



SYSTEMS ANALYSIS AND DESIGN

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*.



Characteristics of System Analyst in Requirements Determination

- ◆ **Impartiality:** Fairness is important, consider issues raised by all parties, your job is to find the best solution to a business problem and not to for example, justify the purchase of new hardware, or impose your views on users.

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- ◆ **Relax Constraints:-** Assume that anything is possible and eliminate the infeasible. Avoid statements like we have always done it that way. Traditions are different from rules and policies. Organizations and environments change, traditions can turn into habit rather than sensible procedures

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- ◆ **Reframing:-** Analysis is a creative process. You must challenge yourself to look at the organization in new ways. You must consider how each user views his her requirements. Avoid jumping to the conclusion that the new system must work the same way as the one you have built before



PIECES CLASSIFICATION OF requirements discovery

Nonfunctional Requirement Type	Explanation
Performance	<p>Performance requirements represent the performance the system is required to exhibit to meet the needs of users.</p> <ul style="list-style-type: none">• What is the acceptable throughput rate?• What is the acceptable response time?
Information	<p>Information requirements represent the information that is pertinent to the users in terms of content, timeliness, accuracy, and format.</p> <ul style="list-style-type: none">• What are the necessary inputs and outputs? When must they happen?• What is the required data to be stored?• How current must the information be?• What are the interfaces to external systems?
Economy	<p>Economy requirements represent the need for the system to reduce costs or increase profits.</p> <ul style="list-style-type: none">• What are the areas of the system where costs must be reduced?• How much should cost be reduced or profits be increased?• What are the budgetary limits?• What is the timetable for development?
Control (and security)	<p>Control requirements represent the environment in which the system must operate, as well as the type and degree of security that must be provided.</p> <ul style="list-style-type: none">• Must access to the system or information be controlled?• What are the privacy requirements?• Does the criticality of the data necessitate the need for special handling (backups, off-site storage, etc.) of the data?
Efficiency	<p>Efficiency requirements represent the system's ability to produce outputs with minimal waste.</p> <ul style="list-style-type: none">• Are there duplicate steps in the process that must be eliminated?• Are there ways to reduce waste in the way the system uses its resources?
Service	<p>Service requirements represent needs in order for the system to be reliable, flexible, and expandable.</p> <ul style="list-style-type: none">• Who will use the system, and where are they located?• Will there be different types of users?• What are the appropriate human factors?• What training devices and training materials are to be included in the system?• What training devices and training materials are to be developed and maintained separately from the system, such as stand-alone computer-based training (CBT) programs or databases?• What are the reliability/availability requirements?• How should the system be packaged and distributed?• What documentation is required?



Results of incorrect requirements discovery

- ◆ 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.



Results of incorrect requirements discovery....

- ◆ The system may be unreliable and prone to errors.
- ◆ 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.



Criteria to Define System Requirements

- ◆ **Complete** – requirements describe all possible system inputs and responses.
- ◆ **Consistent** – requirements are not conflicting or ambiguous.
- ◆ **Feasible** – requirements can be satisfied based on the available resources and constraints.



Criteria to Define System Requirements.....

- ◆ **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.



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*.



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



Fact-Finding Ethics....

- ◆ Ethical behavior includes:
 - Systems analysts must not misuse that information.
 - Systems analysts must protect that information from people who would misuse it.



Fact-Finding Ethics.....

- ◆ 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



Information can be got from:-

(1) Existing documents e.g.

- ◆ Organization charts
- ◆ Policy manuals
- ◆ Procedural manuals
- ◆ Job descriptions
- ◆ Forms, reports
- ◆ Document flow and work flow diagrams



Information can be got from:-.....

- ◆ Systems flow charts
- ◆ If computerized
 - Computer program documentation
 - Data dictionary listings
 - Computer operation manuals



Information can be got from:-....

(2) System users and managers

(3) External sources: Might be necessary especially when examining alternatives for the new systems. To see what is available

- ◆ Other companies
- ◆ Equipment and software vendors
- ◆ Business publications, seminars, workshops, or visits to show rooms, exhibitions, or other companies for demonstrations.



◆ **Methods of Gathering Information:**

The existing systems must be understood before they can be comprehensively designed. The best way of understanding the activities that take place in any particular system whether computerized or manual is to get information from the users and other processing areas.



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).



Sampling

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



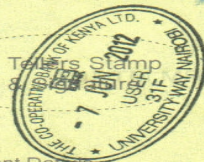
Sampling...

- Completed forms
- Manual and computerized screens and reports
- Samples of databases
- Flowcharts and other system documentation
- And more



Why blank forms?

- ◆ Can determine the type of data going into each blank
- ◆ Can determine the size of data going into each blank
- ◆ Can determine which blanks are not used or not always used
- ◆ Can see data relationships



CO-OPERATIVE
BANK OF KENYA

Part continued
Juliana / Mutio
MT 103 FORM

SWIFT/RTGS APPLICATION FORM

(Fill in Triplicate)

Applicant Details

Branch

CO-OP HOUSE

Date:

07

06

2012

Applicant Name: RONALD MULOMI RAKAMA

ID No: 28121733

Account No.

01109188946500

(Mandatory) Address:

P.O. Box 33342 Postal Code 00100

Mobile

0715460577

Office Line

N/A

Town

Nairobi

Payment Details

Payment Mode : Cash

Account

☒

(Tick as appropriate)

Currency:

U.S. Dollars

Transfer Amount (Figures)

Amount (Words)

Beneficiary Details

Beneficiary Name:

WESTERN MICHIGAN UNIVERSITY

Account No.

4235563025

Beneficiary Bank

PNC BANK

Swift Code

PNCUS33

Beneficiary Branch

Intermediary Bank

Intermediary Bank BIC

Routing/ Branch / Sort Code:

IBAN No. (Compulsory for payments to EURO Zone)

Beneficiary Tel:

(254) 321-5265

Mobile: (254) 321-2752

(Mandatory)

Address P.O. Box

Mt 103

Postal Code

5210

Town

1503 WEST MICHIGAN AVENUE, KALAMA

Correspondent charges to be paid by: Applicant ☒ Shared

(Tick as Appropriate)

Applicants Signatures

Signature (1)

[Signature]

(2)

[Signature]

Details of Payment

RONALD MULOMI RAKAMA

STUDENT ID: 362139592

For Bank use Only:

Branch Reference:

31F 2500201

International transfer / RTGS (Local transfer) - Tick as appropriate

Forex Amount	9.250		
Rate	86.	Currency	USD
Kshs Equivalent	795,500		
Commission	1,988 / 75		
Total	797,488 / 75		

Call Back Details

Call Mode to:	1. Aired by	2. Signature
Phone No.:	(501)	
Date/Time:	07/06/2012	
Name:		Signature & Stamp

ACTION	NAME	SIGNATURE	SIGN NO
Input by:			
Verified by:			
Authorised by:			
Routed by:			

Disclaimer: It is understood that this SWIFT transfer is sent at my/our risk and the Co-operative Bank of Kenya Limited will not be held liable either for any mistake, delay or omission which may happen in the transmission of the message or from the misinterpretation of the message when received. I/we undertake to pay charges made for repetition or elucidation of the message if this occurs.

White - Original

Pink - Duplicate

Yellow - Triplicate

STUDENT ID: 362139592



Observation

Observation — a fact-finding technique wherein the systems analyst either participates in or watches a person perform activities in order to learn about the system.



Guidelines to observation

- ◆ Determine the who, what, where, when, why, and how of the observation.
- ◆ Obtain permission from appropriate supervisors or managers.
- ◆ Inform those who will be observed of the purpose of the observation.
- ◆ Keep a low profile.



Guidelines to observation....

- ◆ Take notes during or immediately following the observation.
- ◆ Review observation notes with appropriate individuals.
- ◆ Don't interrupt the individuals at work.
- ◆ Don't focus heavily on trivial activities.
- ◆ Don't make assumptions.



Advantages of Observation

- ◆ Data gathered is highly reliable.
- ◆ The system analyst can see exactly what happens especially for tasks, which are difficult to explain in words.
- ◆ It allows the system analyst to do some measurements or estimations.
- ◆ It is relatively inexpensive compared to other techniques.
- ◆ The analyst gets first hand information.



Disadvantages of Observation

- ◆ Tendency of people to exaggerate behavior when they know they are being observed.
- ◆ The activities may take place at odd hours hence inconveniencing the analyst.
- ◆ The system analyst may end up observing exceptional activities only.
- ◆ It is subject to bias opinion.



Questionnaire

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



Types of Questions

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.



When to Use Questionnaires

- ◆ When the system analyst is located at a considerable distance from the staff to be questioned.
- ◆ When there is a large number of respondents such that interviewing is prohibited by the time available.



When to Use Questionnaires...

- ◆ When the questions are simple and they call for direct answer.
- ◆ When limited amount of information is required from a large number of people.
- ◆ When it is to be used as a means of verifying information found or gathered using other methods



Advantages of Questionnaires

- ◆ They provide inexpensive method of gathering data from a large number of people.
- ◆ Allows individuals to maintain your identity (anonymity) hence they can provide real facts.
- ◆ The questions are presented consistently to all the respondents without bias.
- ◆ The respondents can complete the questionnaire at their own convenience



Disadvantages of Questionnaires....

- ◆ The number that responds is often too low.
- ◆ They provide no opportunity for clarification.
- ◆ It is not possible for the analyst to observe and analyze body expressions
- ◆ There is no guarantee that the individuals will respond to all the questions.
- ◆ Good questionnaires are difficult to prepare.



Interviews

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



Interviews....

- Generate enthusiasm
- Get the end-user involved
- Identify requirements
- Solicit ideas and opinions



Types of interviews

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



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.



Procedure to Conduct an Interview....

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



Interview Questions

- ◆ Types of Questions to Avoid
 - Loaded questions
 - Leading questions
 - Biased questions



Interview Question Guidelines

- Use clear and concise language.
- Avoid long or complex questions.
- Avoid threatening questions.
- Don't include your opinion as part of the question.
- Don't use “you” when you mean a group of people.



The do's of interviews

- ◆ Be courteous
- ◆ Listen carefully
- ◆ Maintain control
- ◆ Probe
- ◆ Observe mannerisms and nonverbal communication
- ◆ Be patient
- ◆ Keep interviewee at ease
- ◆ Maintain self-control



Don'ts of interviews

- ◆ Continuing an interview unnecessarily.
- ◆ Assuming an answer is finished or leading nowhere.
- ◆ Revealing verbal and nonverbal clues.
- ◆ Using jargon



Don'ts of interviews....

- ◆ Tape recording -- a sign of poor listening skills.
- ◆ Revealing your personal biases.
- ◆ Talking instead of listening.
- ◆ Assuming



Communicating With the User

- ◆ 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



Communicating With the User...

- ◆ “To hear is to recognize that someone is speaking, to listen is to understand what the speaker wants to communicate.” (Gilder sleeve)



Advantages of Interviews

It is effective in answering how and why types of questions.

- ◆ It provides an immediate feedback.
- ◆ The problem is understood clearly because the interviewee is able to explain what he or she wants the system to do.
- ◆ It eliminates panic, resistance and fear because of greater user involvement.



Disadvantages of Interviews

- ◆ It can be time consuming if many people are to be interviewed one by one.
- ◆ It might be difficult to get to the interviewee or the organization e.g. many branches of an organization.
- ◆ Some people want to be perceived in their best right, hence giving wrong information.
- ◆ It is possible to forget some important details during interview.
- ◆ Inconsistent answers from individuals



Disadvantages of Interviews...

- ◆ One option available to the last point group interview where all the key people are interviewed at once or **Nominal Group Technique:-** a facilitated process that supports idea generation by groups. At the beginning of the process group members work alone to generate ideas which are then pooled under the guidance of a trained facilitator



When to Use Interviews

- ◆ When the respondents are very few
- ◆ When the interviewees are physically available.
- ◆ When the main emphasis of system investigation is people.
- ◆ When the system analyst wants to seek direct opinion or answers.
- ◆ When the system analyst wants to verify the validity of the facts collected using other techniques.
- ◆ When immediate response is required.⁵⁰



Rapid Prototyping

- ◆ A prototype is a working version of a system (working model)
- ◆ It performs the same basic tasks that the finished system would perform but ignores such features as: Efficient, Calculations, Security, Error Handling and Program and User documentation.
- ◆ The skeleton version “dummies” the internal processing while concentrating on portraying user screens and reports.



Prototype

- ◆ A prototype is easy to built and use because of the 4GLs and the many software tools on the market. It is appropriate for online systems because of their strong user interface. For example, they require multitude of input and output screens, as well as reports on paper.



Prototype....

- ◆ A prototype can clarify user requirements (by verifying that the finished product will meet those requirements). It also gets users interested in the system, by the analyst demonstrating what is expected.

Prototyping

- ◆ They are user centered, the analyst and user work closely together. It evolves through a process of iteration or refinements, functions are added one by one as deeper understanding of the system emerges. It gives a user the experience of using the actual system

Prototyping...

- ◆ It is good with systems with high uncertainty (where user and designer are not sure of what is required of the system). A lot of errors occur in such systems. Uncertainty can be reduced by reducing errors and omissions.



Prototyping....

Three stages of prototyping:

- ◆ Prototype the user interface (screens/reports) using dummies for programs
- ◆ Include functional programs
- ◆ Expand to become a finished product

Prototyping....

- ◆ Features that are initial left out are:
User documentation, Help screens,
security/controls, backup procedures,
ability to handle large volumes of
data. If added then it would be a
finished product.



Prototyping....

- ◆ If it evolves into a finished product, all the phases of designing a system are left out and the approach is called **Rapid Application Development (RAD)**. RAD systems are grown not built. That is systems design and construction is evolutionary refinement rather than a step by step process.

Prototyping...

- ◆ With this approach, the finished product is less expensive, and is completed in less time; lifetime maintenance will also be inexpensive. Limitations of 4GLs make large systems hard to prototype


Prototyping.....

- ◆ For example, some execute slowly, consume memory, and prevent other parts of the system from executing in a timely fashion. These problems are magnified as the system is expanded. Therefore, it is wrong to assume that the finished product will execute as fast as versions of steps one and two.



Prototyping....

- ◆ Prototypes whose performances are unacceptable should only be used for demonstration of the new system. Part or all of it should be recorded in a standard **procedural language**.
- ◆ Whether used or not, a prototype is a useful tool to use when designing a system. It can be used as a model, or to build user confidence and verify omissions etc.



Advantages of prototypes

- ◆ Heavy user involvement means a more complete, accurate and friendly user interface
- ◆ Prototyping may discover user needs that users were not previously aware of
- ◆ Users feel more confident approving a system they can try out
- ◆ Users have a more positive attitude towards any system that they helped to create



Advantages of Prototyping....

- ◆ Prototyping often results in a development project that costs less and takes less time to built
- ◆ A system prototyped during information gathering is cheaper to maintain because of fewer errors and omissions
- ◆ A prototype that evolves into a finished product is inexpensive to maintain because a system coded in a 4TH generation language is easier to modify than one coded in a third generation language



Disadvantages of Prototyping

- ◆ Users may not want to invest the time and effort that prototyping requires of them
- ◆ A prototype that evolves to a full system may execute slowly, consume memory, and prevents other parts of the system from executing in a timely version



Disadvantages of Prototyping....

- ◆ Often fourth generation prototypes must be recorded in a third generation language in order to improve performance
- ◆ Prototyping is often inappropriate for systems that require complex algorithms for processing



Joint Requirements Planning

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



Joins Requirements Planning....

- ◆ JAD is similar to group interview, however, it follows a particular structure of roles and agenda and usually involves all the stake holders. JAD session leader, users, managers, sponsor, system analyst, scribe, IS staff. The end result of JAD is a set of documents containing details of the working of the current system and detailed information on what is desired of the new system



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



Steps to Plan a JRP Session....

2. Selecting the participants

- Each needs release from regular duties

3. Preparing the agenda

- Briefing documentation
- Agenda distributed before each 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...

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.



Brainstorming Guidelines

- ◆ Isolate the appropriate people in a place that will be free from distractions and interruptions.
- ◆ Make sure everyone understands the purpose of the meeting.
- ◆ Remind everyone of brainstorming rules.
- ◆ Appoint one person to record ideas.



Brainstorming Guidelines...

- ◆ Within a specified time period, team members call out their ideas as quickly as they can think of them.
- ◆ After the group has run out of ideas and all ideas have been recorded, then and only then should the ideas be analyzed and evaluated.
- ◆ Refine, combine, and improve the ideas that were generated earlier.



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.



Benefits of JRP...

- ◆ When JRP incorporates prototyping as a means for confirming requirements and obtaining design approvals, the benefits of prototyping are realized
- ◆ JAD is a user centered design-continual user involvement in systems development



Benefits of JRP...

- ◆ **CASE** tools can be used during the JAD sessions, for example diagramming tools, prototyping tools and form and report generators. The analyst can use these tools to give graphical forms of system requirements, and make changes depending on the users reactions. Illustrations of what the alternative system will look like provides the analyst with information that can assist in selection of the best alternative



Benefits of JRP...

- ◆ The major problem with JAD is that the more the people in a group, the less time there is for them to speak and state their views. A few people dominate the discussion and some will say absolutely nothing. The decision will be tilted towards those who speak most, while some of them may not be fully committed to the conclusions. Some might be afraid to criticize their boss in public, even if what is being said is wrong



Business Process Reengineering

- ◆ The search for and implementation of, radical change in business process to achieve breakthrough improvements in products and services. This can be achieved through creative application of information technologies. BPR also suggest that radical improvement can only be achieved by using a clean sheet of paper and not by modifying the existing system



Disruptive Technologies

- ◆ Technologies that enable the breaking of long-held business rules that inhibit organizations from making radical business changes, for example, only experts can perform complex work or only managers can make decisions or field officers need offices for data transactions. There are Expert systems and decision support tools or virtual office for workers.



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 have been collected, design and distribute questionnaires to clear up things that aren't fully understood.



A Fact-Finding Strategy...

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.



Deliverables and Outcomes

- ◆ Information Collected from conversations or observation of users
- ◆ Existing written information
- ◆ Computer based information: results from JAD, CASE reports, displays and reports from prototyping

All the resulting data has to be organized in order to be useful. This is done by structuring system process requirements by modeling and feasibility assessment



THE END

THANK YOU