Requirements Analysis, Determination and Documentation

Dr. Priti Sajja

Professor

Department of Computer Science

S P University, Vallabh Vidyanagar

What is Requirements Determination?:

- Studying the current business systems to
  - find out how it works and
  - what improvements are needed.

- A requirement is a feature that **must be included** in the new system.

Activities in Requirement Determination:

Requirements Anticipation

Forecasting systems characteristics

- Based on previous **experience**.
- Areas and issues that could otherwise be **overlooked** can be considered here.
- May also introduce **bias**.
- **Mixed Blessing**…

Activities in Requirement Determination:

Requirements Investigation

Study and documentation of the current system, using

- fact-finding techniques,
- data flow analysis and
- decision analysis.

Activities in Requirement Determination:

Requirements Specification

- Analysis of Factual Data.
- Identification of Essential Requirements.
- Selection of Requirements Fulfillment Strategies.

Basic Requirements

- What are the **basic business processes**?
- What **data are used** or produced during those processes?
- What are the **limits** imposed by **time and volume** transactions?
- What **performance controls** are used?

Understand the process

- What is the **process** of business a
- What **steps** are performed?
- **Where** are they performed?
- **Who** performs them?
- **How long** does it take?
- **How often** it is done?
- **Who uses** the resulting information?

- Identify data used and information produced
- Determine processing timing and volume
- Identify controls

- User **Transaction** Requirements.
- User **Decision** Requirements.
- **Organization wide** requirements.

FACT-FINDING TECHNIQUES

- **Interview**
- **Questionnaire**
- **Record Review / Document Search**
- **Observation**

Interview

- Respondents are usually **current or potential** users.
- It's **not always the best way** of fact finding.
- **Lot of time** may be required.
- It is important to remember that respondents and analysts **converse** during an interview - the respondents are not being interrogated.
- This method is frequently the **best source of qualitative information** (opinions, policies and subjective descriptions of activities and problems).
- This method is helpful for gathering information from individuals who **do not communicate effectively** in writing or who may not have the **time** to complete questionnaires.
- **Interviews allows analysts to discover:**
  - **areas of misunderstanding,**
  - **unrealistic expectations &**
  - **resistance to the proposed system**

Structured Interview

Advantages of Structured Interview :

- Interview is **easy** to conduct
- Wording of **questions are consistent***(can be open response or close response)*
- **More objective evaluation** of answers is possible.
- Interview is **short**.
- **Limited interviewer training** needed.

Disadvantages of Structured Interview :

- Cost of preparation is **high**.
- Reduces respondents **spontaneity**.
- Respondents may not **accept high level of structure** and mechanical posing of questions.

Unstructured Interview

Advantages of Unstructured Interview :

- Both the question set and wording can be **directed** to the individual respondent
- **Tangent areas**, initially overlooked, can be explored.
- Can build **relationship between analyst and interviewee** that promotes information collection.
- The method is **flexible and adaptive.**
- Help in **acquire general information** about a system.
- Encourages respondents to **share their feelings, beliefs and ideas.**

Unstructured Interview

Disadvantages of Unstructured Interview :

- The interview may result in **waste of time.**
- The **bias of interviewer** can be injected in the interview, both in framing of the question and in the interpretation of answers.
- **Extraneous** information may be collected.
- Analysis and interpretation of answers may be lengthy, **time-consuming, expensive and inaccurate**.
- Due to the lack of structure, **evaluation** of the results may prove **difficult**.

Questionnaire:

- The use of questionnaires allows analysts to collect information about various aspects of a system from a **large number** of persons.
- It can yield **more reliable data** than other fact finding techniques.
- This method **does not allows** analysts **to observe** the expressions or reactions of respondents.
- Response **may be limited**, since answering questions may not be having higher priority.

Questionnaire:

Structure of questionnaire can by of either :

- Open-ended questionnaires
- Closed questionnaires

Alternatives are

- Check-out,
- Scaled response
- Multiple choice
- Fill-in-the blanks
- Yes/No question
- Short answer

Questionnaire:

- Questionnaires should be **well tested** before conducting because of it's high cost of developing and distribution.

- The analyst should ensure that the respondent's **background and experiences qualify** them to answer the questions.

Record Review:

- Many kinds of records and reports can provide analysts with **valuable information** about the organizations and operations.
- In record review, **analysts examine information** that has been **recorded** about the system and users.
- **Record inspection** can be performed.
- Records include written **policy manuals, regulations, and standard operating procedures** used by most organizations as a guide for managers and employees.

Record Review:

This methods **do not show** what activities are actually occurring, where the decision-making power lies or how tasks are performed.

Observation:

- It allows analysts to gain information they cannot obtain by the other fact-fining methods.

- Through Observation, analyst can obtain **firsthand information** about how activities are carried out.

Observation:

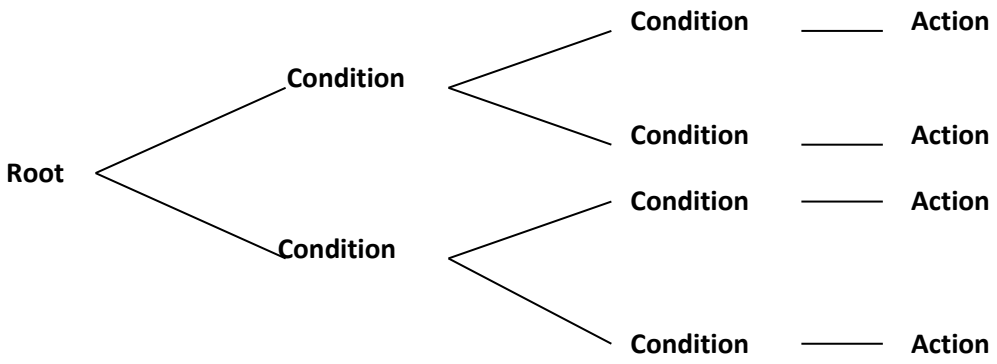
This methods is most useful when analysts need to **actually observe how documents are handled**, how processes are carried out and whether specified steps are actually followed.

Tools for documenting procedures and decisions

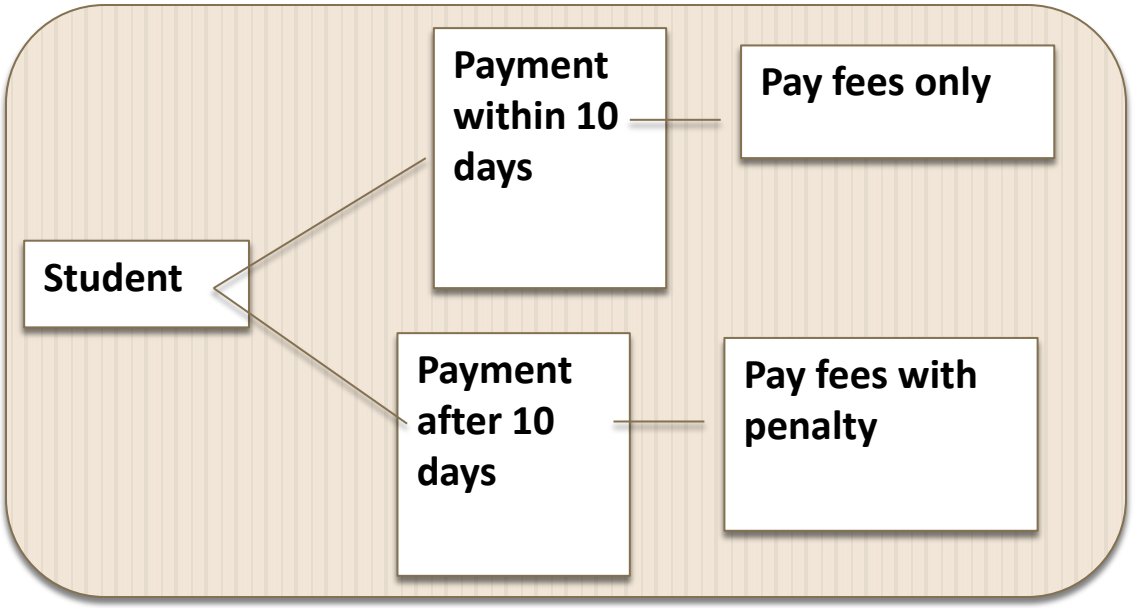
- Analysts must start with **identifying conditions and actions**.
  - What are the possibilities?
  - What can happen?
  - Analyst must consider both the relevant and permissible conditions.
- Conditions may vary and hence analysts may refer them as **decision variables**.
- In many procedures, analysts must consider **combination of conditions and actions**.
- To assist them in understanding & matching combinations, they use
  - Decision Tree
  - Decision Table
  - Structured English

Decision Tree Characteristics

- Diagram that represents **conditions and actions sequentially.**
- Shows **relationship** of each condition and its permissible action.
- It resembles to the branches of a tree.
- The particular branch to be followed depends on the condition that exists and decisions to be made.
- It is simple and sequential.
- But, it is complex and large enough to manage for real life decision making.



Decision Tree Example



Decision Tables

- A decision table is a matrix of rows and columns.
- Decision rules, included in a decision table states what procedures to follow when certain conditions exists.

Condition	Decision Rules
Condition Statements	Condition Entries
Action Statements	Action Entries

Decision Table

Condition	Condition 1	Condition 2	Condition 3	Condition 4
C1: Patient has basic health insurance	**Y**	**Y**	**N**	**N**
C2: Patient has full health insurance	**Y**	**N**	**Y**	**N**
Action	**Action Entries**			
A1: Pay partial amount		**X**		
A2: Pay nothing	**X**		**X**	
A3: Pay full amount				**X**

Types of Table Entries

- **Limited Entry Form** : The basic table contains only Y,N, and blank entries and is a limited-entry form.
- **Extended-Entry Form** : Replaces Y and N with action entries telling the reader how to decide.
- **Mixed-Entry Form** : Analysts may prefer to combine features both the limited and extended-entry forms in the same table.
- **Else Form:** Still another variation in decision tables is aimed at omitting repetitions through ELSE rules.

Limited Entry Decision Table

Condition Statements	**Condition Entries**					
Within 5 days	Y	Y	Y	N	N	N
Over or equal to Rs.10,000	Y			Y		
Between Rs.5,000 to Rs.9,999		Y			Y	
Less than Rs.5,000			Y			Y
Action Statements	**Action Entries**					
20% discount	X	X	X	X		
10% discount					X	
5% discount						X

Extended Entry Decision Table

Time in days	<=5	<=5	<=5	>5	>5	>5
Volume in Rs.	>10k	5k to 10k	<5k	>10k	5k to 10k	<5k
Action	20% Disc.	20% Disc.	20% Disc.	20% Disc.		
					10% Disc.	
						5% Disc.

Mixed Entry Decision Table

Condition Statements	**Condition Entries**					
Time in days	<=5	<=5	<=5	>5	>5	>5
Volume in Rs.	>10k	5k to 10k	<5k	>10k	5k to 10k	<5k
Action Statements	**Action Entries**					
20% discount	X	X	X	X		
10% discount					X	
5% discount						X

Else Form Decision Table

Condition	**Condition entries**			
Time in days	>5	>5	>5	**ELSE**
Volume in Rs.	>10k	5k to 10k	<5k	
Action Statements	**Action Entries**			
20% discount	X			X
10% discount		X		
5% discount			X	

Multiple Tables

- One way to reduce the size of decision table is by linking together multiple decision tables.
- Depending on the actions selected on the first table, additional actions are explained by one or more tables.
- **Direct Transfer: GO TO** (one time transfer)
- **Temporary Transfer : Perform** (and return statement in another table)
- Decision tables

Decision Table Processors

- Decision tables have been partially automated using Table Processors.
- Table Processors are computer programs that handle actual table formulations on the basis of input provided by the analysts.
- They also do all the checking for redundancy and consistency.

Structured English

- Structured English uses narrative statements to describe a procedure.
- It does not show decision rules it **states** them.
- No special symbols or formats are used.
- The terminology used in the structured description of an application consists largely of data names of elements that are defined in the data dictionary.
- Structured English uses three basic types of statements to describe a process.
  - Sequence Structures
  - Decision Structures
  - Iteration Structures
- It is simple, quick and easy to follow (even for non computer professionals)

- Take basic pay of an employee.
- Calculate 45% of the basic pay as allowance
- Add basic pay and allowance to calculate gross salary
- Prepare pay report for the employee

Sequence Structure

- Take basic pay of an employee.
- IF employee type is 'Permanent' then calculate 45% of the basic pay as allowance ELSE calculate 25% of the basic pay as allowance
- Add basic pay and allowance to calculate gross salary
- Prepare pay report for the employee

Decision Structure

DO WHILE Employee_list is not empty

- Read an Employee information
- IF employee type is 'Permanent' then calculate 45% of the basic pay as allowance ELSE calculate 25% of the basic pay as allowance
- Add basic pay and allowance calculate
- Prepare pay report for the employee
- Clear

ENDDO

Iterative Structure

- clipsahoy.com
- Illustrationsof.com
- Clipartheaven.com
- drcivils.com
- James A Senn Analysis and Design of Information Systems McGraw Hill Intl. Stdt. Edn,1985.
- Sajja, P.S. “Essence of Systems Analysis and Design: A Workbook Approach”, Springer International Publishing, Singapore (Aug’17)