Politecnico di Milano
A.A. 2015-2016
Software Engineering 2 Project

My Taxi Service

Project Plan

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Contents

1. Introduction

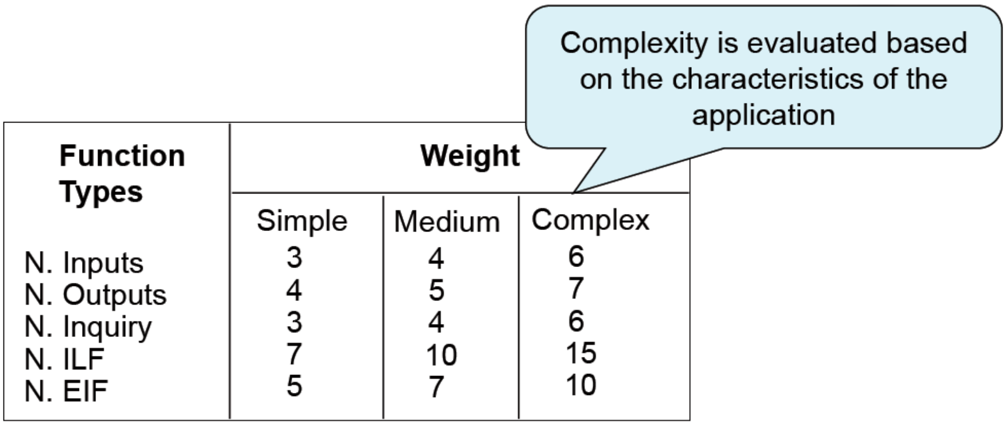
1.1. Purpose

The following document purpose is to provide a detailed Project Plan for MyTaxiService project. First will be provided estimates for project size, effort and cost using Function Points and CoCoMo methods then tasks, schedules, resources allocation and risk analysis.

2. Project size

This section reports a size estimation of the project made by Function Points technique. The development effort is based on the system functionalities.

2.1. Function Points Analysis



Complexity is evaluated based on the characteristics of the application

Function Types	Weight		
	Simple	Medium	Complex
N. Inputs	3	4	6
N. Outputs	4	5	7
N. Inquiry	3	4	6
N. ILF	7	10	15
N. EIF	5	7	10

(notation S, M, C identify “Simple”, “Medium” and “Complex”)

Internal Logic Files (ILF):

This type of functions concern set of data used and managed by the application.

- Registered User (M)
- Taxi Driver (M)
- Zone (S)

- Queue (M)
- Run (C)
- Reservation (S)
- Taxi Exception (S)

Total: 66 FPs

External Logic Files (ELF):
This type of functions concern set of data used by the application but generated and maintained by other applications.

- Geocoding Places (M)
- Geocoding Drivers (C)

Total: 12 FPs

External Inputs:
This type of functions concern operations to elaborate data coming from the external environment.

- Login (S)
- Logout (S)
- Update User Info (S)
- Make Call (C)
- Make Reservation (C)
- Delete Reservation (S)
- Set availability (M)
- Accept Call (C)
- Refuse Call (S)
- Update registered drivers list (S)

Total: 40 FPs

External Outputs:

This type of functions concern operations to generate data for the external environment.

- Get Taxi Position (C)

Total: 7 FPs

External Inquiries:

This type of functions concern operations that involve input and output but very few elaboration on data.

- Get User Info (S)
- Get Ride History (S)
- Get drivers list (S)

Total: 9 FPs

2.2. Unadjusted Function Points (UFP)

UFP = ILF + ELF + ExInputs + ExOutputs + ExInquiries
= 66 + 12 + 40 + 7 + 9 = **134 FP**

2.3. Value Adjustment Factor (VAF)

VAF is used to adjust UFP taking into consideration 14 parameters called General System Characteristics (GSC). Each of these parameters get a value between 1 and 5.

Data Communication: 3
Distributed data processing: 4
Performance: 2
Heavily used configuration: 2
Transaction rate: 4
Online data entry: 4
End user efficiency: 4
Online update: 5
Complex processing: 1

Reusability: 3
Installation ease: 1
Operational ease: 3
Multiple sites: 3
Facilitate change: 3

VAF = sum(GSC) * (0.01) + 0.65 = 1.09

2.4. Adjusted Function Points (FP)

Adjusted FP (effort estimate) = UFP * VAF
= 140 * 1.09 = **153 FP**

3. Project effort and price

3.1. COCOMO (COnstructive COst MOdel)

This section provides an efford and cost estimate using COCOMO II model.

3.2. Assumptions

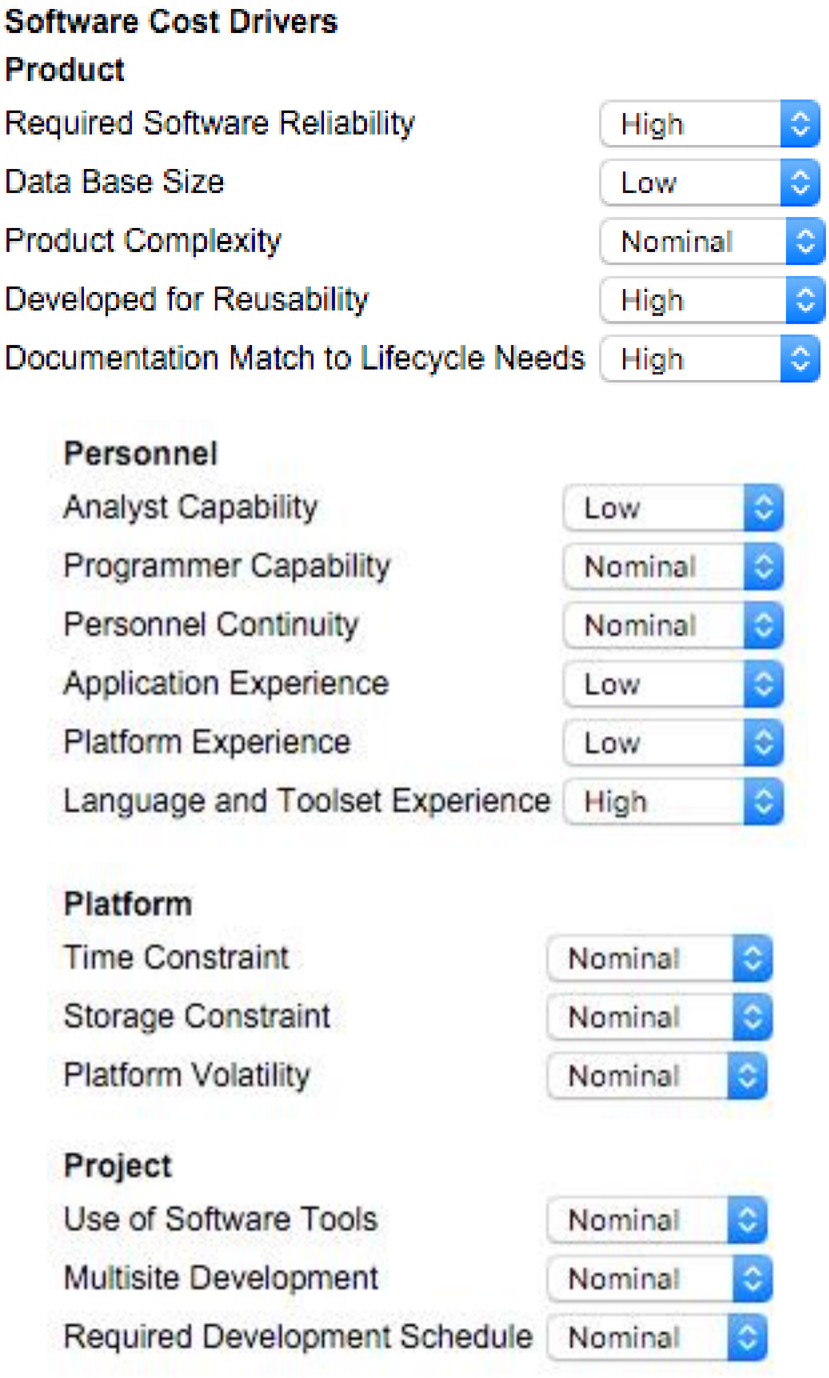
Due to uncertainty about implementation source code lenght we provide 3 different results for 3 possible values of SLOC (Source Lines of Code): 2000, 4000, 12000.
We also assumed a salary of 2000$ / month for each developer involved into project.

3.3. Scale Drivers

Scale drivers consist in 5 high level parameters having a value between this set: Very Low, Low, Nominal, High, Very High, Extra High.

- Precedenteness: **Low**
- Development Flexibility: **Low**
- Architecture / Risk Analysis: **Nominal**
- Team Cohesion: **Very High**
- Process Maturity: **Nominal**

3.4. Cost Drivers



Software Cost Drivers

Product

Required Software Reliability	High
Data Base Size	Low
Product Complexity	Nominal
Developed for Reusability	High
Documentation Match to Lifecycle Needs	High

Personnel

Analyst Capability	Low
Programmer Capability	Nominal
Personnel Continuity	Nominal
Application Experience	Low
Platform Experience	Low
Language and Toolset Experience	High

Platform

Time Constraint	Nominal
Storage Constraint	Nominal
Platform Volatility	Nominal

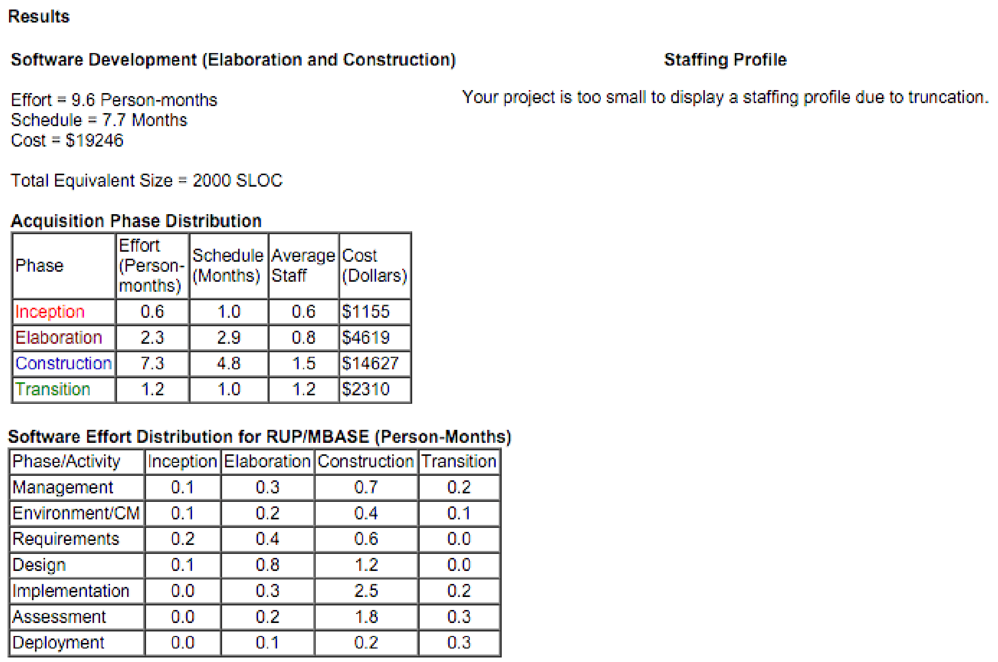
Project

Use of Software Tools	Nominal
Multisite Development	Nominal
Required Development Schedule	Nominal

3.5. Results

Here we present results given by the model computation under the assumptions made on the project.

CASE A: 2000 SLOC
Effort: 9.6 Person-months
Schedule: 7.7 months
Required staff: 2 people
Cost: 19 246 $



Results

Software Development (Elaboration and Construction)

Effort = 9.6 Person-months
Schedule = 7.7 Months
Cost = $19246

Total Equivalent Size = 2000 SLOC

Staffing Profile

Your project is too small to display a staffing profile due to truncation.

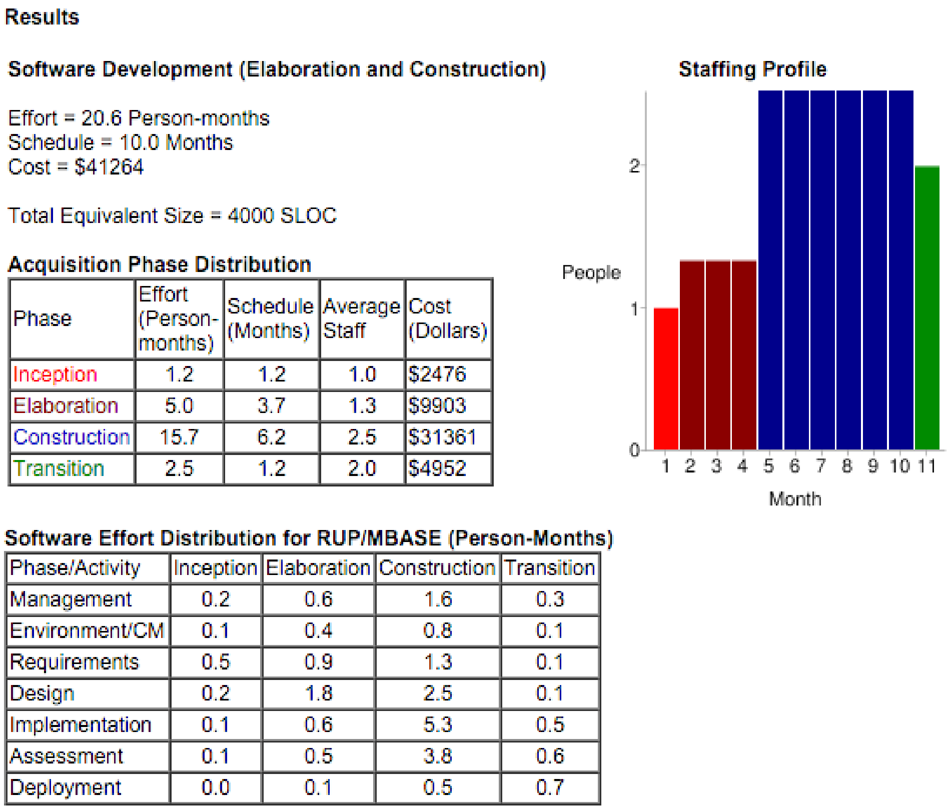
Acquisition Phase Distribution

Phase	Effort (Person-months)	Schedule (Months)	Average Staff	Cost (Dollars)
Inception	0.6	1.0	0.6	$1155
Elaboration	2.3	2.9	0.8	$4619
Construction	7.3	4.8	1.5	$14627
Transition	1.2	1.0	1.2	$2310

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

Phase/Activity	Inception	Elaboration	Construction	Transition
Management	0.1	0.3	0.7	0.2
Environment/CM	0.1	0.2	0.4	0.1
Requirements	0.2	0.4	0.6	0.0
Design	0.1	0.8	1.2	0.0
Implementation	0.0	0.3	2.5	0.2
Assessment	0.0	0.2	1.8	0.3
Deployment	0.0	0.1	0.2	0.3

CASE B: 4000 SLOC
Effort: 20.6 Person-months
Schedule: 10 months
Required staff: 3 people
Cost: 41 264 $



Results

Software Development (Elaboration and Construction)

Effort = 20.6 Person-months
Schedule = 10.0 Months
Cost = $41264

Total Equivalent Size = 4000 SLOC

Acquisition Phase Distribution

Phase	Effort (Person-months)	Schedule (Months)	Average Staff	Cost (Dollars)
Inception	1.2	1.2	1.0	$2476
Elaboration	5.0	3.7	1.3	$9903
Construction	15.7	6.2	2.5	$31361
Transition	2.5	1.2	2.0	$4952

Staffing Profile

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

Phase/Activity	Inception	Elaboration	Construction	Transition
Management	0.2	0.6	1.6	0.3
Environment/CM	0.1	0.4	0.8	0.1
Requirements	0.5	0.9	1.3	0.1
Design	0.2	1.8	2.5	0.1
Implementation	0.1	0.6	5.3	0.5
Assessment	0.1	0.5	3.8	0.6
Deployment	0.0	0.1	0.5	0.7

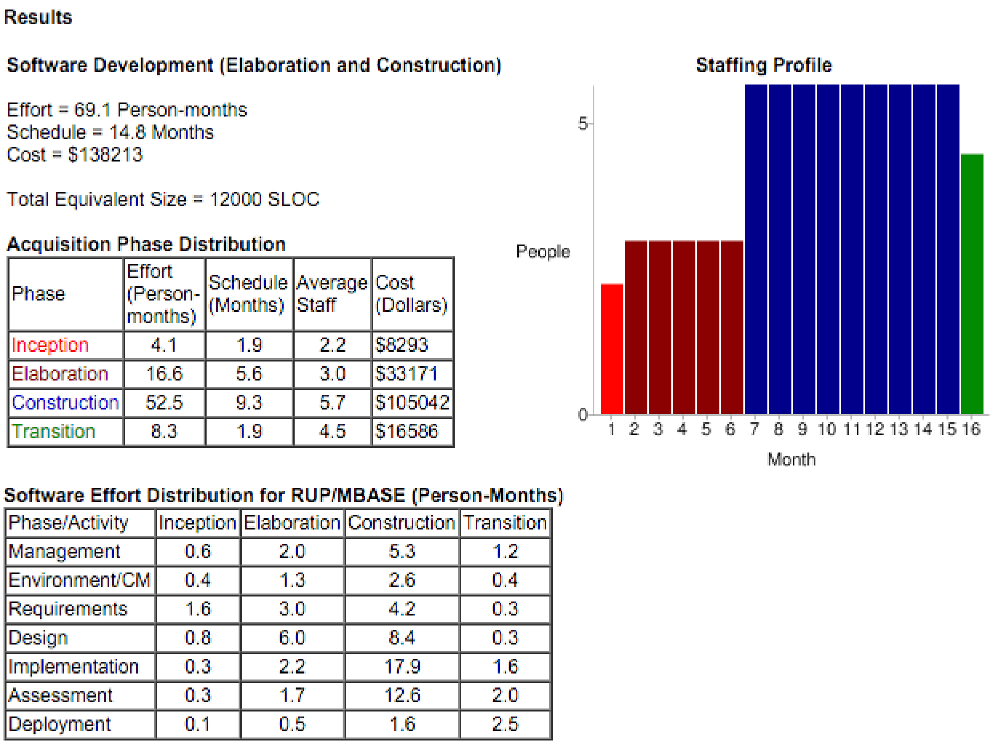
CASE C: 12000 SLOC

Effort: 69.1 Person-months

Schedule: 14.8 months

Required staff: 5 people

Cost: 138 213 $



Results

Software Development (Elaboration and Construction)

Effort = 69.1 Person-months
Schedule = 14.8 Months
Cost = $138213

Total Equivalent Size = 12000 SLOC

Acquisition Phase Distribution

Phase	Effort (Person-months)	Schedule (Months)	Average Staff	Cost (Dollars)
Inception	4.1	1.9	2.2	$8293
Elaboration	16.6	5.6	3.0	$33171
Construction	52.5	9.3	5.7	$105042
Transition	8.3	1.9	4.5	$16586

Staffing Profile

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

Phase/Activity	Inception	Elaboration	Construction	Transition
Management	0.6	2.0	5.3	1.2
Environment/CM	0.4	1.3	2.6	0.4
Requirements	1.6	3.0	4.2	0.3
Design	0.8	6.0	8.4	0.3
Implementation	0.3	2.2	17.9	1.6
Assessment	0.3	1.7	12.6	2.0
Deployment	0.1	0.5	1.6	2.5

4. Tasks and Schedules

The task of our project are:

- [T1] Deliver of RASD(Requirement Analysis and Specification Document)
- [T2]Deliver of DD (Design Document)
- [T3]Deliver of ITPD (Integration Test Plan Document)
- [T4]Deliver of Project Plan Document
- [T5]Prepare of a brief presentation (20 min) about the previous document to show to our customer
- [T6]Implementation of the software and preparation of unit tests
- [T7]Perform the integration tests (specified in ITPD) on the system

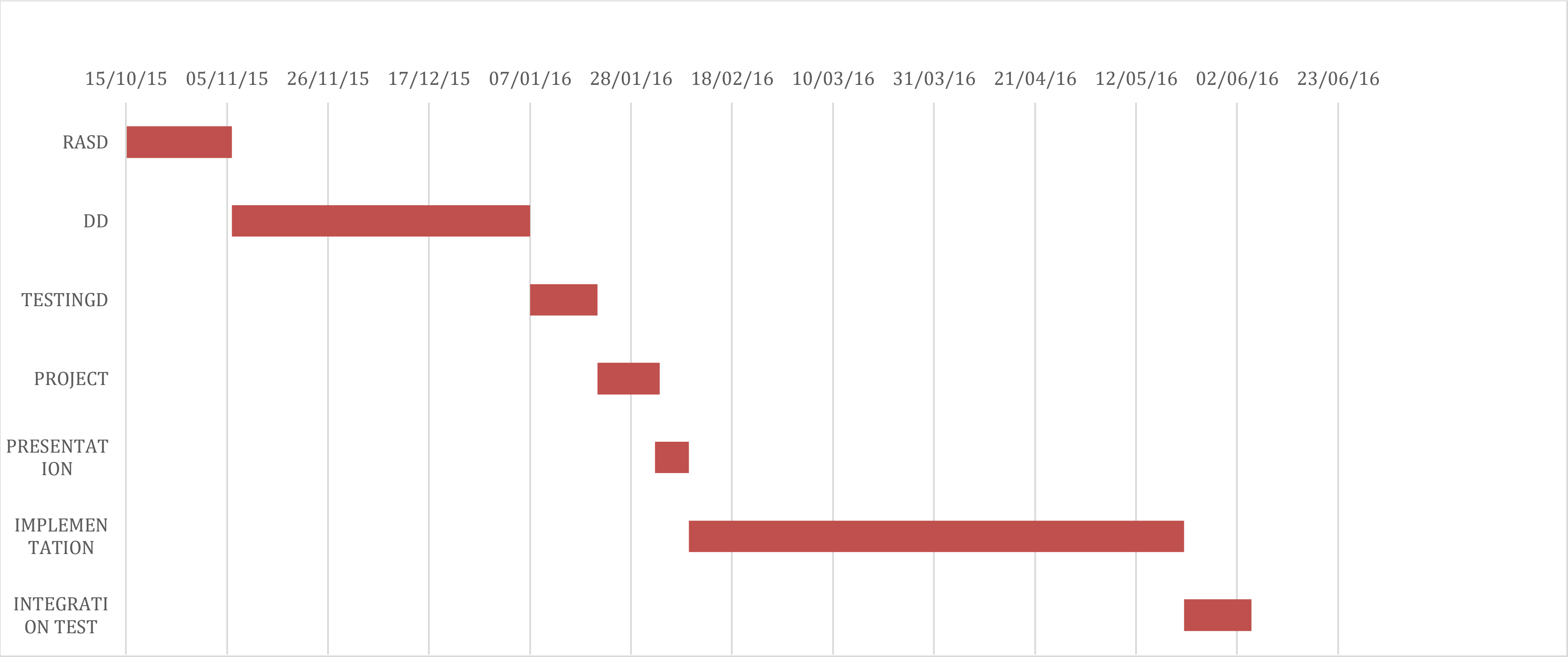
The schedule of the project is based on the COCOMO estimation performed in the 3.5 paragraph CASE A of this document which fix the duration to 8 months.

The deadlines are fixed for the first five tasks accordingly to the project rule.

One important modification of the project rules is the duration of the DD preparation raised to 7 weeks due to the fact that the code inspection is not performed. We choose to give more time to DD preparation due to the criticality of this task which is the first responsible of delays and cost raise.

Here the schedule of the project followed by the Gantt diagram:

TASK	Start	End	Duration	Dependencies
T1	15-10-2015	06-11-2015	3 weeks	
T2	06-11-2015	7-01-2015	7 weeks	T1
T3	7-01-2016	21-01-2016	3 weeks	T2
T4	21-01-2016	02-02-2016	2 weeks	T3
T5	02-02-2016	09-02-2016	1 week	T4
T6	09-02-2016	22-05-2016	10 weeks	T5
T7	22-05-2016	06-06-2016	2 weeks	T6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05/11/15
26/11/15
17/12/15
07/01/16
28/01/16
18/02/16
10/03/16
31/03/16
21/04/16
12/05/16
02/06/16
23/06/16
RASD
DD
TESTINGD
PROJECT
PRESENTAT ION
IMPLEMEN TATION
INTEGRATI ON TEST

5. Resources

In this chapter its shown how the resources are allocated to the project.
Each task are divided in macroareas in an high level way of

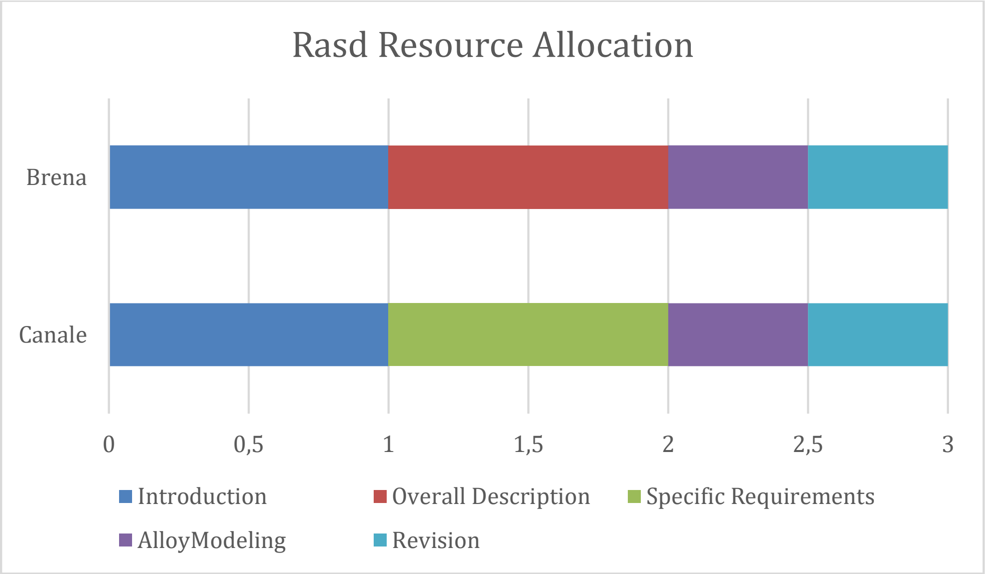
abstraction ,for the first four task they represent the chapter of the related document.

Regarding the implementation the task is divided in the tiers which compose the project: Database Tier , Mobile Tier , Web Tier ,Business Tier.
The resources are allocated in a way to optimize the time and quality of the software:
-In the first Month each member implement the tier in which they are more skilled (Web Tier for Canale,Mobile Tier for Brena)
-In the second one each member focus on test and implementing of new tiers (Canale DB Tier, Brena Business Tier)
-In the third one as soon as the DB tier is finished , Canale join Brena in the implementation of Business Tier
-In the fourth one each member performs tests on the completed Tiers

The divisions of works between members are listed and shown in the following tables:

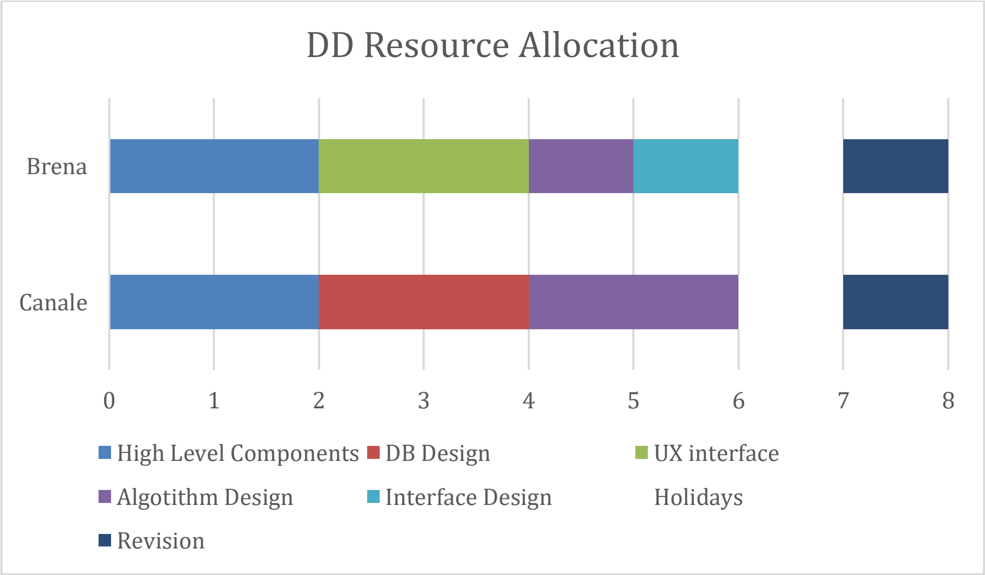
5.1RASD

Member	Week 1	Week 2	Week 3
Canale	Introduction	Spec.req	AlloyModeling& Revision
Brena	Introduction	Overall Descr. &Spec.Req.	Revision



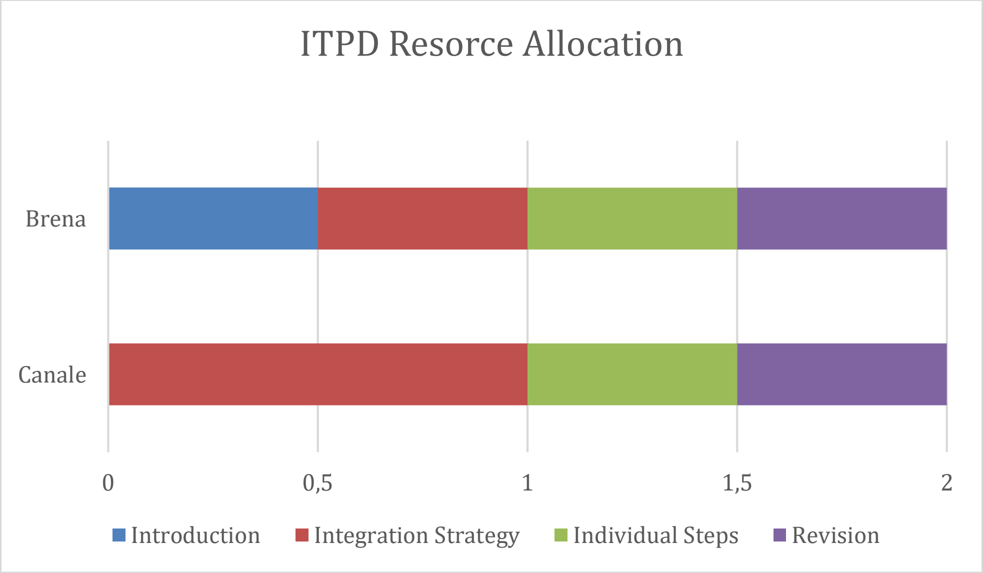
5.2Design Document

Member	Weeks 1-2	Week 3-4	Week 5-6	Week 8
Canale	HighLevelComp	DB Design	Algorithm Des.	Revision
Brena	HighLevelComp	UX Interface	Interface& Algorithm Des.	Revision



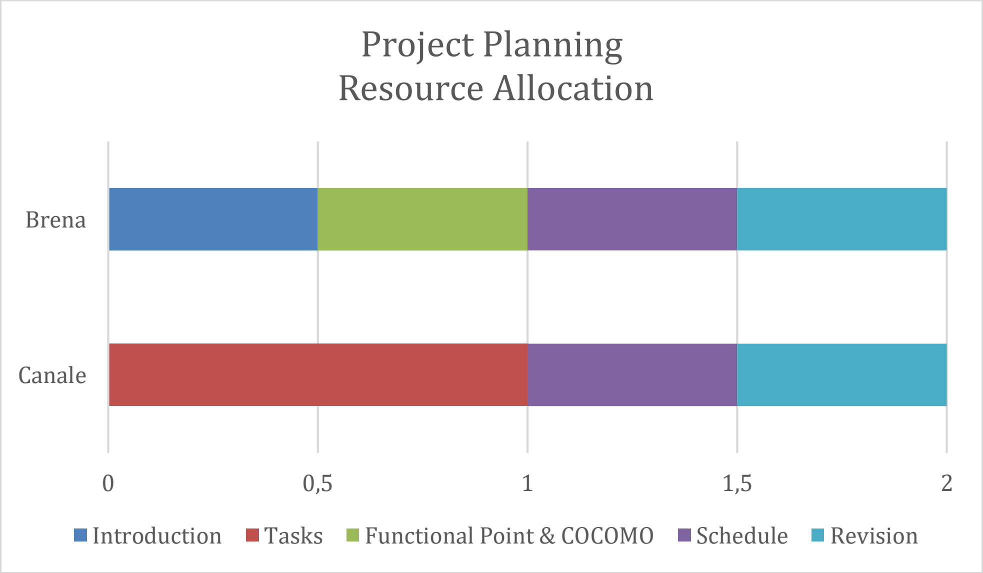
5.2ITPD Document

Member	Weeks 1	Week 2
Canale	Integration Strategy	Individual Steps
Brena	Introduction & Integration Strategy	Revision



5.3 Project Planning

Member	Weeks 1	Week 2
Canale	Task	Schedule & Revision
Brena	Introduction & FP &Cocomo	Schedule & Revision

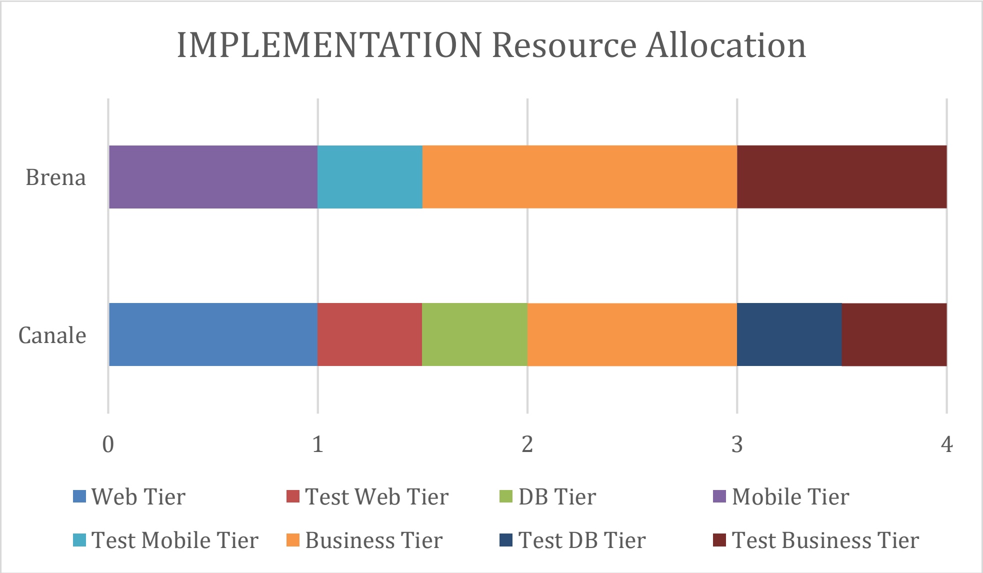


5.4 Presentation

The presentation task doesn't need a graphical representation of work because the members work together on the preparation of the slides.

5.5 Implementation

Member	Month 1	Month 2	Month 3	Month 4
Canale	WebTier	Test WT & DB Tier	Business Tier	Test DB Tier+ Test Business Tier
Brena	MobileTier	Test MT & BusinessTier	BusinessTier	Test BusinessTier



5.6 Integration Tests

Member	Week 1	Week 2	Week 3	Week 4
Canale	CoreSB	BT components +DBT	BT+DBT+CoreSB +MobileClient	BT+DBT+ WebClient+ MobileClient
Brena	BT components	BT components +CoreSB	BT+DBT+CoreSB +WebClient	BT+DBT+ WebClient+ MobileClient

6. Risk estimation

6.1. Risk Analysis

Known Risks:
Basing our analysis on MyTaxiService RASD and Design Document developing team can be quite safe about **Product Size Risks** if human resources has been choosen accordingly to the size and effort analysis (chapter 2 and 3).
Also **Experience Risks** have to be taken into account while composing the project team.

Risks connected to **Business Impact** have been restricted by a deep analysis of requirements made by project team and stakeholders. This does not ensure absence of business risks, in particular we think that the due to poor innovativeness of the system (many Taxi Booking platforms are already in the market) could constitute a risk in collecting customers. At same time, less newness reduces **Technological Risks** and provides developing examples and guidelines to build a robust product.