Requirements Engineering Process

Requirement

- A description of a service that the system is expected to provide and the constraints under which it must operate.
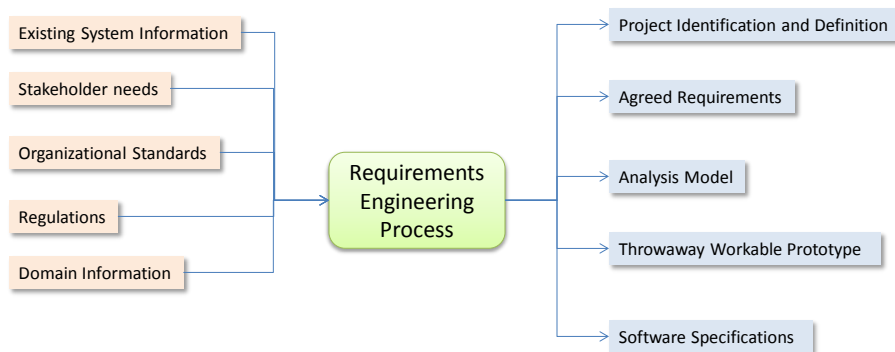
Requirement Types

- Functional Requirement
  - A requirement that specifies how the system should react to particular inputs and how the system should behave in particular situations.
- Non-functional Requirement
  - A requirement that specifies a constraint on the services or operations offered by the system.
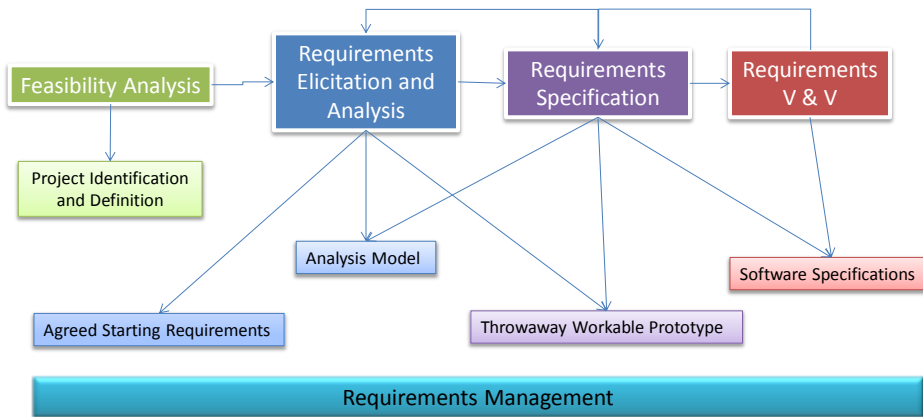
In Class Activity

- For each requirement on the handout, please state the requirement type – functional or non-functional. For the NF, please state the constraint.

Software Requirements Engineering

- System Engineering
  - Determining the overall objective of the system
  - Identifying the roles of hardware, software, people, database, documentation, procedures
  - Establishing Requirements
- Our emphasis – The Software Aspects
- Software Requirements Engineering
  - Requirements Elicitation
  - Requirements Analysis
  - Requirements Specification
  - Requirements Validation

Existing System Information		Project Identification and Definition
Stakeholder needs		Agreed Requirements
Organizational Standards	Requirements Engineering Process	Analysis Model
Regulations		Throwaway Workable Prototype
Domain Information		Software Specifications

Requirements Engineering Process

Requirements Elicitation

- The process of gathering the client's needs
- Techniques
  - Questionnaires
  - Interviews
    - informal, formal, very formal (JAD sessions)
  - Prototyping
  - Observation
  - Forms Analyses
  - Use Case Analyses

Requirements Analysis

- Reviewing requirements in order to uncover ambiguities, incorrectness, incompleteness, and inconsistencies
  - Analysis checklists
    - A list of questions which the analyst may use to assess each requirement.
  - Interaction matrices
    - Used to discover the interaction between requirements
  - Ambiguity checks
  - Completeness checks
  - Accuracy checks
  - Consistency checks
  - Verifiability checks
- Creating an analysis model

Requirements Specification

- a precise statement of the requirements that the system must satisfy.
- Two categories of specifications
  - Static descriptions
  - Dynamic descriptions

Requirements Specification

- Static Descriptions (Data Modeling)
  - Expression as a language
    - BNF
  - Data Abstractions
    - ERD
    - Class Diagrams

Requirements Specification

- Dynamic Descriptions (Operations Modeling)
  - Decision Tables
  - State Diagrams
    - For demonstration of parallel processing
      - Petri Nets
      - Activity Diagrams
  - Data Flow Diagrams (DFDs)
  - Activity Diagrams
  - Interaction Diagrams

Requirements Validation

- "Requirements validation is concerned with checking a final draft of a requirements document which includes all system requirements and where known incompleteness and inconsistency has been removed."

  – Kotanya and Sommerville

Requirements Validation

- Requirements Reviews
  - A group of people meet, read, and analyze the requirements.
- Prototyping
  - Develop a prototype so that the clients and users are able to visualize the system.
- Model Validation
  - Review of the diagrams and models created.
  - Trace each functional requirement to a section in the analysis model.
- Requirements Test Case Development
  - Define one or more tests that may be carried out on the finished system which will clearly demonstrate that the requirement has been met.

Requirements Documents

- Problem Identification and Definition
  - Very short statement of the problem to be solved
- Top-Level Requirements (TLR)
  - Requirements document
    - for managers, customers, engineers
- Software Requirements Specification (SRS)
  - definitive specification of the requirements
    - for engineers, customers, managers

Problem Identification and Definition

- Identify the business value of the software
  1. Identify the name of the project
  2. Identify the project sponsor
  3. Identify the business need
  4. Identify high level functionalities
  5. Identify the expected value (feasibility analysis)
  6. Identify any special issues

Top-Level Requirements

- **REVISION HISTORY**
- **EXECUTIVE SUMMARY**
- **CLIENT AND USER PROFILE**
- **SCOPE**
- **SYSTEM DEFINITION**
  - SYSTEM LEVEL DIAGRAM
  - FUNCTIONAL REQUIREMENTS
  - NON-FUNCTIONAL REQUIREMENTS
  - USER-INTERFACE REQUIREMENTS
  - DATA STORAGE REQUIREMENTS

Software Requirements Specifications

1. **REVISION HISTORY**
2. **INTRODUCTION**
3. **OVERALL DESCRIPTION**
4. **EXTERNAL INTERFACE REQUIREMENTS**
5. **SYSTEM FEATURES**
6. **OTHER NON-FUNCTIONAL REQUIREMENTS**
7. **OTHER REQUIREMENTS**

APPENDIX A: GLOSSARY
APPENDIX B: MODELS
APPENDIX C: TBD LIST