

Systems Analysis and Design Chapter 4

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Requirements Analysis

Identifying Requirements

Correct systems can only be built if you know exactly

what the system must do



Systems Analyst

- Therefore most important factor in building correct systems is to first clearly define what the system must do
- For that we should have a better communication between system users and the analyst.



Requirements Analysis

Importance of Communication

- Analyst must ensure that no ambiguities arise, during the discussions between various people involved in the analysis phase
- Different jargon used by different people may cause problems
- Reduce misunderstandings between the end-users and developers



Requirements Analysis

Example:

Ambiguous Requirement Statement

Identify the mode of transportation to transfer a single individual from home to place of work









Disadvantages of not identifying user requirements correctly

- The system will exceed time schedules and cost schedules
- The user may not be satisfied with the system requirements. Therefore, they may not use the system
- The cost of maintenance may be excessively high
- The system may be unreliable and prone to errors
- The reputation of the IT staff on the team will be tarnished



Process of Requirements Discovery

Consists of

- Problem discovery and analysis (already discussed in Chapter 3)
- Requirements discovery (the process and techniques used by systems analysts to identify or extract system problems and requirements from the user community
- Documenting and analyzing requirements
- Requirements management



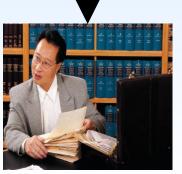
- Can start to define requirements after understanding the problem
- Must use effective methods for gathering information (Fact Finding)
- After completing the process of fact finding use various tools to document the requirements



- The process and techniques used by systems analysts to
 - Identify
 - Analyze
 - Understand

System Requirements

Works with



Systems Owner



Systems User



Systems Analyst

Works with

System Requirements

Specify what the information system must do, or what property / quality the system must have



System Requirements

Functional Requirements

Specify what the information system must do

Non functional Requirements

Specify a property / quality the system must have

e.g. user friendliness, Security

etc. Refer page 209

Ref1 table 6-1



System requirements can be gathered by

- using discussions with users, about their requirements
- building systems that satisfy these requirements





System requirements should meet the following criteria

- Consistent: not conflicting / ambiguous
- Complete: describe all possible system inputs and responses
- Feasible: 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 the functions and features of the system
- Verifiable: defined so that they can be demonstrated during testing.



Documenting and Analyzing Requirements

- Assemble or document the gathered information / draft requirements in an
 - Organized
 - Understandable
 - Meaningful way.
- Provide direction for the modeling techniques



Documenting and Analyzing Requirements...

- Documenting the draft requirements
 - Use various tools to draft the initial findings
 - <u>Use cases:</u> describe the system functions from the external users' perspective
 - <u>Decision tables:</u> document an organization's complex business policies and decision making rules
 - Requirement tables: document each specific requirement.



Documenting and Analyzing Requirements...

- Analyzing Requirements
 - Fact finding activities produce requirements that are in conflict with one another
 - Requirements analysis activity
 - Discover and resolve the problems with the requirements
 - Reach agreement on any modifications to satisfy the stakeholders



Requirements Management

- Help to alleviate the many problems associated with changing requirements
 - Emerging new requirements
 - Changing existing requirements
- Encompasses
 - Policies
 - Procedures
 - Processes

Refer Page 215 Ref1



Fact-Finding

- A formal process
- Uses techniques to collect / gather information about
 - System requirements
 - Problems
 - Preferences
- Also known as Information gathering
- Used across the entire development cycle
- Extremely critical in the requirement analysis phase





Sampling of Existing documents



Research and site visits



Observations of the work environment



Prototyping



Interviews



Questionnaires



Joint requirements planning

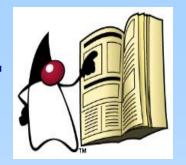


Fact Finding Ethics

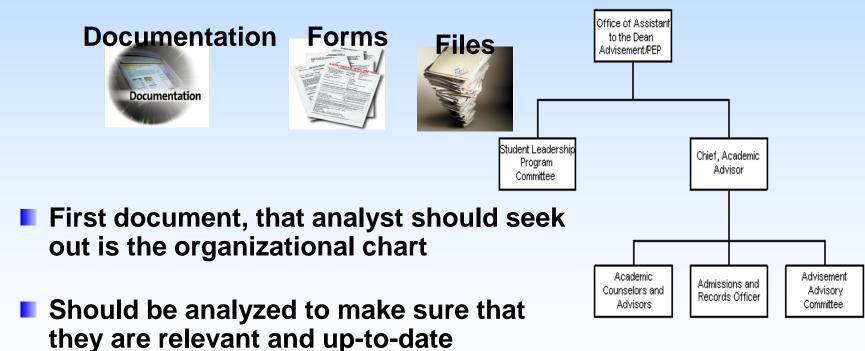
- Come across sensitive data
 e.g. employee profile: salaries, performance history, medical history, career plans etc.
- Leaving sensitive documents in plain view on the desks or publicly discuss sensitive data could cause great harm to the organization
- Therefore, analysts must take great care to protect security and privacy of any facts



Sampling of existing Documentation



 When you are studying an existing system, you can get a good idea by studying existing







Research and Site Visits

- Thoroughly, research the problem domain.
- Identify the material that are relevant and reliable

Computer trade Journals World Wide Web Good sources of information



Observations of the work environment

- Systems Analyst participates in or watches a person perform activities to learn about the system
- Often used when
 - validity of data collected through other methods is in question or
 - the complexity of certain aspects of the system prevents a clear explanation by the end users.





Observations of the work environment...

Advantages



- Data gathered by observation can be highly reliable
- Relatively inexpensive
- Allows systems analyst to do work measurements
- Systems analyst is able to see exactly what is being done



Observations of the work environment...

Disadvantages

I don't like being watched

0

0

- People usually feel uncomfortable when being watched.
- Work being observed may not involve the level of difficulty or volume normally experienced during that time



Refer page 218 Ref1 – The Railroad Paradox



Questionnaires

- Special purpose documents
- Allow the analysts to collect information and opinions from a large audience.



Advantages :

- Most questionnaires can be answered quickly
- Allow individuals to maintain anonymity
- Responses can be tabulated and analyzed quickly etc.
- Relatively inexpensive way of gathering data.

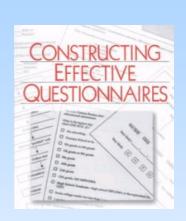




Questionnaires...

Disadvantages:

- ■The number of respondents is often low
- Mostly suited for closed questions
- No guarantee that an individual will answer or expand on all the questions
- ■Good Questionnaires are difficult to prepare
- ■No immediate opportunity to clarify a vague or incomplete answer to any question.





Types of Questionnaires

Questionnaires...

- Free-format: A question is asked, and the respondent records the answer in the space provided after the question.
- Fixed-format: contains questions that require specific responses from individuals



Questionnaires...

There are 3 types of fixed-format questions

- 1. <u>multiple-choice questions:</u> Given several answers to select one. e.g. Yes, No type
- 2. <u>rating questions:</u> Given a statement and asked to use supplied responses to state an opinion.
- 3. <u>ranking questions:</u> Given several possible answers to be ranked in order of preference or experience

Refer Page 221-222 Ref1



Interviews

- Most commonly used technique in analysis
- Collects information from individuals face to face.
- Must possess good human relations skills for dealing effectively with different type of people
- Can be used to achieve any of the following goals:
 - * find facts

* get the end-user involved

* verify facts

- * clarify facts
- * generate enthusiasm * identify requirements
- * solicit ideas and opinions.





Interviews...

Advantages

- Gives the analyst an opportunity to motivate the interviewee to respond freely and openly to questions.
- Allow the analyst to look for more feedback from the interviewee.
- Permit the analyst to ask questions from each individual etc.
- New ideas may arise





Interviews...

Disadvantages

- Very time consuming. Therefore costly approach
- Success of interviews is highly dependent on the systems analyst's human relations skill.
- Interviews may be impractical due to the location of interviewees etc.







Interviews...

Types of Interviews



- Unstructured interviews
 - conducted with only a general goal / subject in mind
 - contain only a few questions if any, specific ones
 - Interviewer counts on interviewee to provide a frame work and direct the conversation
- Structured interviews
 - interviewer has a specific set of questions to ask of the interviewee



Interviews...

Types of Interview Questions

- Open-ended questions
 - Allows the interviewee to respond in any way that seems appropriate
- Closed-ended questions
 - Restrict answers to either specific choices or short, direct responses





Interviews...

How to conduct an Interview?

Select Interviewees



- Interview the end users of the information system you are studying.

- We Higher the management level of the interviewees, less time should be spent.



Interviews...

How to conduct an Interview?

Prepare for the Interview

Prepare an *interview guide* - checklist of specific questions interviewer will ask the interviewee

Avoid the type of questions such as:

- Loaded questions
- e.g Do you need to include both of these columns for this report?
- Leading questions
- e.g. You are not going to use this operator code, are you?
- Biased questions
- e.g. How many codes do we need for food classification in the inventory file? I think 20 should cover it?



Interviews...

How to conduct an *Interview*?

Prepare for the Interview **Interview question guidelines**:



- @Use clear and concise language
- @Don't include your opinion as part of a question

- @verify before you leave

The purpose of the interview is to investigate, not to evaluate or criticize



Interviews...

How to conduct an *Interview*?

Conduct the Interview

The actual interview consist of three phases:

Interview Opening: Intended to influence or motivate the interviewee to participate

Interview body: Obtain interviewee's response to your list of questions

Interview conclusion: Express your appreciation. Important for maintaining good relationship and trust.



Prototyping

- Building a small working model of the users' requirements or a proposed design for an information system
- Usually a design technique
- Can also be used to perform fact-finding requirement analysis (discovery prototyping)
- Allows analyst to quickly create mock forms and tables to simulate the implemented system.



Prototyping...

Analyst will develop a model following an initial analysis

A repeat visit may then validate the model with the user

Agreement is reached on the model

Further detailed data may be gathered to elaborate the model



Prototyping...

This iterative approach serves a number of purposes:

- there is always a record of information gathered to date
- ensures correctness of the information as you continually verify the results with the user
- Analyst does not get too far ahead using wrong assumptions



Prototyping...

Advantages

- Allow users and developers to experiment with the software and develop with an understanding
- Helps to determine feasibility and usefulness of the system
- Minimize the time spent for fact-finding and help define more stable requirements.



Prototyping...

Disadvantages

- Developer may need to be trained in the prototyping approach
- Prototype can only simulate system functionality and are incomplete in nature.



Joint Requirement Planning (JRP)

- □ Highly structured group meeting are conducted to analyze problems and define requirements.
- □ JRP is a subset of a more comprehensive joint application development or JAD technique



Joint Requirement Planning (JRP)

JRP Participants

Sponsor

Serve as JRP champion. Single person in top management who makes the final decision

Facilitator

Single individual who plays the role of the leader or facilitator. Someone who has excellent communication skills



Joint Requirement Planning (JRP)...

JRP Participants...

Users and Managers

Number of participants from the user and management. Both users and managers are relied on to ensure that their critical success factors are being addressed

Scribes

Those who are keeping responsible for keeping records pertaining to everything discussed in the meeting.

System analysts frequently play this role



Joint Requirement Planning (JRP)...

JRP Participants...



IT personnel who primarily listen and take notes regarding issues and requirements. Usually consists of members of the project team.

Refer page 229-234 Ref1



Logical Design Phase

- In this phase various system models are drawn to document the requirements for a new and improved system.
- Typically includes the following tasks
 - Structure functional requirements
 - Prototype functional requirements
 - Validate functional requirements
 - Define accepted test cases.



Structure functional requirements

- Draw or update one or more system models to illustrate the functional requirements.
- This may include any combination of data, process, and object models that accurately show the business and user requirements.
- System models are not complete until all appropriate functional requirements have been modelled.
- Actual outputs are the actual system models and detailed specifications.



Prototype functional requirements (Alternative)

- Sometimes users have difficulty expressing the facts necessary to draw adequate system models.
- An alternative approach to system modelling is to build discovery prototypes.
- Prototyping is frequently applied to system development projects, especially in cases where the users are having difficulty stating or visualizing their business requirements.
- The philosophy is that the users will recognize their requirements when they see them.

Validate functional requirements

- Both system models and prototypes are representation of the users' requirements.
- They must be validated for completeness and correctness.
- Systems Analysts facilitate the prioritization tasks by interactively engaging system users to identify errors and omissions or make clarifications.



Define accepted test cases

- Most experts agree that it is not too early to begin planning for system testing.
- System models and prototypes very effectively define the processing requirements, data rules, and business rules for the new system.
- Accordingly these specifications can be used to define Test Cases that can ultimately be used to test programs for correctness.
- Either systems Analyst or system builder can perform this task and validate the test cases with the system users.