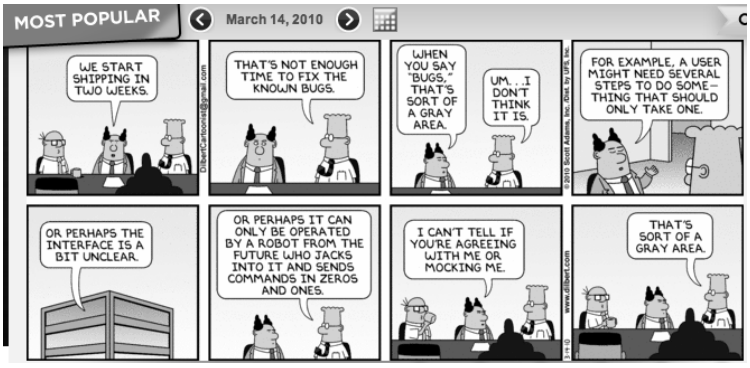
Quality Assurance I

Standup reports

Project 1 delivery

QA Basics



1

Project 1 Presentations

- Project 1 presentations
  - Will be limited to 6-7 minutes apiece (practice your timing)
  - Make sure you can connect to the projector here (in advance)
  - Test your demo on the computer you plan to use
- Which teams can stay if we run a little late?

Project Submission

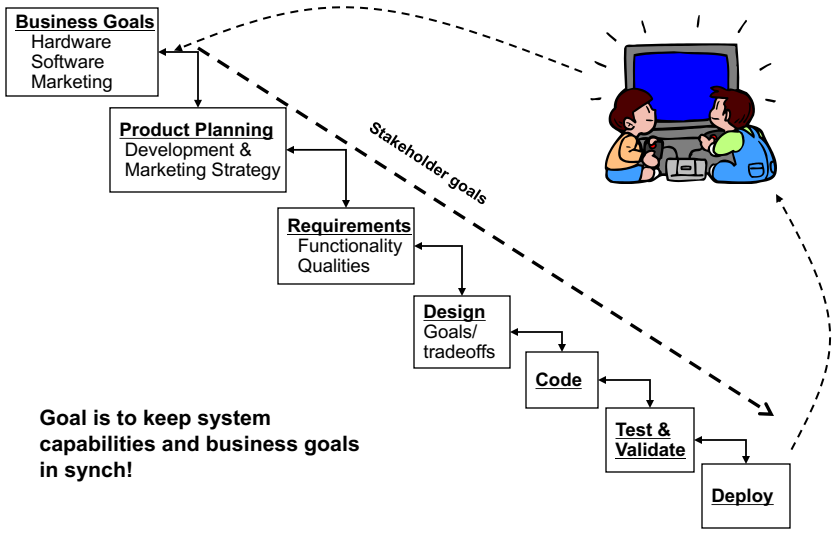
- All Project 1 materials are due at class time on Friday
- Make sure that **all project deliverables** are available on your Assembla pages with links from the Home page
  - Include source code as a downloadable package
  - Include any executable and test cases
  - Include presentation slides
  - Provide explicit instructions how to download, install and run your software!

Quality assurance Basics

Purpose of SE

- The *purpose of Software Engineering* is to *gain* and *maintain* intellectual and managerial control over the products and processes of software development.
  - **Intellectual control**: able to make rational development decisions based on an understanding of the downstream effects of those choices.
  - **Managerial control** means we likewise control development *resources* (budget, schedule, personnel).

Product Development Cycle

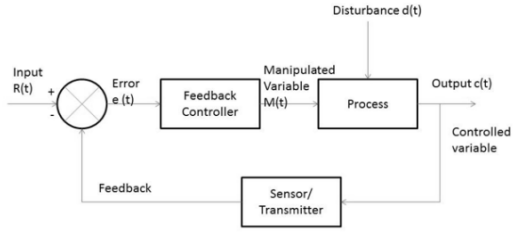


Goal is to keep system capabilities and business goals in synch!

Requires Feedback-Control

- Uncertainty means we cannot get everything under control then run on autopilot
- Rather control requires continuous feedback
  1. Define ideal
  2. Make a step
  3. Measure deviation from ideal
  4. Correct direction or redefine ideal and go back to 2

Role of QA



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Basic QA Questions

- For this to work, must define notions like "ideal" and "measure" for products and processes
  - What defines the "ideal?"
  - What should we measure?
  - How can we measure it?
  - When should we measure it?
  - Who should do the work?

Example: System Requirements

- What happens if we get requirements wrong?
- *What qualities should a "good" requirements specification have (ideally)?*
- *How should we evaluate the qualities of the requirements specification?*
- What is the right time for these activities?
- Which roles should be responsible?

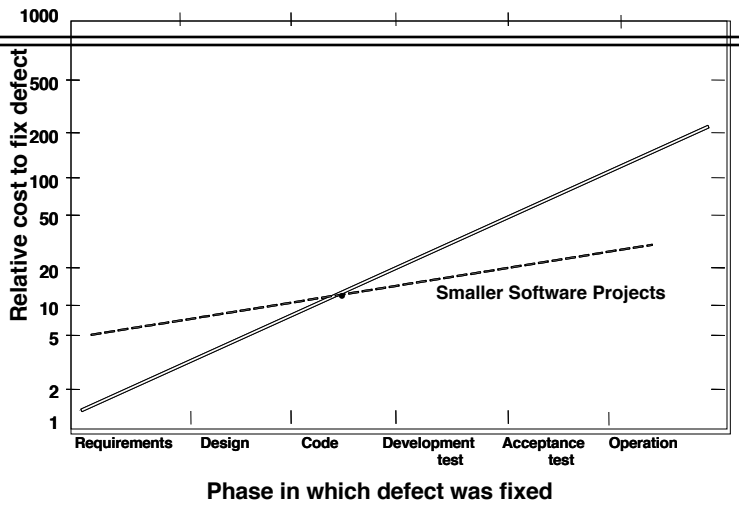
QA Questions

- Properties of a good requirements spec
  - Relevant: captures what the stakeholders want
  - Complete: captures all the stakeholder requirements (functional and quality)
  - Consistent: requirements consistent with one another
  - Unambiguous: avoids multiple interpretations
  - Precise: clearly distinguish acceptable from unacceptable implementations
  - Verifiable: can it be tested
- How could we evaluate these properties?
  - What could we actually *measure*?
  - Hard problem

Example: System Requirements

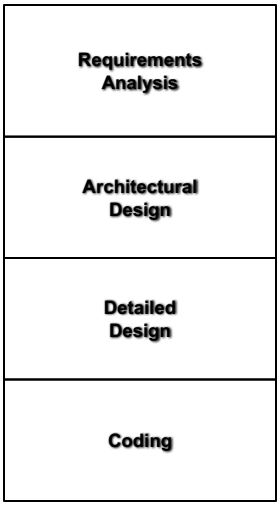
- What happens if we get requirements wrong?
- Ideal: which qualities should a "good" requirements specification have?
- How should we evaluate the qualities of the requirements specification?
- *When is the right time for these activities?*
- Which roles should be responsible?

Increase in Software Cost-to-fix vs. Phase (1976) *



*** Barry Boehm - A View of 20th and 21st Century Software Engineering**

Quality is Cumulative



- Are the requirements valid?
- Complete? Consistent? Implementable?
- Testable?

- Does the design satisfy requirements?
- Are all functional capabilities included?
- Are qualities addressed (performance, maintainability, usability, etc.?

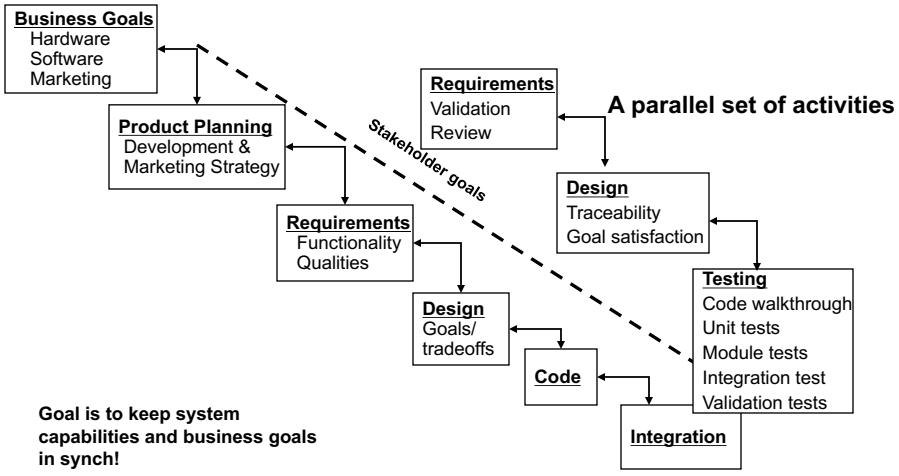
- Do the modules work together to implement all the functionality?
- Are likely changes encapsulated?
- Is every module well defined

- Implement the required functionality?
- Race conditions? Memory leaks? Buffer overflow?

We need a plan!

- QA activities are
  - Critical to control (and project success)
  - Part of every phase of the project
  - Time consuming, labor intensive and expensive
    - NIST Study: *~80% of development costs are consumed by software developers identifying and correcting defects*
  - Cannot do everything, need to choose
- Suggests need to plan QA activities to:
  - Detect issues as early as possible
  - Target highest priority/risk issues for project
  - Support cost-effective use of resources

Product Development Cycle



QA Plan

- Purpose: synchronize QA activities with project deliverables such that:
  - Artifacts satisfy quality goals
  - Delivered code is consistent with stakeholder needs
- The plan should answer the question “How will the project check that stakeholder goals are being met?”
  - The overall QA objectives, strategy, and methodologies
  - The kinds of QA activities that should occur
  - Roles that will carry out the activities
  - When the activities should occur

Example QA Plan

- See examples linked to Schedule page

1. Purpose
2. Methods
    1. Prototypes
    2. Reviews
    3. Testing, etc.
3. Schedule and Resources
4. Measures: metrics collected
5. Acceptance criteria
    1. Review issues
    2. Code defects
    3. Quality variation (e.g., performance variation), etc.
6. Responsibilities

For Project 1

- Informal plan is adequate but, should describe what you intend to do and why
- Reviews
  - Which artifacts will you review?
  - Which qualities will you review them for? (e.g., compliance with grading criteria)
  - How will you track defects?
- Testing
  - What kinds of test will you run on the software?
  - What are the test cases and results?
  - How will you track defects?

Summary

- Quality Assurance activities provide the *feedback* in controlling development
- Effective QA requires that we
  - Can define what we want (the ideal)
  - Can evaluate work products against the ideal
- QA activities consume substantial resources, require planning

  …But, done well, pay for themselves

Questions