

Project Plan Document

Version 1.0

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1 Introduction

1.1 Purpose

The main purpose of this document is to analyze effort and cost for MyTaxiService. The analysis is performed using two different models:

- **Function Points:** to determine the size and the overall complexity of the project
- **COCOMO II:** to determine the effort and cost of the project

In the final part of the document are also included a Gantt diagram to visualize the general schedule of the project and a resource allocation diagram to show how the team members have been assigned to the various tasks.

1.2 Acronyms

- **RASD:** Requirements Analysis and Specification Document
- **DD:** Design Document
- **ITPD:** Integration Test Plan Document
- **AWT:** Approximate Waiting Time

1.3 References

- COCOMO II Specification
- Function Point Specification

2 Function Point Analysis

2.1 Introduction

The function point approach is a technique that allows the project manager to estimate the size of the project.

It is based on a combination of the project characteristics:

- **Internal Logic Files:** It represents a homogeneous set of data managed by the application
- **External Logic Files:** It represents a homogeneous set of data used by the application but generated and maintained by other applications
- **External Input:** It represents a set of elementary procedures to elaborate data coming from the external environment

- **External Output:** It represents a set of procedures that generates data for the external environment with a significant elaboration of data from logic files
- **External Inquiry:** It represents a set of input/output operation that do not require a significant elaboration of logic data files.

The following table outline the number of Functional Point based on functionality and relative complexity:

Function Type	Complexity		
	Simple	Medium	Complex
Internal Logic File	7	10	15
External Interface File	5	7	10
External Input	3	4	6
External Output	4	5	7
External Inquiry	3	4	6

2.2 Internal Logic Files

The system needs to store information about:

User

This data entity consist in a small set of information, for this reason its complexity has been considered **SIMPLE**

Administrator

This data entity consist in a small set of information, for this reason its complexity has been considered **SIMPLE**

Mtaxi driver

This data entity consist in a small set of information, for this reason its complexity has been considered **SIMPLE**

Mtaxi

This data entity consist in a small set of information, for this reason its complexity has been considered **SIMPLE**

WorkTime Table

This data entity consist in a small set of information, for this reason its complexity has been considered **SIMPLE**

Zone

This data entity consist in a small set of information, for this reason its complexity has been considered **SIMPLE**

Location

This data entity consist in a small set of information, for this reason its complexity has been considered **SIMPLE**

Ride Request This data entity consist in a small set of information, for this reason its complexity has been considered **SIMPLE**

Booking Request This data entity consist in a small set of information, for this reason its complexity has been considered **SIMPLE**

Queue This data entity consist in a small set of information, for this reason its complexity has been considered **SIMPLE**

$$ILFFunctionPoints = numberOfILF * 7 = 7 * 7 = 49$$

2.3 External Logic Files

The system needs to access data about:

External Traffic data

The structure of this data could be complex and could need a digest process, for this reason its complexity has been considered **MEDIUM**

$$ILFFunctionPoints = numberOfELF * 7 = 1 * 7 = 7$$

2.4 External Input

The system needs to process the following input:

Ride Request creation

This operation requires the user to perform few and simple actions and the system to perform straightforward checks and data procedures, for this reason its complexity has been considered **SIMPLE**

Booking Request creation

This operation requires the user to perform few and simple actions and the system to perform straightforward checks and data procedures, for this reason its complexity has been considered **SIMPLE**

Booking Request editing

This operation requires the user to perform few and simple actions and the system to perform straightforward checks and data procedures, for this reason its complexity has been considered **SIMPLE**

User Login/Logout

This operation requires the user to perform few and simple actions and the system to perform straightforward checks and data procedures, for this reason its complexity has been considered **SIMPLE**

User Registration

This operation requires the user to perform few and simple actions and the system to perform straightforward checks and data procedures, for this reason its complexity has been considered **SIMPLE**

Mtaxi Driver Registration

This operation requires the Mtaxi driver to perform few and simple actions and the system to perform straightforward checks and data procedures, for this reason its complexity has been considered **SIMPLE**

Driver Notification

This operation requires the user to perform few and simple actions and the system(including the MYT device) more complex and numerous procedures, for this reason its complexity has been considered **MEDIUM**

Administrator Operations

This operation requires the administrator to perform few and simple actions and the system to perform straightforward checks and data procedures, for this reason its complexity has been considered **SIMPLE**

$$\begin{aligned} EIfunctionPoints &= numberOfSimpleEI * 3 + numberOfMediumEI * 4 = \\ &7 * 3 + 1 * 4 = 25 \end{aligned}$$

2.5 External Output

This operation requires the system to perform complex calculations on traffic data and Mtaxi positions, for this reason its complexity has been considered **COMPLEX**

AWT Notification

Zone Change Notification

This operation implies that the system noticed an unbalanced distribution of Mtaxi in city zones; this last process requires complex and numerous calculations and data checks, this operation requires the system to perform complex calculations on traffic data and Mtaxi positions, for this reason its complexity has been considered **COMPLEX**

$$EOFunctionPoints = numberOfEO * 7 = 2 * 7 = 14$$

2.6 External Inquiry

User Profile Visualization

This operation the system to retrieve and elaborate data in a simple way, for this reason its complexity has been considered **SIMPLE**

User Ride Request Visualization

This operation the system to retrieve and elaborate data in a simple way, for this reason its complexity has been considered **SIMPLE**

User Booking Request Visualization

This operation the system to retrieve and elaborate data in a simple way, for this reason its complexity has been considered **SIMPLE**

Mtaxi Notification Visualization

This operation the system to retrieve and elaborate data in a simple way, for this reason its complexity has been considered **SIMPLE**

Mtaxi Accident Reports Visualization

This operation the system to retrieve and elaborate data in a simple way, for this reason its complexity has been considered **SIMPLE**

Mtaxi Bad Behavior Reports Visualization

This operation the system to retrieve and elaborate data in a simple way, for this reason its complexity has been considered **SIMPLE**

$$EIFunctionPoints = numberOfEI * 3 = 6 * 3 = 18$$

2.7 Summary

$$TotalFunctionPoints(UFP) = 49 + 7 + 25 + 14 + 18 = 113$$

3 COCOMO II Analysis

3.1 Introduction

The COCOMO II calculations are based on estimates of a project's size in Source Lines of Code (SLOC). In this case the previous Function Points analysis is used to estimate the SLOC number.

Assuming that the programming language used for the will be Java EE, the conversion factor between the total function point counts(UFP) and the SLOC is 46.

$$SLOCs = conversionFactor * UFP = 113 * 46 = 5198 \quad (1)$$

The SLOC number represents the entry point, the analysis proceeds by defining:

- **Cost Drivers:** COCOMO II has 17 cost drivers, i.e. multiplicative factors that determine the effort required to complete the software project
- **Scale Drivers:** COCOMO II has 5 scale driver that defines the most important factors to determine cost and duration of the project

The method defines the effort equation:

$$effor = 2.94 * EAF * (KSLOC)^E \quad (2)$$

where EAF(Effort Adjustment Factor) depends on the Cost Drivers and E is derived from the Scale Driver.


The duration of the project is defined as:

$$duration = 3.67 * (effort)^E \quad (3)$$

3.2 Analysys

In this section is included the final COCOMO analisys performed using a tool available at:

<http://csse.usc.edu/tools/COCOMOII.php>

**COCOMO II - Constructive Cost Model**

Software Size Sizing Method **Source Lines of Code** ▼
[SLOC](#) % Design Modified % Code Modified % Integration Required Assessment and Assimilation (0% - 8%) Software Understanding (0% - 50%) Unfamiliarity (0-1)

New

Reused

Modified

Software Scale Drivers
Precedentedness **Nominal** ▼ Architecture / Risk Resolution **High** ▼ Process Maturity **Nominal** ▼
Development Flexibility **Nominal** ▼ Team Cohesion **Very High** ▼

Software Cost Drivers
Product
Required Software Reliability **High** ▼
Data Base Size **High** ▼
Product Complexity **Nominal** ▼
Developed for Reusability **Nominal** ▼
Documentation Match to Lifecycle Needs **Nominal** ▼
Personnel
Analyst Capability **Nominal** ▼
Programmer Capability **High** ▼
Personnel Continuity **High** ▼
Application Experience **Low** ▼
Platform Experience **Low** ▼
Language and Toolset Experience **Nominal** ▼
Platform
Time Constraint **High** ▼
Storage Constraint **Nominal** ▼
Platform Volatility **Low** ▼
Project
Use of Software Tools **Nominal** ▼
Multisite Development **Low** ▼
Required Development Schedule **Nominal** ▼

Maintenance **Off** ▼

Software Labor Rates
Cost per Person-Month (Dollars)

Results

Software Development (Elaboration and Construction)

Effort = 21.3 Person-months

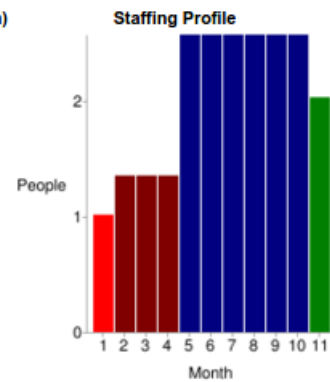
Schedule = 10.1 Months

Cost = \$42552

Total Equivalent Size = 5198 SLOC

Acquisition Phase Distribution

Phase	Effort (Person- months)	Schedule (Months)	Average Staff	Cost (Dollars)
Inception	1.3	1.3	1.0	\$2553
Elaboration	5.1	3.8	1.4	\$10213
Construction	16.2	6.3	2.6	\$32340
Transition	2.6	1.3	2.0	\$5106

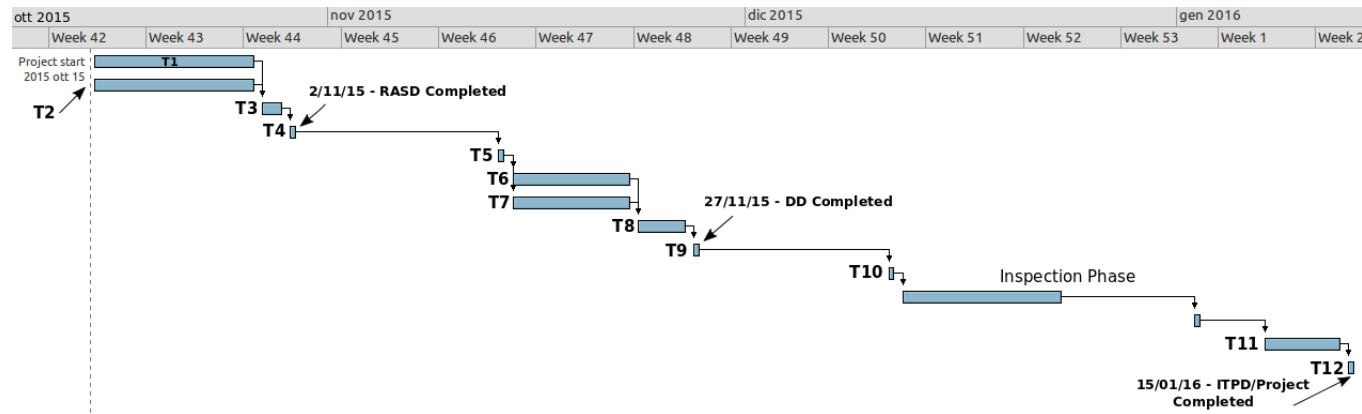


Software Effort Distribution for RUP/MBASE (Person-Months)

Phase/Activity	Inception	Elaboration	Construction	Transition
Management	0.2	0.6	1.6	0.4
Environment/CM	0.1	0.4	0.8	0.1
Requirements	0.5	0.9	1.3	0.1
Design	0.2	1.8	2.6	0.1
Implementation	0.1	0.7	5.5	0.5
Assessment	0.1	0.5	3.9	0.6
Deployment	0.0	0.2	0.5	0.8

4 Task Gantt Diagram

In this section is included a gantt diagram that represents the tasks in which the project is divided.



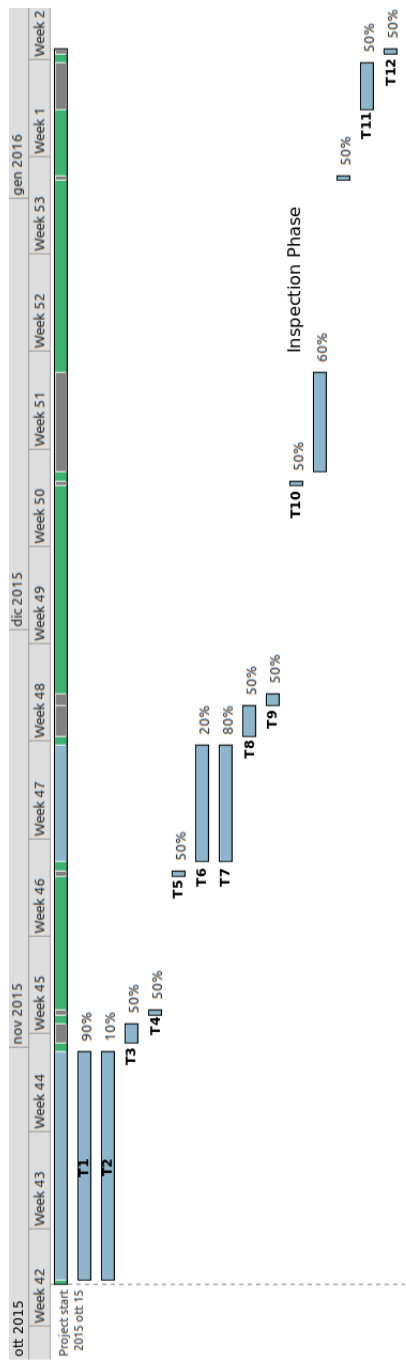
In the following paragraph is included an explanation of each task and of its duration in terms of work

- **T1:** Requirements Specification - Duration: 29h
- **T2:** RASD Diagrams Specification - Duration: 29h
- **T3:** Alloy Model Definition - Duration: 4h
- **T4:** RASD Revision - Duration: 2h
- **T5:** RASD Post-Presentation Revision - Duration: 2h
- **T6:** Architecture Specification - Duration: 18h
- **T7:** DD Diagrams Specification - Duration: 18h
- **T8:** Algorithms Definition - Duration: 2h
- **T9:** DD Revision - Duration: 2h
- **T10:** DD Post-Presentation Revision - Duration: 2h
- **T11:** Integration Test Plan Definition - Duration: 8h
- **T12:** ITPD Revision: Duration: 1h

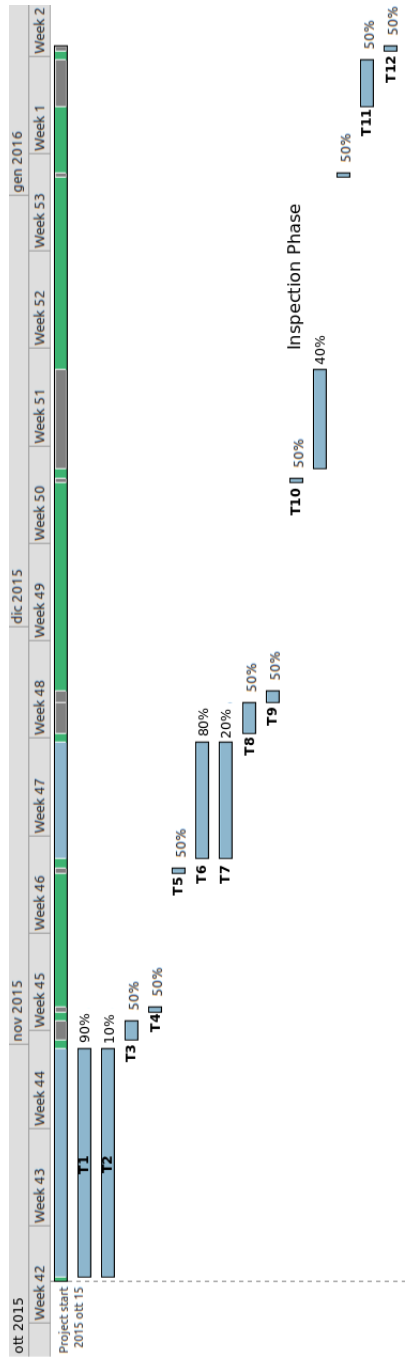
5 Resource Allocation Diagram

In this section are included two diagrams showing how the two team members (Andrea Sessa, Giorgio Pea) have been allocated to the tasks described in the previous section. In grey is indicated the work time while in green the free time, besides each task is indicated the percentage of time allocated for that particular activity. Due to space constraints the diagrams are shown in the next two pages.

Allocation Diagram: Andrea Sessa



Allocation Diagram: Giorgio Pea



6 Risks Detection and Management

In this section is included a list of possible risks that can occur during the project.

6.1 Project Risks

1. Key staff are ill at critical times in the project
Probability: Moderate
Effect: Serious
Recover Strategy: Reorganize team so that there is more overlap of work and people therefore understand each other's jobs
2. Changes to requirements that require major design rework Moderate are proposed
Probability: Low
Effect: Critical
Recover Strategy: Use previously derived traceability information to assess requirements change impact
3. Key staff is busy at critical times in the project
Probability: Moderate
Effect: Serious
Recover Strategy: Reorganize the resource allocation plan to match the availability of the staff with the project schedule

6.2 Technical Risks

1. Database or other key components in the architecture do not perform as expected
Probability: Low
Effect: Catastrophic
Recover Strategy: Investigate the possibility of buying a higher-performance components.
2. Underestimated development time
Probability: Moderate
Effect: Serious
Recover Strategy: Investigate the possibility of using COTS or try to renegotiate the deadlines.

6.3 Business Risks

We assume for this section that we are developing MyTaxiService for a real-world company.

1. The organization is restructured so that different high management are responsible for the project
Probability: Low
Effect: Serious
Recover Strategy: Prepare a briefing document for senior management showing how the project is making a very important contribution to the goals of the business.
2. Organization financial problems **Probability:** Moderate
Effect: Catastrophic
Recover Strategy: Prepare a briefing document for the management showing how the project goals are fundamental for the company business

7 Appendix

7.1 Tools

- **Planner:** to draw gantt and resource diagrams
- \LaTeX / **Atom:** to redact this document

7.2 Hours

- Andrea Sessa: 12 hours
- Giorgio Pea: 8 hours