Intro to Software Requirements

• What question do software requirements answer?
  – Who, what, when, where, why, how

What is the system to do?
Who are the system user groups?

*Business case* tells us why (and perhaps who, when, where).
*Project plan* tells us when and who.
*Architecture* tells us how.
Why do we care?

- Requirements issues are among the most common reasons cited for project failures and challenges

- Project Success Factors
  
  1. User Involvement 15.9%
  2. Executive Management Support 13.9%
  3. Clear Statement of Requirements 13.0%
  4. Proper Planning 9.6%
  5. Realistic Expectations 8.2%
  6. Smaller Project Milestones 7.7%
  7. Competent Staff 7.2%
  8. Ownership 5.3%
  9. Clear Vision & Objectives 2.9%
  10. Hard-Working, Focused Staff 2.4%
  Other 13.9%

Why do we care?

• Project Challenged Factors % of Responses
  1. Lack of User Input 12.8%
  2. Incomplete Requirements & Specifications 12.3%
  3. Changing Requirements & Specifications 11.8%
  4. Lack of Executive Support 7.5%
  5. Technology Incompetence 7.0%
  6. Lack of Resources 6.4%
  7. Unrealistic Expectations 5.9%
  8. Unclear Objectives 5.3%
  9. Unrealistic Time Frames 4.3%
 10. New Technology 3.7%
 Other 23.0%

Why do we care?

• Cost of avoiding/fixing defects increases as project progresses
  – Cheapest in requirements development
  – Boehm’s cost of fixing a defect curve

• Anecdote: Sprint LARS
IEEE Definition of Requirement

- IEEE Standard Glossary of SE Terminology
  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 document.
  3. A documented representation of a condition or capability as in 1 or 2.
Other Definitions

• Weiger
  – A property that a product must have to provide value to a stakeholder

• Sommerville and Sawyer
  – A specification of what should be implemented. They are descriptions of how the system should behave, or of a system property or attribute. They may be a constraint on the development process of the system.

• Any others?
Types of Requirements

• Discussion Question:
  – Explain the difference between business, user, system, and functional requirements.
  – What are nonfunctional requirements?
Types of Requirements

• Business
  – High-level objectives of the organization or customer who requests the system
  – Documented in a Vision and Scope document

• User
  – User goals or tasks that the users must be able to perform with the product
  – Use-cases often used to capture these
  – Ex. Make a reservation

• System
  – High-level requirements for a product that contains multiple subsystems
Types of Requirements

• Functional
  – Specify the software functionality that the developers must build into the product to enable users to accomplish their tasks.
  – Ex. The system shall mail a confirmation to the user

• Non-functional
  – Quality attributes, performance goals, reliability, …
  – Ex. Reservation request submissions should receive a response in less than 10 seconds
Requirements Documents

• “different organizations might call any of the following a ‘requirements document’”:

1. Half-page software product vision
2. Two page list of key features
3. 50 page list of detailed end-user-level requirements
4. 250 page exhaustive listing of every visual element on every screen, input-field-by-input-field descriptions of all possible input conditions, all possible system state changes, and detailed description of every persistent data element

Requirements Engineering

• Discussion questions:
  – What is Software Engineering?
  – How does Requirements Engineering fit with Software Engineering?
  – Why do both include the word "engineering" and is this fair and appropriate?
  – Recall Chaos report; why is requirements engineering hard?
Requirements Problems

- Insufficient User Involvement
- Creeping User Requirements
- Ambiguous Requirements
- Gold Plating
- Minimal Specification
- Overlooked User Classes
- Inaccurate Planning

Discussion Questions:
- Have you seen any of these occur?
- What could have been done to avoid the problem?
Excellent Requirements

- **Statements**
  - Complete, correct, feasible, necessary, prioritized, unambiguous, verifiable

- **Specification**
  - Complete, consistent, modifiable, traceable

- **Discussion Question:**
  - What would you add to the list?