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Project Plan Document (PPD)

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# Abstract

**Purpose:** this document represent the Project Plan Document (PPD) of My-TaxiService project, in order to estimate its size, effort, cost, duration, resources and risks.

**Scope:** plan the MyTaxiService project.

**Brief summary:** the main activity concerned with estimate function points, scale drivers and cost drivers, and resource allocation.

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# Introduction

## 0.1 Revision History

Table 1: Detailed history of the document revisions

Name	Date	Note
PPD	02/02/2016	Document creation

## 0.2 Purpose

This document represents the Project Plan Document (PPD) of the MyTaxiService project in order to plan an optimal working path.

## 0.3 Scope

The Project Planning Document describes a planning of the MyTaxiService project:

- estimating its size through the Function Points (FP) algorithm
- estimating its effort and its cost through the COConstructive COst MOdel (CO-COMO) algorithm
- identifying its tasks and their schedule
- allocating its resources
- defining its risks, their relevance and the related recovery actions

## 0.4 Definitions, acronyms and abbreviations

### 0.4.1 Definitions

- **System:** the whole MyTaxiService service.

### 0.4.2 Acronyms

- **DD:** Design Document
- **ETA:** Estimated Time of Arrival
- **FP:** Function Point
- **GUI:** Graphic User Interface
- **LoC:** Line of Code
- **MVC:** Model View Controller
- **OS:** Operating System
- **PPD:** Project Plan Document
- **RASD:** Requirements And Specifications Document
- **UML:** Unied Modeling Language
- **ITPD:** Integration Testing Plan Document
- **WRT:** With Respect To

### 0.4.3 Abbreviations

- **COCOMO:** COConstructive COst MOdel
- **FLEX:** Development Exibility
- **ID:** Identier
- **PMAT:** Process Maturity
- **PREC:** Precedentedness
- **RESL:** Architecture/Risk Resolution
- **TEAM:** Team Cohesion
- **UX:** User Experience

## 0.5 Overview

This document is composed by four parts:

1. Application of FP and COCOMO II algorithm in order to estimate respectively the project size, effort and cost.

2. Identification of the project tasks and their schedule.
3. Allocation of the project resources to the various tasks.
4. Definition of the project risks, their relevance and the associated recovery actions.



# Chapter 1

## Estimation Strategy

### 1.1 FP Algorithm

*«FP allow to estimate LoC depending on the average number of LoC per FP for a given language.» [1]*

The following table summarize the factors needed to this estimation:

Table 1.1: Function points express the dimension of the functionalities offered by a software.

Function type	Multiplier		
	Simple	Average	Complex
Internal Logic File	7	10	15
External Logic File	5	7	10
External Input	3	4	6
External Output	4	5	7
External Inquiries	3	4	6

- **Internal Logic Files (ILFs):** internal data managed used by the application concerns of:
  - users
  - requests
  - rides
  - taxi queues
  - payments
  - sessions

Due to the fact that all of them have a simple structure, it is reasonable to use a simple factor. Therefore:  $6 * 7 = 42FPs$

- **External Logic Files (ELFs):** data managed by other systems is about:
  - ETA
  - government checking (payment data, identification cards and taxi licenses).

All of them have a very simple structure, so:  $4 * 5 = 20FPs$

- **External Inputs (EIs):** data coming from users deals with:
  - registration (considered simple operation)  
 $1 * 3 = 3FPs$
  - login/logout, which involve also session management (simple)  
 $3 * 3 = 9FPs$
  - ride request, which involves also the ETA and queues management (complex)  
 $3 * 6 = 18FPs$
  - ride acceptance (average)  
 $1 * 4 = 4FPs$
  - taxi driver availability setting (simple)  
 $1 * 3 = 3FPs$
  - profile management about personal data, payment data and password management (average)  
 $3 * 4 = 12FPs$
  - payment (average)  
 $1 * 4 = 4FPs$

Other data regards to initial settings of the backend:

- timeouts, e.g. the time within which a taxi driver has to answer to a ride request (simple)  
 $1 * 3 = 3FPs$
- map GPS coordinates to be managed for requesting rides and queues management (average):

$$2 * 4 = 8FPs$$

$$\text{TOTAL: } \sum EI_i = 64FPs$$

- **External Outputs (EOs):**

- notification system, either through SMS, emails or push notifications (simple)

$$3 * 4 = 12FPs$$

- **External Inquiries (EIQs):**

- request and acceptance of a ride, which involves also management of the zone queues and the ETA (average)

$$3 * 5 = 15FPs$$

- profile management about personal data, payment data and password management (average)

$$3 * 5 = 15FPs$$

$$\text{TOTAL: } \sum EIQ_i = 30FPs$$

After the summation of all the above FPs, it can be estimated the project size in terms of LoC:

$$LoC = A * FP_{total}$$

A is a parameter which depends on the chosen programming language.

J2EE accomplish all the requirements and it is known by the project developers.

Hence:

$$LoC = 46 * 168 = 7728LoC$$

The following section uses LoC to estimate the project effort and costs.

Table 1.2: A: programming language parameter

Language	Average	Medium	Low	High
<b>Assembler</b>	119	98	25	320
<b>C</b>	97	99	39	333
<b>C++</b>	50	53	25	80
<b>C#</b>	54	59	29	70
<b>Excel</b>	209	191	131	315
<b>HTML</b>	34	40	14	48
<b>Java</b>	53	53	14	134
<b>Javascript</b>	47	53	31	63
<b>J2EE</b>	46	49	15	67
<b>SQL</b>	21	21	13	37
<b>Visual Basic</b>	42	44	20	60

## 1.2 COCOMO II Algorithm

### 1.2.1 Effort

$$Effort = 2.94 * EAF * (KLoC)^E \quad [person/month]$$

$$E = 0.91 + 0.01 * \sum_{j=1}^5 SF_j$$

SFs are the scale factors (scale drivers) taken from the following table (the bold numbers are used in MyTaxiService project):

Table 1.3: Scale factors of COCOMO II

Scale Factors	Very Low	Low	Nominal	High	Very High	Extra High
<b>PREC</b>	6.20	<b>4.96</b>	3.72	2.48	1.24	0.00
<b>FLEX</b>	5.07	4.05	<b>3.04</b>	2.03	1.01	0.00
<b>RESL</b>	7.07	5.65	<b>4.24</b>	2.83	1.41	0.00
<b>TEAM</b>	5.48	4.38	<b>3.29</b>	2.19	1.10	0.00
<b>PMAT</b>	7.80	<b>6.24</b>	4.68	3.12	1.56	0.00

Therefore:

$$E = 0.91 + 0.01 * (4.96 + 3.04 + 4.24 + 3.29 + 6.24) = 1.128$$

While EAF is calculated through this formula:

$$EAF = \prod_{j=1}^{17} EM_j$$

EMs are the effort multipliers (cost drivers) taken from this table (the bold numbers are used in MyTaxiService project):

Table 1.4: Effort multipliers of COCOMO II

Driver	Symbol	Very Low	Low	Nominal	High	Very High	Extra High
<b>RELY</b>	EM1	0.82	0.92	1.00	<b>1.10</b>	1.26	n/a
<b>DATA</b>	EM2	n/a	0.90	<b>1.00</b>	1.14	1.28	n/a
<b>CPLX</b>	EM3	0.73	0.87	<b>1.00</b>	1.17	1.34	1.74
<b>RUSE</b>	EM4	n/a	0.95	1.00	<b>1.07</b>	1.15	1.24
<b>DOCU</b>	EM5	0.81	0.91	<b>1.00</b>	1.11	1.23	n/a
<b>TIME</b>	EM6	n/a	n/a	<b>1.00</b>	1.11	1.29	1.63
<b>STOR</b>	EM7	n/a	n/a	<b>1.00</b>	1.05	1.17	1.46
<b>PVOL</b>	EM8	n/a	0.87	<b>1.00</b>	1.15	1.30	n/a
<b>ACAP</b>	EM9	1.42	1.19	1.00	<b>0.85</b>	0.71	n/a
<b>PCAP</b>	EM10	1.34	1.15	<b>1.00</b>	0.88	0.76	n/a
<b>PCON</b>	EM11	1.29	1.12	<b>1.00</b>	0.90	0.81	n/a
<b>APEX</b>	EM12	1.22	<b>1.10</b>	1.00	0.88	0.81	n/a
<b>PLEX</b>	EM13	1.19	1.09	<b>1.00</b>	0.91	0.85	n/a
<b>LTEX</b>	EM14	1.20	1.09	<b>1.00</b>	0.91	0.84	n/a
<b>TOOL</b>	EM15	1.17	1.09	<b>1.00</b>	0.90	0.78	n/a
<b>SITE</b>	EM16	1.22	1.09	<b>1.00</b>	0.93	0.86	0.80
<b>SCED</b>	EM17	1.43	1.14	1.00	<b>1.00</b>	1.00	n/a

Therefore:

$$EAF = 1.10 * 1.07 * 0.85 * 1.10 = 1.10$$

$$Effort = 2.94 * 1.10 * (7.728)^{1.128} = 32.47 person/month$$

### 1.2.2 Duration

$$Duration = 3.67 * PM^{[0.28+0.2*(E-0.91)]} * \frac{SCED\%}{100} \quad [months]$$

where PM is the Effort estimation (in person/month) without taking into account the SCED driver value and SCED% is the percentage of SCED taken from the drivers' table.

In this case SCED is equal to 1.00 (high), so PM=EAF.

Then:

$$\text{Duration} = 3.67 * 1.10^{[0.28 + 0.2 * (1.128 - 0.91)]} * \frac{130\%}{100} = 4.92 \text{ months}$$

### 1.2.3 Number of people required

$$N = \frac{\text{Effort}}{\text{Duration}} = \frac{32.47}{4.92} = 6.6 \sim 7 \text{ persons}$$

## Chapter 2

# Tasks Identification and Scheduling

### 2.1 Task Identification

The main project activities are the following:

- RASD
- DD
- Development
- CI
- Unit Test
- Integration Test
- System Test

### 2.2 Task Scheduling

According to the estimation done so far, here is the tasks scheduling:

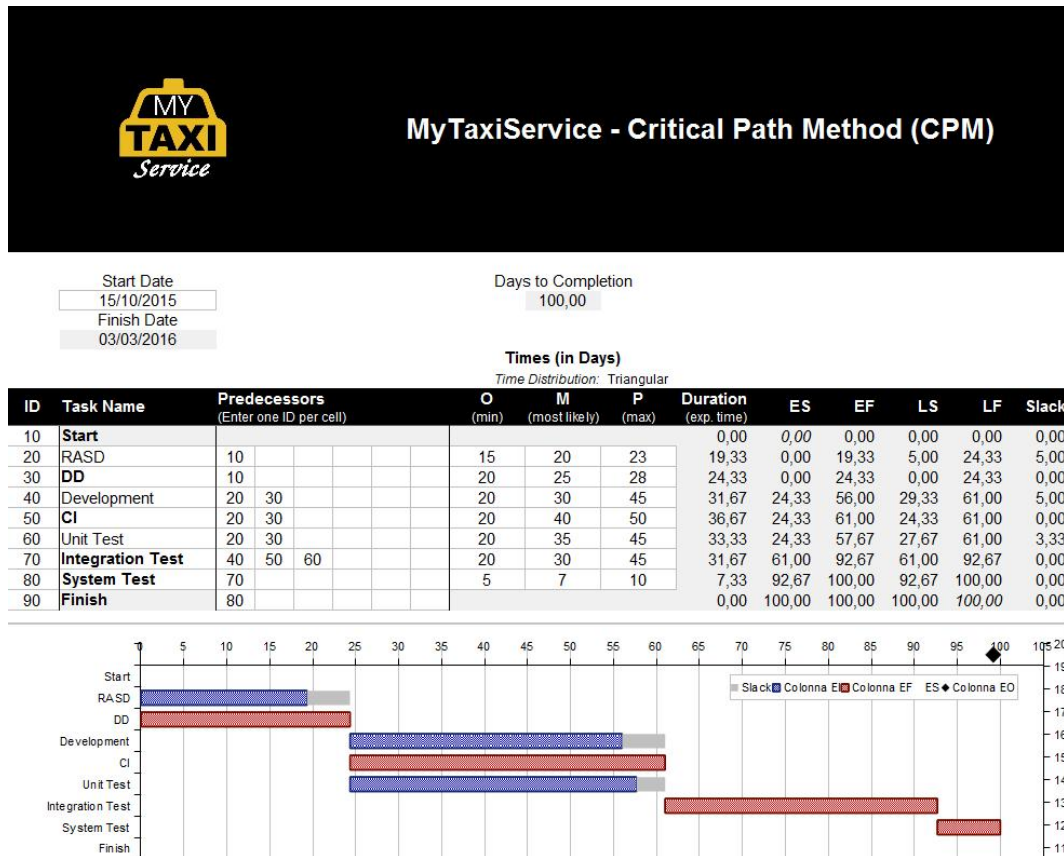


Figure 2.1: MyTaxiService Gantt chart at earliest, calculated using Critical Path Method



## Chapter 3

# Resources Allocation

### 3.1 Resources Allocation

## Chapter 4

# Project Risks

### 4.1 Project Risks

# Appendix A

## Document Information

### A.1 Effort

Approximately **10 hours** have been spent making this document.

### A.2 Tool Used

- **L<sup>A</sup>T<sub>E</sub>X**: [www.lyx.org](http://www.lyx.org)

## Appendix B

## References

- [1] Function Points Languages Table:  
<https://dl.dropboxusercontent.com/u/79082424/Function%20Points.pdf>
- [2] COCOMO II Model Definition Manual:  
<https://dl.dropboxusercontent.com/u/79082424/cocomo%20.pdf>
- [3] Project Plan assignment  
<https://dl.dropboxusercontent.com/u/79082424/Project%20Plan%20assignment.pdf>