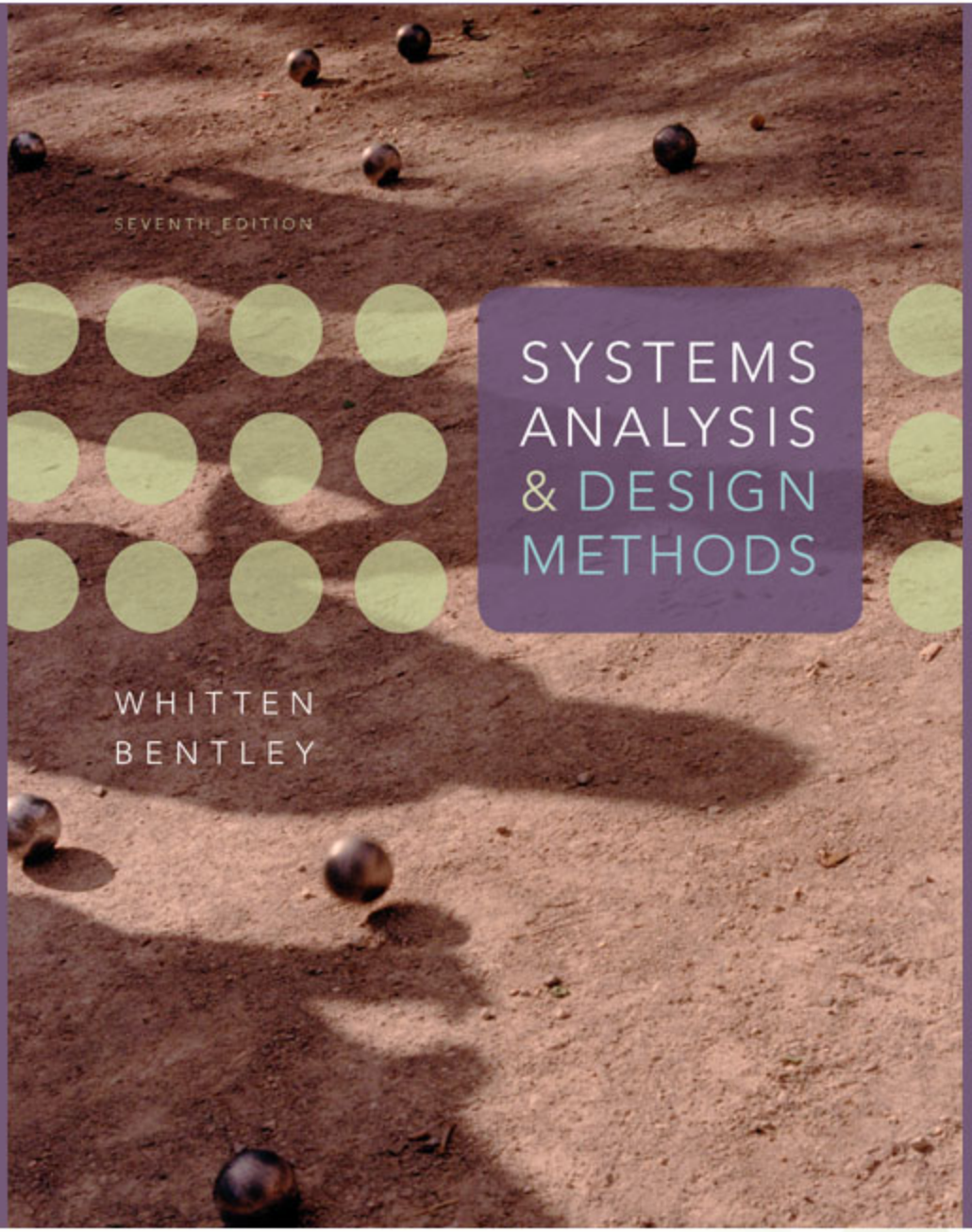
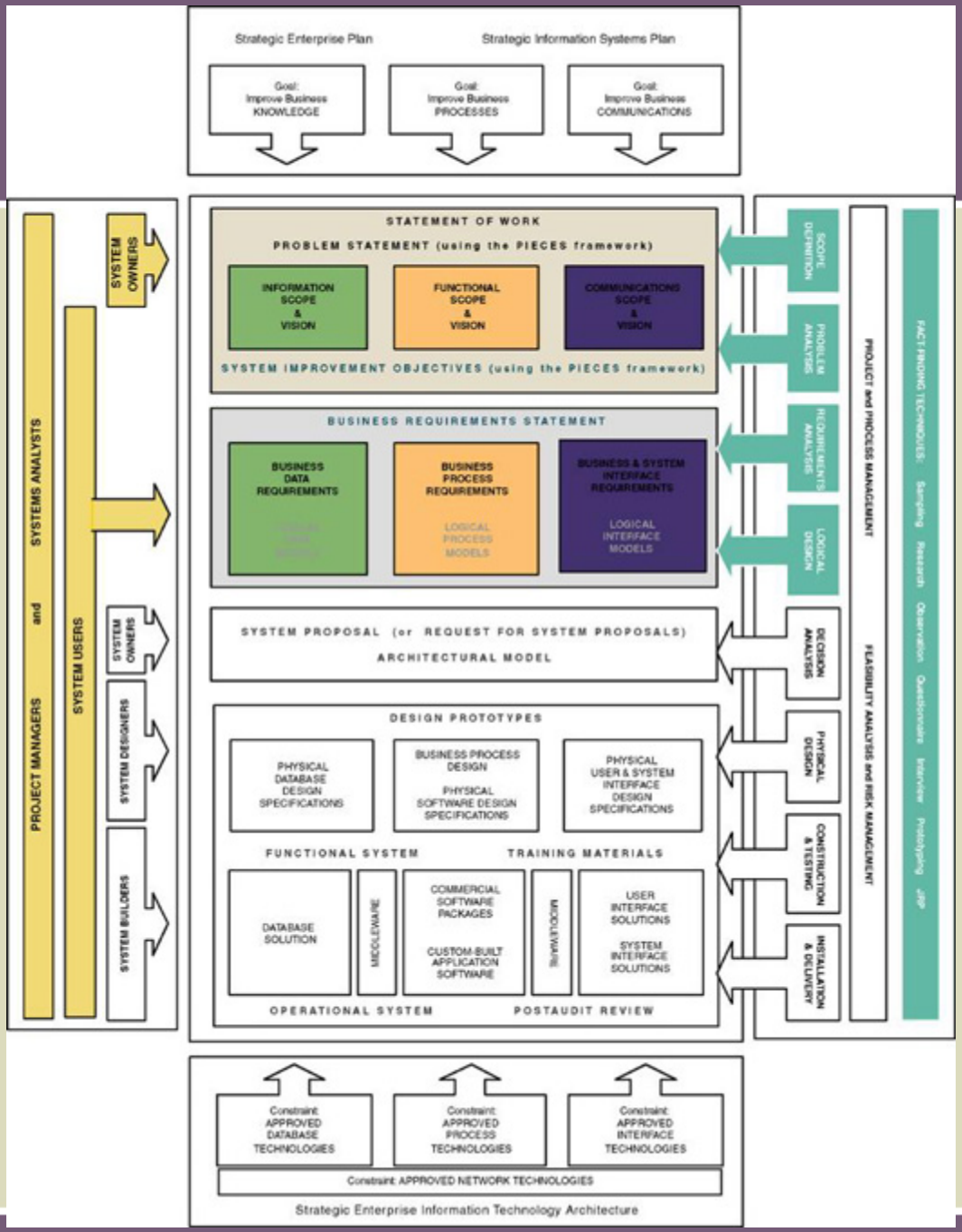
Rumuskan dengan baik hasil jawaban saudara di topik diskusi forum E-L 6


SEVENTH EDITION
SYSTEMS ANALYSIS & DESIGN METHODS
WHITTEN
BENTLEY

Objectives

- Define system requirements and differentiate between functional and nonfunctional requirements.
- Understand the activity of problem analysis and be able to create an Ishikawa (fishbone) diagram.
- Understand the concept of requirements management.
- Identify and characterize seven fact-finding techniques.
- Understand six guidelines for effective listening.
- Understand body language and proxemics.
- Characterize the typical participants in a JRP session.
- Complete the planning process for a JRP session.
- Describe benefits of JRP as fact-finding technique.
- Describe a fact-finding strategy that will make the most of your time with end-users.


Strategic Enterprise Plan
Strategic Information Systems Plan
Goal: Improve Business KNOWLEDGE
Goal: Improve Business PROCESSES
Goal: Improve Business COMMUNICATIONS
PROJECT MANAGERS and SYSTEMS ANALYSTS
SYSTEM USERS
SYSTEM OWNERS
SYSTEM OWNERS
SYSTEM DESIGNERS
SYSTEM BUILDERS
STATEMENT OF WORK
PROBLEM STATEMENT (using the PIECES framework)
INFORMATION SCOPE & VISION
FUNCTIONAL SCOPE & VISION
COMMUNICATIONS SCOPE & VISION
SYSTEM IMPROVEMENT OBJECTIVES (using the PIECES framework)
BUSINESS REQUIREMENTS STATEMENT
BUSINESS DATA REQUIREMENTS
LOGICAL DATA MODELS
BUSINESS PROCESS REQUIREMENTS
LOGICAL PROCESS MODELS
BUSINESS & SYSTEM INTERFACE REQUIREMENTS
LOGICAL INTERFACE MODELS
SYSTEM PROPOSAL (or REQUEST FOR SYSTEM PROPOSALS)
ARCHITECTURAL MODEL
DESIGN PROTOTYPES
PHYSICAL DATABASE DESIGN SPECIFICATIONS
BUSINESS PROCESS DESIGN
PHYSICAL SOFTWARE DESIGN SPECIFICATIONS
PHYSICAL USER & SYSTEM INTERFACE DESIGN SPECIFICATIONS
FUNCTIONAL SYSTEM
TRAINING MATERIALS
DATABASE SOLUTION
MIDDLEWARE
COMMERCIAL SOFTWARE PACKAGES
CUSTOM-BUILT APPLICATION SOFTWARE
MIDDLEWARE
USER INTERFACE SOLUTIONS
SYSTEM INTERFACE SOLUTIONS
OPERATIONAL SYSTEM
POSTAUDIT REVIEW
SCOPE DEFINITION
PROBLEM ANALYSIS
REQUIREMENTS ANALYSIS
LOGICAL DESIGN
DECISION ANALYSIS
PHYSICAL DESIGN
CONSTRUCTION & TESTING
INSTALLATION & DELIVERY
PROJECT and PROCESS MANAGEMENT
FEASIBILITY ANALYSIS and RISK MANAGEMENT
FACT-FINDING TECHNIQUES: Sampling Research Observation Questionnaire Interview Prototyping JRP
Constraint: APPROVED DATABASE TECHNOLOGIES
Constraint: APPROVED PROCESS TECHNOLOGIES
Constraint: APPROVED INTERFACE TECHNOLOGIES
Constraint: APPROVED NETWORK TECHNOLOGIES
Strategic Enterprise Information Technology Architecture

Introduction to Requirements Discovery

Requirements discovery – the process and techniques used by systems analysts to identify or extract system problems and solution requirements from the user community.

System requirement – something that the information system must do or a property that it must have. Also called a *business requirement*.

Functional vs. Nonfunctional Requirements

Functional requirement - something the information system must do

Nonfunctional requirement - a property or quality the system must have

- Performance
- Security
- Costs

Results of Incorrect Requirements

- The system may cost more than projected.
- The system may be delivered later than promised.
- The system may not meet the users' expectations and they may not to use it.
- Once in production, costs of maintaining and enhancing system may be excessively high.
- The system may be unreliable and prone to errors and downtime.
- Reputation of IT staff is tarnished as failure will be perceived as a mistake by the team.

Relative Cost to Fix an Error

Phase in Which Error Discovered	Cost Ratio
Requirements	1
Design	3–6
Coding	10
Development Testing	15–40
Acceptance Testing	30–70
Operation	40–1000

Criteria for System Requirements

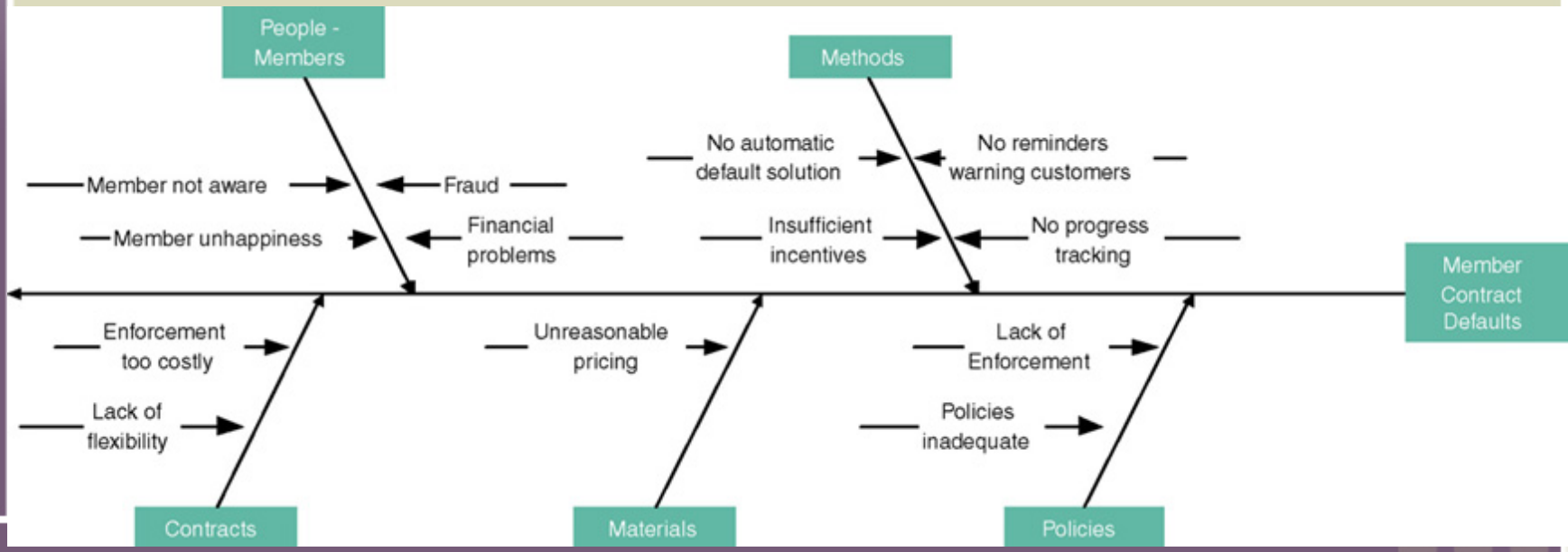
- **Consistent** – not conflicting or ambiguous.
- **Complete** – describe all possible system inputs and responses.
- **Feasible** – can be satisfied based on the available resources and constraints.
- **Required** – truly needed and fulfill the purpose of the system.
- **Accurate** – stated correctly.
- **Traceable** – directly map to functions and features of system.
- **Verifiable** – defined so can be demonstrated during testing.

Process of Requirements Discovery

- Problem discovery and analysis
- Requirements discovery
- Documenting and analyzing requirements
- Requirements management

Ishikawa Diagram

- Graphical tool used to identify, explore, and depict problems and the causes and effects of those problems. It is often referred to as a cause-and-effect diagram or a fishbone diagram.
  - Problem at right (fish head)
  - Possible causes drawn as "bones" off main backbone
  - Brainstorm for 3-6 main categories of possible causes



Requirements Discovery

- Given an understand of problems, the systems analyst can start to define requirements.

  Fact-finding – the formal process of using research, meetings, interviews, questionnaires, sampling, and other techniques to collect information about system problems, requirements, and preferences. It is also called *information gathering* or *data collection*.

Documenting and Analyzing Requirements

- Documenting the draft requirements
  - Use cases
  - Decision tables
  - Requirements tables
- Analyzing requirements to resolve problems
  - Missing requirements
  - Conflicting requirements
  - Infeasible requirements
  - Overlapping requirements
  - Ambiguous requirements
- Formalizing requirements
  - Requirements definition document
  - Communicated to stakeholders or steering body

Requirements Definition Document

Requirements Definition Document – A formal document that communicates the requirements of a proposed system to key stakeholders and serves as a contract for the systems project.

- Synonyms
  - Requirements definition report
  - Requirements statement
  - Requirements specification
  - Functional specifications

Sample Requirements Definition Report Outline

REQUIREMENTS DEFINITION REPORT

1. Introduction
   - 1.1. Purpose
   - 1.2. Background
   - 1.3. Scope
   - 1.4. Definitions, Acronyms, and Abbreviations
   - 1.5. References
2. General Project Description
   - 2.1. Functional Requirements
3. Requirements and Constraints
   - 3.1. Functional Requirements
   - 3.2. Nonfunctional Requirements
4. Conclusion
   - 4.1. Outstanding Issues

Appendix (optional)

Requirements Management

Requirements management - the process of managing change to the requirements.

- Over the lifetime of the project it is very common for new requirements to emerge and existing requirements to change.
- Studies have shown that over the life of a project as much as 50 percent or more of the requirements will change before the system is put into production.

Fact-Finding Ethics

- Fact-Finding often brings systems analysts into contact with sensitive information.
  - Company plans
  - Employee salaries or medical history
  - Customer credit card, social security, or other information
- Ethical behavior
  - Systems analysts must not misuse information.
  - Systems analysts must protect information from people who would misuse it.
- Otherwise
  - Systems analyst loses respect, credibility, and confidence of users and management, impairing ability to do job
  - Organization and systems analyst could have legal liability
  - Systems analyst could lose job

Seven Fact-Finding Methods

- Sampling of existing documentation, forms, and databases.
- Research and site visits.
- Observation of the work environment.
- Questionnaires.
- Interviews.
- Prototyping.
- Joint requirements planning (JRP).

Sampling Existing Documentation, Forms, & Files

Sampling –process of collecting a representative sample of documents, forms, and records.

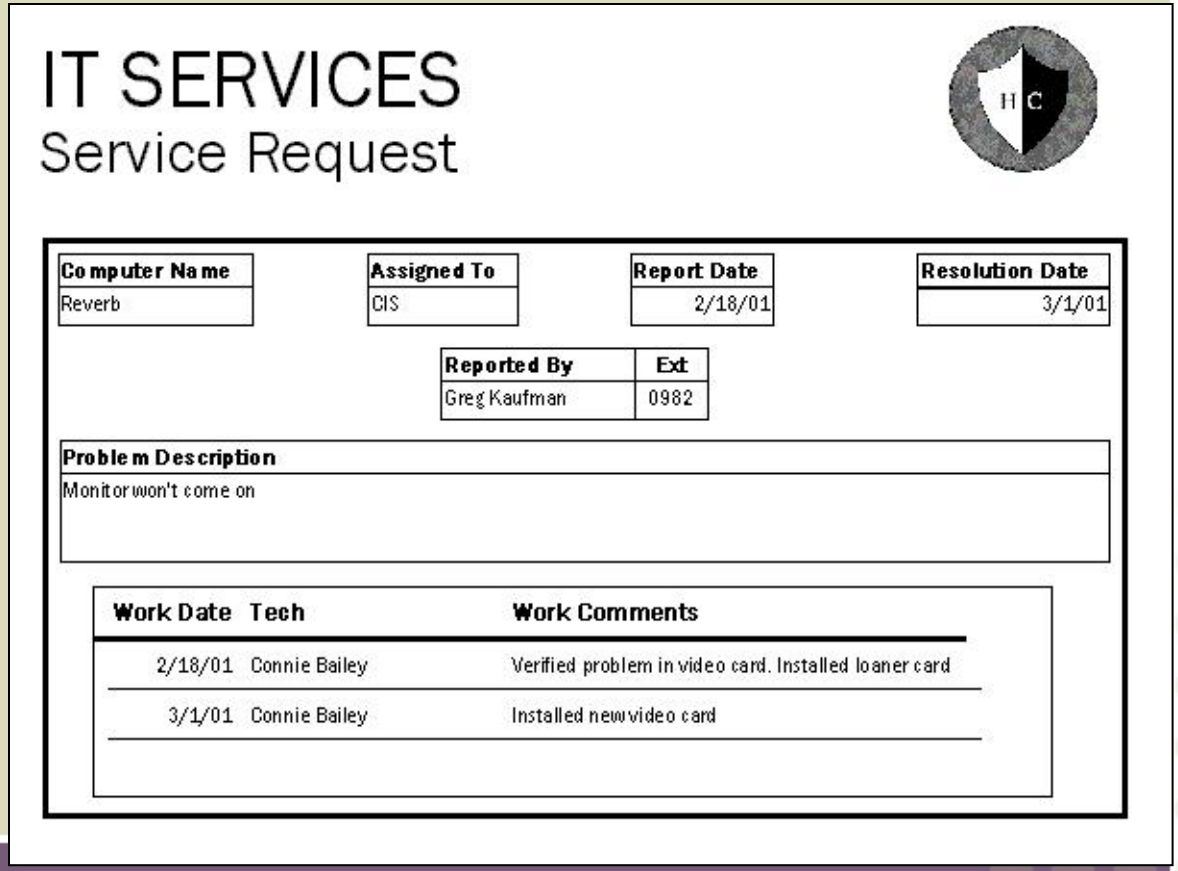
- Organization chart
- Memos and other documents that describe the problem
- Standard operating procedures for current system
- Completed forms
- Manual and computerized screens and reports
- Samples of databases
- Flowcharts and other system documentation
- And more

Things to be Gleaned from Documents

- Symptoms and causes of problems
- Persons in organization who have understanding of problem
- Business functions that support the present system
- Type of data to be collected and reported by the system
- Questions that need to be covered in interviews

Why to Sample Completed Rather than Blank Forms

- Can determine type of data going into each blank
- Can determine size of data going into each blank
- Can determine which blanks are not used or not always used
- Can see data relationships



IT SERVICES
Service Request

Computer Name	Assigned To	Report Date	Resolution Date
Reverb	CIS	2/18/01	3/1/01

Reported By	Ext
Greg Kaufman	0982

Problem Description
Monitor won't come on

Work Date	Tech	Work Comments
2/18/01	Connie Bailey	Verified problem in video card. Installed loaner card
3/1/01	Connie Bailey	Installed new video card

Determining Sample Size for Forms

- Sample Size = 0.25 x (Certainty factor/Acceptable error) ^{2}
- Sample Size = 0.25(1.645/0.10) ^{2} = 68
- Sample Size =0.10(1 – 0.10)(1.645/0.10)^2 = 25

Or if analyst knows 1 in 10 varies from norm.

Certainty factor from certainty table. 10% acceptable error.

Desired Certainty	Certainty Factor
95%	1.960
90	1.645
80	1.281

Sampling Techniques

Randomization – a sampling technique characterized by having no predetermined pattern or plan for selecting sample data.

Stratification – a systematic sampling technique that attempts to reduce the variance of the estimates by spreading out the sampling—for example, choosing documents or records by formula—and by avoiding very high or low estimates.

Observation

Observation – a fact-finding technique wherein the systems analyst either participates in or watches a person perform activities to learn about the system.

Advantages?

Disadvantages?

Work sampling - a fact-finding technique that involves a large number of observations taken at random intervals.

Observation

Advantages

- Data gathered can be very reliable
- Can see exactly what is being done in complex tasks
- Relatively inexpensive compared with other techniques
- Can do work measurements

Disadvantages

- People may perform differently when being observed
- Work observed may not be representative of normal conditions
- Timing can be inconvenient
- Interruptions
- Some tasks not always performed the same way
- May observe wrong way of doing things

Observation Guidelines

- Determine the who, what, where, when, why, and how of the observation.
- Obtain permission from appropriate supervisors.
- Inform those who will be observed of the purpose of the observation.
- Keep a low profile.
- Take notes.
- Review observation notes with appropriate individuals.
- Don't interrupt the individuals at work.
- Don't focus heavily on trivial activities.
- Don't make assumptions.

Questionnaires

Questionnaire – a special-purpose document that allows the analyst to collect information and opinions from respondents.

Free-format questionnaire – a questionnaire designed to offer the respondent greater latitude in the answer. A question is asked, and the respondent records the answer in the space provided after the question.

Fixed-format questionnaire – a questionnaire containing questions that require selecting an answer from predefined available responses.

Questionnaires

Advantages

- Often can be answered quickly
- People can complete at their convenience
- Relatively inexpensive way to gather data from a large number
- Allow for anonymity
- Responses can be tabulated quickly

Disadvantages

- Return rate is often low
- No guarantee that an individual will answer all questions
- No opportunity to reword or explain misunderstood questions
- Cannot observe body language
- Difficult to prepare

Types of Fixed-Format Questions

- Multiple-choice questions
- Rating questions
- Ranking questions

Rank the following transactions according to the amount of time you spend processing them.

___ % new customer orders
___ % order cancellations
___ % order modifications
___ % payments

The implementation of quality discounts would cause an increase in customer orders.

___ Strongly agree
___ Agree
___ No opinion
___ Disagree
___ Strongly disagree

Is the current accounts receivable report that you receive useful?

___ Yes
___ No

Developing a Questionnaire

1. Determine what facts and opinions must be collected and from whom you should get them.
2. Based on the facts and opinions sought, determine whether free- or fixed-format questions will produce the best answers.
3. Write the questions.
4. Test the questions on a small sample of respondents.
5. Duplicate and distribute the questionnaire.

Interviews

Interview - a fact-finding technique whereby the systems analysts collect information from individuals through face-to-face interaction.

- Find facts
- Verify facts
- Clarify facts
- Generate enthusiasm
- Get the end-user involved
- Identify requirements
- Solicit ideas and opinions

The personal interview is generally recognized as the most important and most often used fact-finding technique.

Types of Interviews and Questions

Unstructured interview –conducted with only a general goal or subject in mind and with few, if any, specific questions. The interviewer counts on the interviewee to provide a framework and direct the conversation.

Structured interview –interviewer has a specific set of questions to ask of the interviewee.

Open-ended question – question that allows the interviewee to respond in any way.

Closed-ended question – a question that restricts answers to either specific choices or short, direct responses.

Interviews

Advantages

- Give analyst opportunity to motivate interviewee to respond freely and openly
- Allow analyst to probe for more feedback
- Permit analyst to adapt or reword questions for each individual
- Can observe nonverbal communication

Disadvantages

- Time-consuming
- Success highly dependent on analyst's human relations skills
- May be impractical due to location of interviewees

Procedure to Conduct an Interview

1. Select Interviewees
   - End users
   - Learn about individual prior to the interview
2. Prepare for the Interview
   - interview guide
3. Conduct the Interview
   - Summarize the problem
   - Offer an incentive for participation
   - Ask the interviewee for assistance
4. Follow Up on the Interview
   - Memo that summarizes the interview

Sample Interview Guide

Interviewee:	Jeff Bentley, Accounts Receivable Manager
Date:	January 19, 2003
Time:	1:30 P.M.
Place:	Room 223, Admin. Bldg.
Subject:	Current Credit-Checking Policy

Time Allocated	Interviewer Question or Objective	Interviewee Response
1 to 2 min.	**Objective** Open the interview: • Introduce ourselves • Thank Mr. Bentley for his valuable time. • State the purpose of the interview — to obtain an understanding of the existing credit-checking policies.	
5 min.	**Question 1** What conditions determine whether a customer's order is approved for credit? **Follow-up**	
5 min.	**Question 2** What are the possible decisions or actions that might be taken once these conditions have been evaluated? **Follow-up**	
3 min.	**Question 3** How are customers notified when credit is not approved for their order? **Follow-up**	

(continued)

Sample Interview Guide (concluded)

1 min.	**Question 4** After a new order is approved for credit and placed in the file containing orders that can be filled, a customer might request that a modification be made to the order. Would the order have to go through credit approval again if the new total order cost exceeds the original cost? **Follow-up**	
1 min.	**Question 5** Who are the individuals who perform the credit checks? **Follow-up**	
1 to 3 min.	**Question 6** May I have permission to talk to those individuals to learn specifically how they carry out the credit-checking process? **Follow-up** If so: When would be an appropriate time to meet with each of them?	
1 min.	**Objective** Conclude the interview: • Thank Mr. Bentlry for his cooperation and assure him that he will be receiving a copy of what transpired during the interview.	
21 minutes	Time allotted for questions and objectives	
9 minutes	Time allotted for follow-up questions and redirection	
30 minutes	Time allotted for interview (1:30 p.m. - 2:00 p.m.)	
General Comments and Notes:		

Prepare for the Interview

- Types of Questions to Avoid
  - Loaded questions
  - Leading questions
  - Biased questions
- Interview Question Guidelines
  - Use clear and concise language.
  - Don’t include your opinion as part of the question.
  - Avoid long or complex questions.
  - Avoid threatening questions.
  - Don’t use “you” when you mean a group of people.

Conduct the Interview

- Dress to match interviewee
- Arrive on time
  - Or early if need to confirm room setup
- Open interview by thanking interviewee
- State purpose and length of interview and how data will be used
- Monitor the time
- Ask follow-up questions
  - Probe until you understand
  - Ask about exception conditions ("what if...")

Interviewing Do's and Don'ts

Do

- Dress appropriately
- Be courteous
- Listen carefully
- Maintain control of the interview
- Probe
- Observe mannerisms and nonverbal communication
- Be patient
- Keep interviewee at ease
- Maintain self-control
- Finish on time

Don't

- Assume an answer is finished or leading nowhere
- Reveal verbal and nonverbal clues
- Use jargon
- Reveal personal biases
- Talk more than listen
- Assume anything about the topic or the interviewee
- Tape record (take notes instead)

Body Language and Proxemics

Body language – the nonverbal information we communicate.

- Facial disclosure
- Eye contact
- Posture

Proxemics – the relationship between people and the space around them.

- Intimate zone—closer than 1.5 feet
- Personal zone—from 1.5 feet to 4 feet
- Social zone—from 4 feet to 12 feet
- Public zone—beyond 12 feet

Discovery Prototyping

Discovery prototyping – the act of building a small-scale, representative or working model of the users' requirements in order to discover or verify those requirements.

Discovery Prototyping

Advantages

- Can experiment to develop understanding of how system might work
- Aids in determining feasibility and usefulness of system before development
- Serves as training mechanism
- Aids in building test plans and scenarios
- May minimize time spent on fact-finding

Disadvantages

- Developers may need to be trained in prototyping
- Users may develop unrealistic expectations
- Could extend development schedule

Joint Requirements Planning

Joint requirements planning (JRP) – a process whereby highly structured group meetings are conducted for the purpose of analyzing problems and defining requirements.

- JRP is a subset of a more comprehensive joint application development or JAD technique that encompasses the entire systems development process.

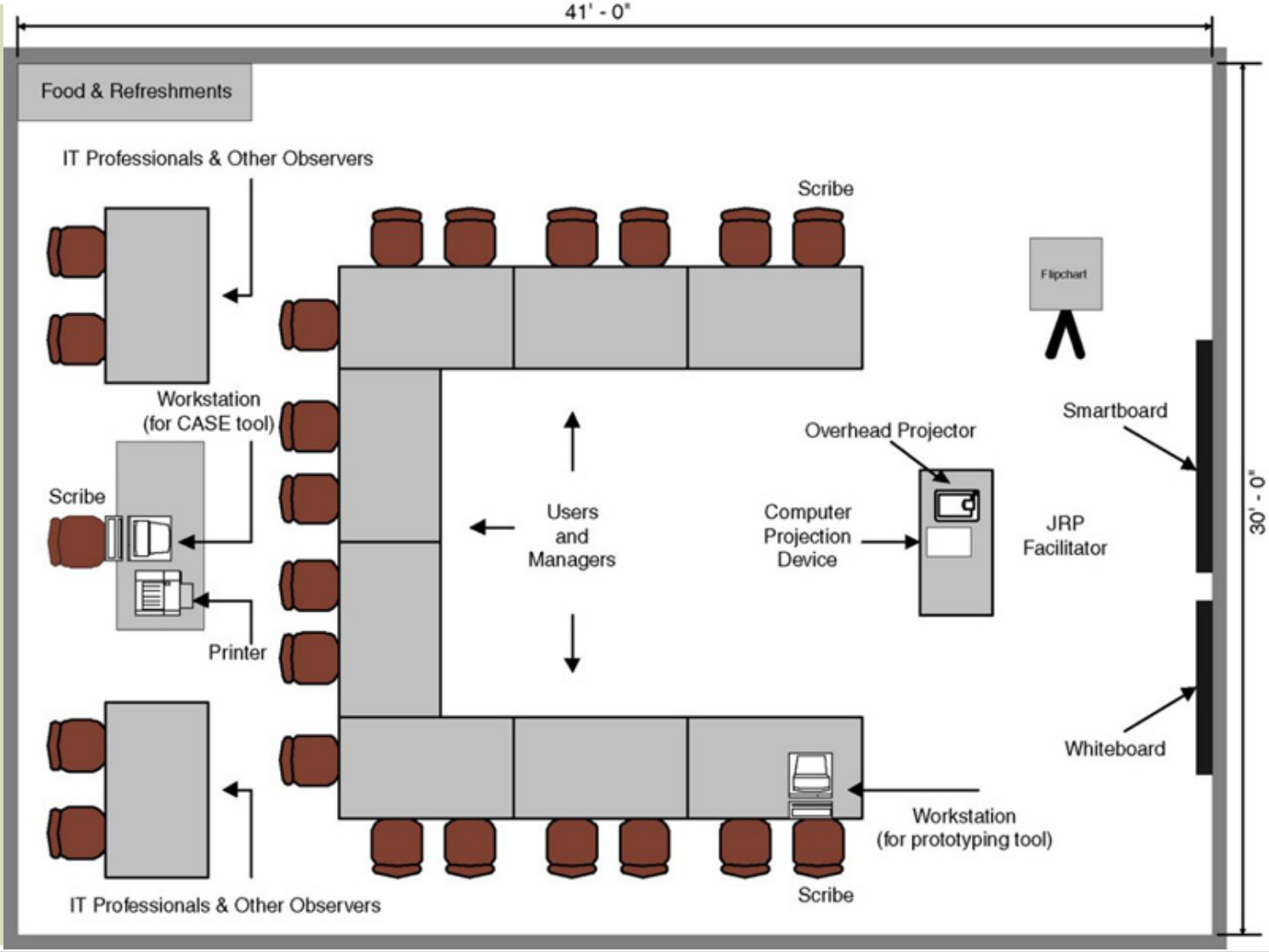
JRP Participants

- Sponsor
- Facilitator
- Users and Managers
- Scribes
- IT Staff

Steps to Plan a JRP Session

1. Selecting a location
   - Away from workplace when possible
   - Requires several rooms
   - Equipped with tables, chairs, whiteboard, overhead projectors
   - Needed computer equipment
2. Selecting the participants
   - Each needs release from regular duties
3. Preparing the agenda
   - Briefing documentation
   - Agenda distributed before each session

Typical Room Layout for JRP session



Guidelines for Conducting a JRP Session

- Do not unreasonably deviate from the agenda
- Stay on schedule
- Ensure that the scribe is able to take notes
- Avoid the use of technical jargon
- Apply conflict resolution skills
- Allow for ample breaks
- Encourage group consensus
- Encourage user and management participation without allowing individuals to dominate the session
- Make sure that attendees abide by the established ground rules for the session

Brainstorming

- Sometimes, one of the goals of a JRP session is to generate possible ideas to solve a problem.
  - Brainstorming is a common approach that is used for this purpose.

Brainstorming – a technique for generating ideas by encouraging participants to offer as many ideas as possible in a short period of time without any analysis until all the ideas have been exhausted.

Brainstorming Guidelines

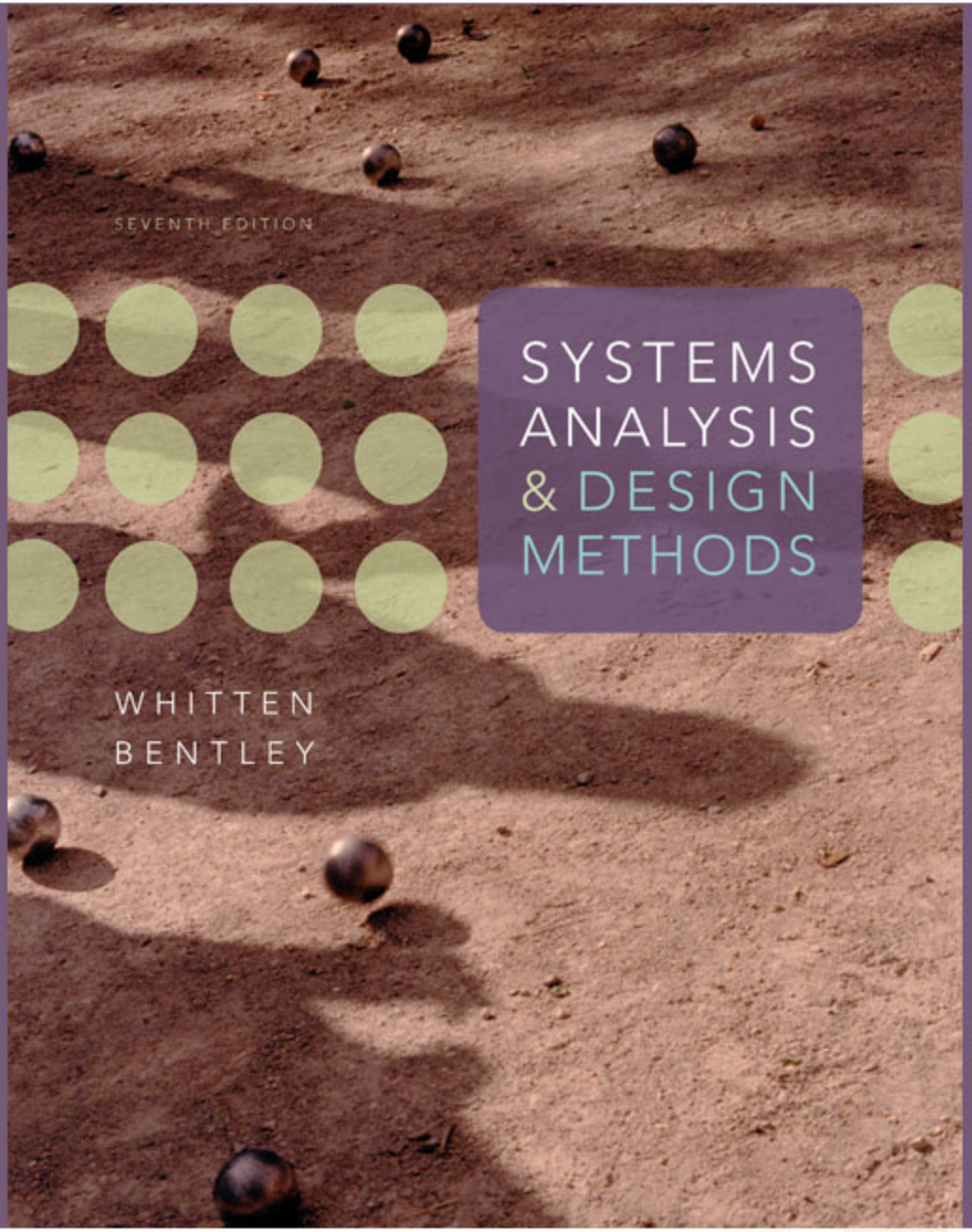
- Isolate appropriate people in a place that free from distractions and interruptions.
- Make sure everyone understands purpose of the meeting.
- Appoint one person to record ideas.
- Remind everyone of brainstorming rules.
- Within a specified time period, team members call out their ideas as quickly as they can think of them.
- After group has run out of ideas and all ideas have been recorded, then and only then should ideas be evaluated.
- Refine, combine, and improve ideas generated earlier.

Benefits of JRP

- JRP actively involves users and management in the development project (encouraging them to take “ownership” in the project).
- JRP reduces the amount of time required to develop systems.
- When JRP incorporates prototyping as a means for confirming requirements and obtaining design approvals, the benefits of prototyping are realized

A Fact-Finding Strategy

1. Learn from existing documents, forms, reports, and files.
2. If appropriate, observe the system in action.
3. Given all the facts that already collected, design and distribute questionnaires to clear up things that aren't fully understood.
4. Conduct interviews (or group work sessions).
5. (Optional). Build discovery prototypes for any functional requirements that are not understood or for requirements that need to be validated.
6. Follow up to verify facts.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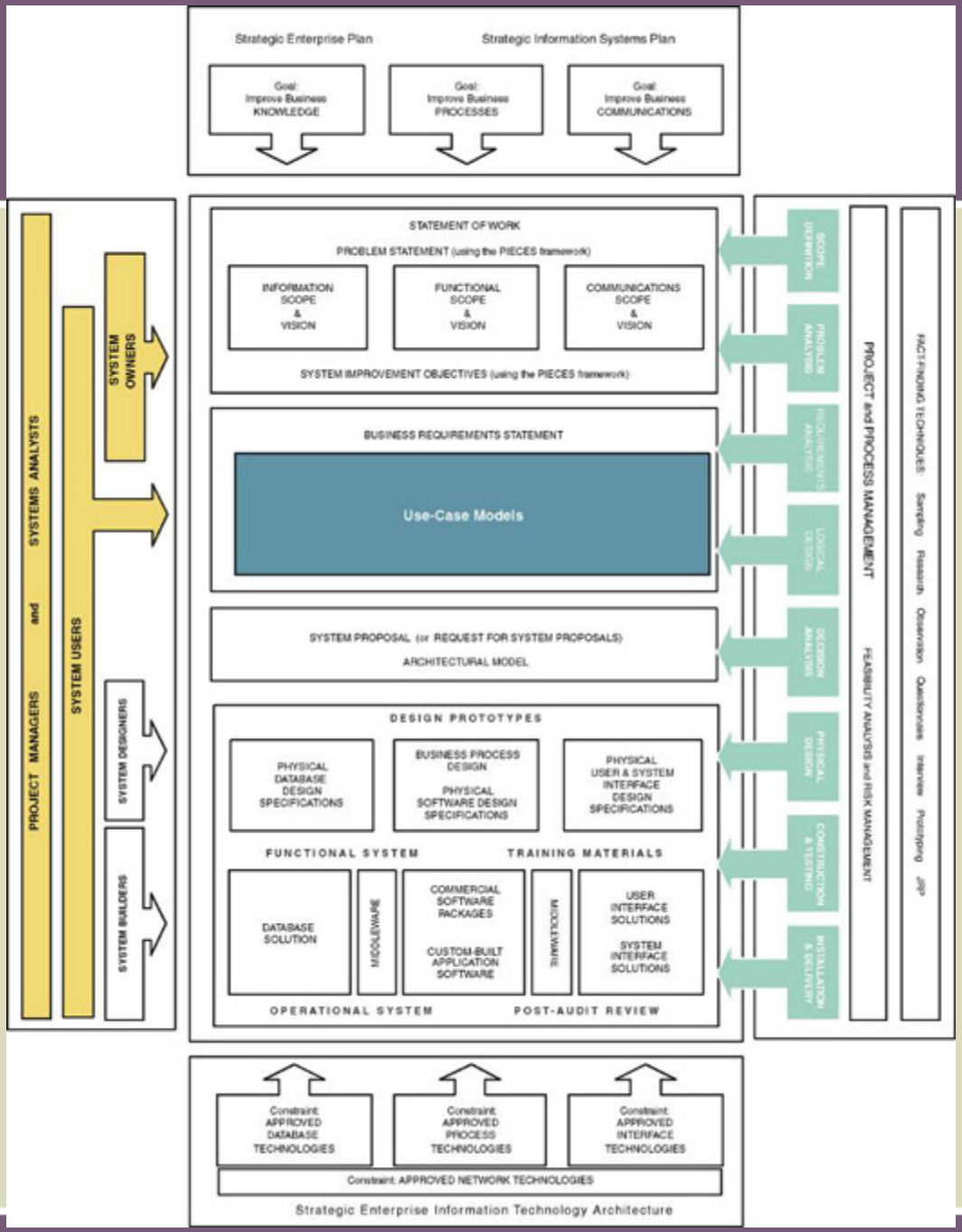
Objectives

- Describe the benefits of use-case modeling.
- Define actors and use cases and be able to identify them from context diagrams and other sources.
- Describe the relationships that can appear on a use-case model diagram.
- Describe the steps for preparing a use-case model.
- Describe how to construct a use-case model diagram.
- Describe the various sections of a use-case narrative and be able to prepare one.
- Define the purpose of the use-case ranking and priority matrix and the use-case dependency diagram.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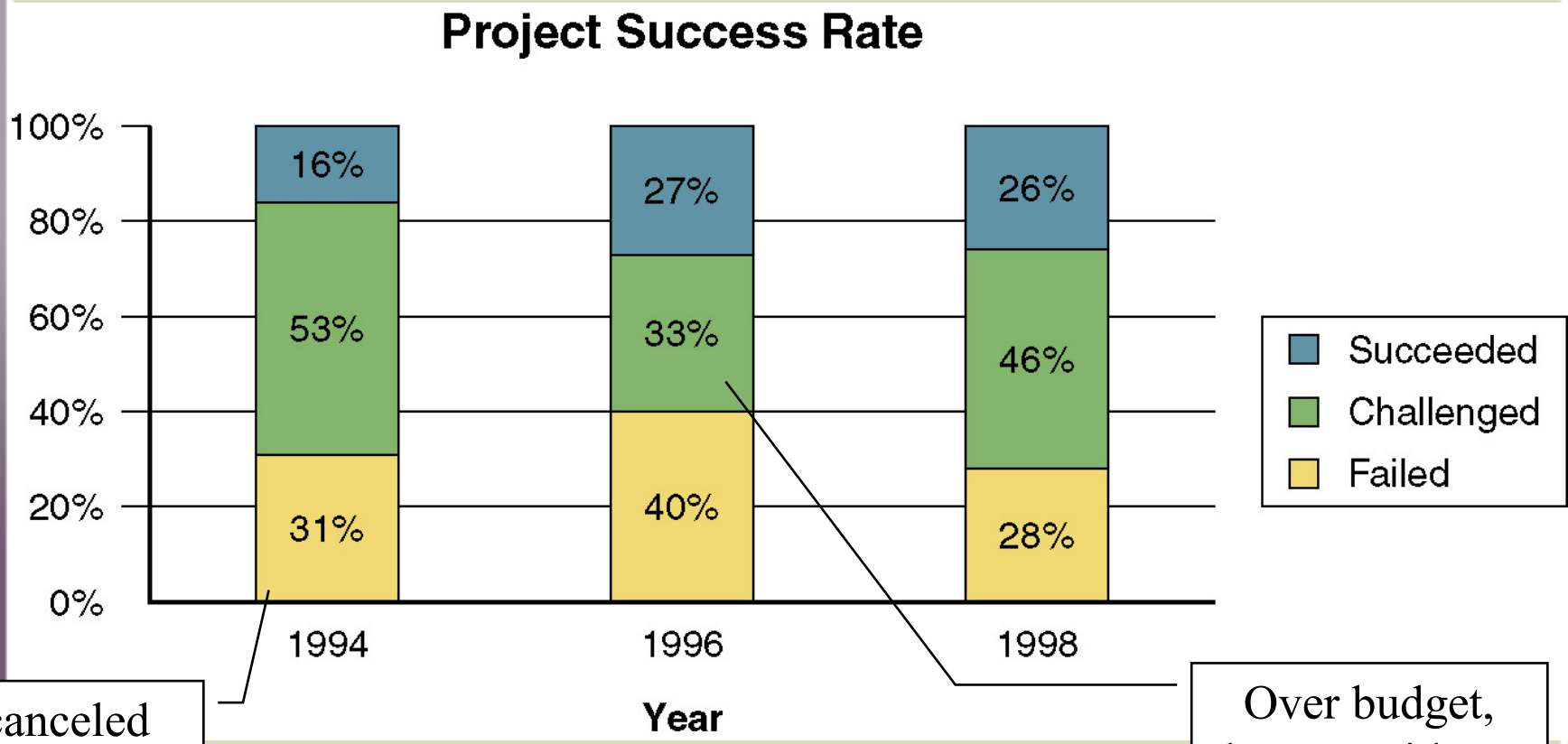
An Introduction to Use-Case Modeling

- One of the primary challenges is the ability to elicit the correct and necessary system requirements from the stakeholders and specify them in a manner understandable to them so those requirements can be verified and validated.

The hardest single part of building a software system is deciding precisely what to build. No other part of the conceptual work is a difficult as establishing the detailed technical requirements, including all the interfaces to people, to machines, and to other software systems. No other work so cripples the resulting system if done wrong. No other part is more difficult to rectify later. Fred Brooks

IS Development Project Track Record



Source: The Standish Group International, Inc., "Chaos: A Recipe for Success"

User-Centered Development and Use-Case Modeling

User-centered development – a process of systems development based on understanding the needs of the stakeholders and the reasons why the system should be developed.

Use-case modeling – the process of modeling a system's functions in terms of business events, who initiated the events, and how the system responds to those events.

- Use-case modeling has roots in object-oriented modeling.
- Gaining popularity in non-object development environments because of its usefulness in communicating with users.
- Compliments traditional modeling tools.

Benefits of Use-Case Modeling

- Provides tool for capturing functional requirements.
- Assists in decomposing system into manageable pieces.
- Provides means of communicating with users/stakeholders concerning system functionality in language they understand.
- Provides means of identifying, assigning, tracking, controlling, and management system development activities.
- Provides aid in estimating project scope, effort, and schedule.

Benefits of Use-Case Modeling (continued)

- Aids in defining test plans and test cases.
- Provides baseline for user documentation.
- Provides tool for requirements traceability.
- Provides starting point for identification of data objects or entities.
- Provides specifications for designing user and system interfaces.
- Provides means of defining database access requirements.
- Provides framework for driving the system development project.

System Concepts for Use-Case Modeling

Use case – a behaviorally related sequence of steps (scenario), both automated and manual, for the purpose of completing a single business task.

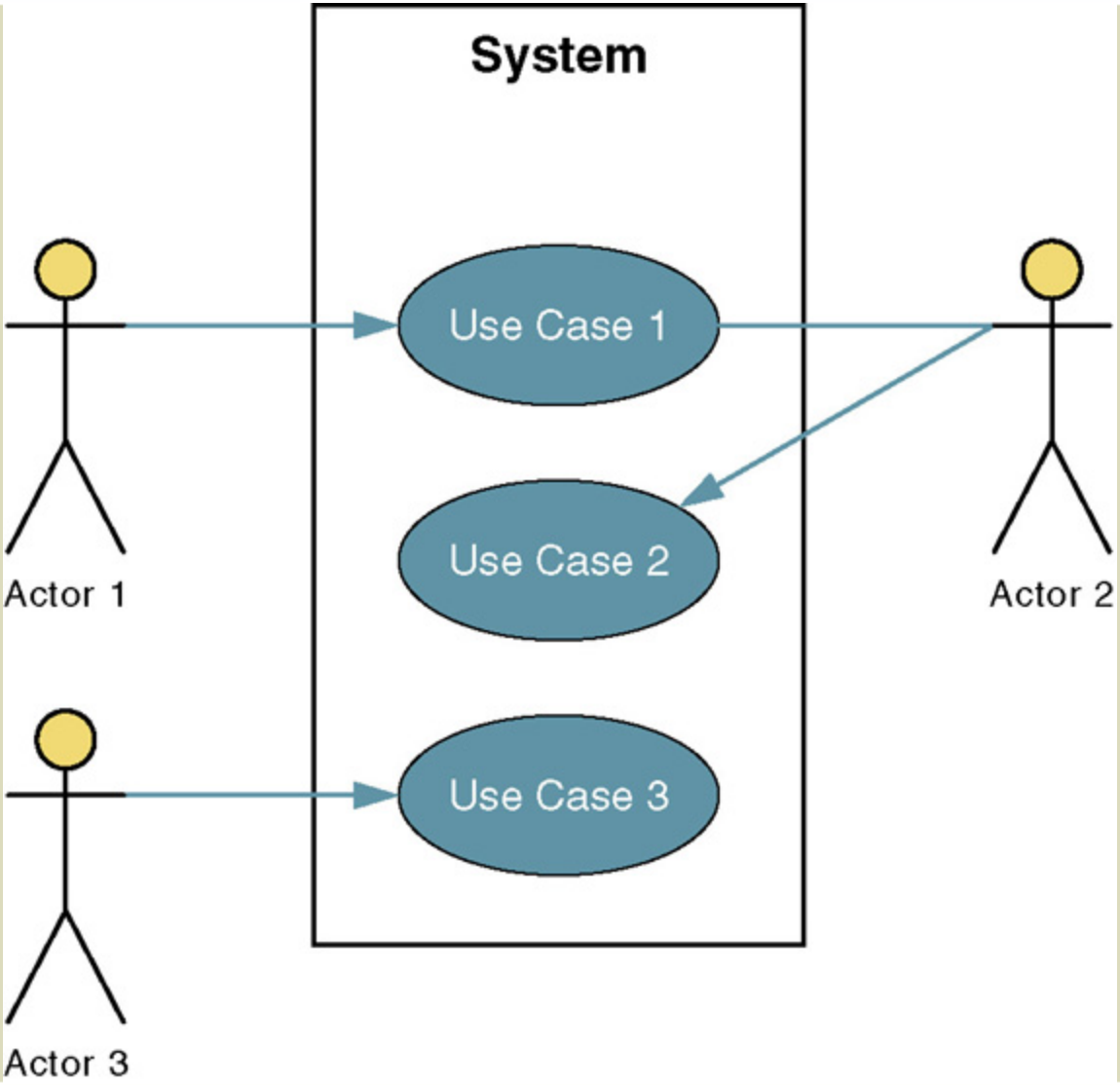
- Description of system functions from the perspective of external users in terminology they understand.

Use-case diagram – a diagram that depicts the interactions between the system and external systems and users.

- graphically describes who will use the system and in what ways the user expects to interact with the system.

Use-case narrative – a textual description of the business event and how the user will interact with the system to accomplish the task.

Sample Use-Case Model Diagram



Basic Use-Case Symbols

Use case – subset of the overall system functionality

- Represented by a horizontal ellipse with name of use case above, below, or inside the ellipse.

Actor – anyone or anything that needs to interact with the system to exchange information.

- human, organization, another information system, external device, even time.


Actor Symbol

Temporal event – a system event triggered by time.

- The actor is time.

Four Types of Actors

- **Primary business actor**
  - The stakeholder that primarily benefits from the execution of the use case.
  - e.g. the employee receiving the paycheck
- **Primary system actor**
  - The stakeholder that directly interfaces with the system to initiate or trigger the business or system event.
  - e.g. the bank teller entering deposit information
- **External server actor**
  - The stakeholder that responds to a request from the use case.
  - e.g. the credit bureau authorizing a credit card charge
- **External receiver actor**
  - The stakeholder that is not the primary actor but receives something of value from the use case.
  - e.g. the warehouse receiving a packing slip

Use Case Association Relationship

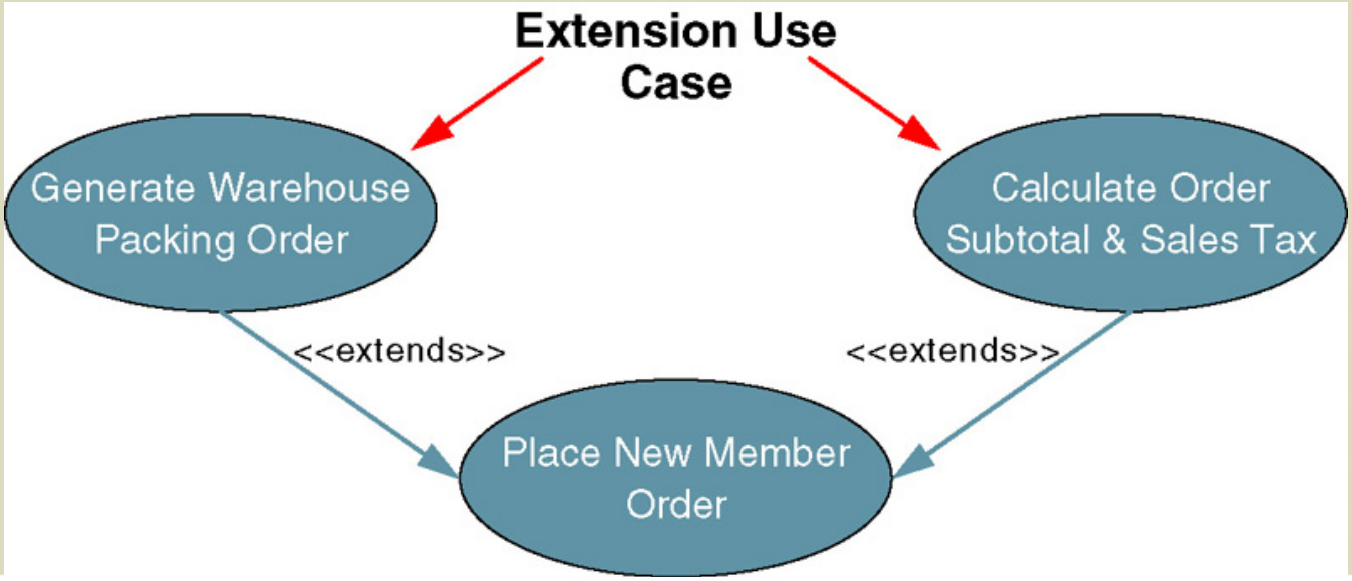
Association – a relationship between an actor and a use case in which an interaction occurs between them.

- Association modeled as a solid line connecting the actor and the use case.
- Association with an arrowhead touching the use case indicates that the use case was initiated by the actor. (1)
- Association lacking arrowhead indicates a receiver actor. (2)
- Associations may be bidirectional or unidirectional.

Use Case Extends Relationship

Extension use case –use case consisting of steps extracted from another use case to simplify the original.

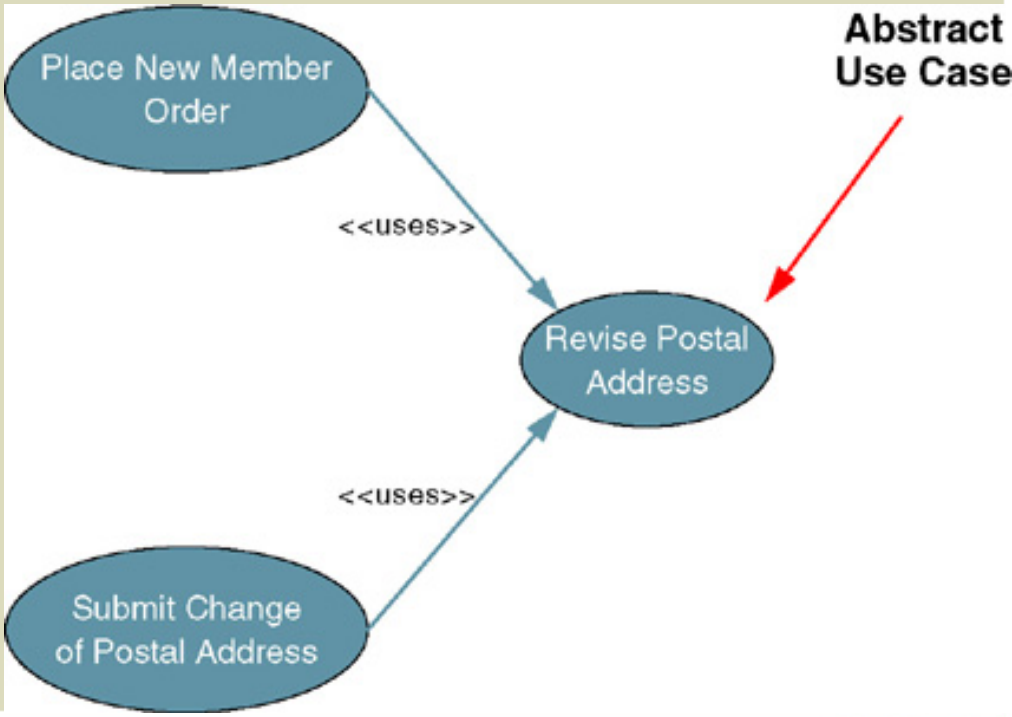
- Extends the functionality of the original use case.
- Generally not identified in the requirements phase
- Extends relationship represented as arrow beginning at the extension use case and pointing to use case it is extending.
- Labeled <<extends>>.



Use Case Uses Relationship

Abstract use case – use case that reduces redundancy in two or more other use cases by combining common steps found in both.

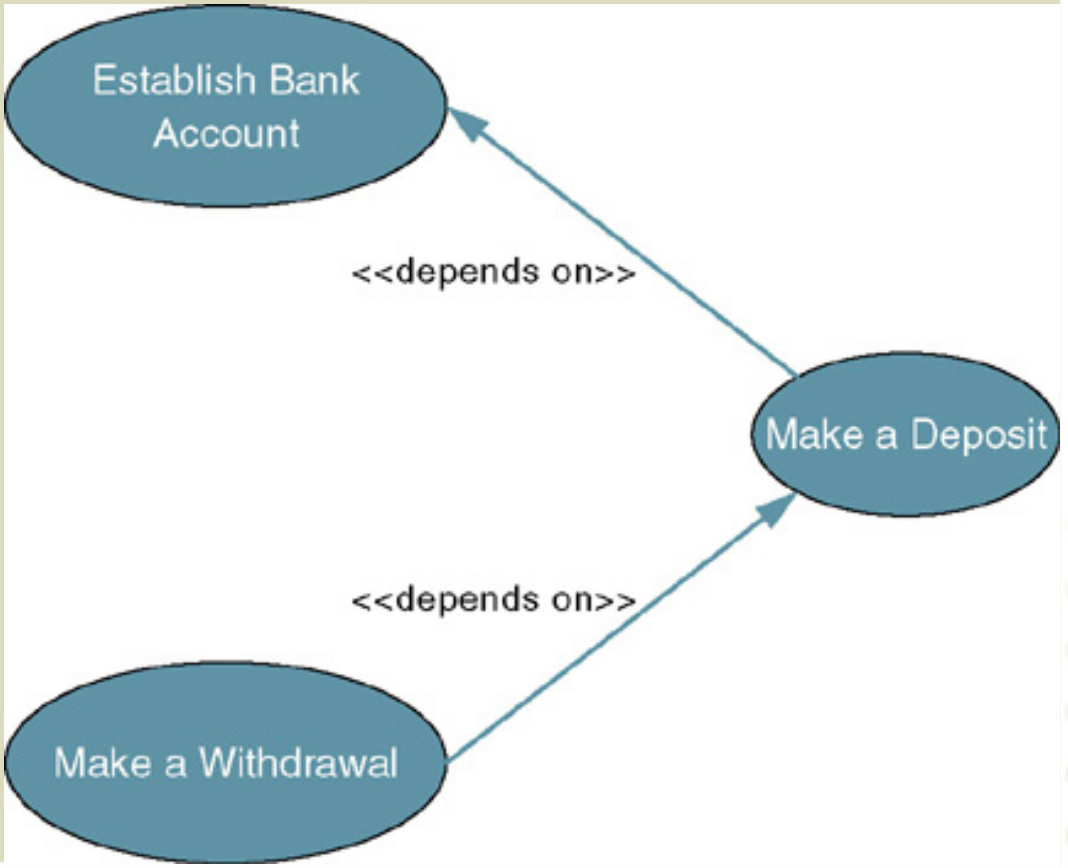
- Available by any other use case that requires its functionality.
- Generally not identified in requirements phase
- Relationship between abstract use case and use case that uses it is called a *uses* (or *includes*) relationship.
- Depicted as arrow beginning at original use case and pointing to use case it is using.
- Labeled <<uses>>.



Use Case Depends On Relationship

Depends On – use case relationship that specifies which other use cases must be performed before the current use case.

- Can help determine sequence in which use cases need to be developed.
- Depicted as arrow beginning at one use case and pointing to use case it depends on.
- Labeled <<depends on>>.

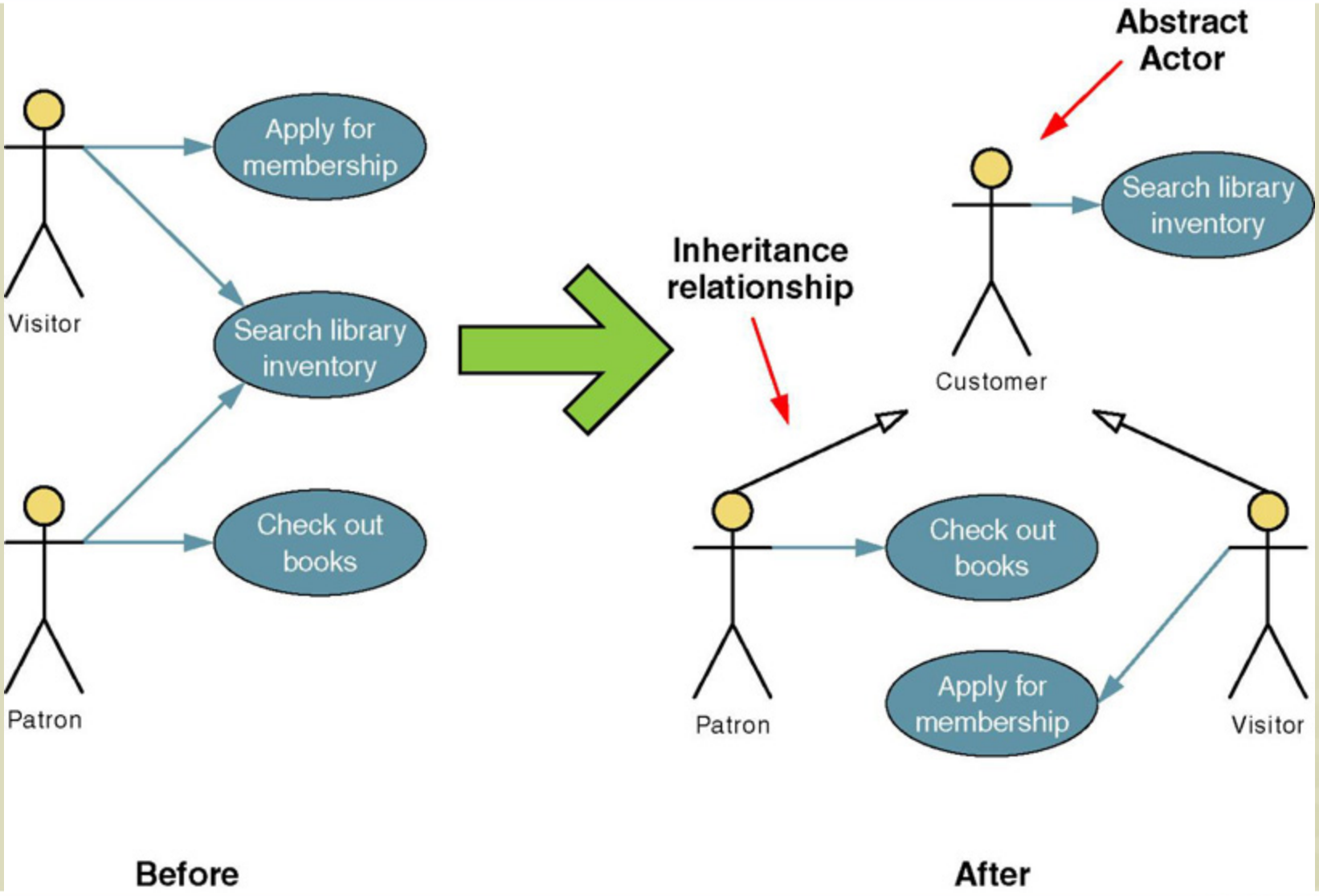


Use Case Inheritance Relationship

Inheritance – a use case relationship in which the common behavior of two actors initiating the same use case is extrapolated and assigned to a new *abstract* actor to reduce redundancy.

- Other actors can inherit the interactions of the abstract actor.
- Depicted as an arrow beginning at one actor and pointing to the abstract actor whose interactions the first actor inherits.

Use Case Inheritance Relationship



The Process of Requirements Use-Case Modeling

- Objective is to elicit and analyze enough requirements information to prepare a model that:
  - Communicates what is required from a user perspective.
  - Is free of specific details about how system will be implemented.
- To effectively estimate and schedule project, may need to include preliminary implementation assumptions.
- Steps
  1. Identify business actors.
  2. Identify business use cases.
  3. Construct use-case model diagram.
  4. Documents business requirements use-case narratives.

Step 1: identify Business Actors

- When looking for actors, ask the following questions:
  - Who or what provides inputs to the system?
  - Who or what receives outputs from the system?
  - Are interfaces required to other systems?
  - Are there events that are automatically triggered at a predetermined time?
  - Who will maintain information in the system?
- Actors should be named with a noun or noun phrase

Sample List of Actors

	Term	Synonym	Description
1.	Potential member		An individual or corporation that submits a subscription order in order to join the club.
2.	Club member	Member	An individual or corporation that has joined the club via an agreement.
3.	Past member	Inactive member	A type of member that has fulfilled the agreement obligation but has not placed an order within the last six months but is still in good standing.
4.	Marketing		Organization responsible for creating promotion and subscription programs and generating sales for the company.
5.	Member services		Organization responsible for providing point of contact for SoundStage Entertainment customers in terms of agreements and orders.
6.	Distribution center	Warehouse	Entity that houses and maintains SoundStage Entertainment product inventory and processes customer shipments and returns.
7.	Accounts receivable		Organization responsible for processing customer payments and billing as well as maintaining customer account information.
8.	Time		Actor concept responsible for triggering temporal events.

Step 2: Identify Business Requirements Use Cases

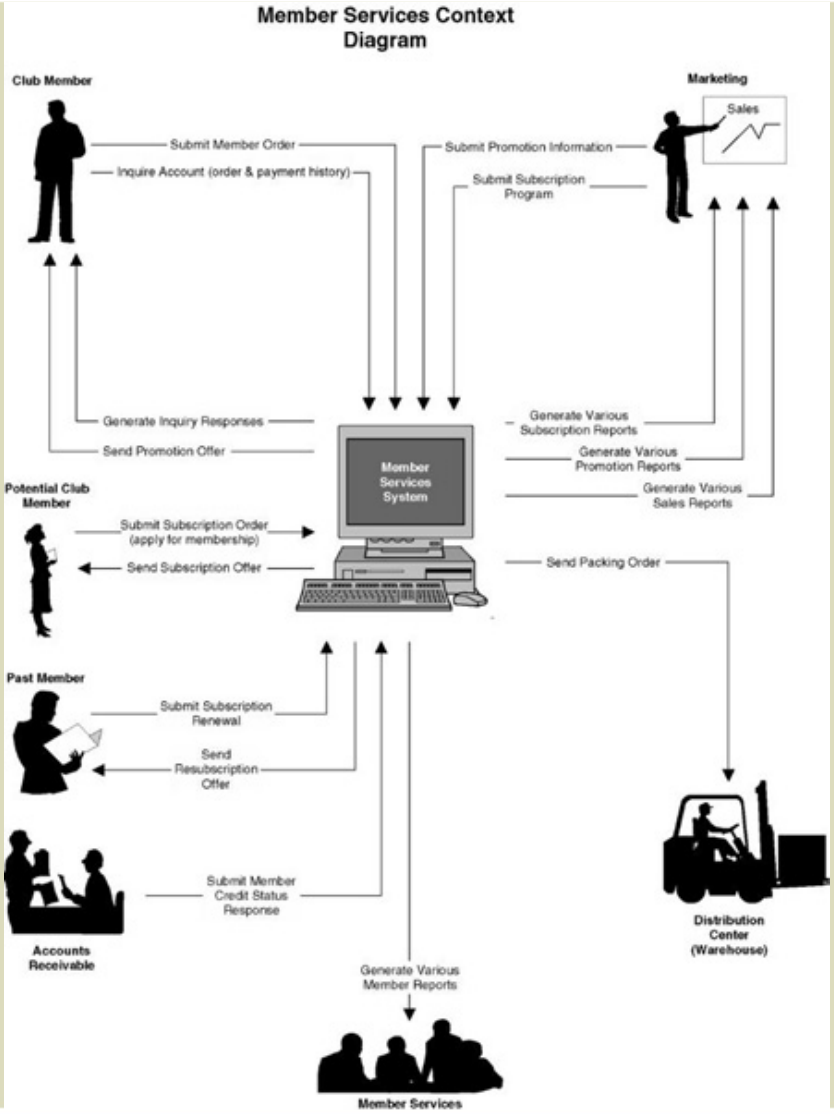
Business Requirements Use Case - a use case created during requirements analysis to capture the interactions between a user and the system free of technology and implementation details.

- During requirements analysis, strive to identify and document only the most critical, complex, and important use cases, often called *essential* use cases.

Step 2: Identify Business Requirements Use Cases (cont.)

- When looking for use cases, ask the following questions:
  - What are the main tasks of the actor?
  - What information does the actor need form the system?
  - What information does the actor provide to the system?
  - Does the system need to inform the actor of any changes or events that have occurred?
  - Does the actor need to inform the system of any changes or events that have occurred?
- Use cases should be named with a verb phrase specifying the goal of the actor (i.e. Submit Subscription Order)

Sample Context Diagram



Sample Use-Case Glossary

Use-Case Name	Use-Case Description	Participating Actors and Roles
Submit Subscription Order	This use case describes the event of a potential member requesting to join the club by subscribing. ("Take any 12 CDs for one penny and agree to buy 4 more at regular prices within two years.")	• Potential member (primary business) • Distribution Center (external receiver)
Submit Subscription Renewal Order	This use case describes the event of a past member requesting to rejoin the club by subscribing. ("Take any 12 CDs for one penny and agree to buy 4 more at regular prices within two years.")	• Past member (primary business) • Distribution Center (external receiver)
Submit Member Profile Changes	This use case describes the event of a club member submitting changes to his or her profile for such things as postal address, e-mail address, privacy codes, and order preferences.	• Club member (primary business)
Place New Order	This use case describes the event of a club member submitting an order for SoundStage products.	• Club member (primary business) • Distribution Center (external receiver) • Accounts Payable/Receivable (external server)

continued

Sample Use-Case Glossary (cont.)

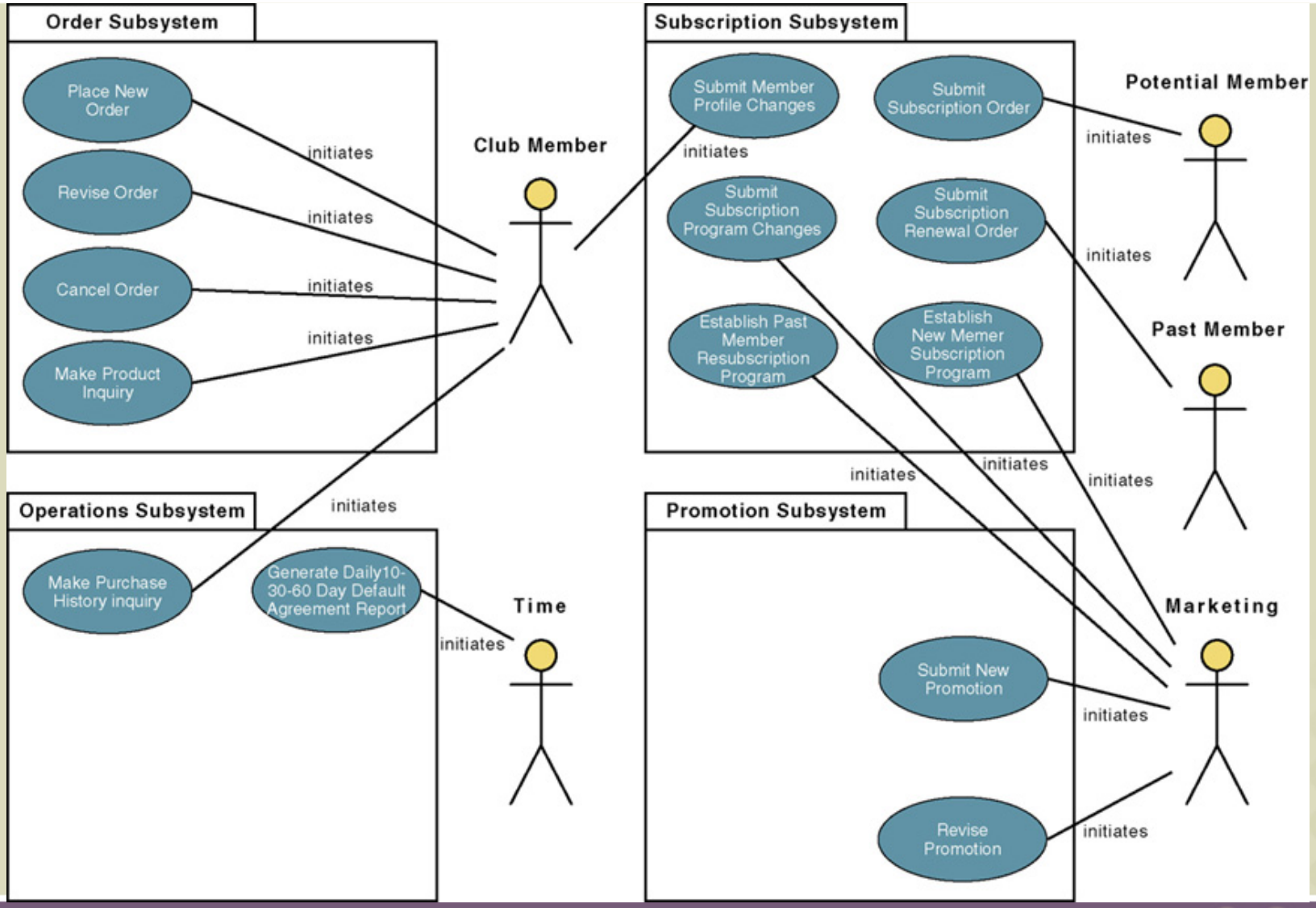
Revise Order	This use case describes the event of a club member revising an order previously placed. (Order must not have shipped.)	• Club member (primary business) • Distribution Center (external receiver) • Accounts Payable/Receivable (external server)
Cancel Order	This use case describes the event of a club member canceling an order previously placed. (Order must not have shipped.)	• Club member (primary business) • Distribution Center (external receiver) • Accounts Payable/Receivable (external server)
Make Product Inquiry	This use case describes the event of a club member viewing products for possible purchase. (Driven by web access requirement.)	• Club member (primary business)
Make Purchase History Inquiry	This use case describes the event of a club member viewing her or his purchasing history. (Three-year time limit.)	• Club member (primary business)

continued

Sample Use-Case Glossary (cont.)

Establish New Member Subscription Program	This use case describes the event of the marketing department establishing a new membership subscription plan to entice new members	• Marketing (primary business)
Submit Subscription Program Changes	This use case describes the event of the marketing department changing a subscription plan for club members (e.g., extending the fulfillment period).	• Marketing (primary business)
Establish Past Member Resubscription Program	This use case describes the event of the marketing department establishing a resubscription plan to lure back former members.	• Marketing (primary business)
Submit Member Profile Changes	This use case describes the event of the marketing department establishing a new promotion plan to entice active and inactive members to order the product. (Note: A promotion features specific titles, usually new, that the company is trying to sell at a special price. These promotions are integrated into a catalog sent (or communicated) to all members.)	• Marketing (primary business)
Revise Promotion	This use case describes the event of the marketing department revising a promotion.	• Marketing (primary business)
Generate Daily 10-30-60-Day Default Agreement Report	This use case describes the event of a report that is generated on a daily basis to list the members who have not fulfilled their agreement by purchasing the required number of products outlined when they subscribed. This report is sorted by members who are 10 days past due, 30 days past due, and 60 days past due.	• Time (initiating actor) • Member Services (primary* — external receiver)

Step 3: Construct Use-Case Model Diagram



Step 4: Document Business Requirements Use-Case Narratives

- Document first at high level to quickly obtain an understanding of the events and magnitude of the system.
- Then expand to a fully-documented business requirement narrative.
  - Include the use case's typical course of events and its alternate courses.

Sample High-Level Version of a Use-Case Narrative

Member Services System

Author (s): (1) _____ **Date:** (2) _____
Version: (3)

Use-Case Name:	Place New Order (4)	**Use-Case Type** **Business Requirements:** ☑ (5)
Use-Case ID:	MSS-BUC002.00 (6)	
Priority:	High (7)	
Source:	Requirement — MSS-R1.00 (8)	
Primary Business Actor:	Club member (9)	
Other Participating Actors:	• Warehouse (external receiver) • Accounts Receivable (external server) (10)	
Other Interested Stakeholders:	• Marketing — Interested in sales activity in order to plan new promotions. (11) • Procurement — Interested in sales activity in order to replenish inventory. • Management — Interested in order activity in order to evaluate company performance and customer (member) satisfaction.	
Description: (12)	This use case describes the event of a club member submitting a new order for SoundStage products. The member's demographic information as well as his or her account standing is validated. Once the products are verified as being in stock, a packing order is sent to the warehouse for it to prepare the shipment. For any product not in stock, a back order is created. On completion, the member will be sent an order confirmation.	

Sample Expanded Version of a Use-Case Narrative

Member Services System

Author (s): _____ **Date:** _____

Version:

Use-Case Name:	Place New Order	**Use-Case Type**
Use-Case ID:	MSS-BUC002.00	**Business Requirements:** ☑
Priority:	High	
Source:	Requirement — MSS-R1.00	
Primary Business Actor:	Club member	
Other Participating Actors:	• Warehouse (external receiver) • Accounts Receivable (external server)	
Other Interested Stakeholders:	• Marketing — Interested in sales activity in order to plan new promotions. • Procurement — Interested in sales activity in order to replenish inventory. • Management — Interested in order activity in order to evaluate company performance and customer (member) satisfaction.	
Description:	This use case describes the event of a club member submitting a new order for SoundStage products. The member's demographic information as well as his or her account standing is validated. Once the products are verified as being in stock, a packing order is sent to the warehouse for it to prepare the shipment. For any product not in stock, a back order is created. On completion, the member will be sent an order confirmation.	
Precondition: (1)	The party (individual or company) submitting the order must be a member.	
Trigger: (2)	This use case is initiated when a new order is submitted.	

continued

Sample Expanded Version of a Use-Case Narrative (cont)

Typical Course of Events: 3	Actor Action	System Response
	Step 1: The club member provides his or her demographic information as well as order and payment information.	**Step 2:** The system responds by verifying that all required information has been provided. **Step 3:** The system verifies the club member's demographic information against what has been previously recorded. **Step 4:** For each product ordered, the system validates the product identity. **Step 5:** For each product ordered, the system verifies the product availability. **Step 6:** For each available product, the system determines the price to be charged to the club member. **Step 7:** Once all ordered products are processed, the system determines the total cost of the order. **Step 8:** The system checks the status of the club member's account. **Step 9:** The system validates the club member's payment if provided. **Step 10:** The system records the order information and then releases the order to the appropriate distribution center (warehouse) to be filled. **Step 10:** Once the order is processed, the system generates an order confirmation and sends it to the club member.

continued

Sample Expanded Version of a Use-Case Narrative (cont)

Alternate Courses: 4	**Alt-Step 2:** The club member has not provided all the information necessary to process the order. The club member is notified of the discrepancy and prompted to resubmit. **Alt-Step 3:** If the club member information provided is different from what was previously recorded, verify what was recorded is current, then update the club member information accordingly. **Alt-Step 4:** If the product information the club member provided does not match any of SoundStage's products, notify the club member of the discrepancy and request clarification. **Alt-Step 5:** If the quantity ordered of the product is not available, a back order is created. **Alt-Step 8:** If the status of the club member's account is not in good standing, record the order information and place it in hold status. Notify the club member of the account status and the reason the order is being held. Terminate use case. **Alt-Step 9:** If the payment the club member provided (credit card) cannot be validated, notify the club member and request an alternative means of payment. If the club member cannot provide an alternate means, cancel the order and terminate the use case.
Conclusion: 5	This use case concludes when the club member receives a confirmation of the order.
Postcondition: 6	The order has been recorded and if the ordered products were available, they were released. For any product not available a back order has been created.
Business Rules: 7	• The club member responding to a promotion or a member using credits may affect the price of each ordered item. • Cash or checks will not be accepted with the orders. If provided, they will be returned to the club member. • The club member is billed for products only when they are shipped.
Implementation Constraints and Specifications: 8	• GUI to be provided for Member Services associate, and web screen to be provided for club member.
Assumptions: 9	Procurement will be notified of back orders by a daily report (separate use case).
Open Issues: 10	1. Need to determine how distribution centers are assigned.

concluded

Use Cases and Project Management

- Use-case model can drive entire development effort.
- Project manager or systems analyst uses business requirements use cases to estimate and schedule the build cycles of the project.
  - Build cycles are scoped on the basis of the importance of the use case and the time it takes to implement the use case.
- To determine importance of use cases, will create:
  - Use-case ranking and evaluation matrix
  - Use-case dependency diagram

Use-Case Ranking and Priority Matrix

- In most projects, the most important use cases are developed first.

Use-case ranking and priority matrix – a tool used to evaluate use cases and determine their priority.

- Evaluates use cases on 1-5 scale against six criteria.
  1. Significant impact on the architectural design.
  2. Easy to implement but contains significant functionality.
  3. Includes risky, time-critical, or complex functions.
  4. Involves significant research or new or risky technology.
  5. Includes primary business functions.
  6. Will increase revenue or decrease costs.

Sample Use-Case Ranking and Priority Matrix

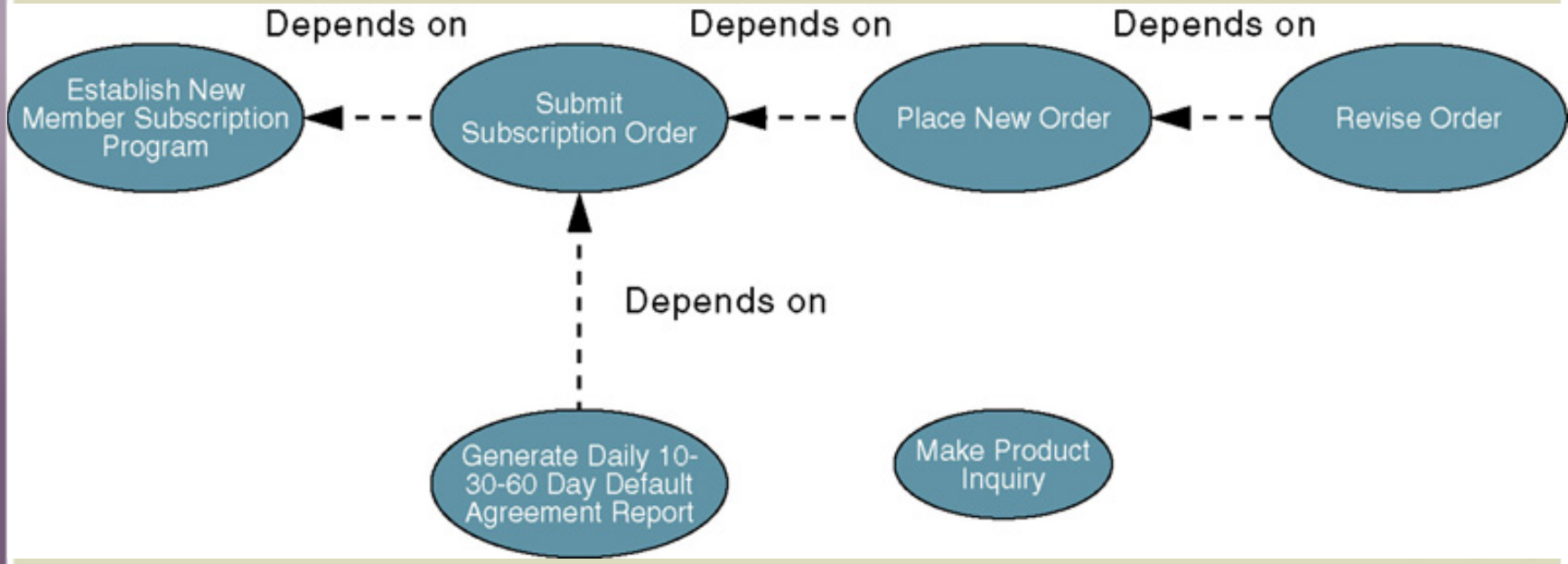
Use-Case Name	Ranking Criteria, 1 to 5						Total Score	Priority	Build Cycle
	1	2	3	4	5	6			
Submit Subscription Order	5	5	5	4	5	5	29	High	1
Place New Order	4	4	5	4	5	5	27	High	2
Make Product Inquiry	1	1	1	1	1	1	6	Low	3
Establish New Member Subscription Program	4	5	5	3	5	5	27	High	1
Generate Daily 10-30-60-Day Default Agreement Report	1	1	1	1	1	1	6	Low	3
Revise Order	2	2	3	3	4	4	18	Medium	2

Use-Case Dependency Diagram

Use-case dependency diagram – graphical depiction of the dependencies among use cases.

- Provides the following benefits:
  - Graphical depiction of the system's events and their states enhances understanding of system functionality.
  - Helps identify missing use cases.
  - Helps facilitate project management by depicting which use cases are more critical.

Sample Use-Case Dependency Diagram



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TUGAS

Apakah diagram fishbone cukup efektif digunakan dalam analisis dan mengapa?

Jawab :

Diagram tulang ikan atau fishbone adalah salah satu metode / tool di dalam meningkatkan kualitas. Sering juga diagram ini disebut dengan diagram sebab-akibat atau cause effect diagram. Penemunya adalah seorang ilmuwan jepang pada tahun 60-an. Bernama Dr. Kaoru Ishikawa, ilmuwan kelahiran 1915 di Tikyo Jepang yang juga alumni teknik kimia Universitas Tokyo. Sehingga sering juga disebut dengan diagram Ishikawa. Metode tersebut awalnya lebih banyak digunakan untuk manajemen kualitas. Yang menggunakan data verbal (non-numerical) atau data kualitatif.

Dikatakan Diagram Fishbone (Tulang Ikan) karena memang berbentuk mirip dengan tulang ikan yang moncong kepalanya menghadap ke kanan. Diagram ini akan menunjukkan sebuah dampak atau akibat dari sebuah permasalahan, dengan berbagai penyebabnya. Efek atau akibat dituliskan sebagai moncong kepala. Sedangkan tulang ikan diisi oleh sebab-sebab sesuai dengan pendekatan permasalahannya. Dikatakan diagram Cause and Effect (Sebab dan Akibat) karena diagram tersebut menunjukkan hubungan antara sebab dan akibat. Berkaitan dengan pengendalian proses statistikal, diagram sebab-akibat dipergunakan untuk menunjukkan faktor-faktor penyebab (sebab) dan karakteristik kualitas (akibat) yang disebabkan oleh faktor-faktor penyebab itu.

Diagram Fishbone cukup efektif digunakan dalam analisis karena dapat membantu dan memampukan setiap orang atau organisasi/perusahaan dalam menyelesaikan masalah dengan tuntas sampai ke akarnya. Kebiasaan untuk mengumpulkan beberapa orang yang mempunyai pengalaman dan keahlian memadai menyangkut problem yang dihadapi oleh perusahaan. Semua anggota tim memberikan pandangan dan pendapat

dalam mengidentifikasi semua pertimbangan mengapa masalah tersebut terjadi. Kebersamaan sangat diperlukan di sini, juga kebebasan memberikan pendapat dan pandangan setiap individu. Jadi dengan adanya diagram ini sangat bermanfaat bagi perusahaan, tidak hanya dapat menyelesaikan masalah sampai akarnya namun bisa mengasah kemampuan berpendapat bagi orang – orang yang masuk dalam tim identifikasi masalah perusahaan yang dalam mencari sebab masalah menggunakan diagram tulang ikan.

Dengan adanya diagram Fishbone ini sebenarnya memberi banyak sekali keuntungan bagi dunia bisnis. Selain memecahkan masalah kualitas yang menjadi perhatian penting perusahaan, masalah – masalah klasik lainnya juga terselesaikan. Masalah – masalah klasik yang ada di industri manufaktur khusunya antara lain :

a. keterlambatan proses produksi
b. tingkat defect (cacat) produk yang tinggi
c. mesin produksi yang sering mengalami trouble
d. output lini produksi yang tidak stabil yang berakibat kacaunya plan produksi
e. produktivitas yang tidak mencapai target
f. komplain pelanggan yang terus berulang

Namun, pada dasarnya diagram Fishbone dapat dipergunakan untuk kebutuhan-kebutuhan berikut :

a. Membantu mengidentifikasi akar penyebab dari suatu masalah.
b. Membantu membangkitkan ide-ide untuk solusi suatu masalah.
c. Membantu dalam penyelidikan atau pencarian fakta lebih lanjut.
d. Mengidentifikasi tindakan (bagaimana) untuk menciptakan hasil yang diinginkan.
e. Membahas issue secara lengkap dan rapi.
f. Menghasilkan pemikiran baru.

Jadi ditemukannya diagram Fishbone memberikan kemudahan dan menjadi bagian penting bagi penyelesaian masalah yang mucul bagi perusahaan.

Penerapan diagram Fishbone dapat menolong kita untuk dapat menemukan akar “penyebab” terjadinya masalah khususnya di industri manufaktur dimana

prosesnya terkenal dengan banyaknya ragam variabel yang berpotensi menyebabkan munculnya permasalahan. Apabila “masalah” dan “penyebab” sudah diketahui secara pasti, maka tindakan dan langkah perbaikan akan lebih mudah dilakukan. Dengan diagram ini, semuanya menjadi lebih jelas dan memungkinkan kita untuk dapat melihat semua kemungkinan “penyebab” dan mencari “akar” permasalahan sebenarnya.

Apabila ingin menggunakan Diagram Fishbone , kita terlebih dahulu harus melihat, di departemen, divisi dan jenis usaha apa diagram ini digunakan. Perbedaan departemen, divisi dan jenis usaha juga akan mempengaruhi sebab – sebab yang berpengaruh signifikan terhadap masalah yang mempengaruhi kualitas yang nantinya akan digunakan.

Nama : Rahmi

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Menurut saya diagram fishbone cukup efektif digunakan dalam analisis. karena diagram fishbone ini merupakan sebuah diagram sebab-akibat atau sering disebut juga dengan cause effect diagram. diagram ini mampu menunjukkan sebuah dampak atau akibat dari sebuah permasalahannya dengan berbagai penyebabnya. dengan diagram ini, semua masalah menjadi lebih jelas dan memungkinkan kita dapat melihat semua kemungkinan "penyebab" dan mencari "akar"

Nama : Rani Okta Felani

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Mata Kuliah : Advanced is Analisis and Design

Dosen Pengampu : M. Izman Herdiansyah, M.M, Ph.D

EL- 6

Apakah Diagram Fishbone cukup efektif digunakan dalam analisis , mengapa ?

Jawab :

Diagram Fishbone cukup efektif digunakan dalam menganalisa masalah proses ketika ada banyak kemungkinan penyebab masalah karena tujuannya adalah untuk menentukan tindakan korektif atau perubahan proses yang di perlukan. Tehnik ini dapat memakan waktu tetapi sangat bermanfaat karena bisa mencatat semua faktor yang mungkin menjadi penyebab masalah sehingga dapat didiskusikan , di evaluasi dan di prioritaskan.

PASCA SARJANA

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TUGAS ELEARNING 6

SOAL!

Apakah diagram fishbone cukup efisien digunakan dalam analysis, mengapa.?

Jawaban !

Diagram *fishbone* atau tulang ikan adalah salah satu metode / tool di dalam menigkatkan kualitas. Sering juga diagram ini disebut dengan diagram sebab – akibat atau *ceuse effect fiagram.* Dikatakan diagram tulang ikan (*Fishbi\one)* karena memang berbentuk mirip dengan tulang ikan yang moncong kepalanya menghadap ke kanan. Diagram ini akan menunjukkan sebuah dampak atau akibat dari sebuah permasalahan dengan berbagai penyebab. Efek atau akibat dituliskan sebagai moncong kepala. Sedangkan tulang ikan di isi oleh sebab – sebab sesuai dengan pendekatan permasalahan.

Menurut saya diagram fishbone ini cukup efisien untuk digunakan dalam analysis, karen diagram ini mempu menyelesaikan dan mengorganisasi penyebab – penyebab yang mungkin timbul dari suatu efek sepesifik dan kemudian memisahkan akar penyebabnya. Di agram ini juga selain mampu memecahkan masalah kualitas yang menjadi perhatian penting perusahaan masalah – masalah klasik lainya juga terselesaikan.

Apabila ingin menggunakan diagram fishbone, kita terlebih dahulu melihat, di departemen, devisi dan jenis uasaha apa diagram ini digunakan. Perbedaan departemen, devisi dan jenis usaha juga akan mempengaruhi sebab – sebab yang berpengaruh signifikan terhadap masalah nantinya akan digunakan.

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Tugas E-L 6 (Rumusan berdasarkan topik diskusi forum E-L 6)

Menurut saya Diagram Fishbone cukup efektif dalam melakukan analisis karena diagram fishbone dapat membantu mengidentifikasi akar penyebab dari suatu masalah dan membantu menemukan ide-ide untuk solusi suatu masalah. Pada dasarnya diagram fishbone memang dipergunakan untuk mengidentifikasi akar penyebab dari suatu permasalahan, mendapatkan ide-ide yang dapat memberikan solusi untuk pemecahan suatu masalah, membantu dalam pencarian dan penyelidikan fakta lebih lanjut.

Dalam membuat *Fishbone Diagram*, ada beberapa tahapan yang harus dilakukan, yakni :

1. Mengidentifikasi masalah : identifikasikan masalah yang sebenarnya sedang dialami. Masalah yang diidentifikasi yang akan menjadi pusat perhatian dalam proses pembuatan *fishbone diagram*.

2. Mengidentifikasi faktor-faktor utama masalah : dari masalah yang ada, maka ditentukan faktor-faktor utama yang menjadi bagian dari permasalahan yang ada. Faktor ini dapat berupa sumber daya manusia, metode yang digunakan, cara produksi, dan lain sebagainya.

3. Menemukan kemungkinan penyebab dari setiap faktor : dari setiap faktor utama yang menjadi pangkal masalah, maka perlu ditemukan kemungkinan penyebab. Kemungkinan penyebab dapat ditemukan dengan cara melakukan *brain storming* atau analisa keadaan dengan observasi.

4. Melakukan analisa hasil diagram yang sudah dibuat : setelah membuat *fishbone diagram*, maka dapat dilihat semua akar penyebab masalah. Dari akar penyebab yang sudah ditemukan, perlu dianalisa lebih jauh prioritas dan signifikansi dari

penyebabnya. Kemudian dapat dicari tau solusi untuk menyelesaikan masalah yang ada dengan menyelesaikan akar masalah.

Nama : Arpa Pauziah

Mata Kuliah : Advanced Is Analysis And Design

Pertanyaan:

Apakah diagram fishbone cukup efektif digunakan dalam analisis.mengapa?

Tanggapan:

Diagram fishbone cukup efektif digunakan dalam analisis karena Diagram Fishbone atau sering juga disebut dengan istilah Diagram Ishikawa. Penyebutan diagram ini sebagai Diagram Ishikawa karena yang mengembangkan model diagram ini adalah Dr. Kaoru Ishikawa pada sekitar Tahun 1960-an. Diagram Fishbone bentuknya menyerupai kerangka tulang ikan yang bagian-bagiannya meliputi kepala (masalah utama), sirip (faktorfaktor penyebab), dan duri (rincian dari faktor penyebab). Diagram Fishbone ini umumnya digunakan pada tahap mengidentifikasi permasalahan dan menentukan penyebab dari munculnya permasalahan tersebut. Selain digunakan untuk mengidentifikasi masalah dan menentukan penyebabnya, diagram Fishbone ini juga dapat digunakan pada proses perubahan.

Nama : Elpina Sari

Nim : 192420050

Tugas 6 E-L

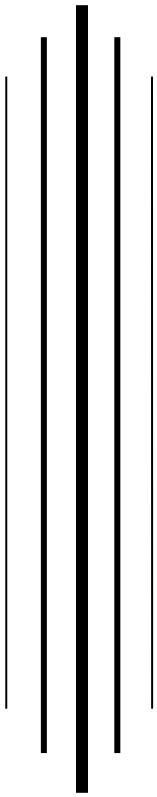
Apakah diagram fishbone cukup efektif digunakan dalam analisis.mengapa?

Jawaban :

Iya, diagram fishbone cukup efektif digunakan dalam analisis karena diagram fishbone salah satu metode atau tool yang berfungsi untuk meningkatkan kualitas dalam analisis sebuah sistem yang merupakan alat terstruktur untuk melakukan *brainstorming*, yang secara khusus dibuat untuk membantu tim mengidentifikasi potensi penyebab masalah. Diagram ini akan sangat efektif untuk menganalisa masalah proses ketika ada banyak kemungkinan penyebab masalah. Tujuannya adalah untuk menemukan "sebab-sebab" dan akhirnya menentukan tindakan korektif atau perubahan proses yang diperlukan. Teknik ini dapat memakan waktu, tetapi sangat bermanfaat karena bisa mencatat semua faktor yang mungkin menjadi penyebab masalah, sehingga dapat didiskusikan, dievaluasi, dan diprioritaskan.

TUGAS ADVANCE IS ANALYSIS AND DESIGN

Diagram Fishbone



DISUSUN OLEH:

FADEL MUHAMMAD MADJID

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PROGRAM PASCA SARJANA MAGISTER TEKNIK INFORMATIKA

UNIVERSITAS BINA DARMA

Ada banyak metode untuk mengetahui akar penyebab dari masalah yang muncul diperusahaan. Metode – metode tersebut antara lain : Brainstorming, Bertanya Mengapa beberapakali (WHY – WHY) dan metode Diagram Fishbone (Tulang Ikan)/ Cause and Effect (Sebab dan Akibat)/ Ishikawa. Pada kesempatan ini yang dibicarakan adalah metode yang ke 3 yakni Diagram Fishbone (Tulang Ikan)/ Cause and Effect (Sebab dan Akibat)/ Ishikawa

Diagram tulang ikan atau fishbone adalah salah satu metode / tool di dalam meningkatkan kualitas. Sering juga diagram ini disebut dengan diagram Sebab-Akibat atau cause effect diagram. Penemunya adalah seorang ilmuwan jepang pada tahun 60-an. Bernama Dr. Kaoru Ishikawa, ilmuwan kelahiran 1915 di Tikyo Jepang yang juga alumni teknik kimia Universitas Tokyo. Sehingga sering juga disebut dengan diagram ishikawa. Metode tersebut awalnya lebih banyak digunakan untuk manajemen kualitas. Yang menggunakan data verbal (non-numerical) atau data kualitatif. Dr. Ishikawa juga ditengarai sebagai orang pertama yang memperkenalkan 7 alat atau metode pengendalian kualitas (7 tools). Yakni fishbone diagram, control chart, run chart, histogram, scatter diagram, pareto chart, dan flowchart.

Dikatakan Diagram Fishbone (Tulang Ikan) karena memang berbentuk mirip dengan tulang ikan yang moncong kepalanya menghadap ke kanan. Diagram ini akan menunjukkan sebuah dampak atau akibat dari sebuah permasalahan, dengan berbagai penyebabnya. Efek atau akibat dituliskan sebagai moncong kepala. Sedangkan tulang ikan diisi oleh sebab-sebab sesuai dengan pendekatan permasalahannya. Dikatakan diagram Cause and Effect (Sebab dan Akibat) karena diagram tersebut menunjukkan hubungan antara sebab dan akibat. Berkaitan dengan pengendalian proses statistikal, diagram sebab-akibat dipergunakan untuk untuk menunjukkan faktor-faktor penyebab (sebab) dan karakteristik kualitas (akibat) yang disebabkan oleh faktor-faktor penyebab itu.

Diagram Fishbone telah menciptakan ide cemerlang yang dapat membantu dan memampukan setiap orang atau organisasi/perusahaan dalam menyelesaikan masalah dengan tuntas sampai ke akarnya. Kebiasaan untuk mengumpulkan beberapa orang yang mempunyai pengalaman dan keahlian memadai menyangkut problem yang dihadapi oleh perusahaan Semua anggota tim memberikan pandangan dan pendapat dalam mengidentifikasi semua pertimbangan mengapa masalah tersebut terjadi. Kebersamaan sangat diperlukan di sini, juga kebebasan memberikan pendapat dan pandangan setiap individu. Jadi sebenarnya dengan adanya diagram ini sangatlah bermanfaat bagi perusahaan, tidak hanya dapat menyelesaikan masalah sampai akarnya namun bisa mengasah kemampuan berpendapat bagi orang – orang yang masuk dalam tim identifikasi masalah perusahaan yang dalam mencari sebab masalah menggunakan diagram tulang ikan.

Manfaat Diagram Fishbone

Fungsi dasar diagram Fishbone (Tulang Ikan) adalah untuk mengidentifikasi dan mengorganisasi penyebab-penyebab yang mungkin timbul dari suatu efek spesifik dan kemudian memisahkan akar penyebabnya . Sering dijumpai orang mengatakan “penyebab yang

mungkin" dan dalam kebanyakan kasus harus menguji apakah penyebab untuk hipotesa adalah nyata, dan apakah memperbesar atau menguranginya akan memberikan hasil yang diinginkan.

Dengan adanya diagram Fishbone ini sebenarnya memberi banyak sekali keuntungan bagi dunia bisnis. Selain memecahkan masalah kualitas yang menjadi perhatian penting perusahaan. Masalah – masalah klasik lainnya juga terselesaikan. Masalah – masalah klasik yang ada di industri manufaktur khusunya antara lain adalah : a) keterlambatan proses produksi, b) tingkat defect (cacat) produk yang tinggi, c) mesin produksi yang sering mengalami trouble, d) output lini produksi yang tidak stabil yang berakibat kacaunya plan produksi, e) produktivitas yang tidak mencapai target, f) complain pelanggan yang terus berulang.

Namun, pada dasarnya diagram Fishbone dapat dipergunakan untuk kebutuhan-kebutuhan berikut :a) Membantu mengidentifikasi akar penyebab dari suatu masalah, b) Membantu membangkitkan ide-ide untuk solusi suatu masalah, c) Membantu dalam penyelidikan atau pencarian fakta lebih lanjut, d) Mengidentifikasi tindakan (bagaimana) untuk menciptakan hasil yang diinginkan, e) Membahas issue secara lengkap dan rapi, f) Menghasilkan pemikiran baru. Jadi ditemukannya diagram Fishbone memberikan kemudahan dan menjadi bagian penting bagi penyelesaian masalah yang mucul bagi perusahaan.

Penerapan diagram Fishbone dapat menolong kita untuk dapat menemukan akar "penyebab" terjadinya masalah khususnya di industri manufaktur dimana prosesnya terkenal dengan banyaknya ragam variabel yang berpotensi menyebabkan munculnya permasalahan. Apabila "masalah" dan "penyebab" sudah diketahui secara pasti, maka tindakan dan langkah perbaikan akan lebih mudah dilakukan. Dengan diagram ini, semuanya menjadi lebih jelas dan memungkinkan kita untuk dapat melihat semua kemungkinan "penyebab" dan mencari "akar" permasalahan sebenarnya.

Apabila ingin menggunakan Diagram Fishbone , kita terlebih dahulu harus melihat, di departemen, divisi dan jenis usaha apa diagram ini digunakan. Perbedaan departemen, divisi dan jenis usaha juga akan mempengaruhi sebab – sebab yang berpengaruh signifikan terhadap masalah yang mempengaruhi kualitas yang nantinya akan digunakan.

Cara Membuat Diagram Fishbone

Dalam hal melakukan Analisis Fishbone, ada beberapa tahapan yang harus dilakukan, yakni 1). Menyiapkan sesi analisa tulang ikan. 2). Mengidentifikasi akibat atau masalah. 3). Mengidentifikasi berbagai kategori sebab utama. 4). Menemukan sebab-sebab potensial dengan cara sumbang saran. 5). Mengkaji kembali setiap kategori sebab utama. 6). Mencapai kesepakatan atas sebab-sebab yang paling mungkin

Cara yang lain dalam menyusun Diagram Fishbone dalam rangka mengidentifikasi penyebab suatu keadaan yang tidak diharap adalah sebagai berikut:

- Mulai dengan pernyataan masalah-masalah utama penting dan mendesak untuk diselesaikan.
- Tuliskan pernyataan masalah itu pada kepala ikan, yang merupakan akibat (effect). Tulislah pada sisi sebelah kanan dari kertas (kepala ikan), kemudian gambarkan tulang belakang dari kiri ke kanan dan tempatkan pernyataan masalah itu dalam kotak.
- Tuliskan faktor-faktor penyebab utama (sebab-sebab) yang mempengaruhi masalah kualitas sebagai tulang besar, juga ditempatkan dalam kotak. Faktor-faktor penyebab atau kategori-kategori utama dapat dikembangkan melalui Stratifikasi ke dalam pengelompokan dari faktor-faktor: manusia, mesin, peralatan, material, metode kerja, lingkungan kerja, pengukuran, dll. Atau stratifikasi melalui langkah-langkah aktual dalam proses. Faktor -faktor penyebab atau kategori-kategori dapat dikembangkan melalui brainstorming. Berikut beberapa pendekatan yang bisa dijadikan panduan untuk merumuskan faktor-faktor utama dalam mengawali pembuatan Diagram Cause and Effect:

a) Pendekatan The 4 M's (digunakan untuk perusahaan manufaktur). Faktor-faktor utama yang bisa dijadikan acuan menurut pendekatan ini adalah 1) Machine (Equipment), 2) Method (Process/Inspection), 3) Material (Raw, Consumables dll.), 4) Man power.

b) Pendekatan The 8 P's (digunakan pada industri jasa). Menurut pendekatan ini, ada setidaknya 8 hal yang bisa dijadikan acuan sebagai faktor utama antara lain 1) People, 2) Process, 3) Policies, 4) Procedures, 5) Price, 6) Promotion, 7) Place/Plant, 8) Product

c) PendekatanThe 4 S's (digunakan pada industri jasa). Pendekatan ini memberikan acuan 4 faktor utama antara lain 1) Surroundings, 2) Suppliers, 3) Systems, 4) Skills

d) Pendekatan 4 P (pendekatan manajemen pemasaran). Pendekatan yang menggunakan perspektif manajemen pemasaran untuk memberikan faktor utama yang bisa dijadikan acuan yakni 1) Price, 2) Product 3) Place, 4) Promotion

- Tuliskan penyebab-penyebab sekunder yang mempengaruhi penyebab-penyebab utama (tulang-tulang besar), serta penyebab-penyebab sekunder itu dinyatakan sebagai tulang-tulang berukuran sedang.
- Tuliskan penyebab-penyebab tersier yang mempengaruhi penyebab-penyebab sekunder (tulang-tulang berukuran sedang), serta penyebab-penyebab tersier itu dinyatakan sebagai tulang-tulang berukuran kecil.
- Tentukan item-item yang penting dari setiap faktor dan tandailah faktor-faktor penting tertentu yang kelihatannya memiliki pengaruh nyata terhadap karakteristik kualitas. Untuk mengetahui faktor-faktor penyebab dari suatu masalah yang sedang dikaji kita dapat mengembangkan pertanyaan-pertanyaan berikut :Apakah penyebab itu? Mengapa kondisi atau penyebab itu terjadi? Bertanya "Mengapa" beberapa kali (konsep five whys) sampai ditemukan penyebab yang cukup spesifik untuk diambil tindakan peningkatan. Penyebab-penyebab spesifik itu yang dimasukkan atau dicatat ke dalam diagram sebab-akibat.

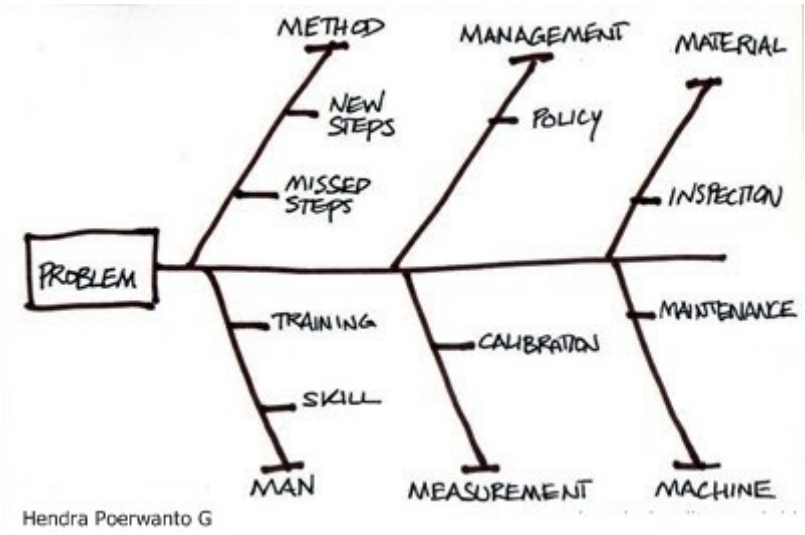
Kelebihan/ Kekurangan Diagram FishBone

Kelebihan Fishbone diagram adalah dapat menjabarkan setiap masalah yang terjadi dan setiap orang yang terlibat di dalamnya dapat menyumbangkan saran yang mungkin menjadi penyebab masalah tersebut. Sedang Kekurangan Fishbone diagram adalah opinion based on tool dan di design membatasi kemampuan tim / pengguna secara visual dalam menjabarkan masalah yang mengunakan metode "level why" yang dalam, kecuali bila kertas yang digunakan benar – benar besar untuk menyesuaikan dengan kebutuhan tersebut. Serta biasanya voting digunakan untuk memilih penyebab yang paling mungkin yang terdaftar pada diagram tersebut.

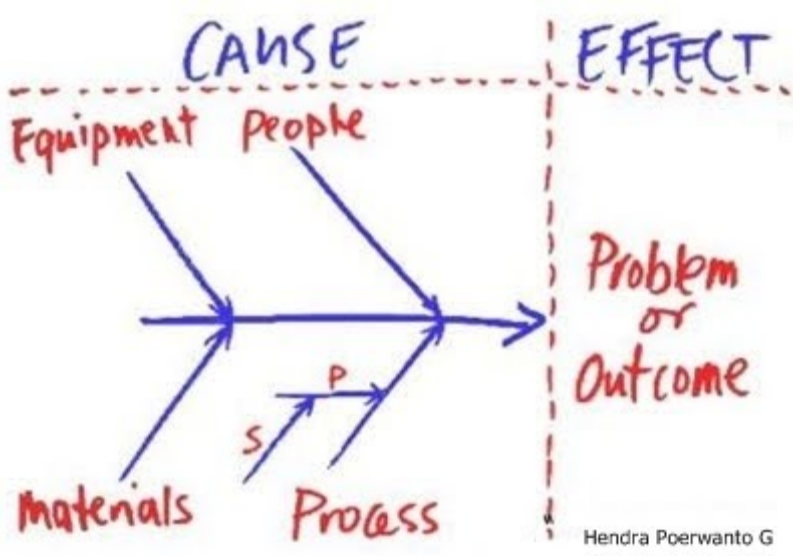
Contoh Bentuk Dasar Diagram Fishbone

Ada banyak bentuk dasar Diagram Fishbone yang dapat diadikan acuan. Berikut ini diberikan format dasar dari Diagram Fishbone yang sekiranya dapat memberikan inspirasi dalam penerapan dan pengembangan lebih jauh yang disesuaikan situasi dan kondisi yang ada. Ada yang penggambaran Cause ditulis di tulang ikan sebelah kiri dan Effect di kepala ikan, namun ada pula yang sebaliknya.

Contoh 01 bentuk dasar Diagram Fishbone



Contoh 2 bentuk dasar Diagram Fishbone

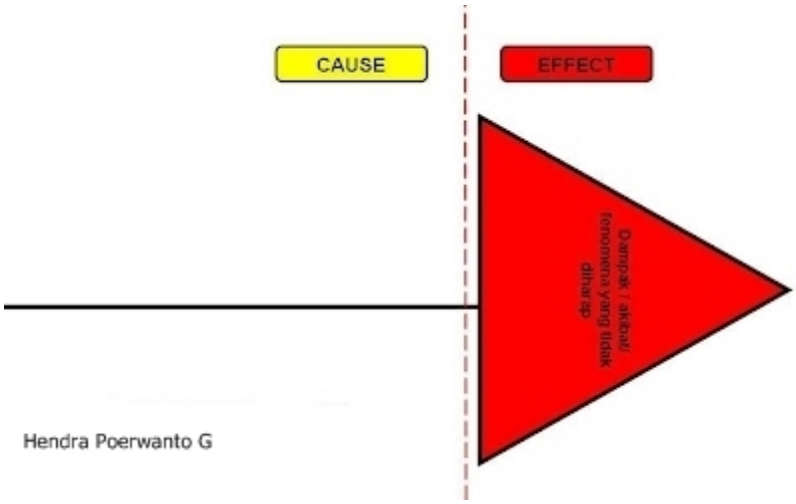


Contoh Penerapan Diagram Fishbone

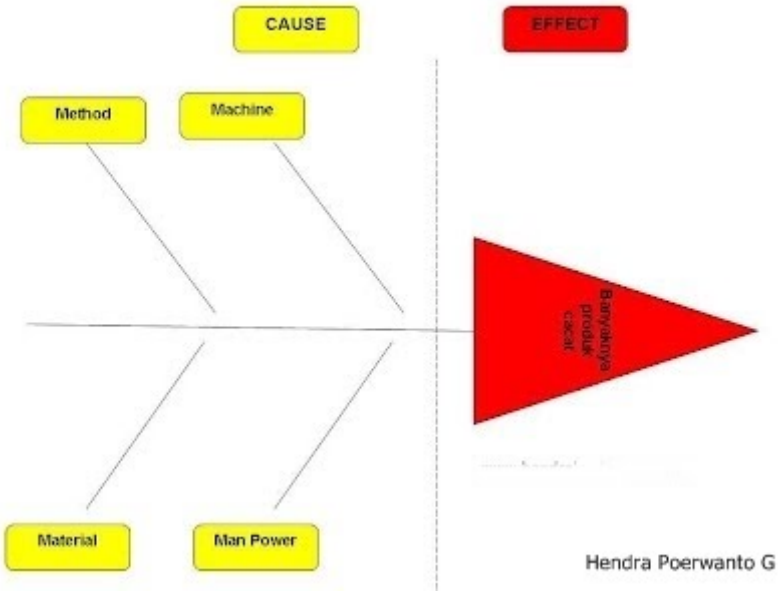
Perusahaan ABC bergerak di bidang manufaktur. Perusahaan ini memproduksi sepatu olahraga, karena begitu pesatnya pertumbuhan pasar sehingga memaksa perusahaan ini menjaga kualitas agar tetap bisa bersaing dengan para pesaingnya. Namun pada kuartal akhir tahun 20xx perusahaan ini mengalami penuruanan penjualan karena produk dinilai cacat oleh distributor. Untuk mengatasi permasalahan ini, manajer produksi diminta menganalisa dan mencari akar permasalahan sehingga banyak produk yang cacat, sehingga diharapkan penjualan produk awal tahun depan bisa meningkat. Namun sebelum manajer produksi melakukan analisa, sudah ada evaluasi yang menjelaskan bahwa banyaknya produk cacat dikarenakan rendahnya kualitas bahan baku sepatu yang didapat. Manajer produksi, akhirnya menetapkan ingin menggunakan Diagram Cause and Effect sebagai bahan pencari akar penyebab dari masalah tersebut.

Langkah awal yang dilakukan adalah Manajer produksi menentukan Masalah yang terjadi. Masalah yang muncul misalnya " banyaknya produk cacat".

Langkah ke dua adalah menuliskan masalah tersebut pada kepala ikan yang merupakan akibat atau effect.

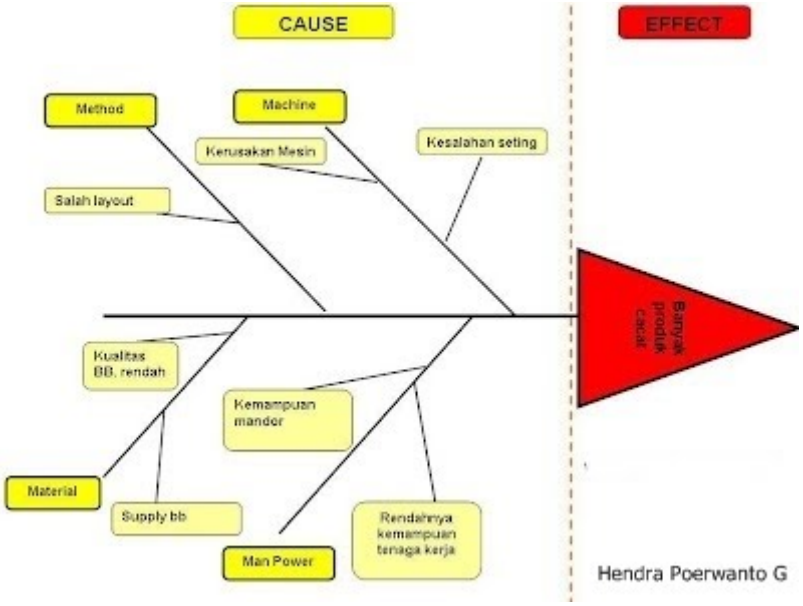


Langkah ketiga, Manajer produksi menuliskan faktor – faktor yang mungkin menjadi penyebab utama masalah pada banyaknya produk cacat di akhir kuartal tahun 20xx. Dimisalkan yang menjadi faktor penyebab utama masalah ini adalah : a) Machine (Mesin), b) Method (Metode atau proses produksi), c) Material (Bahan baku), d) Man power (Tenaga kerja).

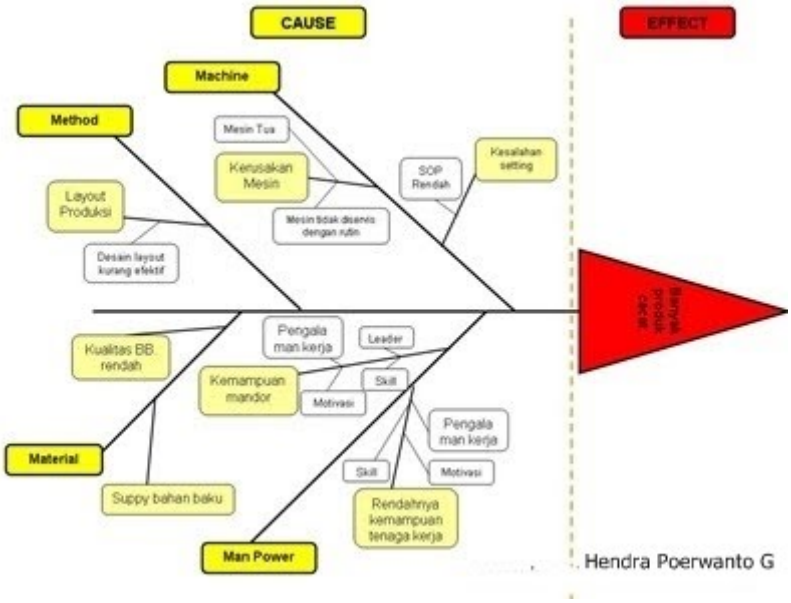


Langkah Keempat. Pada tahap ini manajer produksi mencari penyebab – penyebab sekunder yang mungkin mempengaruhi penyebab utama. misalnya kemungkinan penyebab masalah sekunder pada tulang Machine bersumber dari kerusakan mesin dan kesalahan setting mesin produksi. Kemungkinan penyebab masalah sekunder pada tulang Metode dimisalkan terkait layout produksi. Kemungkinan penyebab masalah sekunder pada Tulang Material misalkan disebabkan oleh dua kemungkinan yakni kualitas bahan baku rendah dan pemasok

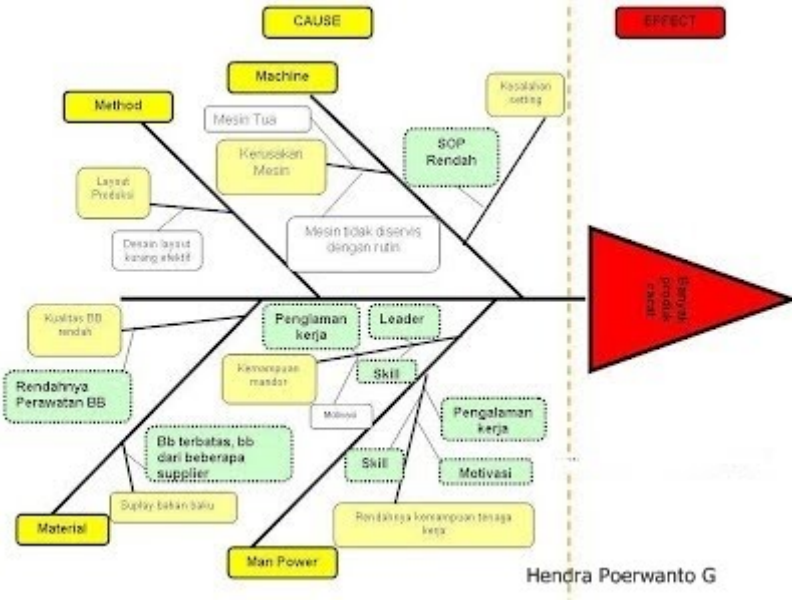
barang baku. Sedangkan, kemungkinan penyebab masalah sekunder pada tulang Man Power dimisalkan berasal dari kemampuan tenaga kerja dan kemampuan mandor.



Pada langkah kelima, manajer produksi mencari penyebab – penyebab tersier yang mungkin bisa mempengaruhi penyebab – penyebab sekunder. Jadi terjadi analisis lagi pada tahap ini. Apabila memang tidak ditemukan penyebab tersier, penyebab sekunder dinyatakan cukup menjadi akar permasalahan pada tiap pokok tulang permasalahan. Diandaikan hasil analisis penyebab tersier pada kasus ini yakni 1). Kemungkinan penyebab masalah tersier pada tulang Machine bagian tulang kerusakan mesin adalah mesin tua dan mesin tidak diservis dengan rutin. Sedang kemungkinan penyebab tersier pada tulang kesalahan setting mesin produksi adalah rendahnya pengetahuan tentang SOP. 2). Kemungkinan penyebab masalah tersier pada tulang Method pada bagian tulang layout produksi bersumber dari desain layout yang kurang efektif. 3). Kemungkinan Penyebab masalah tersier pada tulang Material dimisalkan tidak ada, dan 4) Kemungkinan penyebab masalah tersier pada tulang Man Power bagian tulang kemampuan tenaga kerja dimisalkan menyangkut keterampilan, pengalaman kerja, dan motivasi. Sementara penyebab tersier pada bagian tulang kemampuan mandor dimisalkan juga terkait dengan pengalaman kerja, motivasi, keterampilan dan kepemimpinan.



Pada langkah keenam, manajer produksi menetukan item-item yang penting dari seiap faktor pada hasil diagram langkah kelima dan menandai (dalam hal ini diberi warna hijau) bahwa faktor-faktor tersebut yang paling mungkin mempunyai pengaruh nyata terhadap banyaknya produk sepatu yang cacat



Dari diagram tulang ikan di atas dapat dilihat bahwa ternyata, banyaknya produk cacat tidak hanya disebabkan oleh material atau bahan baku yang tidak berkualitas, namun juga dipengaruhi oleh tenaga kerja, metode atau system operasi dan mesin yang digunakan.

Tahap terakhir adalah Kesimpulan. Dari hasil analisis, Manajer produksi menyimpulkan

ada beberapa cara yang dapat dilakukan untuk kembali menjaga kualitas produk untuk awal kuartal tahun 2011 yaitu :

Dari analisis fishbone diperoleh kesimpulan yang memberkan gambaran spesifik tentang penyebab dari suatu efek atau problem. Temuan penyebab yang spesifik tersebut menjadi dasar untuk mendisain atau merancang program solutif untuk mengatasi efek atau persoalan. (Hendra Poerwanto G)