SOFTWARE ENGINEERING (Week-1)

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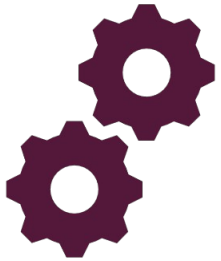
CONTENTS OF WEEK # 1

Introduction to Software Engineering

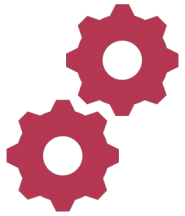


Importance of Software Engineering

Agile Software development

WHAT IS SOFTWARE ENGINEERING?

Systematic approach for developing software



Methods and techniques to develop and maintain quality software to solve problems.

Study of the *principles* and *methodologies* for developing and maintaining software systems.

WHAT IS SOFTWARE?

According to the IEEE

Software is:

“Computer programs, procedures, and possibly associated documentation and data pertaining to the operation of a computer system”.

THE ROLE OF SOFTWARE ENGINEERING

A bridge from customer needs to programming implementation

First law of software engineering

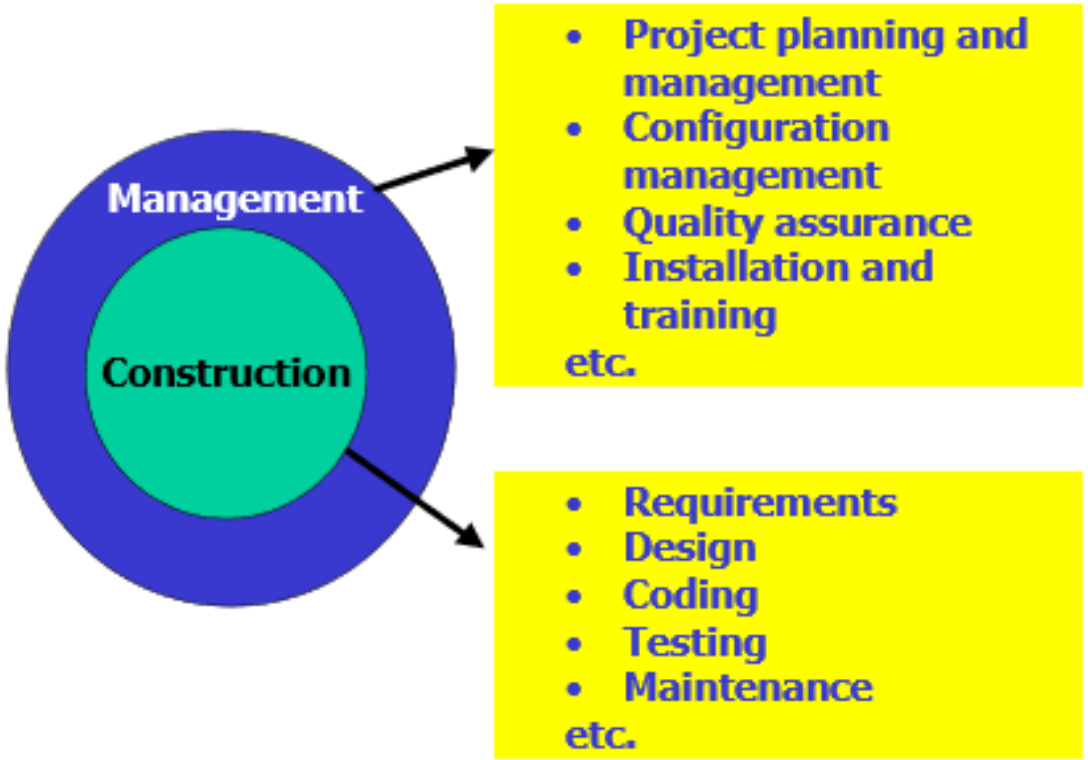
Software engineer is willing to learn the problem domain
(problem cannot be solved without understanding it first)

SOME IMPORTANT SOFTWARE ENGINEERING RELATED ACTIVITIES

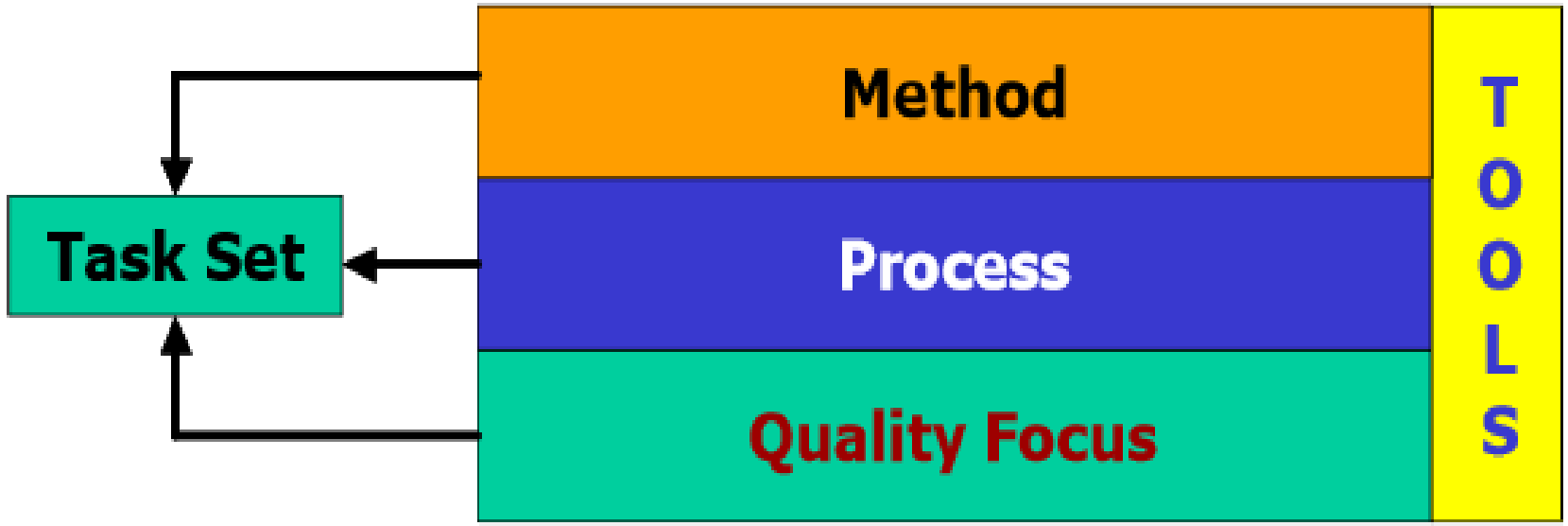
- Project Management
- Requirement Engineering
- Software Design
- Coding
- Testing

- Software Quality Assurance
- Software Configuration Management
- Software Deployment

SOFTWARE DEVELOPMENT



SOFTWARE DEVELOPMENT



AGILE DEVELOPMENT

WHAT IS “AGILE”?

- Agile is a philosophy or a way of thinking guided by some **values and principles**.

WHAT IS “AGILITY”?

- Effective (rapid and adaptive) response to change
- Effective communication among all stakeholders

Yielding …

- Rapid, incremental delivery of software

AGILE VALUES

1. Individuals and Interactions over Processes and Tools
2. Working Software over Comprehensive Documentation
3. Customer Collaboration over Contract Negotiation
4. Responding to change over Following a Plan

PRINCIPLES OF AGILE METHODS

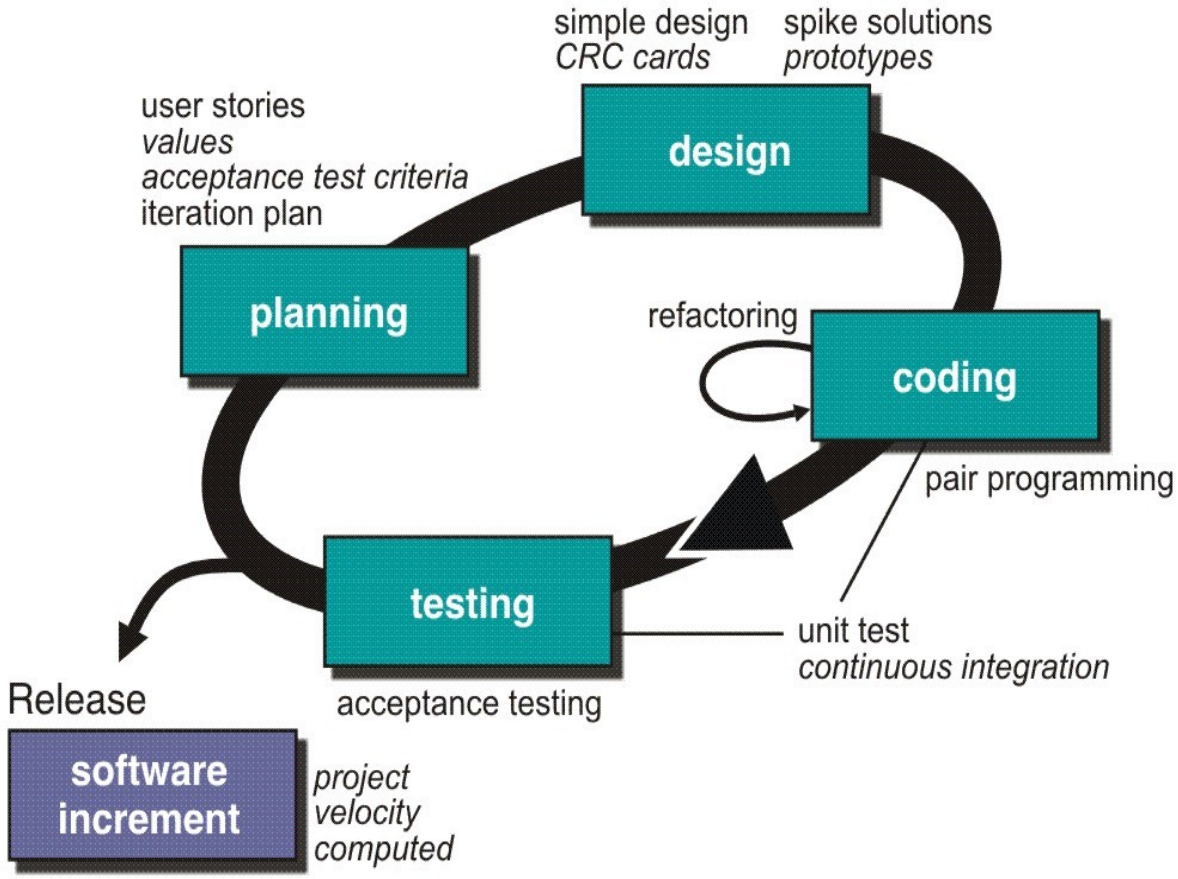
AGILE PROCESS MODELS

- **Extreme Programming (XP)**
- **Scrum**
- Adaptive Software Development
- Dynamic System Development Method (DSDM)
- Crystal
- Feature Driven Development
- Agile Modeling (AM)

EXTREME PROGRAMMING (XP)

- Perhaps one of the well-known and most widely used agile method.
- Extreme Programming (XP) takes an ‘extreme’ approach to iterative development.
  - New versions may be built several times per day;
  - Increments are delivered to customers every 2 weeks;
  - All tests must be run for every build and the build is only accepted if tests run successfully.

EXTREME PROGRAMMING (XP)



EXTREME PROGRAMMING (XP)

XP Planning

- Begins with the creation of user stories
- Agile team assesses each story and assigns a cost
- Stories are grouped to for a deliverable increment
- A commitment is made on delivery date

REQUIREMENTS SCENARIOS

- In XP, user requirements are expressed as scenarios or user stories.
- These are written on cards and the development team break them down into implementation tasks. These tasks are the basis of schedule and cost estimates.
- The customer chooses the stories for inclusion in the next release based on their priorities and the schedule estimates.

STORY CARD FOR DOCUMENT DOWNLOADING

Downloading and printing an article

First, you select the article that you want from a displayed list. You then have to tell the system how you will pay for it - this can either be through a subscription, through a company account or by credit card.

After this, you get a copyright form from the system to fill in and, when you have submitted this, the article you want is downloaded onto your computer.

You then choose a printer and a copy of the article is printed. You tell the system if printing has been successful.

If the article is a print-only article, you canÕ t keep the PDF version so it is automatically deleted from your computer .

EXTREME PROGRAMMING (XP)

XP Design

- Follows the KIS (keep it simple) principle
- Encourage the use of CRC (class-responsibility-cards) cards
- For difficult design problems, suggests the creation of spike solutions — a design prototype
- Encourages refactoring — an iterative refinement of the internal program design

EXTREME PROGRAMMING (XP)

CRC Cards:

Class-responsibility-collaboration (CRC) cards are a tool used in the design of object-oriented software.

EXTREME PROGRAMMING (XP)

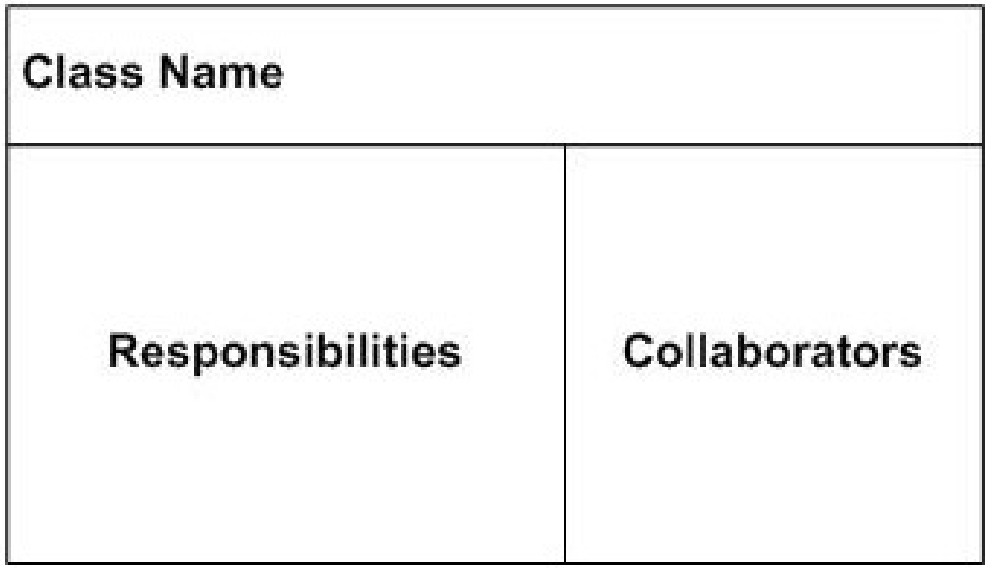
CRC Cards:

The card is partitioned into three areas:

I. On top of the card, the class name
II. On the left, the responsibilities of the class
III. On the right, collaborators (other classes) with which this class interacts to fulfill its responsibilities.

EXTREME PROGRAMMING (XP)

CRC Cards:



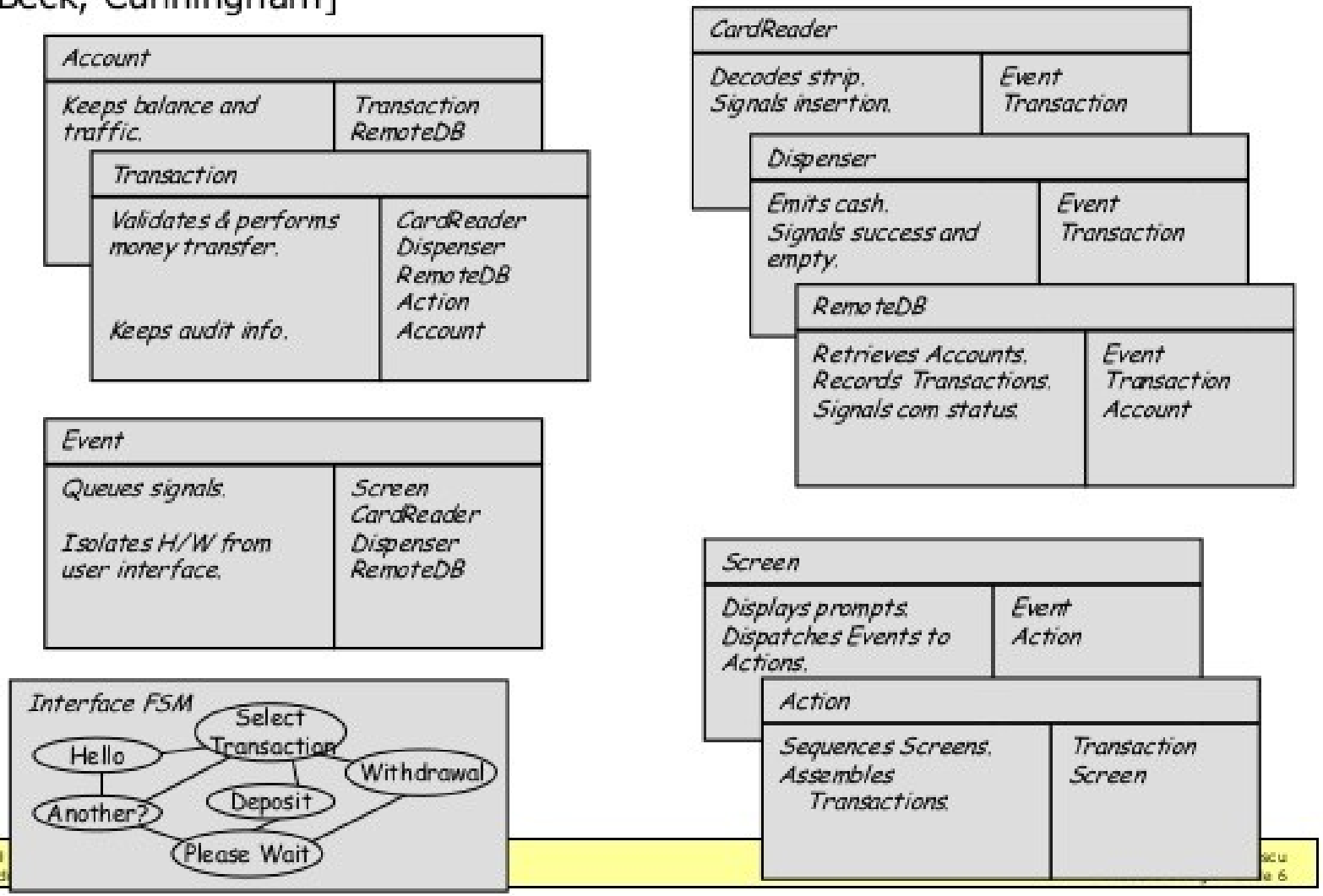
EXTREME PROGRAMMING (XP)

CRC Cards

Student	
Student number Name Address Phone number Enroll in a seminar Drop a seminar Request transcripts	Seminar

CRC example: ATM software

[Beck, Cunningham]



EXTREME PROGRAMMING (XP)

XP Coding

- Recommends the construction of a unit test for a store *before* coding commences
- Encourages pair programming

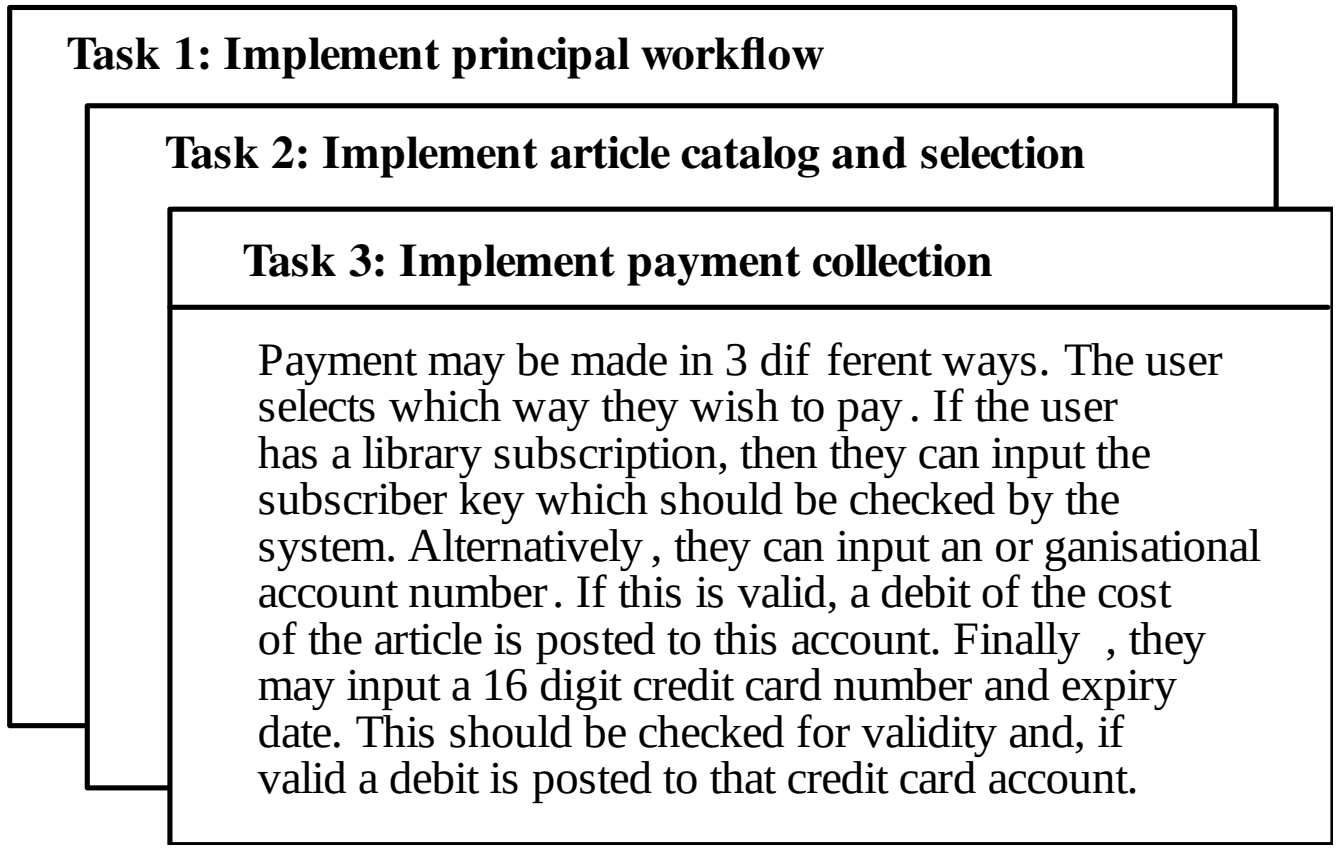
XP Testing

- All unit tests are executed daily
- Acceptance tests are defined by the customer and executed to assess customer visible functionality

TESTING IN XP

- Test-first development.
- Incremental test development from scenarios.
- User involvement in test development and validation.

TASK CARDS FOR DOCUMENT DOWNLOADING



TEST CASE DESCRIPTION

Test 4: Test credit card validity

Input:
A string representing the credit card number and two integers representing the month and year when the card expires

Tests:
Check that all bytes in the string are digits
Check that the month lies between 1 and 12 and the year is greater than or equal to the current year .
Using the first 4 digits of the credit card number , check that the card issuer is valid by looking up the card issuer table. Check credit card validity by submitting the card number and expiry date information to the card issuer

Output:
OK or error message indicating that the card is invalid

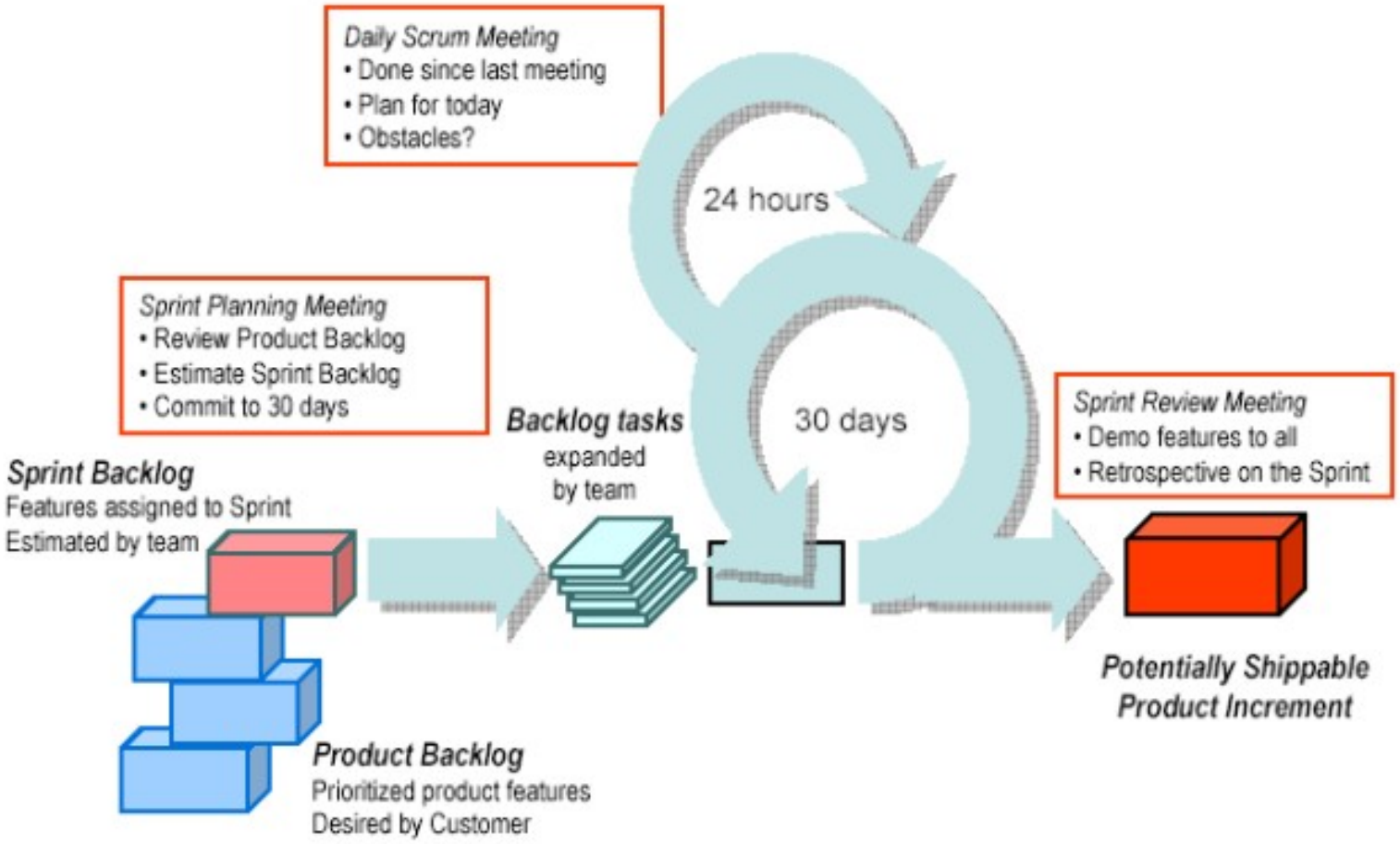
SIGNIFICANCE OF TEST-FIRST DEVELOPMENT

- Writing tests before code clarifies the requirements to be implemented.
- Tests are written as programs rather than data so that they can be executed automatically. The test includes a check that it has executed correctly.
- All previous and new tests are automatically run when new functionality is added. Thus checking that the new functionality has not introduced errors.

SCRUM

- Scrum is an Agile framework for completing complex projects.
- Scrum originally was formalized for software development projects, but it works well for any complex, innovative scope of work.
- Scrum is a team-based approach, to iteratively, incrementally develop systems and products.
- when requirements are rapidly changing .

HOW DOES SCRUM WORK?



How Scrum work

USER STORIES

User Story 3 capture important items

- Who
- What
- Why

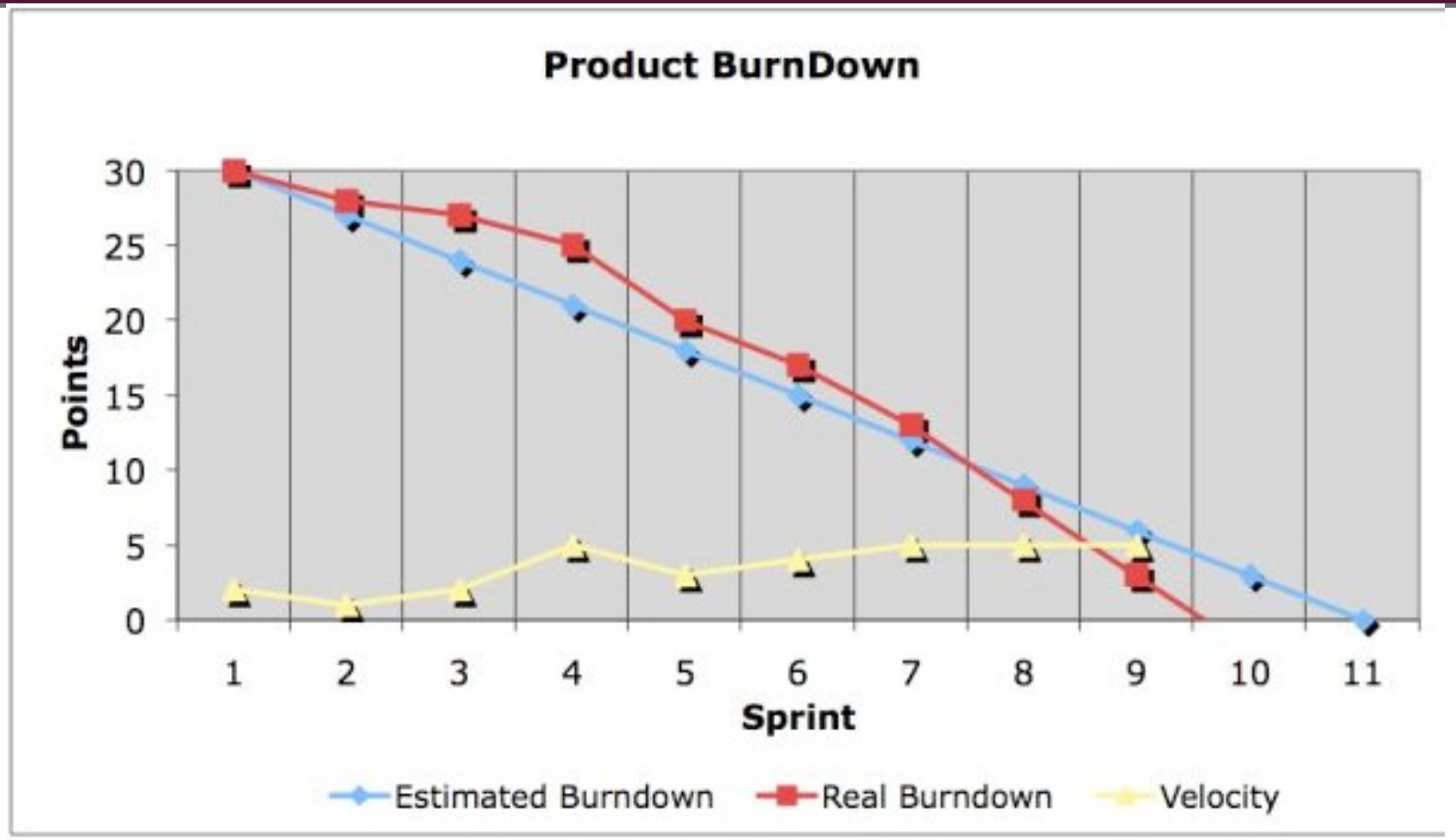
User Story Format

As a (user or type of user)

I want a (some goal or what)

So that (I can achieve some value or why)

BURNDOWN CHART



Simple Burndown Chart

DIFFERENCE BETWEEN XP AND SCRUM

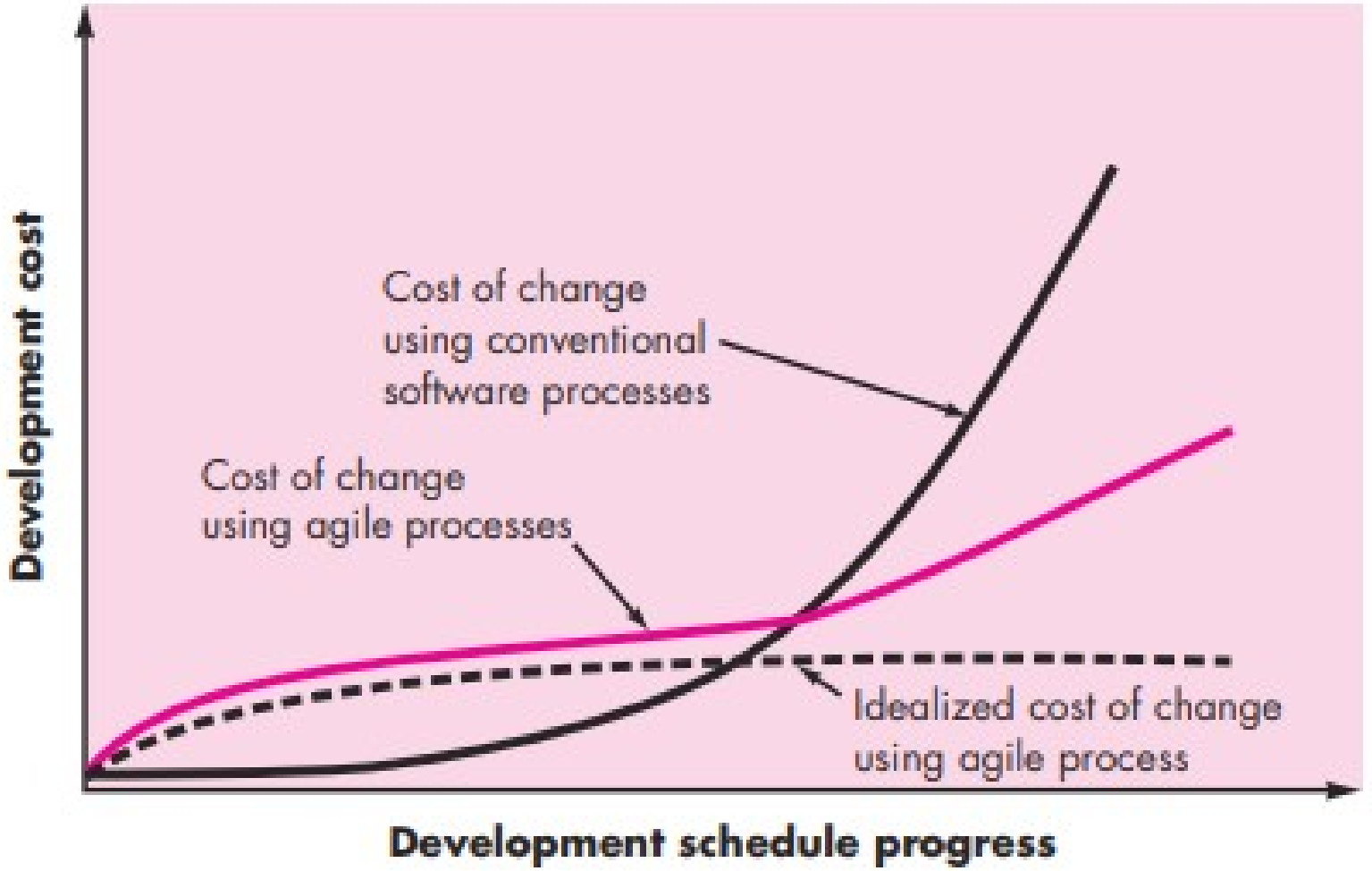
XP Iterations (1-2 Weeks)

Scrum Iterations (3-4Weeks)

Scrum teams (do not allow changes into their sprints).

XP team (allow changes)

COST OF CHANGE IN AGILE



HAVE A GOOD DAY!