Chapter Six  Requirements Discovery

- 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 seven fact-finding techniques and characterize the advantages and disadvantages of each.
- Understand six guidelines for doing effective listening.
- Understand what body language and proxemics are, and why a systems analyst should care.
- 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 using JRP as a fact-finding technique.
- Describe a fact-finding strategy that will make the most of your time with end-users.

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.

• The system may cost more than projected.
• The system may be delivered later than promised.
• The system may not meet the users’ expectations and that dissatisfaction may cause them not to use it.
• Once in production, the costs of maintaining and enhancing the system may be excessively high.
• The system may be unreliable and prone to errors and downtime.
• The reputation of the IT staff on the team is tarnished because any failure, regardless of who is at fault, will be perceived as a mistake by the team.
Relative Cost to Fix an Error

### Phase in Which Error Discovered

<table>
<thead>
<tr>
<th>Phase</th>
<th>Cost Ratio</th>
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<tbody>
<tr>
<td>Requirements</td>
<td>1</td>
</tr>
<tr>
<td>Design</td>
<td>3-6</td>
</tr>
<tr>
<td>Coding</td>
<td>10</td>
</tr>
<tr>
<td>Development Testing</td>
<td>15-40</td>
</tr>
<tr>
<td>Acceptance Testing</td>
<td>30-70</td>
</tr>
<tr>
<td>Operation</td>
<td>40-1000</td>
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</table>

Criteria to Define System Requirements

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

The Process of Requirements Discovery

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

Ishikawa Diagram (Problem Discovery and Analysis)

The Ishikawa diagram is a 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.

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 includes:
  - Systems analysts must not misuse that information.
  - Systems analysts must protect that 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

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

**Fact-finding** – the formal process of using research, meetings, questionnaires, sampling, and other techniques to collect information about system problems, requirements, and preferences. It is also called **information gathering** or **data collection.**
Chapter 6 - Requirements Discovery

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).

Documenting and Analyzing Requirements

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

Requirements Definition Outline

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.

Sampling – the 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
Sampling of Existing Documentation, Forms, and Files

- Determining the sample size:
  \[ \text{Sample Size} = 0.25 \times \left( \frac{\text{Certainty factor}}{\text{Acceptable error}} \right)^2 \]

  - 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.

<table>
<thead>
<tr>
<th>Desired Certainty</th>
<th>Certainty Factor</th>
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<tbody>
<tr>
<td>95%</td>
<td>1.960</td>
</tr>
<tr>
<td>50%</td>
<td>1.645</td>
</tr>
<tr>
<td>10%</td>
<td>1.000</td>
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</tbody>
</table>

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 – 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.

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

- **Advantages?**
- **Disadvantages?**

**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.
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.

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

- Can be used to:
  - Find facts
  - Verify facts
  - Clarify facts
  - Generate enthusiasm
  - Get the end user involved
  - Identify requirements
  - Solicit ideas and opinions

- Advantages?
- Disadvantages?

Unstructured interview - an interview that is 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 - an interview in which the interviewer has a specific set of questions to ask of the interviewee.

Open-ended question - a question that allows the interviewee to respond in any way that seems appropriate.

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

Types of Interviews and Questions

Unstructured interview
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- a question that restricts answers to either specific choices or short, direct responses.

Procedure to Conduct an Interview

1. Select Interviewees
   - End users
   - Learn about individual prior to the interview
2. Prepare for the Interview
   - An interview guide is a checklist of specific questions the interviewer will ask the interviewee.
   - See Figure 6-3
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 (continued)
• 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.

<table>
<thead>
<tr>
<th>Do</th>
<th>Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Be courteous</td>
<td>• Continuing an interview unnecessarily.</td>
</tr>
<tr>
<td>• Listen carefully</td>
<td>• Assuming an answer is finished or leading nowhere.</td>
</tr>
<tr>
<td>• Maintain control</td>
<td>• Revealing verbal and nonverbal clues.</td>
</tr>
<tr>
<td>• Probe</td>
<td>• Using jargon</td>
</tr>
<tr>
<td>• Observe mannerisms and nonverbal</td>
<td>• Revealing your personal biases.</td>
</tr>
<tr>
<td>communication</td>
<td>• Talking instead of listening.</td>
</tr>
<tr>
<td>• Be patient</td>
<td>• Assuming anything about the</td>
</tr>
<tr>
<td>• Keep interviewee at ease</td>
<td>topic and the interviewee.</td>
</tr>
<tr>
<td>• Maintain self-control</td>
<td>• Tape recording — a sign of poor listening skills.</td>
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</table>

• Guidelines for Communicating
  – Approach the Session with a Positive Attitude
  – Set the Other Person at Ease
  – Let Them Know You Are Listening
  – Ask Questions
  – Don’t Assume Anything
  – Take Notes

”To hear is to recognize that someone is speaking, to listen is to understand what the speaker wants to communicate.”
(Gildersleeve – 1978)

Body language – the nonverbal information we communicate.
  – Facial disclosure
  – Eye contact
  – Posture

Proxemics – the relationship between people and the space around them.
  – Intimate zone—from 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 – the act of building a small-scale, representative or working model of the users’ requirements in order to discover or verify those requirements.
  – Advantages?
  – Disadvantages?

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
   – See Figure 6-4
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.