Programming Project: Introduction to Software Development

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Norms

- The main goal of this subject is to familiarize the students with professional software development
- Though the main activity in the course is the development of a *Programming Project*, the final grade is composed by three parts:
    - A practical exercise about development tools and testing (in pairs)
        - Around the 6th week
        - 10% of the final grade
    - A multiple-choice test (January)
        - On January
        - 20% of the final grade
    - The development of a *programming project* in groups of 3-4 students
        - Starting around the 5th week and finishing in January
        - 70% of the final grade

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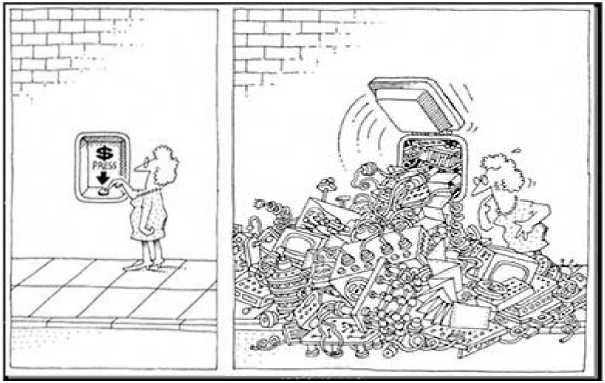

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Software Engineering

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The systematic application of scientific and technological knowledge, methods, and experience to the design, implementation, testing, and documentation of software

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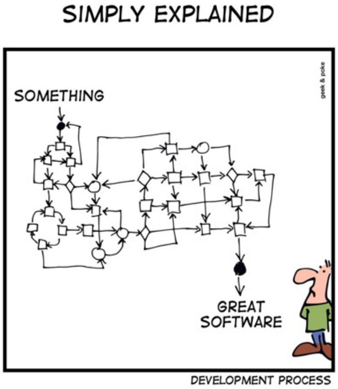


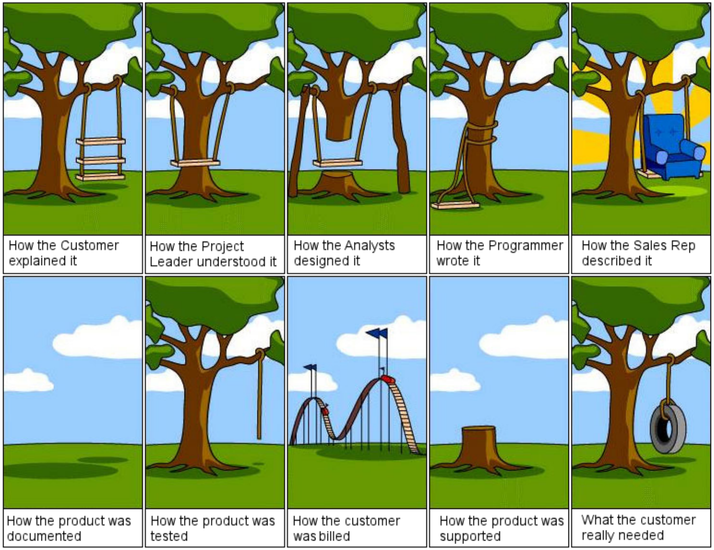
Software Engineering

- An engineering process implies the use of well understood techniques in a systematic way
  - Computer science is a young discipline and these techniques are evolving very fast
- Software projects always have multiple constraints
  - Time, budget, knowledge, human resources, customer requirements, . . .
  - Do not hold these constraints might led to project delays or cancellation
- Large software systems cannot be understood by one person
  - Teamwork is crucial for the success of the project
  - Forget the idea of having a *guru* who perfectly knows the whole system

Some Typical Problems

- Poor end-user description of to the project or inaccurate understanding of the customer needs
- Difficulties to deal with changing requirements
- Low performance of the software running in production
- Software hard to maintain or extend
  - Bad designed, poorly documented, . . .
- Software not properly tested (when it is tested. . .)
  - Some inputs are not covered by the test suites
  - It contains serious flaws (i.e. parts badly integrated)
- Collaboration problems
  - Teams not well organized with communication problems
  - Impossible to reconstruct who did something (what, when, why . . .)

Problems: Graphically


How the Customer explained it
How the Project Leader understood it
How the Analysts designed it
How the Programmer wrote it
How the Sales Rep described it
How the product was documented
How the product was tested
How the customer was billed
How the product was supported
What the customer really needed

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- **Document your code**
  - Think in the rest of the world and in your future self

Outline of the Subject

1. Development Tools
   - `GIT (GitLab)`, `Maven`
2. Software Quality
   - `SonarQube`
3. Testing
   - Testing introduction
   - Automated Testing (`JUnit`)
   - Test Driven Development
4. Software Development
   - Continuous Integration
   - Agile and eXtreme Programming Ideas
5. Software Design
   - Design principles
   - Design Patterns
6. Project development