CSE 4283 / 6283
Software Testing and QA

Dr. Tanmay Bhowmik

tbhowmik@cse.msstate.edu

Special thanks to Dr. Nan Niu & Dr. Byron Williams

Agenda

This Class:
Course Orientation
SE Recap

Next Class:
Introduction to Testing

About the Instructor

- Tanmay Bhowmik
  - Assistant Prof. Dept. of CSE, MSU, 2016 – present
  - Assistant Prof. of CS, Northwest Missouri State University, 2015 – 16
  - PhD and MS in Computer Science, MSU, 2008 – 15
  - BS in CSE, NIT Durgapur, West Bengal, India, 2003 – 07
  - Professional software development at nSPARC, MSU, 2012 – 14
  - From Bangladesh
- Research interest
  - Software Engineering
    - Requirements engineering, secure software engineering, software maintenance
- How to reach
  - Office hours: T & R 9:30am – 10:30am
  - Other times by appointment
- Hobby
  - Travelling, watching documentary, reading, cooking

Teaching Style?

- Interactive
  - Lecturing alone doesn't work well
  - Need feedback – both positive and negative
  - Need your participation, and YES, that helps in a BIG way!

About This Course

- Get to know the discipline of software quality
- Prerequisite
  - CSE 4214/6214 (Intro to Software Engineering)
    - CSE2383 (data structures & analysis of algorithms)
  - Talk to the instructor if your case is special
- Regularly check course website for updates
- Class
  - Twice a week: T & R 2:00pm-3:15pm, **HILBUN** 350
- Textbook
  - Jeff Tian, Software Quality Engineering, 2005
  - Paul C. Jorgensen, Software Testing: A Craftsman's Approach, 4th edition

Course Goals

- Learn the basics of software quality
- Learn various testing techniques
- Learn other QA techniques than testing
- Get ready for a software testing or QA position
- Get ready to do SE research
  - For graduate and honors students
- Learn to become a (software) professional
- Improve the skills
  - Communication, time management, using testing tools, etc.

Topics (subject to change WITH notice)

- Overview and Basics
  - Software, Quality, QA, Quality Engineering, etc.
- Software Testing
  - Test Activities, Coverage and Usage Testing, Boundary Testing, Finite State Machine, Control Flow, etc.
- QA beyond Testing
  - Defect Prevention, Software Inspection, Formal Verification, Fault Tolerance, etc.
- Quantifiable Quality Improvement
  - Feedback, Measurements, Risk Management, Reliability, etc.

Grading

Grading Scale (FIRM)		Grading Activities
89.50% - 100%	A	Exams: 45% (1 midterm, and 1 optional final)
79.50% - 89.49%	B	Assignment I: 5%
69.50% - 79.49%	C	Assignment II: 15%
59.50% - 69.49%	D	Assignment III: 15%
0% - 59.49%	F	Assignment IV: 10%
		Quizzes: 10%

- **How to succeed**
  - Do your homework (also, class reviews & readings)
  - Take the exams, quizzes, and assignments very seriously
  - Participate in the class
    - Attendance is mandatory
    - Take part in discussion
  - Be fair and supportive to your colleagues

Grading

Grading Scale (FIRM)		Grading Activities
89.50% - 100%	A	Exams: 45% (1 midterm, and 1 optional final)
79.50% - 89.49%	B	Assignment I: 5%
69.50% - 79.49%	C	Assignment II: 15%
59.50% - 69.49%	D	Assignment III: 15%
0% - 59.49%	F	Assignment IV: 10%
		Quizzes: 10%

- **How to succeed**
  - Do your homework (also, class reviews & readings)
  - Take the exams, quizzes, and assignments very seriously
  - Participate in the class
    - Attendance is mandatory
    - Take part in discussion
  - Be fair and supportive to your colleagues

Graduate and Honors Credit

- Graduate Students
  - Need to write a term paper
  - Will comprise 25% of the final grade
- Honors Students
  - Will comprise 15% of the final grade
- Tentative deadlines are given in the course calendar

Course Policies

- Assignment Deadlines
- Attendance, Unexcused absence
- Late submission and re-grading
- Communication policy
  - Emails and course announcements
- Classroom policy
  - Mute laptops & cell phones, but be out loud when speaking
- Academic honesty

Software Engineering Recap

SE Reviews (Some Questions)

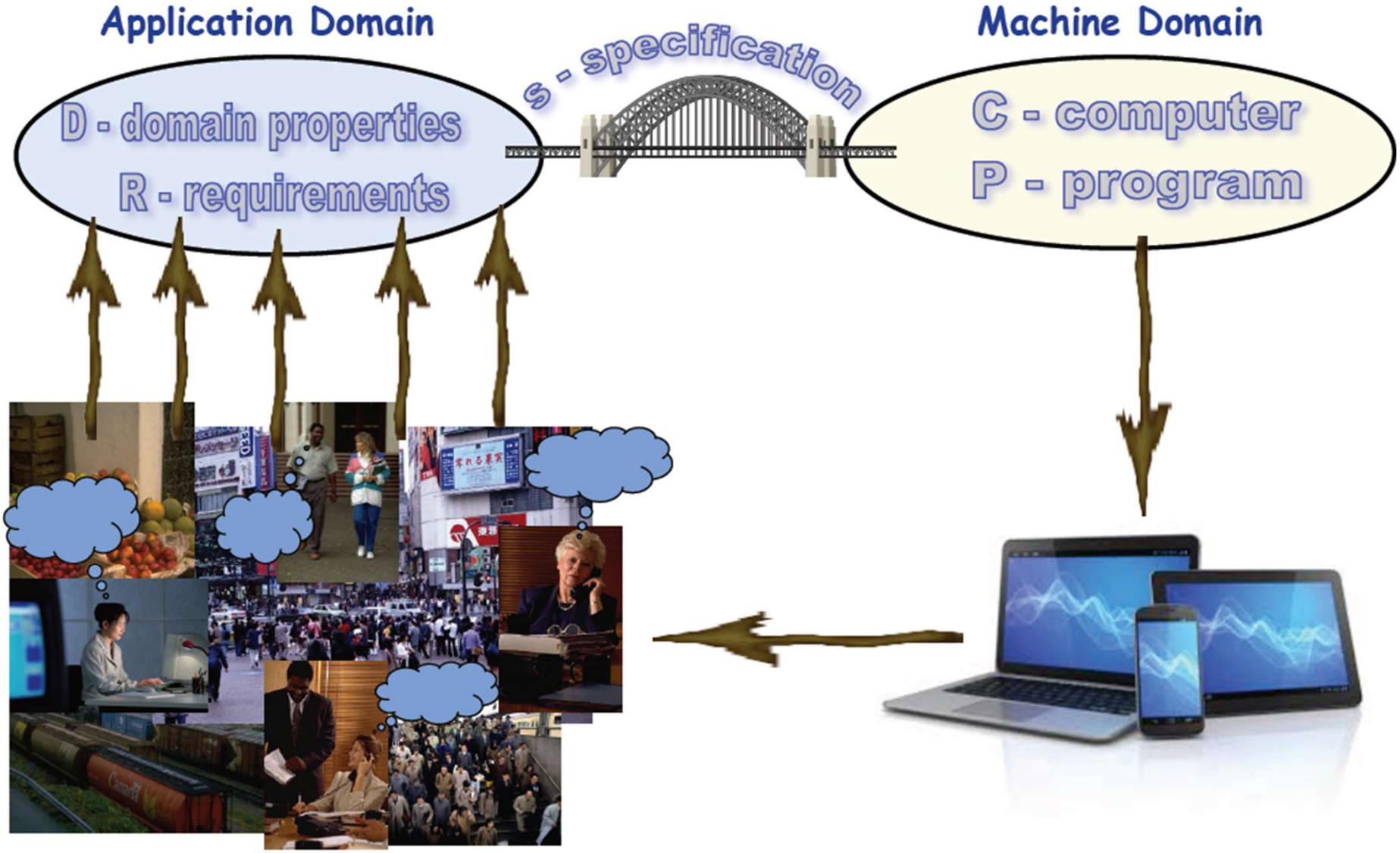
- Why do we call it Software “Engineering” not “Manufacturing”?
- Why do we engineer software?

- To solve customer’s problem
  - To discover the real needs & adjust the expectations
- To produce quality product within budget and schedule
  - “software crisis” (early days of computing)
- To show/demonstrate/prove the product (software) is indeed high quality
  - Does what it is supposed to do
  - Does it fast, securely, reliably…

What's a "problem"?

- Why do we engineer software?
  - To solve customer's **problem** via software-intensive systems
  - To produce quality software within budget and schedule
  - To show/demonstrate/prove the software is indeed high quality

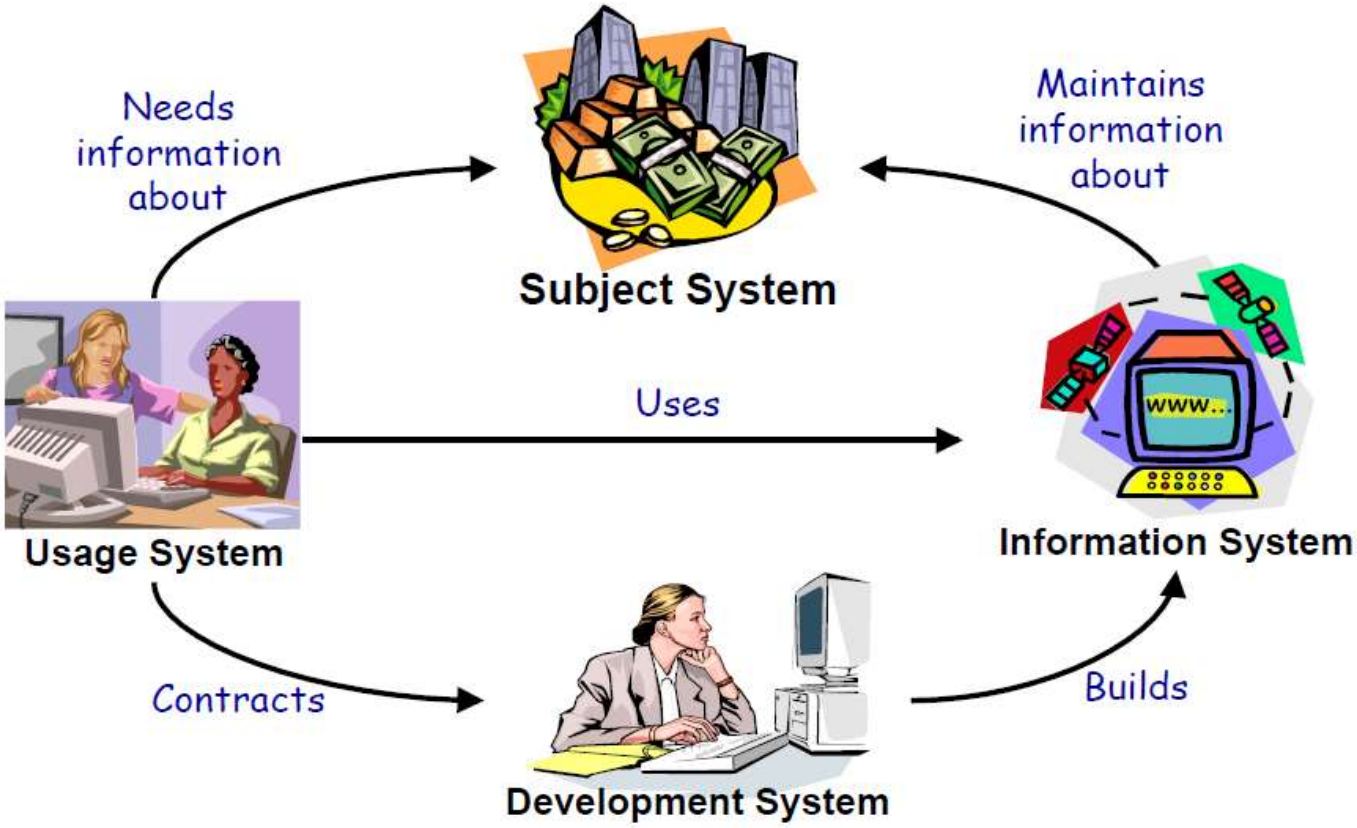
Software Engineer: Agent of Change



Picture source: Internet

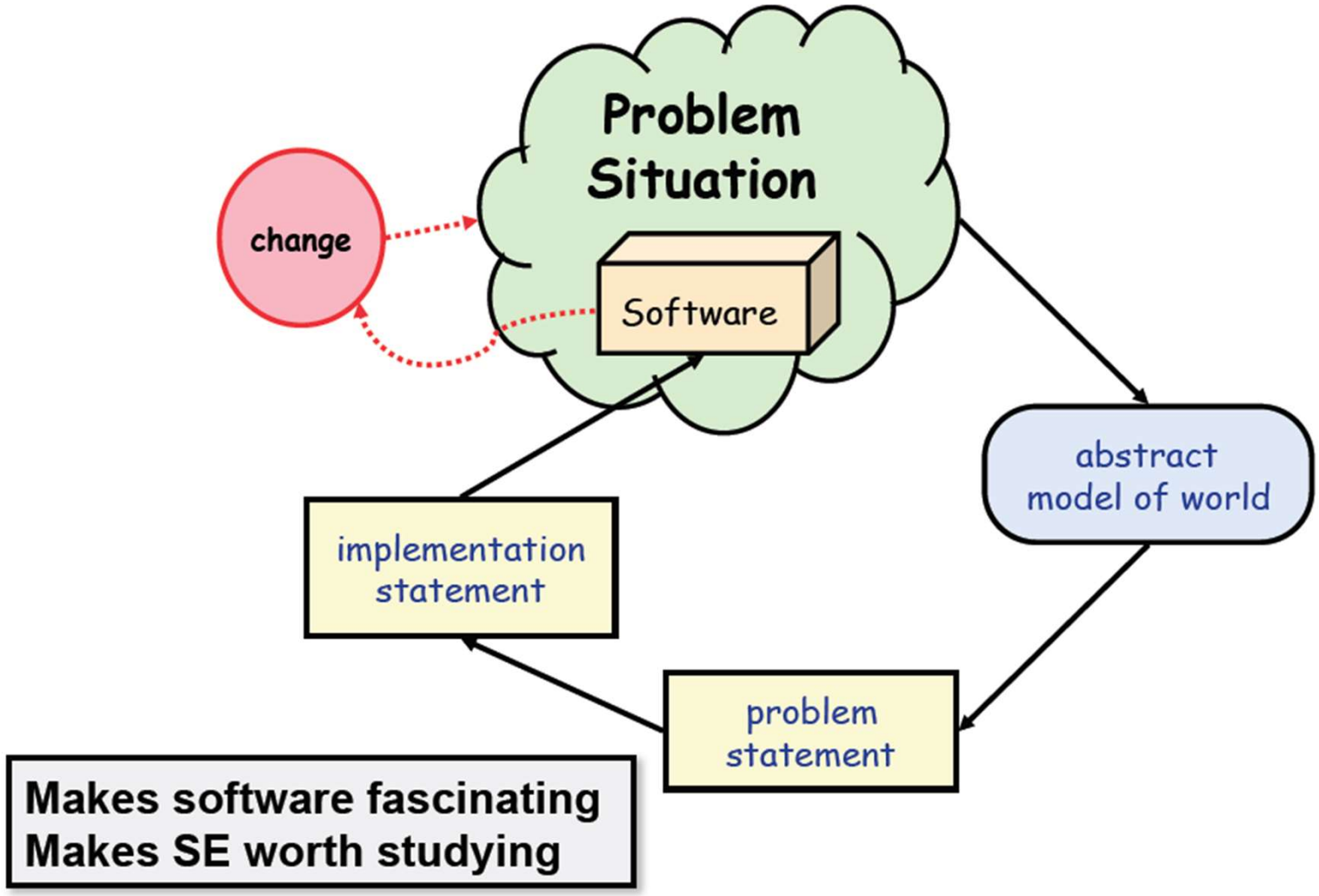
Stakeholders

- The holders of the bets in a gambling game
- Those who have a stake in the change being considered & who stand to gain or lose from the change



Source: Loucopoulos & Karakostas, 1995, p73

But software changes the world…



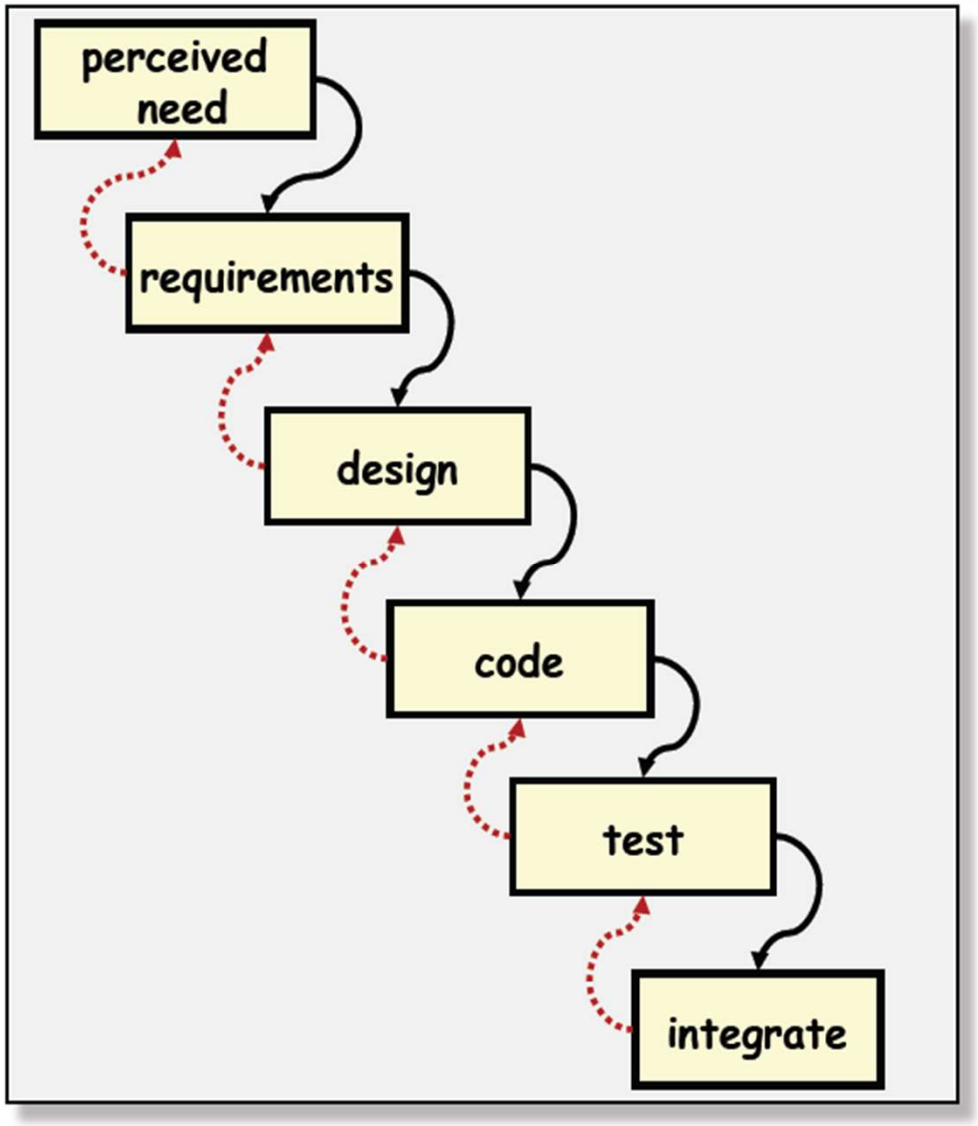
SE Reviews (3 Questions)

- Q1: Why do we engineer software?
  - deliver quality software
- Q2: How do we achieve quality software (product)?

> • Using systematic, disciplined and quantifiable approach
>
> • In other words: by following a process
>
> • *"software engineering"* (coined in 1968)

- Q3: What are process (lifecycle) models?
  - (What role do "testing & QA" play in these models?)

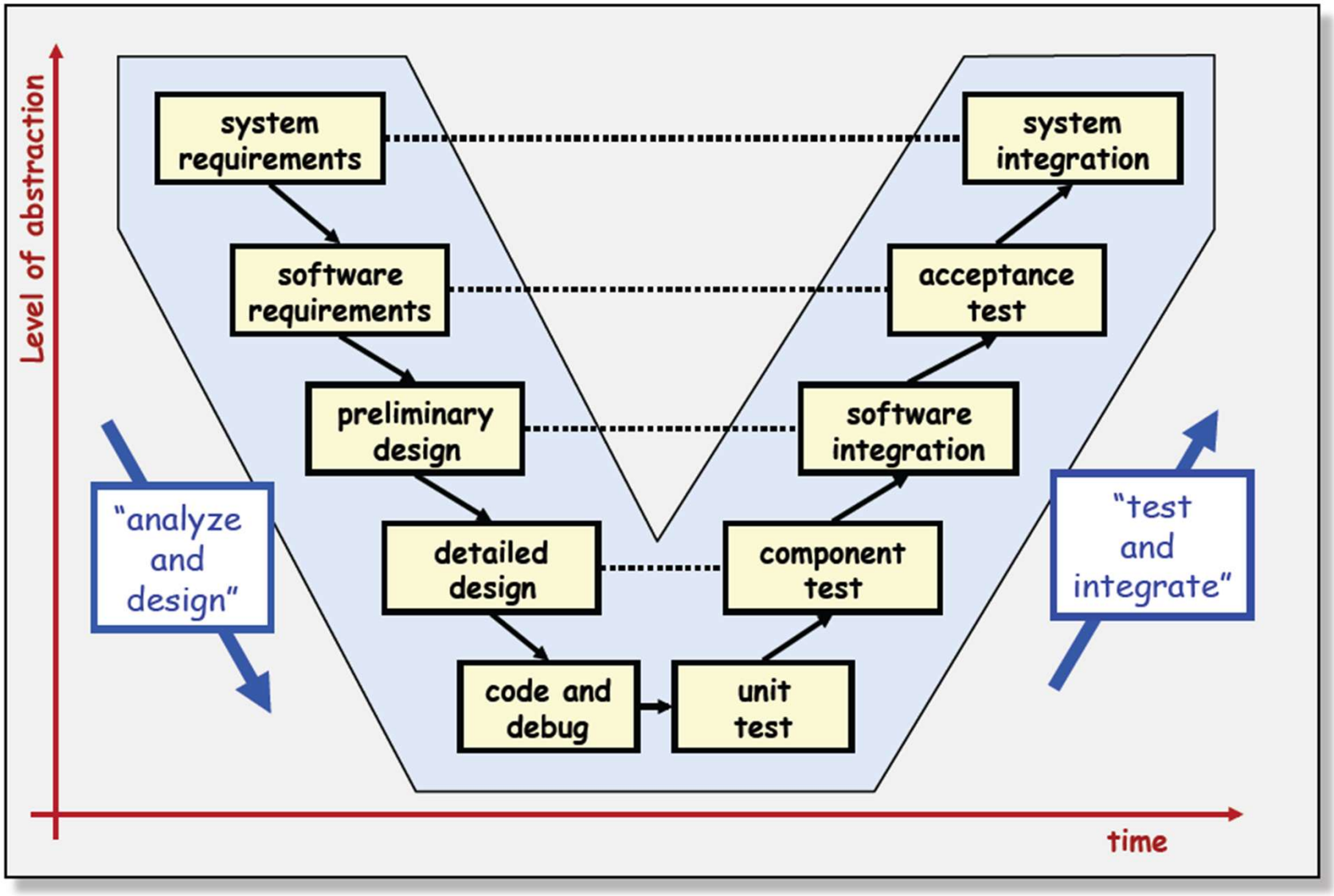
Waterfall Model



- A view on development
  - A process of stepwise refinement
  - Largely a high-level management view
- Problems
  - Static view of requirements
    - Ignores volatility
  - Lack of user involvement once specification is written
  - Unrealistic assumption that customer can state all requirements explicitly
  - Doesn't accommodate prototyping, reuse, etc.

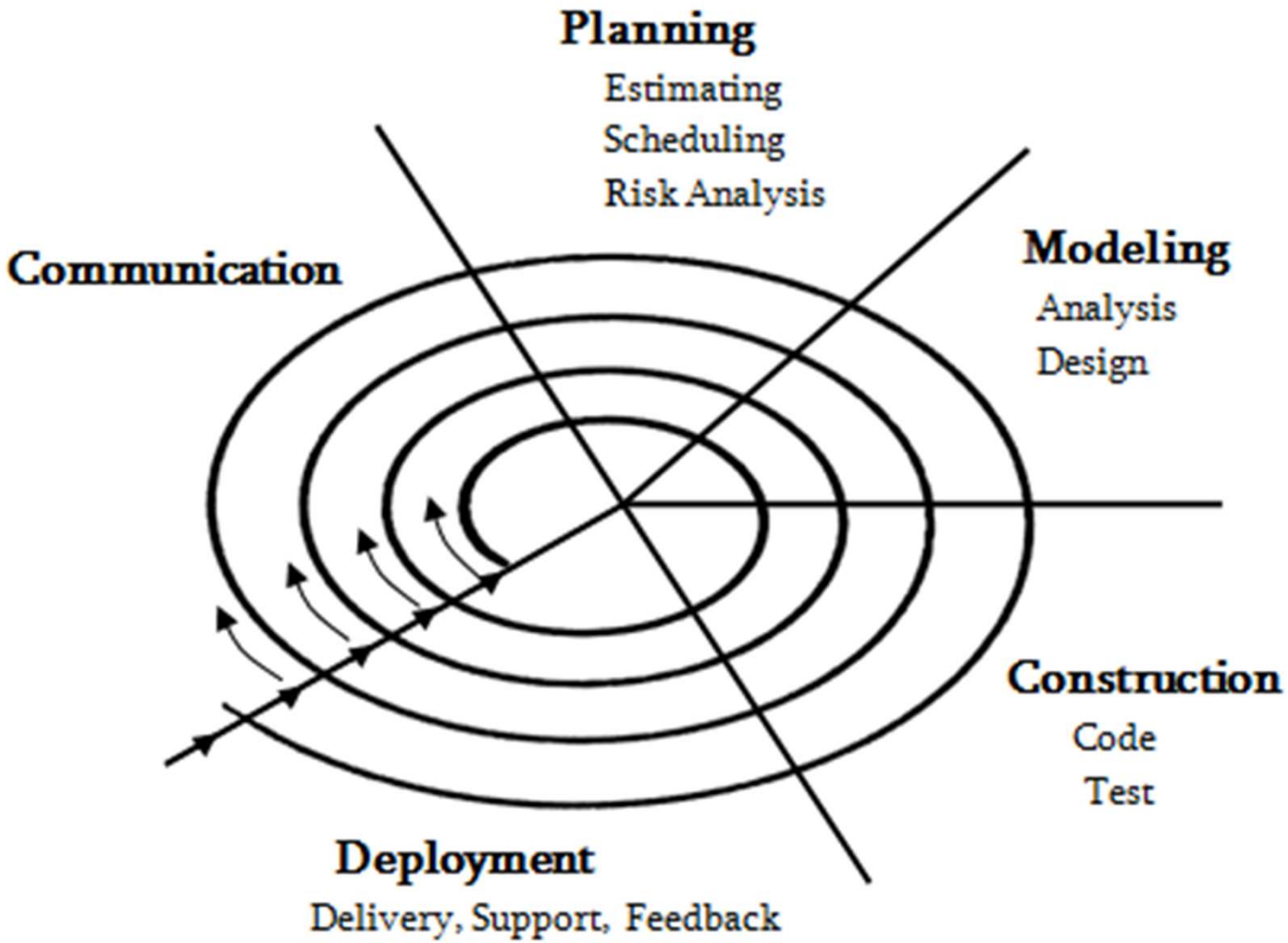
Source: *Dorfman, 97; Loucopoulos & Karakostas, 95*

V – Model



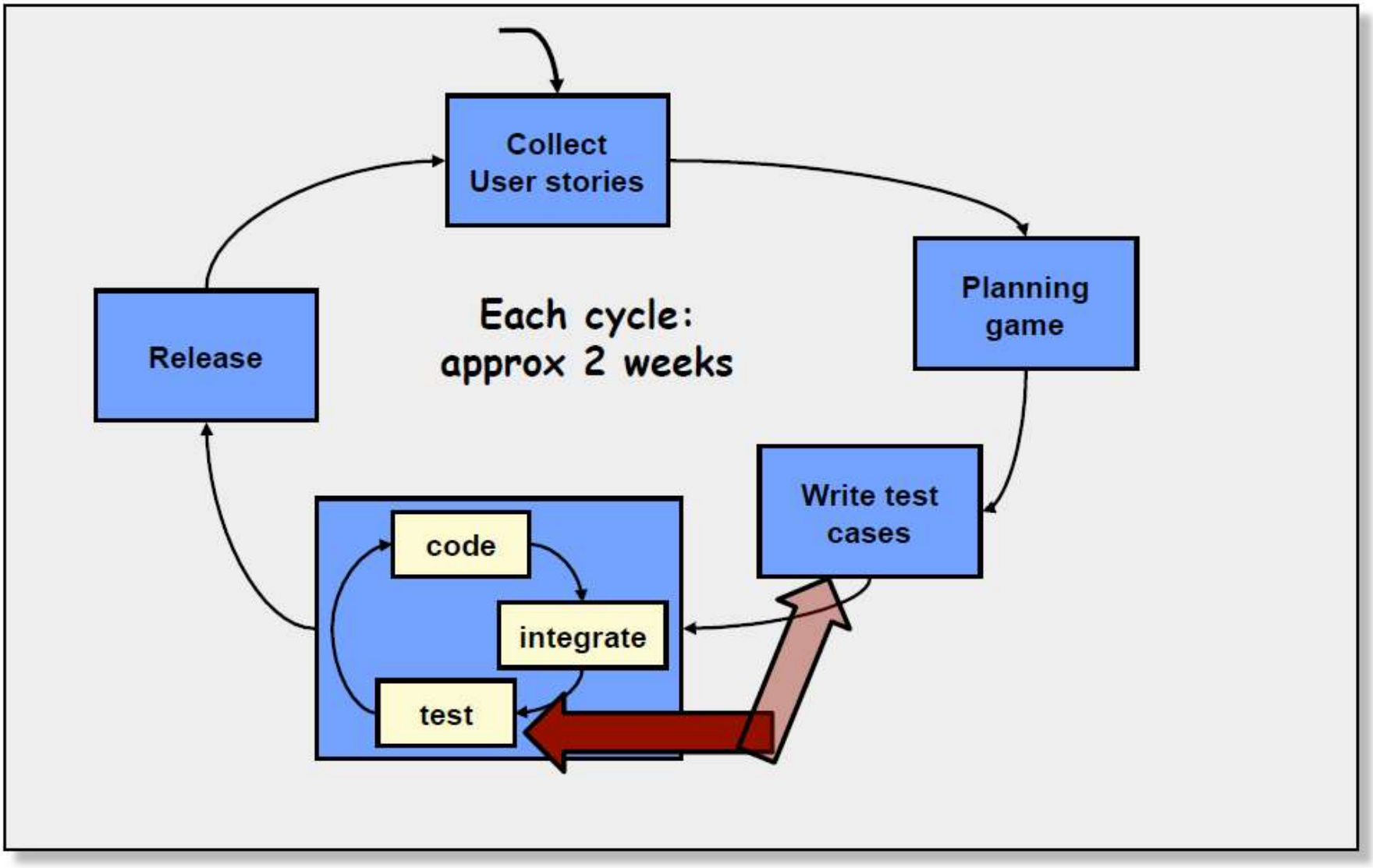
Adapted from: *R. Pressman, SE Book (textbook), 2010*

The Spiral Model



Adapted from: *R. Pressman, SE Book, 2010;* Pic. Source: *Internet*

eXtreme Programming (XP)



Summary

- Course Orientation
- SE Recap
  - 3 questions & your views
  - Setting the stage of “quality”

- Homework
  - Study the syllabus carefully
  - Review today’s slides

- Next class
  - Introduction to testing

THANK YOU