Fundamentals of Software Engineering

Introduction

Fundamentals
Course Web Site

* Central communication:
  - https://piazza.com/class#spring2015/cmpe352

* Course Management: In progress. Will be announced.

* You are responsible for regularly checking this page.
Instructor:
  Suzan Üsküdarlı (suzan.uskudarli@boun.edu.tr)
  Room: ETA 35
  Office Hours: Mondays 14:00-15:00

Teaching Assistants:
  Alp Kındıroğlu (alpkindiroglu@gmail.com) / PILAB (ETA 27)
  Can Tunca (can.tunca@boun.edu.tr) /NETLAB (ETA 46)

  Office Hours: TBA
Professional Organizations

- Project Reference

- Software Engineering Institute (SEI)
  [http://www.sei.cmu.edu/](http://www.sei.cmu.edu/)

- Project Management Institute (PMI)
  [http://www.pmi.org](http://www.pmi.org)

- The International Association of Project and Program Management
  [http://www.iappm.org](http://www.iappm.org)
What is Software?

- Software
  - Computer programs
  - Associated documentation
    - requirements
    - design models
    - user manuals
Software Engineering

- All aspects of developing a software product
- Processes and methods
- Tools and technologies
- Team work
CS vs SWE

- **CS** – Computer Science
  - Fundamentals of how computers and programs work

- **SWE** – Software Engineering
  - *design* and *build* software in *teams*
A project is a *temporary* endeavor undertaken to *create* a unique *product* or *service*.

*PMI: Project Management Institute*
Properties

* Unique purpose

* Temporary

* Requires resources

* Has a sponsor and/or customer

* Has stakeholders
Project Management

The application of knowledge, skills, tools, and techniques to project activities in order to meet project requirements.

PMI*, Project Management Body of Knowledge
The project manager aims to meet 3 goals

- Time
- Cost
- Scope

Thus, satisfy customer.
Four Project Dimensions

- People
- Process
- Product
- Technology
People Issues

- Matching people to tasks
- Balance
  - individual and team
- Clear communication
  - Expectations
- Authority with responsibility
- Career development
Process

- Development fundamentals
- Quality assurance
- Risk management
- Lifecycle planning
- Customer orientation
- Process maturity improvement
- Rework avoidance
Product

- Size management
- Product
  - characteristics
  - requirements
- Feature creep management
  - What is it?
  - Why does it happen?
  - How and when to stop it?
Technology

- Language
- Tool selection
Planning

- Determine
  - requirements
  - resources
  - product features

- Select lifecycle model
Value of Planning

Plans are nothing; planning is everything.

Dwight D. Eisenhower
Tracking

- Track
  - Cost
  - Effort
  - Schedule
- Tracking is comparing
  - Planned vs. Actual
- How to handle when things go off plan?
Cost of software failure ~ 50 to 80 billion dollar/year

Standish Chaos Report Findings By Year

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* Software Hall of Shame

Why do projects Fail?
Major Causes Of Project Failure

- Bad communications between relevant parties: 57%
- Lack of planning of scheduling, resources, and activities: 39%
- No quality control: 35%
- Milestones not being met: 34%
- Inadequate co-ordination of resources: 29%
- Costs getting out of hand: 26%
- Mismanagement of progress: 20%
- Overall poor management: 17%
- Supplier skills overstretched: 13%
- Supplier under-resourced: 12%
- Insufficient measurable outputs: 11%
- Supplier people not consistent: 4%