Master's thesis in
Information- and Communication Technology

Title:

Software Development Process Improvement in Datacom Platform

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Introduction

Whereas computer equipment made and continues to make a very fast progress, the software development process needs always an improvement. Ericsson Mobile Platform (EMP) is responsible of the development of a software platform. EMP is developing the data communication parts of the platform which is used by EMP customers. In this thesis, we present a solution that achieves a fast process with high quality output and handles a customer requirement (CR) without jeopardizing the existing architecture of the running development projects of Ericsson. Thus, a new mechanism has been investigated based on Test-Driven Development (TDD) as a main practice in Extreme Programming (XP).

Problem statement

The software development must be seen like a process, so called a software process. This process is composed as well of sub-processes that communicate between different stages. The current process in software development is composed of iterations. Each iteration can be considered as a small waterfall model.

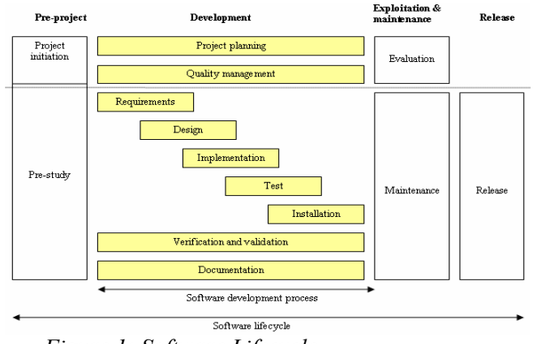

Figure 1: Software Lifecycle

The major inconvenience of this process is the enormous time spent between decisions and the feedback obtained on their results. In addition, the sources of bugs are hardly detected, because it is required to be searched in the whole code. Some developer may have the experience of spending days to discover a small bug. After finding a bug and making the required changes, building project over again takes too much time without being convinced that is fixed the problem.

Proposed approach

In our proposition, we suggest to integrate "test-driven development" in the current software development process without affecting the existing platform. Therefore, we propose locating TDD cycle to cover both of implementation and test modules. It is required that TDD cycle should be a short-term cycle. It should be repeated frequently every day. This proposed development process is shown in figure 2.

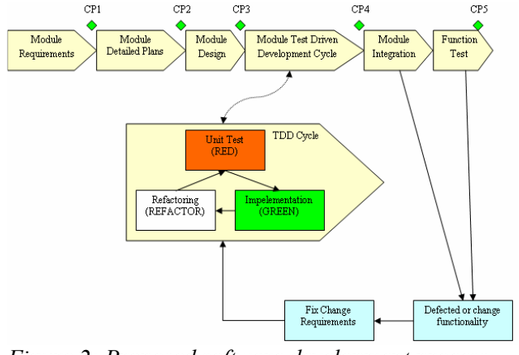

Figure 2: Proposed software development process

TDD recommends writing the tests at the same time, or even before the function to be tested. Figure 3 shows the main mechanism of TDD. Write a test that fails and then write the code to pass it. However, it seems a better way to create software. Thus, writing a test is a quick means to find out if you appreciate the requirement specification.

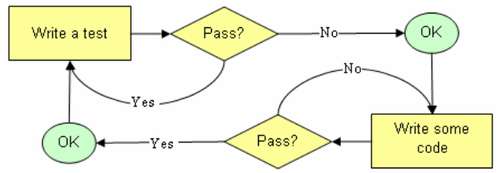

Figure 3: Test Driven Development mechanism

TDD method presents the unit tests, called "programmer's tests", in the heart of programming activity. The process of implementing each test in the test list is defined by red, green, refactor:

Red: Select a functionality to add to software or a defect to fix and write a little test that does not work, and perhaps does not even compile at first. This test is used to show whether the functionality is added successfully or not.
Green: Implement the code that is only enough to make tests succeeded.
Refactor: Refactoring means improving the software design without affecting its functionality. The main goal of refactoring in TDD is eliminating any duplication.

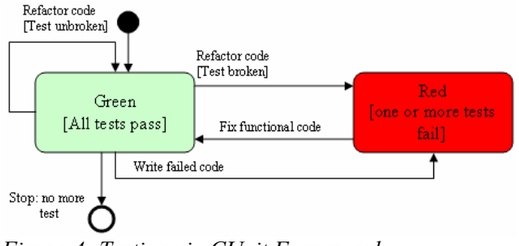

Figure 4: Testing via CUnit Framework

Results

Verification of the proposed solution that explores an improvement in software development process is done by analysing, designing and implementing a new functionality related to Wireless Local Area Network (WLAN). The performance has been demonstrated first by spending less time in development phase. We spent very little time to seek bugs in our code with TDD opposite to the current process. We spent the major time developing new functionality rather than debugging the code. Thus, customer satisfaction can be reached with reducing time to market. In addition, writing high quality code within minor errors and bugs has been noticed. Consequently, improving product quality and reducing the cost of project can be achieved.

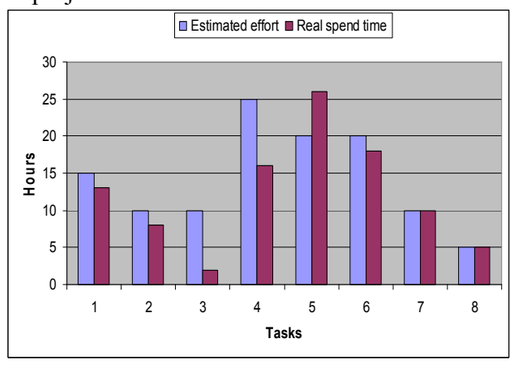

Figure 5: Illustration of effort estimation and real spend time on developing activities

Conclusion

In this thesis, a software development process improvement has been proposed based on TDD. The objective was to improve the EMP development process. Therefore, we investigated a solution that achieves a rapid process with high quality output to handle customer requirements.