Fact-Finding Techniques for Requirements Discovery

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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 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 analysing requirements
- Requirements management

Requirements Discovery

- Given an understanding 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 Analysing Requirements

- Documenting the draft requirements
  - Use cases
  - Decision tables
  - Requirements tables
- Analysing requirements to resolve problems
  - Missing requirements
  - Conflicting requirements
  - Infeasible requirements
  - Overlapping requirements
  - Ambiguous requirements
- Formalising 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 Methods

1. Sampling of existing documentation, forms, and databases
2. Research and site visits
3. Observation of the work environment
4. Questionnaires
5. Interviews
6. Prototyping
7. Joint requirements planning (JRP)

Sampling Existing Documentation, Forms, & Files

- Sampling - process of collecting a representative sample of documents, forms, and records
  - Organisation chart
  - Memos and other documents that describe the problem
  - Standard operating procedures for current system
  - Completed forms
  - Manual and computerised 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 organisation 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

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

Observation

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

Questionnaires

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

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 recognised 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

Interviews

Disadvantages

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

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 minimise time spent on fact-finding

Discovery Prototyping

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 analysing 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 (Product Owner)
- Facilitator
- Users and Managers
- Scribes
- IT Staff

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 realised

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

References

[1] Ivar Jacobsen, Grady Booch & James Rumbaugh The Unified Software Development Process, Addison Wesley, 1999.