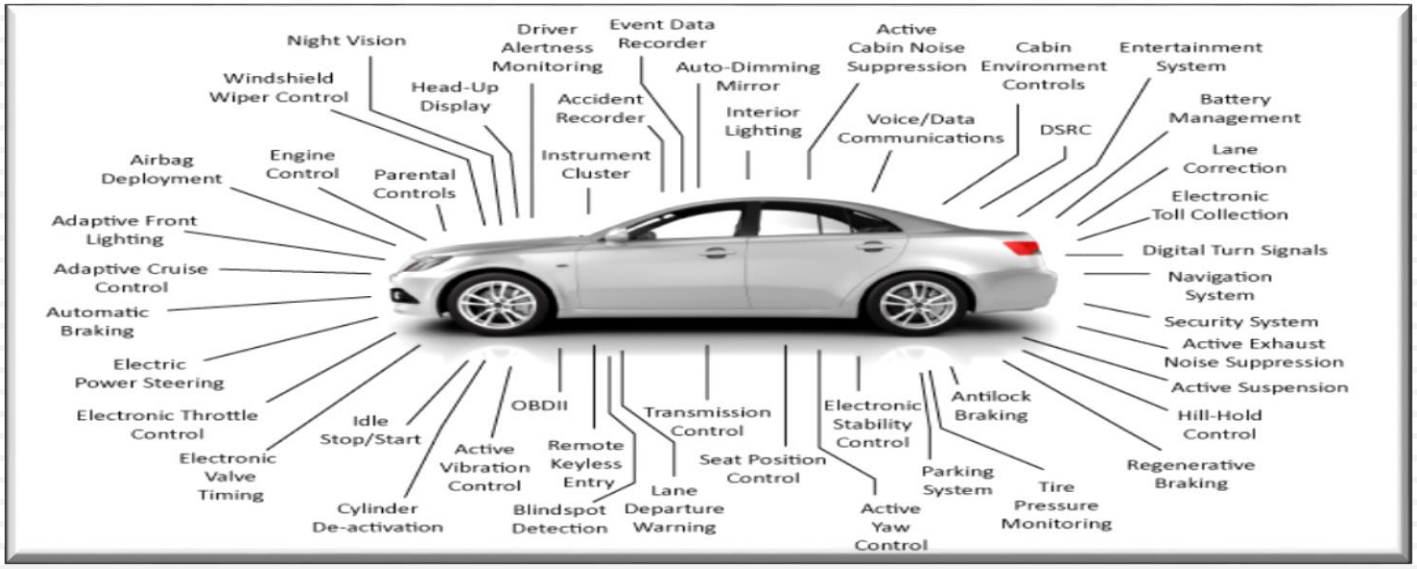
System & Requirement Engineering Overview

By – Deepesh Dongre

Contact : deepeshdongre@gmail.com



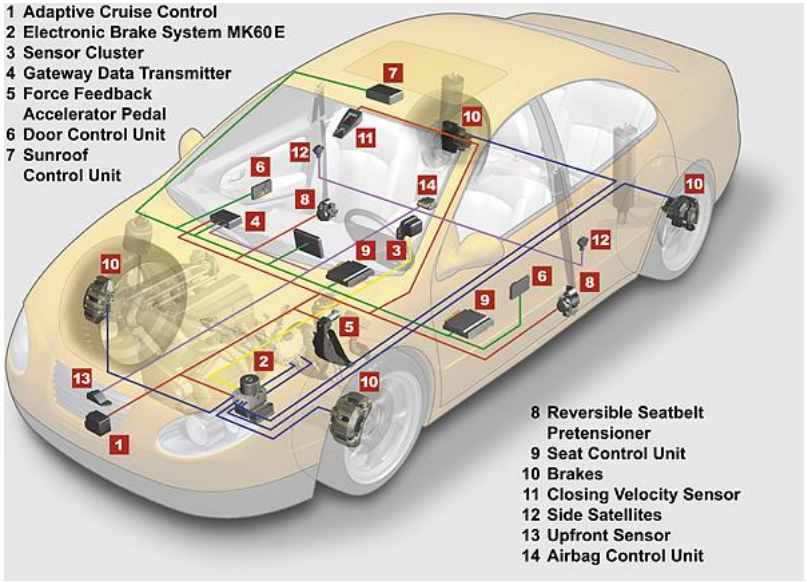
Requirement Engineering Overview

- What is a System
- What is System Context
- What is System Boundary
- What is Context Boundary
- What is a Requirement
- Why Requirements are important
- What is Requirement Engineering
- Activities of Requirement Engineering
- What are different Requirement types
- Qualities of good Requirement

For queries, contact : deepeshdongre@gmail.com

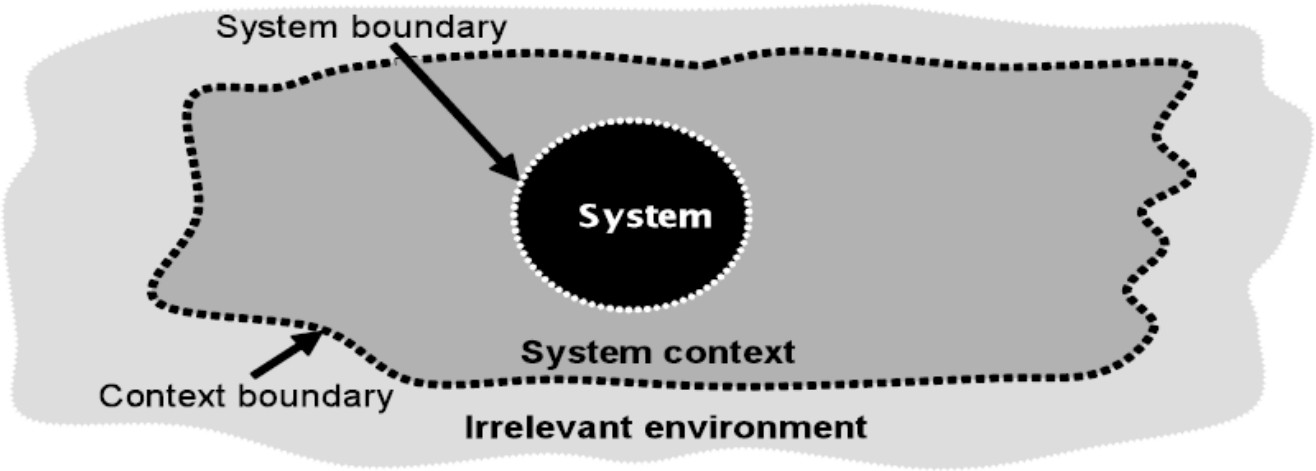
What is a System ?

…an integrated set of elements, subsystems, or assemblies that accomplish a defined objective. These elements include(hardware, software, firmware), processes, people, information, techniques, facilities, services, and other support elements (INCOSE).



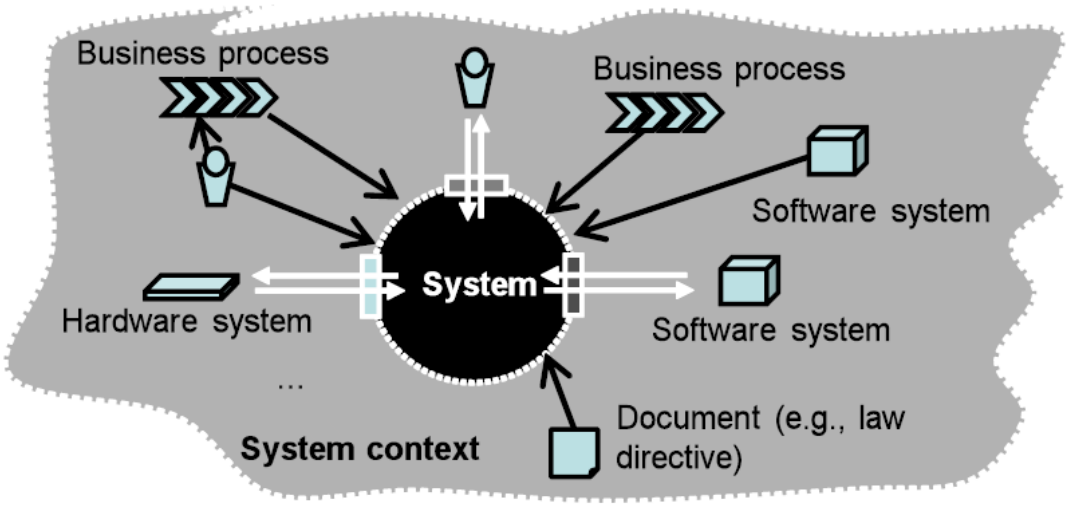
What is System Context ?

- The system context is the part of the system environment that is relevant for the definition as well as the understanding of the requirements of a system to be developed.



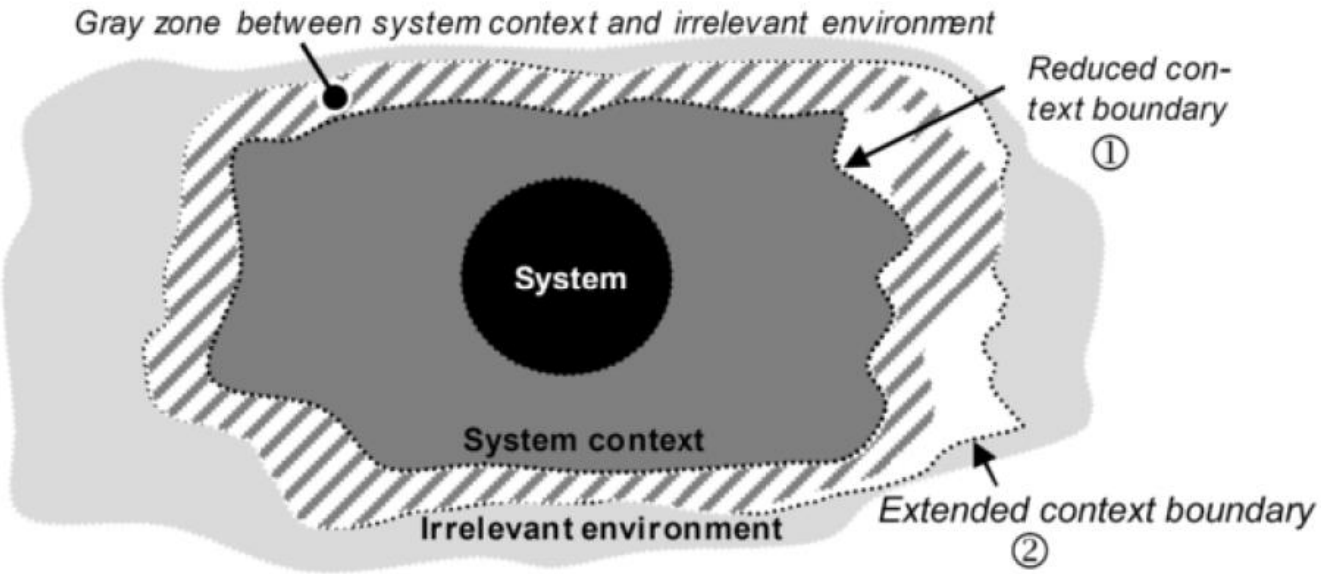
What is System Boundary ?

- The system boundary separates the system to be developed from its environment; i.e., it separates the part of the reality that can be modified or altered by the development process from aspects of the environment that cannot be changed or modified by the development process.

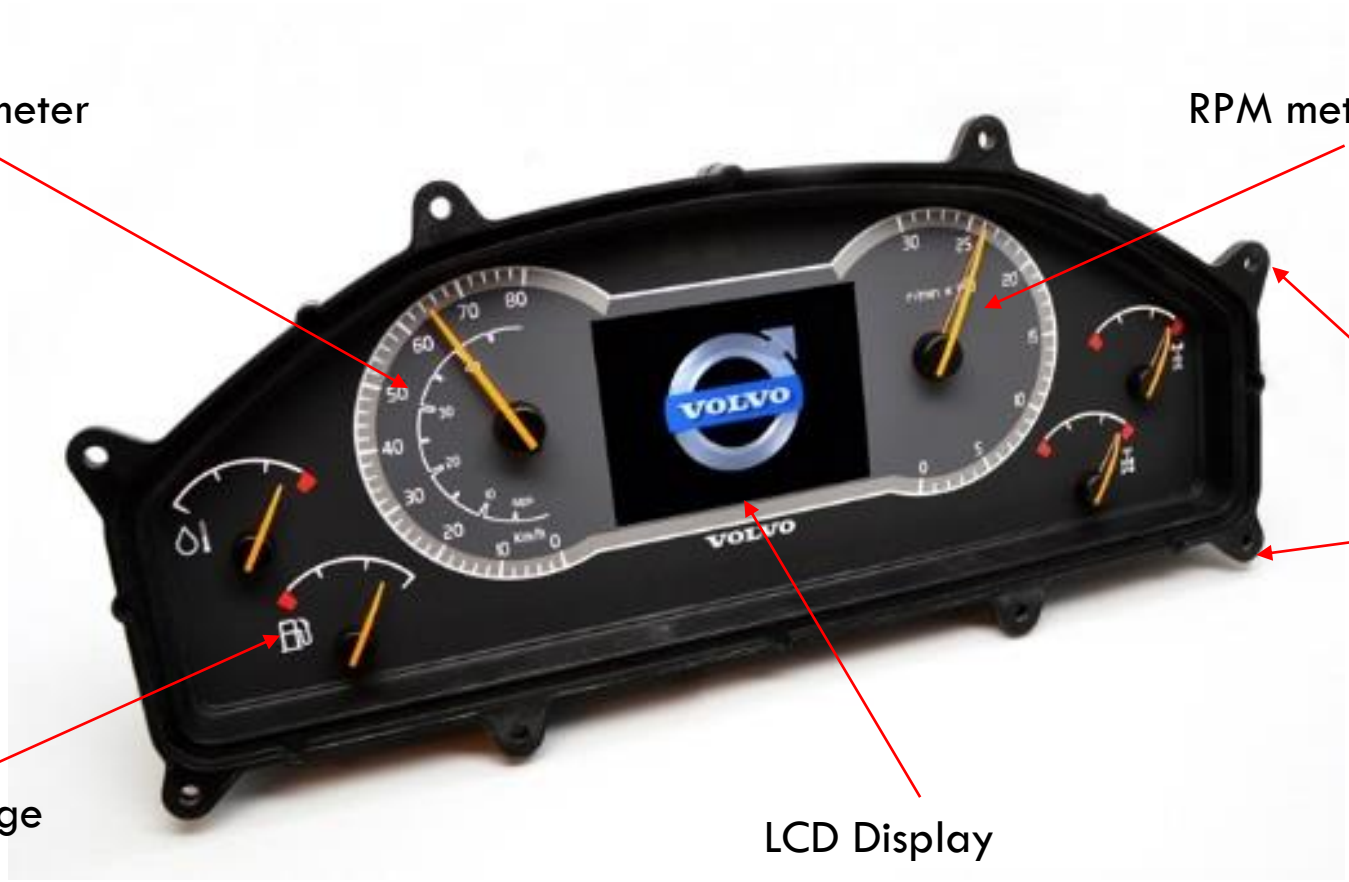


What is Context Boundary ?

- The context boundary separates the relevant part of the environment of a system to be developed from the irrelevant part, i.e., the part that does not influence the system to be developed and, thus, does not have to be considered during requirements engineering.



Sub system – Instrument Cluster



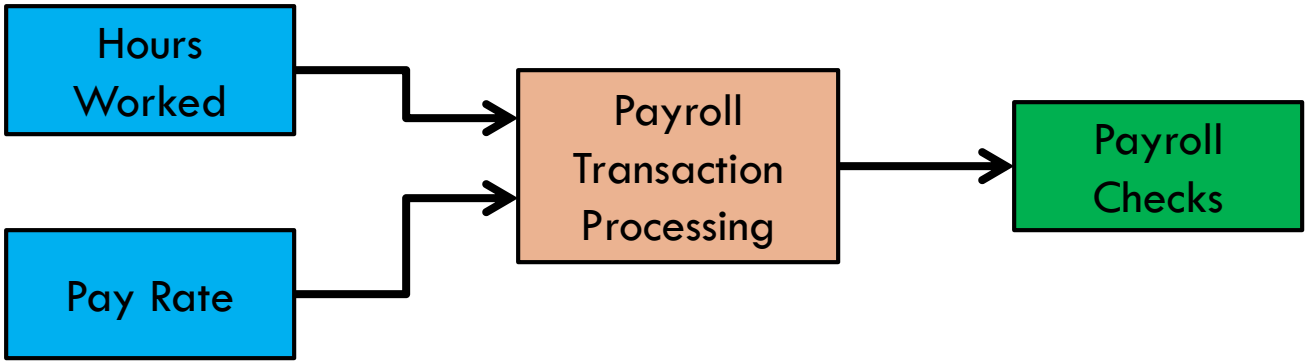
For queries, contact : deepeshdongre@gmail.com

What is a Requirement ?

1. A condition or capability needed by a user to solve a problem or achieve an objective.

2. A condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification, or other formally imposed documents.

3. A documented representation of a condition or capability as in (1) or (2).



Example of Payroll Processing

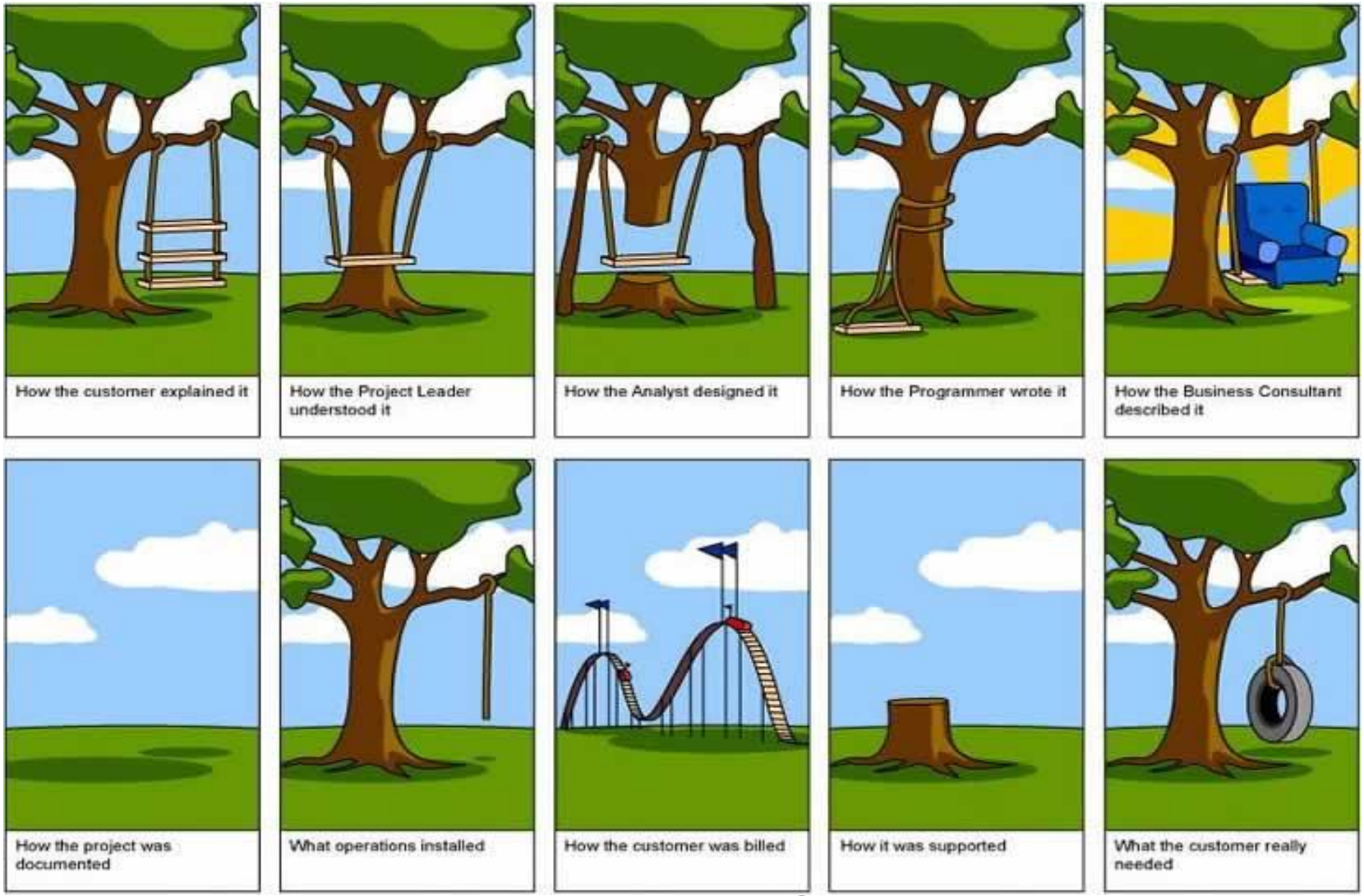
Why requirements are important ?

1. Requirements are the basis of the system development.

2. Requirements of any kind influence the analysis, design, implementation, and test phases directly and indirectly.

3. The quality of a requirement or of a requirements document has a strong impact on the progress of the project and therefore on its success.

The famous cartoon entitled “Project Cartoon” captures the sad reality behind bad requirements gathering



What is Requirement Engineering ?

1. Requirements engineering is a systematic and disciplined approach to the specification and management of requirements with the following goals

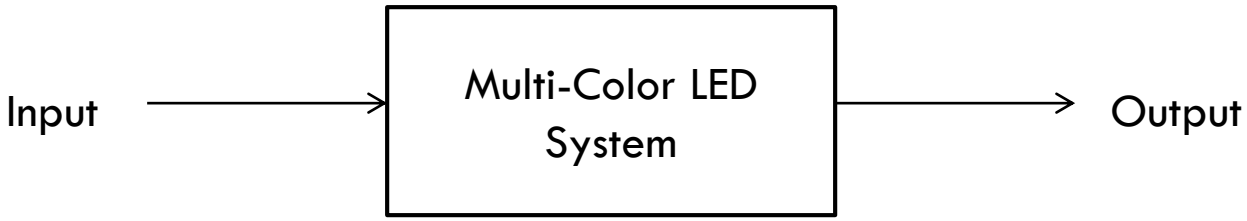
    a. Knowing the relevant requirements, achieving a consensus among the stakeholders about these requirements, documenting them according to given standards, and managing them systematically.

    b. Understanding and documenting the stakeholder's desires and needs, they specifying and managing requirements to minimize the risk of delivering a system that does not meet the stakeholder's desires and needs.

Activity 1

- Need to make a system with one input switch to operate multi-colored LEDs.

  What all requirements to be considered ?



What are activities of Requirement Engineering ?

1. Elicitation :

   During requirements elicitation, different techniques are used to obtain requirements from stakeholders and other sources and to refine the requirements in greater detail.

2. Documentation:

   During documentation, the elicited requirements are described adequately. Different techniques are used to document the requirements by using natural language or conceptual models.

3. Validation and negotiation:

   In order to guarantee that the predefined quality criteria are met, documented requirements must be validated and negotiated early on.

4. Management:

   Requirements management is orthogonal to all other activities and comprises any measures that are necessary to structure requirements, to prepare them so that they can be used by different roles, to maintain consistency after changes, and to ensure their implementation.

What are different Requirement types ?

1. Functional Requirement
   - A functional requirement is a requirement concerning a result of behavior that shall be provided by a function of the system.

2. Quality Requirement
   - A quality requirement is a requirement that pertains to a quality concern that is not covered by functional requirements.

3. Constraint
   - A constraint is a requirement that limits the solution space beyond what is necessary for meeting the given functional requirements and quality requirements.

Activity 2

- BE/TE project –
  - System definition
  - Requirement elicitation

Qualities of good Requirement

- Complete
- Correct
- Concise
- Consistent
- Feasible
- Unambiguous
- Necessary
- Prioritized
- Verifiable
- Traceable

Questions

?

For queries, contact : deepeshdongre@gmail.com

Thank You

For queries, contact : deepeshdongre@gmail.com

References

- Websites :
  - International Counsel on System Engineering (INCOSE) http://www.incose.org/
  - International Requirement Engineering Board (IREB) https://www.ireb.org/en

- Books :
  - Requirements Engineering Fundamentals – Klaus Pohl, Chris Rupp
  - INCOSE Systems Engineering Handbook 4e