

Chapter 5

Fact-Finding Techniques for Requirements Discovery

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 to aid in problem solving.
- Understand the concept of requirements management.
- Identify and characterize seven fact-finding techniques and characterize the advantages and disadvantages of each.
- Understand the importance of effective listening.
- Understand what body language and proxemics are and why a systems analyst should care.

Objectives (cont'd)

- Characterize the typical participants in a JRP session and describe their roles.
- Complete the planning process for a JRP session, including selecting and equipping the location, selecting the participants, and preparing an agenda to guide the JRP session.
- Describe several benefits of JRP as fact-finding technique.
- Describe a fact-finding strategy that will make the most of your time with end-users.

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

Relative Cost to Fix an Error

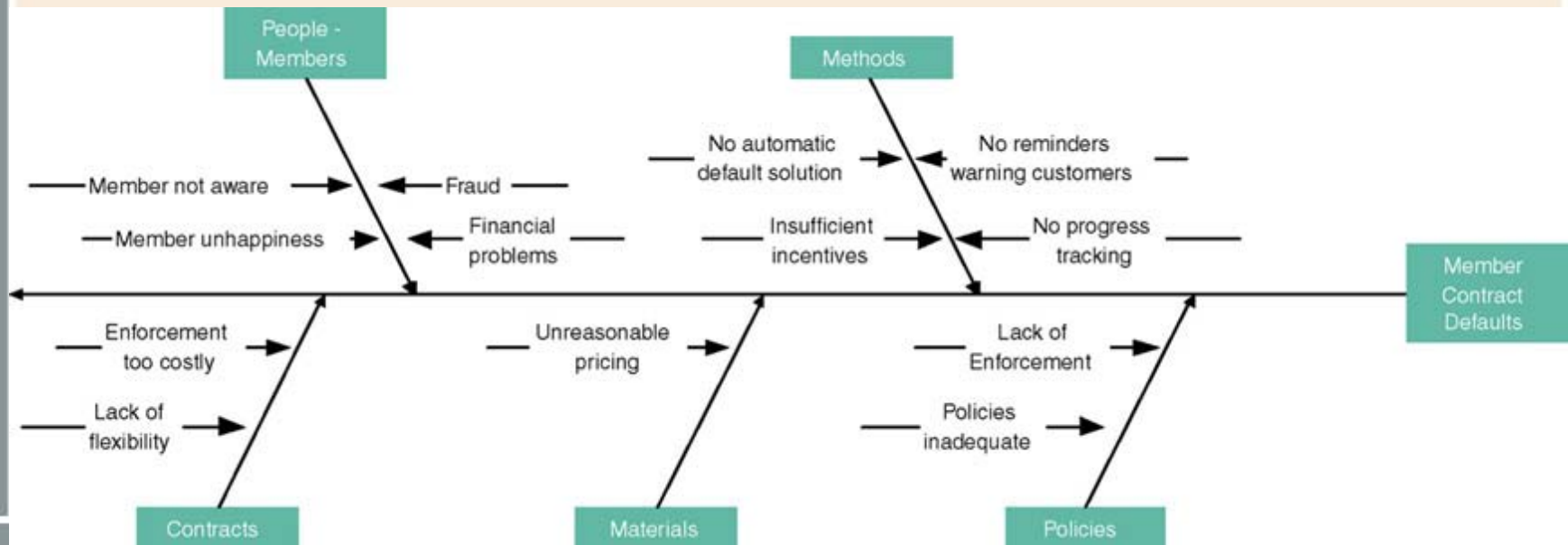
Phase in Which Error Discovered	Cost Ratio
Requirements	1
Design	3-6
Coding	10
Development Testing	15-40
Acceptance Testing	30-70
Operation	40-1000

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.

Seven Fact-Finding Techniques

- 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 = $0.25 \times (\text{Certainty factor}/\text{Acceptable error})^2$
- 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

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: <ul style="list-style-type: none">• 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	

Sample Interview Guide (concluded)

1 min.	<p>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?</p> <p>Follow-up</p>	
1 min.	<p>Question 5 Who are the individuals who perform the credit checks?</p> <p>Follow-up</p>	
1 to 3 min.	<p>Question 6 May I have permission to talk to those individuals to learn specifically how they carry out the credit-checking process?</p> <p>Follow-up If so: When would be an appropriate time to meet with each of them?</p>	
1 min.	<p>Objective Conclude the interview:</p> <ul style="list-style-type: none"> • Thank Mr. Bently 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.

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

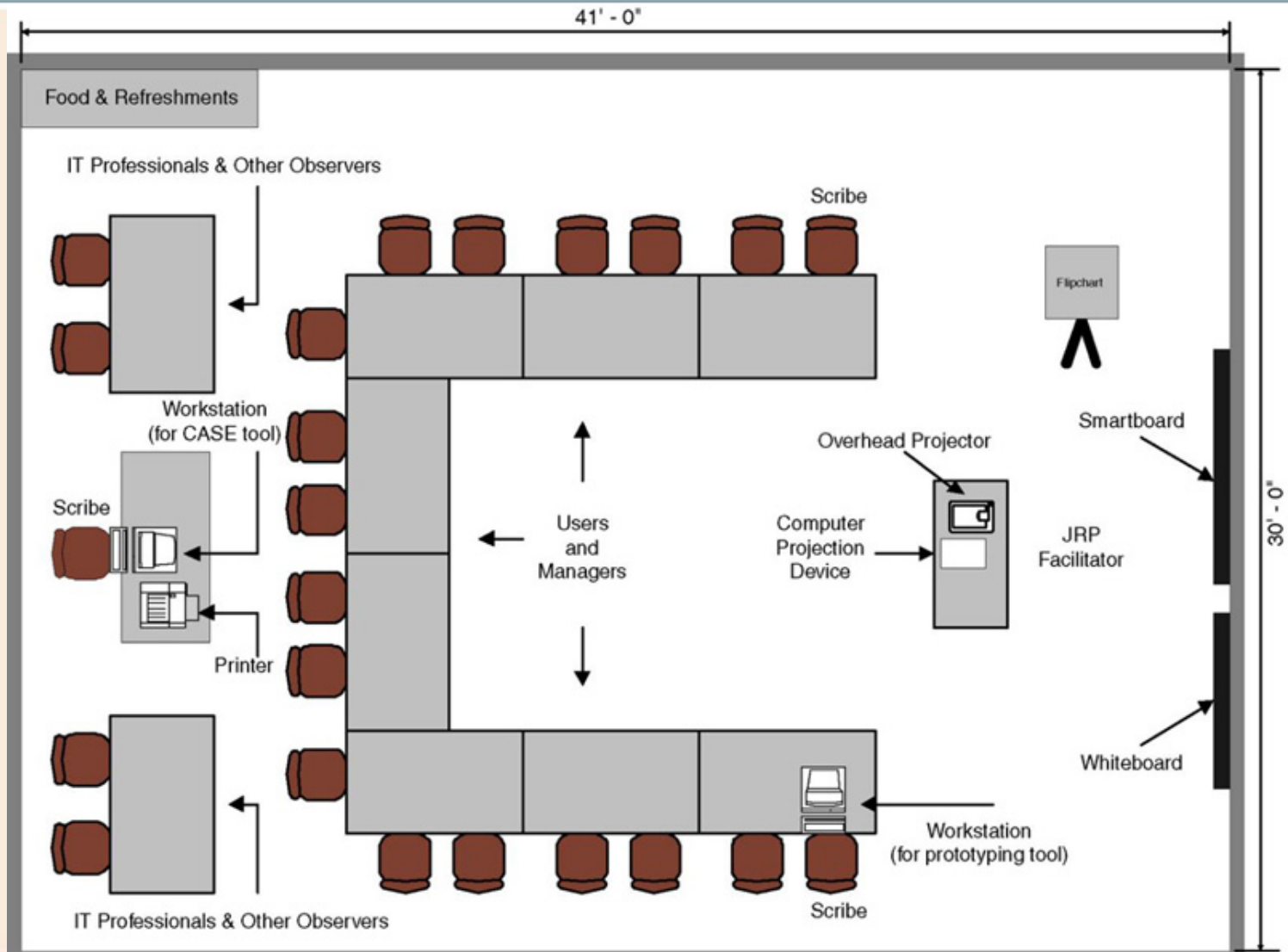
2. Selecting the participants

- 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.

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.