



**CS 413 - Software Engineering Project Management
2018-2019 Spring**

“Patient Tracking System”

Project Charter

Team# 13

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1. Executive Summary

Patient tracking system is a software to be used in small-medium sized hospitals and medical clinics for doctors to keep track of patients' reports, tests, background information, comments and other needed stuff for the medical examination and treatment processes. It is an desktop application which is totally customized and designed for doctor use with a simple user-friendly interface to keep interaction between doctor and the patient individually.

2. Threats-Opportunities-Weaknesses-Strengths (TOWS)

TOWS Analysis PTS	<u>Internal Strengths</u> 1. Customized product 2. Price Advantage 3. Pure interface	<u>Internal Weaknesses</u> 1. New unexperienced team 2. Unrecognition in the market (no references)
<u>External Opportunities</u> 1. Several small-medium sized hospitals and clinics which pay unnecessary prices for the licences and softwares they don't use. 2. Economical situation in Turkey can direct managers to find cheaper and domestic solutions. 3. Most of the products have complicated interface	<u>SO Strategies</u> 1. Put forward the customization of product in terms of doctor usage (not include financial and administrative modules) and lower price while introducing the product (S1, S2, S3, O1, O2, O3)	<u>WO Strategies</u> 1. Arrange face to face interviews with the small-medium sized hospitals and clinics
<u>External Threats</u> 1. Lots of experienced competitives in the market 2. Customer choice	<u>ST Strategies</u> 1. Lower the sale price by minimizing the cost and pile it high and sell it cheap (T1, T2, S2)	<u>WT Strategies</u> 1. Hire experienced engineers who worked and have references in the medical software projects and have knowledge about the domain (T1, W1, W2) 2. Hire sales analyst for manipulating the customer choice (T2, W2)

Table 1: TOWS Analysis

3. Project Purpose

Hospital automation systems are popular software products in medical sector which are used in many countries for facilitating hospital management in terms of finance, administration and patient tracking. As in international market, there are several IT and software companies like ISU, Sinerji Bilişim, interMEDIA, Mikro Yazılım or Talya Bilişim in Turkey which are working on this market to present automation systems for hospitals. However products of these sort of companies are complicated huge software applications which deal with organization of the way of working of accountants, administrative staff and doctors by integrating financial systems, administration systems and patient tracking in same time [1][2][3][4]. So these products can be usable for large scale hospitals or medical companies which have several branches with thousands of visitors in a day, however they create unnecessary purchase and maintenance costs for the medium-small sized hospitals or clinics which have specific customer base. Also because of the high number of facilities in the software, user interface gets more complicated and difficult to control for the doctors.

PTS is a software that just deals with the doctor-patient interaction without including financial and administrative modules to present user-friendly interface for the use of doctors. Two main goals of the software are strengthening the relationship between doctor and patient to provide patient loyalty and minimizing the automation costs of small-medium sized medical corporations so that they can satisfy their financial and administrative needs by small sized low-cost softwares. By the usage of PTS, customers of the hospitals will feel special and know that doctors are totally taking care of with their treatments and diseases. So PTS is a totally suitable software for the usage of small-medium sized hospitals and clinics which generally give service to high income group customers.

4. Product Scope

The users of PTS are just the doctors and patient acceptance staff. Patient, hospital/clinic administrative or any other people except project engineers will not be allowed to access the software. Also project engineers and patient acceptance staff will not be allowed to access patient information. PTS has two main specifications: doctor-patient interaction and doctor-hospital/clinic interaction.

Doctor-Patient Interaction

This is the phase which doctors totally see their history between patient and them and provide further interaction with doctor and patient by providing informative notifications to patient.

- Doctor is able to see personal and provided background information of the patient.
- Doctor is able to see new and old reports and test results (written or graphical ones) of the patient.
- Doctor can provide any comment that he/she wants about the patient.
- Doctor is able to compare all results of the patient in detail by line chart, column chart or circle chart.
- Doctor can add customized comments to each report or test result.
- Doctor is able to mark next appointment(s) that he/she tells the patient. The patient will be informed by SMS or e-mail about the planned appointment and so patient can be reminded and take appointment from hospital/clinic if he/she wants.
- Some test results can not be obtained immediately. For these sort of tests, the patient will be informed as soon as possible when the test results are ready.
- The prescriptions that doctor created on the system will be sent to patient. Also written copy will be provided.

Doctor-Hospital/Clinic Interaction

This is the phase which organizes the interaction of doctor with the other departments of the hospital/clinic.

- Doctor can create a test request for his patient so that patient has nothing to do when he/she arrives the place where the test to be hold on. The call of a personnel will be enough. This can be visualization, radiological or a pathological test.
- Doctor-patient screen immediately be feeded when a test result or graphic is ready. Also reminder to patient is provided. These results will be shared with the government systems.
- Doctor is informed when the entrance of a patient has done by the information desk.
- Doctor is able to create prescription for a patient. These prescriptions will be shared with government systems.

- Doctor can share the test results of his/her patient with the other doctors when he/she needs advise.

All these features are compatible for all departments of the hospital/clinic.

5. Assumptions & Constraints

Assumptions:

- PTS will run on desktop operation systems: Snow Leopard – MAC OS X 10.6 or higher and Windows 7 or higher.
- DataMed Angora PACS System will be used for medical imaging and image archiving.
- The tests of the application will be done on MacBook's with Snow Leopard and Majove and computers with Windows 7, Windows 8 and Windows 10.
- All contributors of the project will work on the application from April 2019 to November 2019 collaboratively without any disconnection.
- The product will present a stock experience to users without any confusing and unnecessary plug-in. There will be given so much importance to simplicity.

Constraints:

- Application will be written in C++.
- Microsoft Visual Studio 2017 will be used as the IDE.
- There will be not any mobile or tablet interaction and everything will locally work in the hospital/clinic.
- Windows 7 or higher and macOS Snow Leopard or higher are needed as operating systems for full compatibility of the product.
- The estimated budged for the project is 100.000 TL.

6. Project Stakeholders

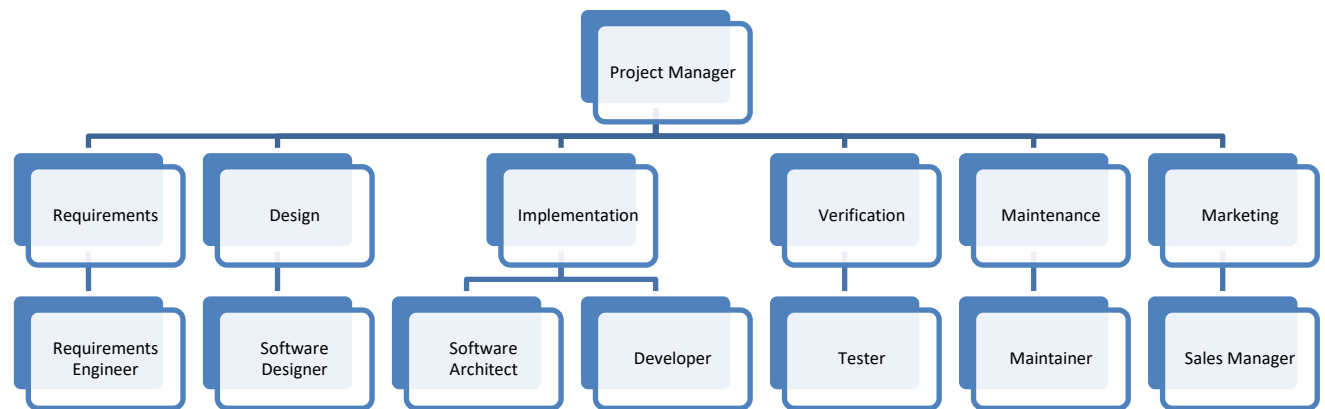


Figure 1: Organization schema of stakeholders

Responsibilities of Stakeholders

Project Manager

- Estimates total expenses, total time requirement and needed effort to complete project.
- Schedules the milestones and manpower.
- Identifies the risks and developing strategies according to risk management.
- Leads the team and provides healthy working atmosphere for collaboration.
- Tracks the progress of the project

Requirements Engineer

- Makes research for understanding the domain.
- Understands the needs of doctors and comes up with unique ideas to present customers.
- Improves the current ideas after domain research.
- Be the bridge between customers and developers.

Software Designer [5]

- Designs the interface of application by taking care of user-friendly goals of the project.
- Designs the windows according to user needs.
- Thinks about smooth experience between the application and end-user.

Software Architect [6]

- Chooses the system architecture and each component of the system at high level.
- Plans new or existing technology insertions.
- Specifies the technical standards.
- Resolves technical problems.
- Makes architectural and code review.

Developer [7]

- Writes the program codes.
- Designs algorithms and flowcharts.
- Integrates software components and third-party programs.

Tester [8]

- Follows the documentation and understands the needed tests.
- Creates realist scenarios to test all components and functionality.
- Reports any type of component failure to project manager.

Maintainer

- Provides consistency of the system.
- Follows the maintenance schedule and check the system for the updates.
- Repairs or reports any nonfunctionality after installation.

Sales Manager

- Makes market research and identifies the common points of market needs and product.
- Specifically identifies the hospitals/clinics which can think of buying the product.

- Creates a marketing and sales strategy with a scientific approach by evaluating all competitors and opportunities.

7. Software Development Process Model

Almost all software projects build their development processes according to appropriate software development process model that chosen by project group and company by evaluating the advantages and disadvantages of the process models according to needs of the project. Software development process models are needed for deciding the rules for project contributors to follow and provide a standardization for the following project steps.

Waterfall Model

Waterfall model is a plan-driven process which does not allow to start following phase without finishing the current one. Usually project process be divided in to 5 steps: requirements definition, system and software design, programming and unit testing, integration and system testing and operation and maintainance [9]. The idea behind this model is project contributors can not start to work on system and software design unless requirements definition completed. This model provides disadvantages for the projects which requirements and customer demands change rapidly because for each large scale change, the process should start from the beginning [9]. If the requirements of the project is pre-defined and there is no expectation of a large scale changes this model can be used to provide process visibility and cost control.

Iterative Model

Iterative model intends to build small portions of all the features which meet the initial scope of the project. By iterative model, the project can be delivered to customer rapidly for getting customer feedback. In each iteration, system features are developed according to requirements until the deployment [9]. Iterative model is can be appropriate for the large projects.

Incremental Model

Incremental model intends to initially building and implementing complete features of the product with some missing functionality. The main goal of the incremental model is

getting feedback from the customer at the beginning stage of the project for a healthier project development. By each increment, functionality of the features and components increase according the changing customer demands and requirements [9]. This model can be appropriate for the big scale projects which requirements are likely to be change frequently.

Spiral Model

Spiral model is a risk-driven process which represented as spiral instead of sequence. This model provides advantages for a healthy risk management [9]. It divides the one loop process in to four subtopics: determination of the goals, risk analysis and strategy development, development and testing and planing the other loop. The first loop can be about requirements, second loop can be about design, third loop can be about implementation and so on. These loops can be decided according to needs of the projects. Also prototypes can be released after some of the loops.

Agile Model

Agile model is the most popular software developmet process model in nowadays which is not plan-driven. It reduces the documentation time and focuses on implementation of the project. It provides dynamism and flexibility to the project process [9]. It combines the approaches of both iterative and incremental model. In agile model, the all phases of the project starts at the same time and continues to develop paralelly till the end of the project. So it is very adaptive to rapid changes in requirements and customer demands. Also it encourages the collaboration between project contributors and customer which can provide healthier communication in terms of satisfying the requirements.

Software Development Process Model of PTS

For developing PTS, our team decided to use waterfall model which consist of five stages: requirements definition, system and software design, programming and unit testing, integration and system testing and operation and maintainance. It is an old and outdated model for software projects however its organization is totally appropriate for our project. The featured characteristic of our product is simplicity, so that it does not include high number of facilities or components which can cause complications and radical changes in customer demand. There can be immediate changes in requirements for financial and management stuff however our product does not include those functionalities and it is

totally for the use of doctors which mean doctor's software needs are not changing monthly or annually. Another important feature of our project is cheapness, thus we are planning to take advantage of waterfall model in terms of consistent cost estimation for avoiding unexpected costs in the later stages of the development. Another reason for our decision is that we are a new team which can cause communication problems in collaborative work so that individuality in the project would be more advantageous. Also strict documentation and a plan-driven model would bring our team a corporate image and give message to customers about our organized working principle. Finally the other process models provide early releases for customer feedback, however we assume that doctors would not be pleased with giving regular feedbacks about the product while they are working on their own business.

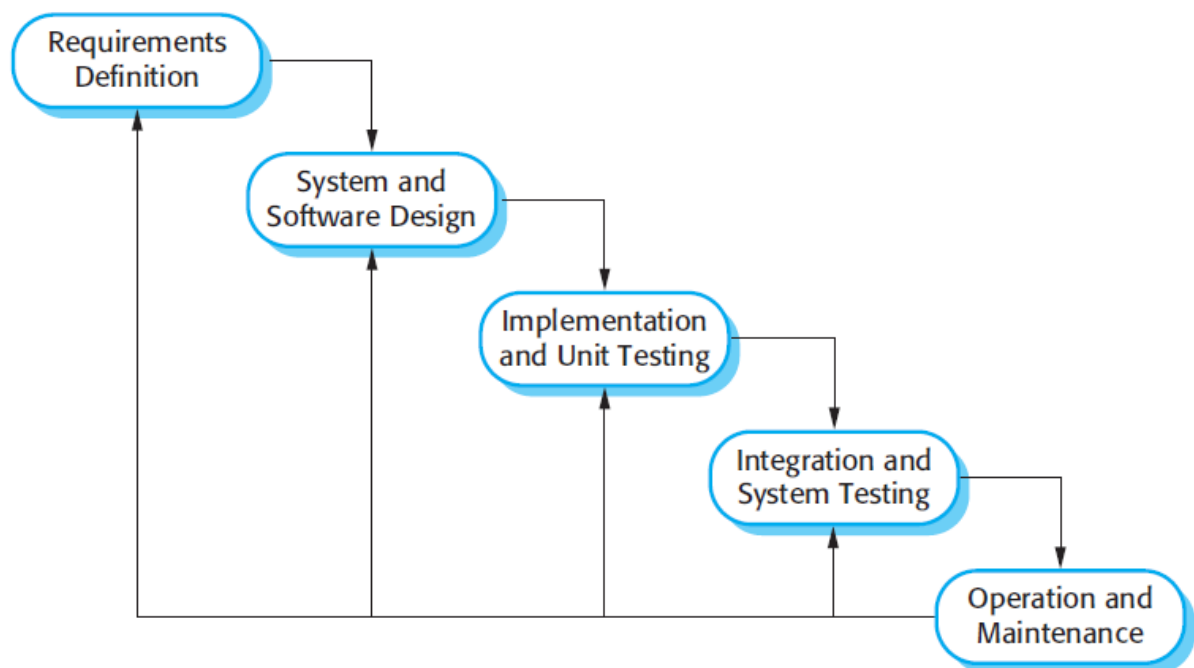


Figure 2: Graphic depiction of the project's software process development model

8. Top Level Schedule

Task Name	Duration	Start	Finish
Project Starts	0 day	Mon 1.04.19	Mon 1.04.19
Requirements Definition	15 days	Mon 1.04.19	Fri 19.04.19
System and Software High Level Desing	20 days	Mon 22.04.19	Fri 17.05.19
System and Software Low Level Desing	30 days	Mon 20.05.19	Fri 28.06.19
Implementation	40 days	Mon 1.07.19	Fri 23.08.19
Unit Testing	10 days	Mon 26.08.19	Fri 6.09.19
Integration and System Testing	20 days	Mon 9.09.19	Fri 4.10.19
Operation and Maintanance	30 days	Mon 7.10.19	Fri 15.11.19
Project Ends	0 days	Fri 15.11.19	Fri 15.11.19

Table 2: Top level schedule

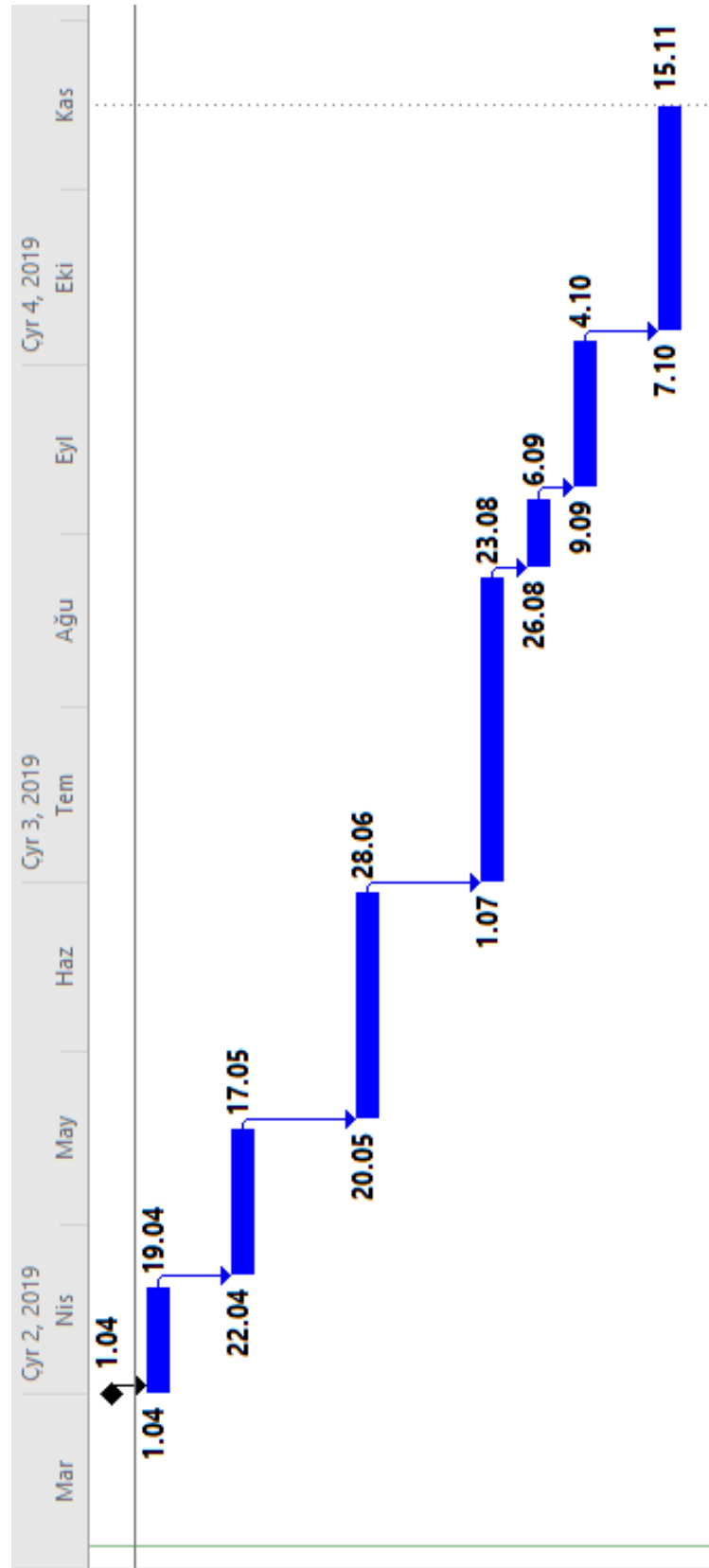


Figure 3: Gantt chart of the project

9. Initial Risk Management Plan

Risk	Probability	Possible Effect	Strategy
Wrong time scheduling	Medium	Loss of time and cost increase	Increase the working hours of employee and start to work in Saturdays if there is a need. Pay extra for extra working to motivate contributors.
Staff turnover	Low	Delay in the project schedule can occur	First look for options to re-arrange responsibilities internally, if not possible hire new contributor.
Productivity or qualification problems for the contributor(s)	Low	Delay in the project schedule	If productivity is the problem analyse the situation in weekly meetings, if qualification is the problem change the employee.
Wrong cost estimation	Low	Delay in time schedule due to work stop.	Apply banks to take loan or find investor.
Late delivery of outsource service	?	Delay in time schedule due to missing integration	Look for other options in the market or make pressure to take outsource service in time

Table 3: Initial risk analysis

10. References

- [1] ISU (n.d.). Retrieved from <http://www.isuicu.com.tr/hastane-otomasyonu.html>
- [2] BizMed. (n.d.). Retrieved from <https://www.bizmed.com.tr/>
- [3] InterMEDIA - Türkiye'nin En İyi Hastane Yazılımları interMEDIA Yazılım. (n.d.). Retrieved from <https://www.intermedia.com.tr/>
- [4] Medisoft Hastane Otomasyonu - En Kapsamlı Hastane Bilgi Sistemi. (2018, September 24). Retrieved from <https://www.talyabilisim.com.tr/saglik/medisoft-hastane-programi/>
- [5] (n.d.). Retrieved from https://study.com/articles/Computer_Software_Designer_Job_Description_and_Requirements.html
- [6] The role, skills, and duties of a software architect. (n.d.). Retrieved from <https://syndicode.com/2017/10/24/the-role-skills-and-duties-of-a-software-architect/>
- [7] Software Developer job description | Workable. (2017, April 20). Retrieved from <https://resources.workable.com/software-developer-job-description>
- [8] Software Testing Roles and Responsibilities. (n.d.). Retrieved from https://www.test-institute.org/Software_Testing_Roles_And_Responsibilities.php
- [9] Elgabry, O., & Elgabry, O. (2017, March 17). Software Engineering - Software Process and Software Process Models (Part 2). Retrieved from <https://medium.com/omarelgabrys-blog/software-engineering-software-process-and-software-process-models-part-2-4a9d06213fdc>