The Business Case for Requirements Engineering

RE’2003
12 September 2003

Donald Firesmith
Acquisition Improvement Team
Acquisition Support Program
Software Engineering Institute (SEI)
Carnegie Mellon University
Pittsburgh, PA  15213
In a Nut Shell

• Requirements first opportunity to screw up
• Many requirements engineers aren’t
• Requirements typically contain many defects
• Requirements impact all down-stream work
• Cost to fix defects increases rapidly the earlier they are introduced
• Requirements primary reason for failure
First Opportunity to Fail

There are many chances to fail on any project:
- Contracting
- Requirements Engineering
- Architecting
- Design
- Implementation
- Integration
- Testing
- Etc.

Requirements first engineering chance to fail.
Many Requirements Engineers Aren’t

Requirement Myth:
• Since most requirements are specified in narrative English and most employees are minimally literate, managers often think that anyone (including low-level new hires) can do requirements engineering.

Requirements engineers lack training in:
• Requirements Tasks:
  • Requirements Identification
  • Requirements Analysis
  • Requirements Specification
  • Requirements Management
• Requirements Techniques (e.g., use case modeling)
• Requirements Tools
Requirements Contain Defects

The percentage of defects originating during requirements engineering are estimated as:

- 50% (Karl Wiegers, 2001)
- 42% (A Wingrove)
- 60-64% (requirements and design – EBG Consulting)

Requirements typically lack:

- Cohesiveness, Completeness, Correctness, Consistency, Currency, Essential, Feasibility, Lack of Ambiguity, Relevance, Testability, Usability, Validatability
Requirements Engineering Impacts

Requirements Engineering impacts:

• Management (scope management)
• Architecture (architecturally-significant requirements)
• Design and Implementation
• Testing
• Quality Engineering (determines defects)
• Safety Engineering (safety requirements)
• Security Engineering (security requirements)
• Reuse
• Training

Requirements Defects Snowball
Defect Costs Are Excessive

Requirements engineering defects cost:
• 50-200 times as much to correct once fielded. (Barry Boehm, 1988)
• 10-100 times as much to correct once fielded (Steve McConnell, 2001)
• 15 times as much to correct once fielded (IBM System Sciences Institute – all defects so requirements worse)
• 10 times as much to correct during testing (Hughes Aircraft)

Reworking requirements defects on most software development projects cost:
• 40-50% of the effort (Capers Jones)
• 80% of the effort (Karl Wiegers, 2001)
Bad Requirements Cause Failures

Requirements problems are the single number one cause of project failure:

- Significantly over budget
- Significantly past schedule
- Significantly reduced scope
- Poor quality applications
- Not significantly used once delivered
- Cancelled
Conclusion

Requirements Engineering:
- Starts project on the right foot
- Turns requirements workers into trained requirements engineers
- Eliminates and minimizes defects
- Improves architecting, design, implementation, testing, QA, security, safety, etc.
- Decreases development and lifecycle costs
- Increases probability of success
Contact Information

Donald Firesmith
Senior Member of the Technical Staff
Acquisition Improvement Team
Acquisition Support Program
Telephone: 412-268-6874
Email: dgf@sei.cmu.edu

U.S. Mail:
Software Engineering Institute (SEI)
Carnegie Mellon University
Pittsburgh, PA 15213-3890

World Wide Web:
http://www.sei.cmu.edu/
http://www.donald-firesmith.com/