

Software Engineering in Practice

Software engineering process

Diomidis Spinellis
Department of Management Science and Technology
Athens University of Economics and Business

dds@aueb.gr
<http://www.dmst.aueb.gr/dds>
@CoolSWEng

2025-05-05

Assignment (Software engineering processes)

- Perform the following tasks on a popular open source project:
 - Identify and classify the software engineering processes.
 - Identify the software life cycle model. Is it suitable?
 - How is the software process assessment performed?

You can retrieve information relevant to these tasks from the source code and the documentation of the project. In the case that the project misses some of the aforementioned information, how do you think that they should have performed them?

Why do we define software processes?

- Facilitate understanding
- Communicate
- Coordinate
- Manage
- Measure
- Improve
- Automate

Breakdown of topics

- Software process definition
- Software life cycles
- Software process assessment and improvement
- Software measurement
- Software engineering process tools

Software process definition

- Input work products

- Product transformation
- Output work products
- Entry and acceptance criteria
- Analysis in distinct actions and tasks

Software process management

- Ensures
 - efficiency
 - effectiveness
- Process improvement

Software process infrastructure

- Definitions
- Policies
- Funding
- Tools
- Training
- Staff members

Software life cycles

- They define the temporal and logical sequence of processes
- Software development life cycle (SDLC)
 - Transform software requirements into deliverable software product
- Software product life cycle (SPLC)
 - development
 - deployment
 - maintenance
 - support
 - evolution
 - retirement

Categories of software processes

- Primary
 - Development, operation, maintenance
- Supporting
 - Configuration management
 - Quality assurance
 - Verification and validation
- Organizational
 - Training
 - Measurement analysis

- Cross-project
 - Reuse
 - Product-line

Software life cycle models

- Predictive
 - Based on controlling requirements established at project initiation
 - Linear
 - Iterative
- Adaptive
 - Based on changing requirements as the project evolves
 - Agile

Software process adaptation

- Ways to adapt
 - Adding processes, activities, and tasks
 - Substituting activities with alternatives
 - Omitting activities
- Reasons for adaptation
 - Conformance to standards, directives, and policies
 - Customer demands
 - Criticality of the software product
 - Application domain
 - Organizational maturity and competencies

Software process assessment and improvement

- By the acquirer or an external agent
- Process's suitability evaluation
- Differs from process audits
 - that ascertain compliance with
 - * policies
 - * standards
- Performed at the level of
 - Organizations
 - Organizational units
 - Individual projects

Assessment Methods

- Methods
 - Qualitative
 - Quantitative

- Includes
 - Planning
 - Fact-finding empirical research
 - * Questionnaires
 - * Interviews
 - * Observations

Improvement modes

- Plan-Do-Check-Act
 - Identify and prioritize desired improvements
 - Introduce an improvement
 - * Training
 - * Tools
 - Evaluate the improvement
 - Make further modifications

Capability Maturity Model levels

- 1 Initial
- 2 Managed
 - Management has visibility of deliverables
- 3 Defined
 - On an organization level or across multiple projects
- 4 Quantitatively managed)
 - Through e.g. statistical analysis
- 5 Optimizing

Measurement

- What do we measure?
 - Efficiency
 - * Resources / production
 - Effectiveness
 - * Actual / expected output
- Causes of low efficiency and low effectiveness
 - Lacking personnel training
 - Frequent changes / churn
 - Complex product
 - Missing tools
 - Unfamiliar product domain

Process tools

- For individual processes

- For process analysis
- Dashboards

Preparation for the next lecture (1)

- Study Chapter 9 from SWEBOK v 3.0
- Assignment (Software engineering models and methods)
 - Answer the following for a popular open source project:
 - * Which of the software engineering models would be most suitable for modeling this project?
 - * Which software engineering method was chosen for its development? You can retrieve information relevant to these tasks from the source code and the project's documentation.
 - * If the system started now its development which software engineering method should be chosen?

Preparation for the next lecture (2)

Video (Software engineering models and methods: An introduction to the agile software development process) <https://www.youtube.com/watch?v=IbhKG0rNWgQ>

Distribution License

Unless otherwise expressly stated, all original material on this page created by Diomidis Spinellis, Marios Fragkoulis, and Antonis Gkortzis is licensed under the Creative Commons Attribution-Share Alike Greece.

