Fact-Finding Techniques for Requirements Discovery

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An Introduction to Requirements Discovery

- To develop a system, we must be able to identify, analyze, and understand the user requirements and the system requirements. **The process and techniques that a system analyst uses to identify, analyze and understand system requirements are referred to as requirement discovery.**
- System Requirements specify the property and quality that an information system should have. System requirements that specify what the information system must do is referred to as **functional requirement,** while **non-functional requirements** specify the property and quality of the system.

Functional requirement and non-functional requirement

- **Requirements**, which are related to functional/working aspect of software fall into this category.
- **Non Functional requirements** are the expected characteristics of the target software. (Security, Storage, Configuration, performance, Cost, Flexibility, Disaster, recovery, Accessibility.)

functional requirement and non-functional requirement

- A **functional requirement** defines a system or its component.
- A **non-functional requirement** defines the quality attribute of a software system.

Functional Requirements	Non Functional Requirements
A functional requirement defines a system or its component.	A non-functional requirement defines the quality attribute of a software system.
It specifies "What should the software system do?"	It places constraints on "How should the software system fulfill the functional requirements?"
Functional requirement is specified by User.	Non-functional requirement is specified by technical peoples e.g. Architect, Technical leaders and software developers.
It is mandatory.	It is not mandatory.

Failure in identifying the requirements may result to following issues

- The system may cost more than the estimated cost.
- The system may be delivered much later than the estimated time.
- The system may not meet the user's expectations.
- The cost of maintaining and operating may be very high.
- The system may be unreliable and may have errors.
- The reputation of the organization may also get worse.

While defining system requirements, it is important that they meet the following criteria

- **Consistent:** the requirements should not be conflicting.
- **Complete:** the requirements should describe all possible inputs and responses.
- **Feasible:** the requirements should be satisfied based on the available resources.
- **Required:** are the requirements truly needed?
- **Accurate:** are the requirements correctly stated.
- **Traceable:** do the requirements directly map to the functions and features of the system.
- **Verifiable: can** the requirements be demonstrated during testing.

The Process of Requirement Discovery

1. Problem Discovery and Analysis
2. Requirement Discovery
3. Documenting and Analysis
4. Requirement Management

Problem Discovery and Analysis

- A Popular tool used by system development team to identify, analyze and solve problems is an Ishikawa diagram.
- Ishikawa diagram is a graphical tool used to identify, explore and depict problems and the causes and effects of those problems.
- It is referred to as cause-and-effect diagram.
- It is also referred to as fishbone diagram. (It resembles the skeleton of a fish). This diagram developed by Kaoru Ishikawa.
- He was the pioneered of Quality Mgt. Process in Kawasaki shipyard,Japan. He was the founding fatherof Modern management.

Problem Discovery and Analysis

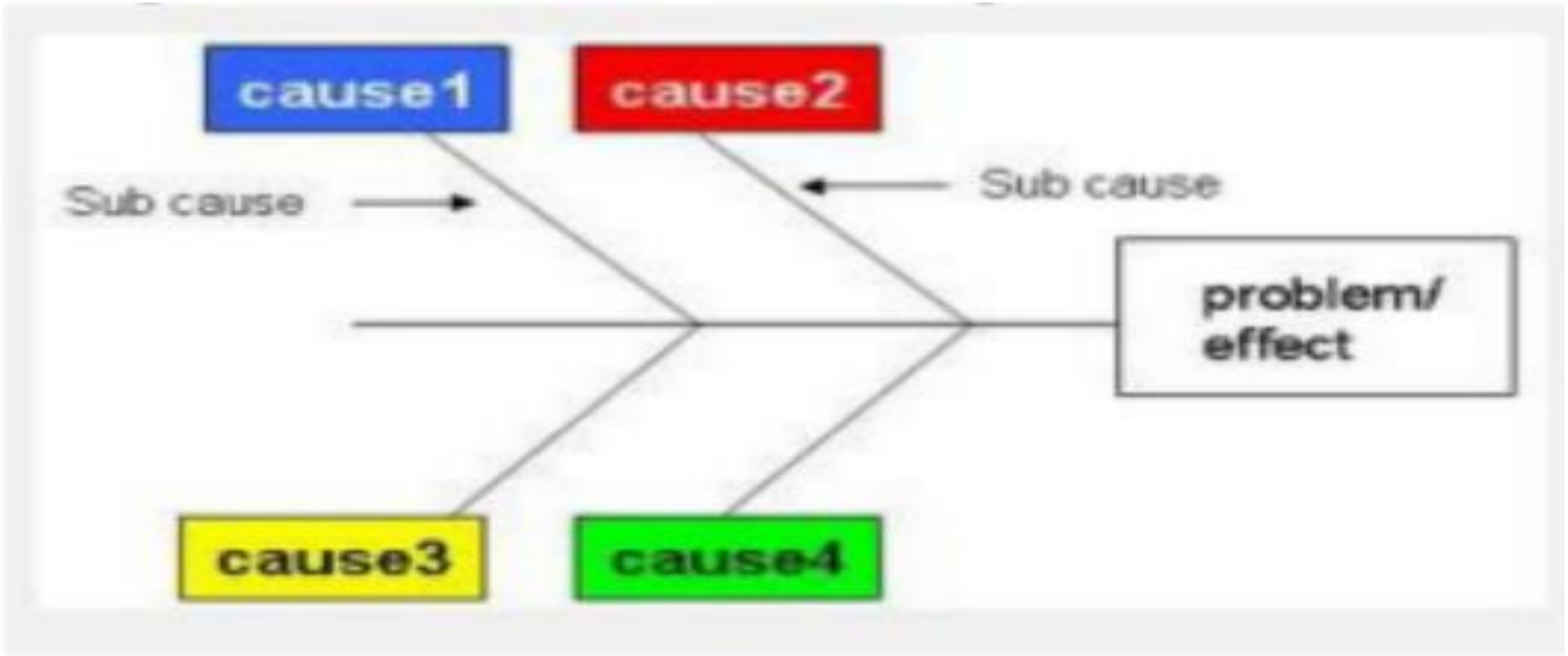

Figure: Ishikawa diagram

Problem Discovery and Analysis

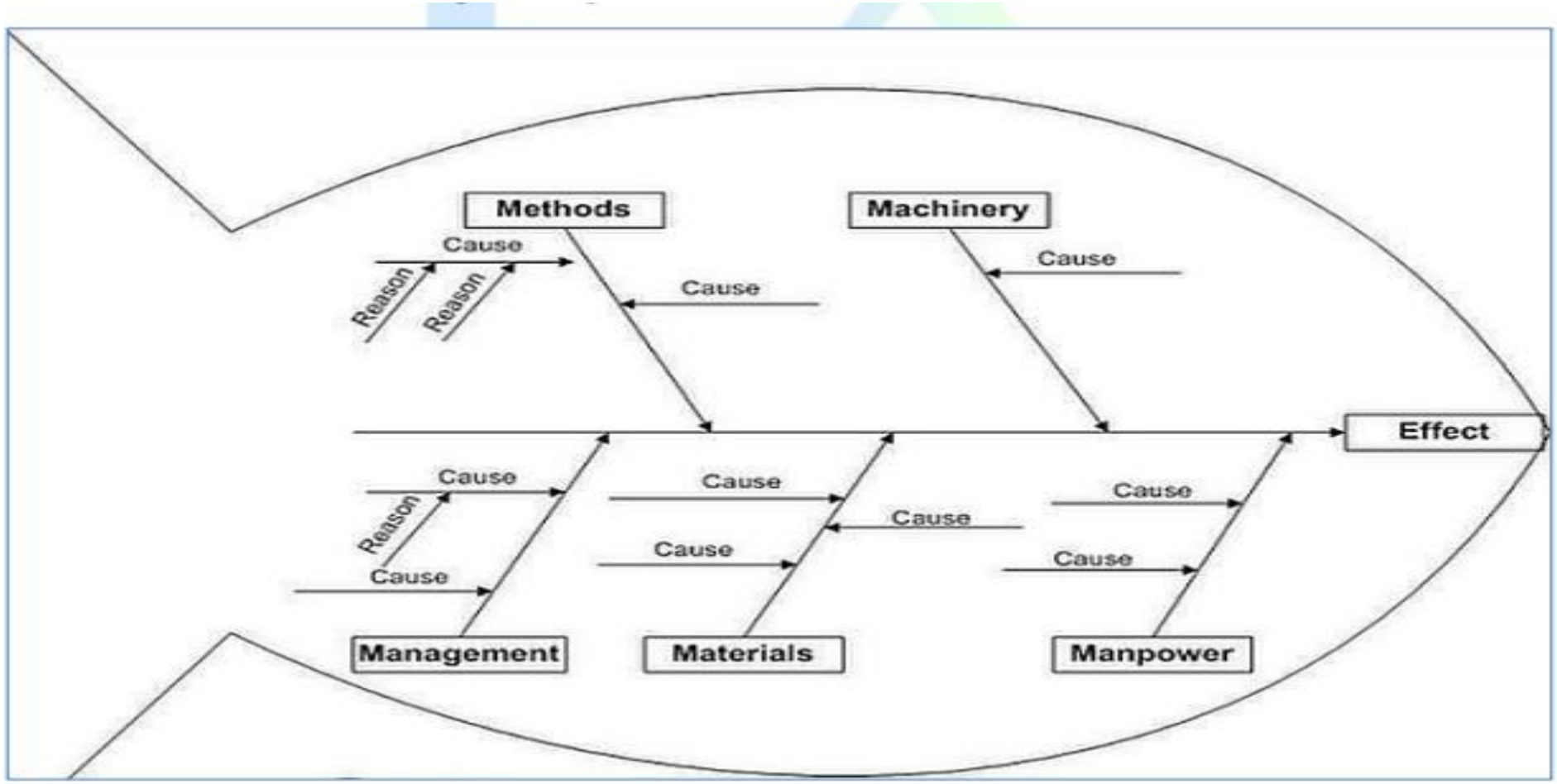

Fig: A Simple Ishikawa Diagram

Requirement Discovery

- Once the problems of a system domain are well understood, the system analyst can start to define the requirements. System Analysts should have adequate knowledge about the **fact-finding** technique that is used across the entire development cycle.
- The fact-finding technique is extremely important in the requirement analysis phase that tries to collect all the possible requirements of the system development process. Once the fact-finding process it completed, tools like use case, data models, process models and object models can be made to draw conclusion of those facts.
- Fact-finding is the most critical phase in requirement discovery to identify information, functional and communication vision, and to identify the business knowledge process.

Documenting and Analysis

- Once the fact-finding process is started, **system analyst starts to collect and document the information in an organized and meaningful way**. The documentation of the facts provides direction for analyzing the requirements and **to determine the correct requirements of the system**.
- Once all the requirements are identified, the system analyst **formalizes them by presenting in a document** that will be reviewed and approved by the users and the owners.
- The documentation of the facts and the requirements goes through the following activities:

Documenting and Analysis

1. **Documenting The Draft Requirements:**
   - The initial findings are recorded in a draft form. The use case diagrams, decision tables and requirement tables are used to document the system functions, business policies, decision making rules and the specific requirements of the system.
2. **Analyzing The Requirements:**
   - The primary objective of requirement analysis is to discover and solve the various problems of the initial requirements that are collected. It analyzes the initial requirement comparing with the following list of problems:
     - Missing requirements
     - Conflicting requirements
     - Infeasible requirements
     - Overlapping requirements

Documenting and Analysis

3. Formalizing Requirements:

- The system requirements are documented in a formalized way and they are presented to the system users and the owners. This document serves as a formal contract between the system owners and the document team.
- The formal document is also referred to as a requirement statement, requirement specification or the requirement definition . Most companies, uses the document format and the naming conventions used in such formal documents while preparing other documents as well.
- The requirement statement finally serves as a formalized standard and a document format for the future documentation of the organization.

Requirement Management

- The requirements of a system changes and new requirements may arise even after documenting all the possible requirements.
- To solve the problems caused by new and changing requirements, it is necessary to perform the requirement management, which is the process of managing changes in the requirements. It consists of procedures, policies and processes to handle the change in requirements.
- It specifies how a change should be submitted, how it is analyzed for impact to cost, schedule and scope, how it is approved or rejected, and how the change is implemented if approved.

Requirement Fact Finding Techniques:

- The different fact finding techniques are:
  - Sampling of existing documentation, forms and files
  - Research and site visits
  - Observation of the work environment
  - Questionnaires Interviews
  - Discovery Prototyping
  - joint Requirements planning

Sampling of existing documentation, forms and files

- Initially, System analyst should get the facts from the existing documentation rather than asking the people. The system analyst should collect the facts from the following types of documents:
  - Memos, studies, minutes, suggestion box notes, customer complaints, reports
  - Accounting records, performance reviews, and their reports
  - Information system project requests

Research and Site Visits:

- Second fact-finding technique is thoroughly researching the problem domain. Most problems are not completely unique. Other people have solved them before us.
- Many times organizations contact or perform site visits with companies because they have faced similar problems previously. If these companies are "willing to share" valuable information can be obtained that may save tremendous time and cost in the development process.
- Exploring the internet and intranet via personal computer can provide immeasurable amounts of information.

0bservation of Work Environment:

- Observation is one of the most effective data-collection techniques for learning about a system. Observation involves the systems analyst becoming an observer of people and activities in order to learn about the system.
- This technique is often used when the validity of data collected through other methods is in question or when the complexity of certain aspects of the system prevents a clear explanation by the end users.
- Collection of facts by observing people at work: is a technique to observe work environment

Questionnaires:

- Another fact-finding technique is conducting surveys through questionnaires. The
- document can be mass-produced and distributed to respondents, who can then complete the questionnaire on their own time.
- Questionnaires allow the analyst to collect facts from a large number of people while maintaining uniform responses. When dealing with a large audience, no other fact-finding technique can tabulate the same facts as efficiently.

Types of Questionnaires:

A. Free Format Questionnaires:

- They are designed to allow the users to exercise more freedom or latitude in their answers to each question. Responses to such question may be difficult to tabulate. It is also possible that the respondents' answers may not match the question asked.
- In order to ensure useful responses in free-format questionnaires, the analyst should ask questions that can be answered with three or few sentences. Otherwise, the questionnaire may take up more time than the respondent is willing to sacrifice.

B. Fixed Format Questionnaires:

- They are more rigid, requiring that the user select an answer from a predefined set of possible answers. Given any question, the respondent must choose from the available answers. This makes the results much easier to tabulate. On the other hand, the respondent cannot provide additional information that might prove valuable.

Interviews

- The personal interview is generally recognized as the most important and most often used fact-finding technique. Personal interviews involve soliciting requirements through direct, face-to-face interaction.
- Interviewing can be used to achieve any or all of the following goals: find facts, verify facts, clarify facts, generate enthusiasm, get the end user involved, identify requirements, and solicit ideas and opinions.
- There are two roles assumed in an interview. The system analyst is the interviewer, responsible for organizing and conducting the interview. The system user or system owner is the interviewee, who asked to respond to a series of questions. There may be one or more interviewers or interviewees.

Types of Interviews:

a. Unstructured Interview:

Involves asking general questions and may get off track from the objective. Are usually not used in system analysis and design. Unstructured interviews tend to involve asking **Open-ended questions.**

b. Structured Interview:

Involves asking specific questions regarding the objective of the interview. Structured interviews tend to involve asking **Closed-ended questions.**

How to Conduct an Interview:

- Interview is a form of persona l oral communication. In business or other fields, interviews are conducted for employment purposes, to get information and to give information. Sometimes exit interviewers are also conducted. At least two types of people are involved in the interview.
- One is interviewer and the other is interviewee. Since interviewing is a form of persona l communication between two or among more people, there are no hard and fast rules to follow. Still, there are some guidelines for the interviewer.

Guidelines for the Interviewer:[1]

- **Plan The Interview:**

  You conduct interview because you need information. So, first of all, you should determine what information you need. Make list of questions and use it as the outline.

- **Put The Interviewee At Ease:**
  - Use social skills; start with a friendly talk on a point of common interest.
- **Explain The Purpose:**
  - The interviewee should know the purpose of interview from the very beginning. If he/she does not know explain clearly and honestly. Generally it is known.
- **Allow The Interviewee Do Most Of Talking:**
  - You can get the information you seek only when the interviewee talks. Some people are reluctant to talk. So, try to put them at ease and get them into an informal relaxed mood.

Guidelines for the Interviewer:[2]

- **Guide The Interview:**
  - Although the interviewee does the talking, your task is to guide the interview. You should follow the plan you setup at beginning. Ask specific questions and end the answers when you have the information.
- **Listen To The Interviewee:**
  - You should listen carefully to all that the interviewee says. In addition to listening, you should give the appearance of listening.
- **Record The Information:**
  - We may forget whatever he interviewee says. Information can be recorded during the interview or soon after. If you need detailed information, take notes during the interview. Explain the purpose of recording notes/information.
- **End The Interview:**
  - Because you are in charge of the interview. You are the one who should end it. You should avoid letting the conversation train off to meaningless talk. Ask finalizing question like "is there anything else you would like to ask or tell me? (Pause) if not, thanks for giving us your time.''

Discovery Prototyping

- The process of building a prototype for the purpose of identifying requirements is referred as discovery prototyping.
- Discovery prototyping is frequently applied to systems development projects,especially in cases where the development team is having problems defining the system requirements.
- The philosophy is that the users will recognize their requirements when they see them. It isimportant to develop prototype quickly so that it can be used during the development process. Usually, only the areas where the requirements are not clearly understood are prototyped.
- Many areas of a proposed system may not be clearly understood, or some features may be a technical challenge for the developers. Creating discovery prototypes enables the developers as well as the users to better understand and refine the issues involved with developing the system.
- This technique helps to minimize the risk of delivering a system that doesn't meet the user's needs or that can't fulfill the technical requirements.

Joint Requirements Planning

- It is a process where highly structured group meetings are conducted for analyzing problems and defining the requirements. It is a team approach and generally requires extensive training of the members. JRP is becoming popular in system planning and analysis to obtain acceptance on problems, objectives and requirements.
- The following are the participants of a JRP session:
  - **Sponsor**: single person, who is in top management. Starts the meeting and also gives closing remarks
  - **Facilitator**: single person who plays the role of leader. Leads all sessions, and has excellent communication, negotiation, business and organization skills.
  - **Users and Managers:**
  - **Scribes**: people responsible for keeping records of everything discussed in the meeting. The records are later published
  - **IT Staff**: do not speak until invited to speak.

A Fact-Finding Strategy:

- An analyst needs an organized method for collecting facts. Analysts should first collect all the facts they can by using other methods. Consider the following step-by-step strategy:
  1. Learn from existing documents, forms, reports, and files. Analysts can learn a lot without any people contact.
  2. If appropriate, observe the system in action.
  3. Given all the facts already collected, design and distribute questionnaires to clear up things that aren't fully understood.
  4. Conduct interviews.
  5. Build discovery prototypes for any functional requirements
  6. Follow up. Use appropriate fact-finding technique to verify facts.
- Although a fact-finding strategy should be developed for every pertinent phase of systems development, every project is unique. Sometimes observation and questionnaires may be inappropriate. But the idea should always collect as many facts as possible before using interviews.