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REQUIREMENT ENGINEERING

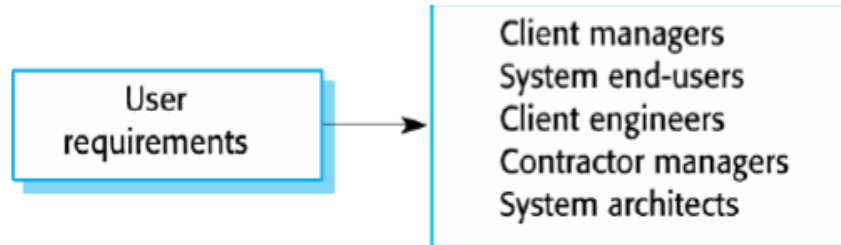
- The process of finding out, analyzing, documenting, and checking the user's requirements and constraints is called requirements engineering.

USER REQUIREMENT

- Statements in natural language plus diagrams of the services the system provides and its operational constraints.

- Written for customers.

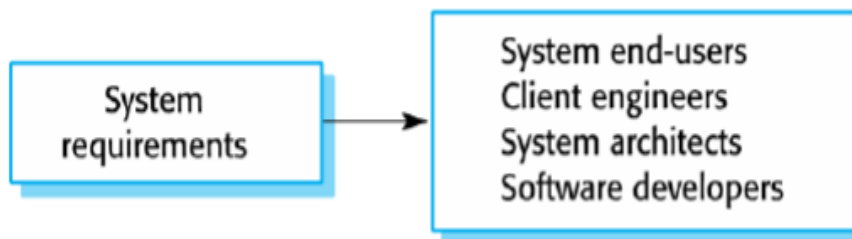
1. The Mentcare system shall generate monthly management reports showing the cost of drugs prescribed by each clinic during that month.



SYSTEM REQUIREMENTS

- A structured document giving out detailed descriptions of the system's function, services, and operational constraints.
- Defines what should be implemented, it may be a contract between client and contractor.

1.1 On the last working day of each month, a summary of the drugs prescribed, their cost and the prescribing clinics shall be generated.
1.2 The system shall generate the report for printing after 17.30 on the last working day of the month.
1.3 A report shall be created for each clinic and shall list the individual drug names, the total number of prescriptions, the number of doses prescribed and the total cost of the prescribed drugs.
1.4 If drugs are available in different dose units (e.g. 10mg, 20mg, etc) separate reports shall be created for each dose unit.
1.5 Access to drug cost reports shall be restricted to authorized users as listed on a management access control list.



STAKEHOLDER:

- A person, group or organization that has interest or concern in a system or software.
- Examples:
 - Investors of a company.
 - End Users, System Managers, System owners, External stakeholders.
 - Patients whose information is recorded in the system.
 - Doctors who are who are responsible for assessing and treating patients.

FUNCTIONAL AND NON-FUNCTIONAL REQUIREMENTS

- Constraints which we will impose on the services.
- <https://www.guru99.com/non-functional-requirement-type-example.html>

FUNCTIONAL REQUIREMENT

- What a system should do.
- This is the list of actual services which a system will provide
- Functions which a user wants from the software.
- Functions demanded by the user.

Example:

- Authentication
- Administrative functions
- Business Rules

NON-FUNCTIONAL REQUIREMENT

- How a system should behave while performing the operations.
- Constraints on the services which the system is offering.
- Helps in making users' functional requirements more efficient.

Example:

- Robustness, Speed, Efficiency etc.
- Also known as quality attributes.
- **Explained Example:** Database should update the details in 2 seconds.
- **Explained Example:** Save data every 5 seconds.

GOAL

- A general intention of the user such as ease of use.

REQUIREMENT IMPRECISION

- When the requirement is not well defined.
- Nonfunctional requirements may be difficult to state precisely and imprecise requirements may be difficult to verify.
- Ambiguous requirements may be interpreted in different ways by developers and users.

Example:

- Consider the term 'Search':
- User intention - search for a patient name across all appointments in all clinics.

- Developer interpretation - search for a patient name in an individual clinic. User chooses the clinic then searches.

REQUIREMENTS COMPLETENESS AND CONSISTENCY

- In principle, requirements should be complete and consistent.

COMPLETE

- They should include descriptions of all facilities required.

CONSISTENT

- There should be no conflicts and contradictions in the descriptions of the system facilities.

REQUIREMENT ENGINEERING PROCESS

- The process used for RE vary widely depending on the application domain, the people involved and the organization developing the requirements.

ELICITATION

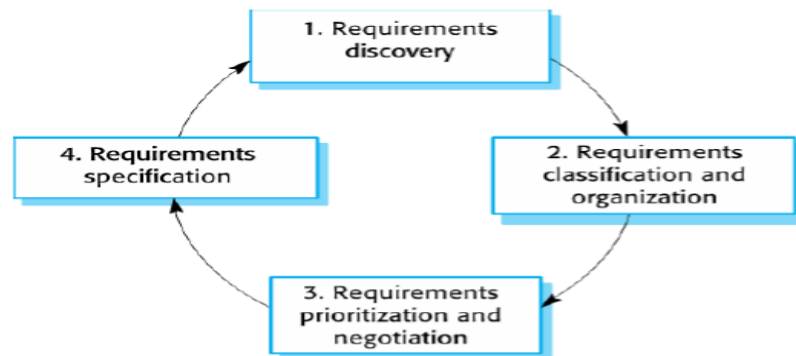
- It is about engaging with stakeholders to elicit and understand their business requirements.
- Like finding out application domain, the services that the system should provide, the required system performance, hardware constraints, etc.

PROBLEMS OF REQUIREMENT ELICITATION

- Stakeholders do not know what they really want.
- Stakeholder express requirements in their own unprofessional standard.
- Different stakeholders many have conflicting requirements.
- Many factors can affect the system requirements.

PROCESS ACTIVITIES

THE REQUIREMENTS ELICITATION AND ANALYSIS PROCESS



ELICITATION TECHNIQUES

- **There are various elicitation techniques for example:**
 - Requirement interviews
 - Workshops.
 - **Scenarios and User Stories:** These are real-life examples of how a system can be used.
These are description of how a system may be used for a particular task. Stake holders can relate to them and comment on their situations.
 - **Ethnography:** A social scientist spends a considerable time observing and analyzing how people work. Social and organizational factors of importance may be observed.
 - Observing and analyzing how people work.
 - Social and organizational factors of importance may be observed.

DOCUMENTATION OR SPECIFICATION

- Documentation is about capturing the user requirements in a documented format, which will make clear sense to the business stakeholders as well as technical teams who may need the document in the process.
- It is important that requirements are clear, complete, and accurate.
- TWO FORMS: Tabular and Detailed.

PROBLEMS WITH DOCUMENTATION

- **Lack of Clarity:** Precision is difficult without making the document difficult to read.
- **Requirements confusions:** Functional and Non-Functional tend to be mixed up.

VALIDATION

- It is all about ensuring that what you have documented as requirements are valid and agreed by all stakeholders.
- It requires continuous and clear communication and negotiation with stakeholders.

REQUIREMENTS CHECKING

1. Validity → System must fulfil customer needs.
2. Consistency → No requirement conflicts.
3. Completeness → All function asked by the customer should be present.
4. Realism. → Requirement to be implemented should be within the budget.
5. Verifiability → Can the requirements be checked?

TECHNIQUES

- Prototyping: Using an executable model to check requirements.
- Reviews: Manual analysis of requirements.
- Test-Case Generation: Developing tests for requirements to check testability.

MANAGEMENT AND CHANGING

- It is about managing any changes that might arise in relation to your requirements.
- Larger systems have diverse user community, with many users having different requirements and proprieties that may be conflicting or contradicting.
- It is vital that the requirement engineer learn to manage the requirements in a systematic and transparent way to ensure that changes are tracked efficiency and accurately.

REQUIREMENTS MANAGEMENT PLANNING

- Requirements Identification: Each requirement must be uniquely identified, so that it can be cross-referenced with other requirements.
- Change Management Process: This is the set of activities that assess the impact and cost of changes.
- Traceability Policies: It defines the relation between requirement and system design that should be recorded.
- Tool Support: It's range may vary from specialist requirements to managing spreadsheet and simple database systems.

REQUIREMENTS CHANGE MANAGEMENT

Deciding if a requirement change should be accepted.

- Problem analysis and change specification: The problem or the change is analyzed to check that it is valid.
- Change Analysis and costing: The effect of the proposed change is assessed using traceability information and general knowledge of the system requirements. Once this analysis is completed, a decision is made whether to proceed with requirements change.
- Change Implementation: The requirements document and, where necessary, the system design and implementation, are modified. Ideally, the document should be organized so that changes can be easily implemented.