Requirements Engineering Process--
A Spiral Model

Start

Informal statement of requirements

Agreed requirements

Decision point: accept document or re-enter spiral

Requirements elicitation

Requirements analysis and negotiation

Requirements documentation

Agreed requirements

Requirements validation

Requirements document and validation

Draft requirements document

Eliciting Requirements

Stakeholder needs

Domain knowledge

Elicit requirements

Regulations

Existing Systems

Etc.
Requirements--What are They?

• A requirement is a description of a system feature, capability, or constraint.
• Requirements generally focus on what a system should do, rather than how it should do it.
• A requirement should be “testable”.
• Classes of Requirements:
  – functional
  – nonfunctional (constraints)
• Requirements Priority
  – essential (“shall”)
  – highly desirable (“should”)
  – desirable but low priority

Types of Requirements

• Physical environment
• Interfaces
• Users and human factors
• functionality
• performance
• documentation/training
• data
• resources
• security
• reliability
• portability
• maintenance
• etc.
Elicited Requirements--An Example

- Consider a library automation system. Here are some examples of possible elicited requirements:
  - The system shall maintain records of all library materials including books, serials, newspapers and magazines, video and audio tapes, reports, and CD-ROMS.
  - The system shall allow users to search for an item by title, author or ISBN.
  - The system’s interface shall be via a web browser.
  - The system shall support 20 transactions per second.
  - The system shall be easy to use.

Analyzing/Negotiating Requirements

- Potential problems with elicited requirements
  - inaccurate
  - incomplete
  - ambiguous
  - inconsistent
  - unnecessary
  - infeasible
  - untestable

- Identified problems with elicited requirements should be negotiated with stakeholders
Documenting Requirements

- Requirements Documents go by various names:
  - requirements document
  - specification document
  - system requirements specification (SRS)

- Sometimes there will be two documents
  - requirements definition--customer-oriented
  - requirements specification--developer oriented

Typical Elements of a Requirements Document

- Listing of functional requirements
- Listing of nonfunctional requirements
- interface requirements
- hardware specification
- essential application domain information
- system models
  - conceptual model
  - use-case analyses
  - basic architectural model
Expressing Requirements

• Informal Specification
  – natural language
  – ad hoc models/diagrams
• Formal Specification
  – mathematically based notations/description languages
  – Well defined modeling techniques
    • Petri nets
    • FSMs
    • UML

Requirements Validation

• Validation is the process of establishing that the requirements specification is is accurate, consistent, and complete with respect to the stakeholder’s needs.
• Note that it is not possible to formally validate a requirements specification with respect to the stakeholders’ expectations
• The most common form of requirements validation is a Requirements Review.
  – Formal meeting similar to a walkthrough
  – review team made up of various stakeholders
Informal Requirements Validation

- General problems to look for
  - incompleteness
  - ambiguity
  - violation of standards
  - redundancy
  - inconsistency (conflict)
  - traceability
    - is this requirement traceable to one or more stakeholder needs
  - testability