Requirements & Use Cases

Joseph Schwarz

Osservatorio Astronomico di Brera, Milan, Italy

Have we finished dealing with requirements?

- Generating requirements is a process
  - It *begins* with the up-front documents
    - These are necessary, but not sufficient to ensure that the system you get is the system you wanted
  - It *continues* as a collaboration between the γ-ray astronomers and the s/w development team
    - As a rule, s/w developers will ***not*** be domain experts
    - They will need more details & guidance as implementation proceeds
    - Requirements are very likely to evolve

The ALMA Experience

- First requirements & use case document
  - Drafted in ~1 week meeting between “black-belt” radio-synthesis astronomers & s/w developers
- “Subsystem scientist” assigned to each subsystem development team
  - Supports the team during construction (10-15 y)
  - Clarify/explain & detail requirements
  - Verify results

Is it worth the effort?
Relative Cost to Fix an Error

Phase in Which Found	**Cost Ratio**
• Requirements	1
• Design	3-6
• Coding	10
• Development testing	15-40
• Acceptance testing	30-70
• Operation	40-1000

B.W. Boehm, *Software Engineering Economics*, cited in Gause & Weinberg, *Exploring Requirements* (Dorset House, 1989)

What is a Use Case?

- A description of system behavior in response to a request from one of the stakeholders, called the *primary actor.*
  - In what ways does the system respond to my request?
  - What will the system do to protect the interest of *all* stakeholders?
    - *e.g.*, the h/w engineer who needs the log records from a telescope failure during ***your*** observation
  - For our current purposes, the system is a black box
- ***Readable by all project members***
  - Simple text, without technical jargon
- Use Cases account for ~1/3 of all requirements
  - The behavioral (functional) requirements

Why should you write them?

- To encourage a common understanding of requirements on system behavior ("functional requirements")
  - Improve communication among project members
- To identify failure/error modes and desired responses to them
- To discover & document outstanding issues
- Because they give context to the remaining requirements (performance, security, …)
- And because only **you** know what you really want

Essential Use Case Content

- Title/Goal
- Primary actor (person or event)
- Stakeholders
- Pre- and post-conditions
- Main success scenario
  - Everything runs without problems
- Alternative scenarios
  - Error modes
  - Other (*e.g.*, interruption for ToO)

Observer-level user scenarios

- Begin with concrete, “day-in-the-life” stories
  - Observe a distant AGN with an LST
  - Survey the Galactic Plane
  - Observe ~10 variable sources simultaneously
- Find the commonalities
- Write the general Use Case(s)

For more details…

- http://alistair.cockburn.us/Use+case+fundamentals
- Cockburn, Alistair, *Writing Effective Use Cases* (Addison-Wesley, 2001)