

Requirements Engineering

Introduction to Requirements

- Introduction to Systems Engineering
- What is Requirements Engineering?
- Quality of Requirements
- Stakeholder Involvement
- Requirements Lifecycle
- Requirements Traceability
- Analysis and Modeling
- Testing and Integration
- Requirements Verification and Validation
- Mapping Requirements from Problem to Solution Domains
- Effective requirements management
- Principles of requirements definition and management
- Best practices for requirements engineering
- Requirements Baselineing

Introduction to Requirements Engineering

- The Requirements Engineering Process
- Requirements and the Business Context
- Hierarchy of requirements
- Stakeholders in the requirements process
- Eliciting and Documenting Requirements
- Requirements Elicitation
- Interviewing for Requirements
- Use of models in Requirements Engineering
- Requirements Documentation
- Requirements Analysis
- Analyzing and Negotiating Requirements
- Requirements Validation and Verification
- Requirements Management

Requirements Engineering and System Views

- Process View
- Deliverable View
- pertinent information for RFPs, SEMP, ConOps, etc
- Checklist View
- Project View
- SE process applies

Activities in the Requirements Engineering

- Develop requirements
- Write and document requirements
- Check completeness
- Analyze, refine, and decompose requirements
- Validate requirements
- Manage requirements

Basic Requirements Engineering and Management

- Techniques for drawing out stakeholder needs, goals, requirements, constraints, priorities, normal operations, and preferences
- Initial needs assessment leading to the development of requirements
- .Elicitation
- Stakeholder Analysis
- Interviews and Workshops
- Observation
- Creativity
- Analysis
- Kano
- Specification
- Use Cases and ConOps
- BPMN
- Verification
- Validation
- Prototypes

- Inspection
- Testing
- Demo
- Change management
- Version control
- Customer acceptance and validation

Elicitation Techniques

- Interviews and Focus groups
- Questionnaires, surveys and Brainstorming
- Role play
- Review incident reports, enhancement requests and Joint authorship
- Benchmark – similar or competing systems
- Prototype
- Throw-away
- Evolutionary

Process for Requirements Engineering

- Value of Systems Engineering
- Value of Requirements Engineering
- Customer Requirements
- Functional Requirements
- Performance Requirements
- Design Requirements
- Derived Requirements
- Allocated Requirements
- Concept of Operations(ConOps)
- System Requirements
- Integration and Verification
- System Validation
- Project Planning
- Project Monitoring and Control
- High-level identification of user needs and system capabilities

- Project stakeholders
- Stakeholder agreement
- Interrelationships and roles and responsibilities
- Shared understanding by system owners, operators, maintainers, and developers
- who, what, why, where, and how of the system and product
- Agreement on key performance measures
- Plan for how the system will be validated
- Developing Systems
- Input Requirements and Derived Requirements
- Acceptance Criteria and Qualification Strategy
- Generic Process Introduction
- Development in the Context of Change

System Modeling for Requirements Engineering

- Requirements Engineering and System Modeling
- Use Cases and Actors
- Data Flow Diagrams
- Entity-Relationship (E-R) Diagrams
- Statecharts
- Object-Oriented Approaches
- DoDAF and NAF Viewpoint Methods
- The UML and SysML Notations
- Formal Methods
- Model Based System Engineering (MBSE) and Requirements Engineering

Managing, Writing and Reviewing Requirements

- System Life Cycle
- The systems engineering process
- Development of system architecture and detail design
- The Origin of Requirements
- Concept of the system boundary
- The modeling boundary
- Managing Requirements

- Validating Requirements
- Requirements traceability
- Baselines and their use
- The waterfall vs. agile life cycle paradigm
- Structuring Requirements
- Requirements Engineering in the Problem Domain
- Identify Stakeholders
- Operational and Use Scenarios
- Scoping the System
- Derive Requirements
- Allocated Requirements
- Requirements Engineering in the Solution Domain
- Stakeholder Requirements mapped to System Requirements
- System Requirements
- Requirements to Subsystems
- Traceability
- Metrics for Traceability

Requirements Engineering Management

- Requirements Management
- Planning
- Monitoring
- Changes
- Development
- Relationship to design
- Relationship to baselines
- Types of Requirements
- Differences between requirements for hardware, software, services
- Non-functional requirements
- Quality of Requirements
- Requirements Analysis
- Context analysis

- Operational Concept Description
- Verification requirements development
- “TBDs”
- Requirements and Requirements Specifications
- Requirements Flowdown into Specifications

Requirements Engineering Gates and Cross-Cutting Activities

- Stakeholder Involvement
- Elicitation
- Project Management Practices
- Risk Management
- Metrics
- Configuration Management
- Project Process Improvement
- Decision Gates
- Decision Support/Trade Studies
- Technical Reviews
- Traceability