Lecture 1: Introduction

Goal of the course

Introduce you, in both theory and practice, to:

The challenges and techniques of building production software in an industrial environment

What is software engineering?

Software now controls much of the modern world:

- Business operations (administrative etc.)
- Government
- Factories
- Transportation
- Defense, finance, health...
- Many traditional processes, e.g. publishing
- New technologies now mainstream, e.g. the Web, which have transformed our life.

Achille’s heel of this revolution: cost, schedule, quality

Business and political concern, not just technical

The need for quality software

Many lives and businesses now depend on software.

We now need larger, more complex, and safer software systems on predictable schedules.

Without different software practices, this will not happen.

The Team Software Process (TSP) addresses this need.

The PSP provides the knowledge and skill that developers need to work on TSP teams

Many projects fail

... See Info I slides
Why projects fail

Five major reasons:

- Unrealistic commitments
- Inadequate leadership and management
- Lack of control (no personal plans by developers, insufficient knowledge by management)
- Insufficient quality (driven by quality of worst part)
- Insufficient technology (methods, tools, languages)

So, what is software engineering?

The production of operational software satisfying defined standards of quality

Software engineering

... includes programming, but is more than programming

As von Clausewitz did not write: “the continuation of programming through other means”.

The five components of software engineering

Describe

Requirements, design specification documentation

Implement

Design, programming

Assess

Testing and other V&V* techniques

Manage

Plans, schedules, communication, reviews

Operate

Deployment, installation,

*Validation & Verification

In this course...

... Every one of these five aspects gets approximately equal weight

Practical information
The Teaching Staff

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Office: RZ J6
Appointments: on request
Secretary: Claudia Günthart, (01) 632 83 46

Exercise sessions

All groups have one session a week:
- Monday 10-12
  IFW A34 Werner Dietl
- Thursday 8-10
  IFW A34 Hermann Lehner
  CAB H57 Jörg Derungs
  IFW B42 Marco Piccioni
- Friday 13-15
  IFW B42 Mitra Purandare
  IFW C42 Adam Darvas

Registration: today and tomorrow

The assistants

Adam Darvas
English
Friday
Jörg Derungs (from April)
German
Thursday
Werner Dietl
German
Monday
Hermann Lehner
German
Thursday

Marco Piccioni
English
Thursday
Mitra Purandare
English
Friday
Arsenii Rudich
(no exercise group)

Course material

Course page:
http://se.inf.ethz.ch/teaching/ss2007/252-0204-00/
  Check it at least twice a week

Lecture material:
- Lecture slides
- No required textbook, but we will recommend books as we go; see bibliography on course page

Exercise material:
- Exercise sheets
- Master solutions

Note: most groups will miss a session in week 2 or 3 - check with assistant!
Electronic forums

Discussion forums: http://forum.vis.ethz.ch

Mailing list for each group:
The usual advice and rules:
- Use the forums and mailing lists! Take advantage of every help you can get.
- Don’t be shy. There are no stupid questions.
- Criticism welcome, but always be polite to every participant and observe the etiquette.

To email the whole teaching team (professor and assistants):
softeng@se.inf.ethz.ch (soon operational)

Exercise sessions and project

Make sure to attend all sessions

Exercise sheets will be distributed by your assistant during the exercise session

Do all exercises and the project

Lecture plan

<table>
<thead>
<tr>
<th>Week 1: Basics</th>
<th>20 March Introduction to the software process, FSP (1)</th>
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</thead>
<tbody>
<tr>
<td>Week 2: Requirements</td>
<td>21 March Basics of the software process, PSP (1)</td>
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<tr>
<td>Week 3: Management</td>
<td>21 March Basics of the software process, PSP (2)</td>
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<td>22 March Management (1)</td>
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<td>23 April Project management (tools)</td>
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<td>Week 4: Process</td>
<td>24 April Project management (principles)</td>
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<tr>
<td>Week 5: From requirements to design</td>
<td>24 April Modeling in UML</td>
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<td>25 April From requirements to design using UML</td>
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<tr>
<td>Week 7: Introduction to UML</td>
<td>27 May Introduction to the V&amp;V lifecycle</td>
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<tr>
<td>Week 8: Design</td>
<td>29 June Detailed Design</td>
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</tbody>
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Special lecture

Tomorrow (21 March), second hour

Guest lecture by Mark Howard, Axa Rosenberg (Orinda, California)

An object-oriented software process in a large investment management organization

Grading

50% Project
50% Exam

Project: a software engineering development (see next...)

Exam: review of all the concepts in the course

The project

Computer Science Academic & Research Daily Advertising Service (CSÁRDÁS)

Purpose:
Introduce you to problems and techniques of software construction in industry, with constraints mimicking those of actual projects.

It is not just a programming project but includes the five key aspects of software engineering as taught in this course (DIAMO):
- Description
- Implementation
- Assessment
- Management
- Operation
More on CSÁRDÁS

Model: CSEL (the Computer Science Events List):
http://events.informatics-europe.org
written by Marco Piccioni
Source code available for guidance.

CSÁRDÁS is not an artificial example but reflects a real need.
We expect that the best student project will actually be deployed at
the end of the semester.

Group size: three students
Technologies imposed by the customer:
- Web server: Apache
- Operating system: Linux
- Programming language: Eiffel
- Web framework: EiffelWeb
- Database technology: mySQL

Project deliverables

Week 1, due week 5:
- Requirements document

Week 5, due week 7:
- Test plan for another group's requirements
- Not released to that group

Week 7, due week 12:
- Design and implementation of your requirements

Week 12, due week 14:
- Test other group's system

About the project

There will be "stakeholders" to help you define the requirements.
Informatics Europe can benefit from CSÁRDÁS. We hope to release the best student project (with credit) on the Web page of the association.
The first project document, describing the first assignment, is on the Web page. Note: it will be revised, please check again by the end of the week.

Software engineering

The production of operational software satisfying defined standards of quality.

Software engineering today

Three cultures:
- Process
- Agile
- Object

The first two are usually seen as exclusive, but all have major contributions to make.

Process

Emphasize:
- Plans
- Schedules
- Documents
- Requirements
- Specifications
- Order of tasks
- Commitments

Examples: Rational Unified Process, CMMI, Waterfall...
Agile

Emphasize:

- Short iterations
- Testing (over specifications): "Test-Driven Development"
- Constant customer involvement
- Refusal to commit to both functionality and deadlines
- Specific practices, e.g. Pair Programming

Examples: Extreme Programming (XP), lean programming

Object-oriented (the Eiffel variant)

Emphasize:

- Seamless development
- Reversibility
- Single Product Principle
- Design by Contract

More on this course

Challenging but should be a rewarding experience.

Expect to learn a lot and have your views challenged

The project will be demanding; situation similar to what is found in industry. Reserve enough time for it throughout the semester.

Observe the rules (in particular confidentiality)

What to do now

Please choose a group