Software Engineering 2: "PowerEnJoy"
Project Plan (V. 1.0)

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22/01/2017

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1. Introduction

1.1 Revision History

Version	Date	Authors	Description
1.0	22/01/2017	S. Caprara, S. Ghanbari, E. Tinti	First release

1.2 Purpose and Scope

This document contains the estimation of the size, cost, and effort in the development of the PowerEnJoy system. This includes the documentation provided in the previous phases.

The following chapters also contain a provisional schedule for the organization of the tasks between the components of the team, in order to take the project to its end and release in the estimated time.

For the estimation, the Function Points approach and the COCOMO II method are applied.

1.3 Definitions and Abbreviations

- **DB:** database, the collection of system data.
- **FP:** Function Point
- **UFP:** Unadjusted Function Point
- **LOC:** Lines of code
- **KSLOC:** Kilo Source Line of code
- **EM**: effort multipliers
- **SF**: scale factors
- **VPN**: Virtual Private Network

1.4 Reference Documents

The documents used as a reference to provide the design document are:

- Assignments AA 2016-2017.pdf
- Project planning example document.pdf
- RASD_PowerEnjoy_Caprara_Ghanbari_Tinti
- DesignDocument_PowerEnjoy_Caprara_Ghanbari_Tinti
- TestPlan_PowerEnjoy_Caprara_Ghanbari_Tinti_v1.0.pdf
- COCOMO II – Model Definition Manual

2. Project size, cost, and effort estimation

This section of the document contains information on the estimation of the time necessary to take the project to its final release.

2.1 Size estimation: function points

The size of the project we are working on, will be estimated using the Function Point Analysis approach. This technique is based on counting the number of functionalities in a software project, assigning a weight to each functionality according to its Function type.

From the result of this calculation, called Unadjusted Function Point (UFP), we will derive the number of lines of code (LOC) that will give us an idea of the size of the project.

Function types are the following:

- External Input, all operation that takes data in from the external environment
- External Output, all operation that sends data out
- External Inquiry, all operation involving both input and output
- Internal Logic Files, data used and managed by our application
- External Interface Files, data used by our system but generated by other applications

The tables used for the estimation are provided below.

File Type Referenced	**Data elements**		
	1-4	**5-15**	**> 15**
0-1	Low	Low	Avg
2	Low	Avg	High
3 or more	Avg	High	High

Table 1: External Input

File Type Referenced	Data elements		
	1-5	6-19	> 19
0-1	Low	Low	Avg
2-3	Low	Avg	High
4 or more	Avg	High	High

Table 2: External Output and External Inquiries

Record Element Type	Data Elements		
	1-19	20-50	> 50
1	Low	Low	Avg
2-5	Low	Avg	High
6 or more	Avg	High	High

Table 3: Internal Logic Files and External Interface Files

Type of Component	Complexity of Components		
	Low	Average	High
External Inputs	3	4	6
External Outputs	4	5	7
External Inquiries	3	4	6
Internal Logic Files	7	10	15
External Interface Files	5	7	10

Table 4: Unadjusted Function Points

2.1.1 External Inputs

The **Login and Logout** (for both users and operators) are low complexity functions, because they involve just one file containing the information, so they get 3 FPs each.

User functions

User Registration is a function that can be classified as having an average complexity, because it deals with different data and because more than one file is referenced. This leads to 4 FPs.

The **Profile Update** function involves many fields that need to be updated on the DB, so it has a medium complexity.

The **Payment Method Update** operation requires the system to check if the new credit card is valid and it interacts with the DB for saving data. For this reasons the operation has a medium complexity, corresponding to 4 FPs.

The **Cancel Reservation** operation has a low complexity because it references two type of files but has few data. So, it has 3 FPs.

The **End of Renting** operation is a simple operation that involves a few fields, then we assign it a weight of 3.

Operator functions

The **Maintenance Request** is a simple operation, involving only one component. For this reason, it has low complexity and gets 3 FPs.

The **End of Maintenance** operation involves few components and has a low complexity, leading to 3 FPs.

EI	Complexity	FPs
Login	Low	3x2
Logout	Low	3x2
User Registration	Average	4
Profile Update	Average	4
Payment Method Update	Average	4
Cancel Reservation	Low	3
End of Renting	Low	3
Maintenance Request	Low	3

End of Maintenance	Low	3
Total		**36**

2.1.2 External Outputs

The operation for **Registration Confirmation** has a low complexity, that corresponds to 4 FPs.

The **Fished Rent Feedback** operation involves many components and requires several calculations. Then we consider it as a medium complexity operation and we assign it a weight of 7.

The **Money Charge Notification** operation involves many components, interacts with the db and performs several calculations. Therefore, we consider it as a complex operation and we assign it a weight of 7.

EO	Complexity	FPs
Registration Confirmation	Low	4
Finished Rent Feedback	High	7
Total Amount Notification	High	7
Total		**18**

2.1.3 External Inquiries

User functions

Car Lookup operation involves more than one component and contains many data, so its complexity is medium, corresponding to 4 FPs.

The **Car Information** is a simple operation to retrieve car details. It references just one component and contains few data. Because of this, the complexity is low and corresponds to 3 FPs.

The **Reserve Car** operation has a low complexity, so it gets 3 FPs.

Car Unlock operation has a medium complexity because it involves different components and requires many interactions. It corresponds to 4 FPs.

View Parking Areas and **View Special Parking Areas** are simple operations, involving only one component each. Their complexity is low, corresponding to 3 FPs each.

The **View Profile Info** functionality is a simple operation. It involves many fields but only some query is needed. We assigned a weight of 3.

Operator functions

The **View Car Maintenance List** is a simple operation and it involves only one simple object. For this reason, we assign a low complexity weight of 3.

The **View Car Details** operation involves many fields because it has to retrieve all the technical information about the car. Then, it has a medium complexity weight of 4.

EQ	Complexity	FPs
Car Lookup	Average	4
Car Information	Low	3
Reserve Car	Low	3
Car Unlock	Average	4
View Parking Areas	Low	3
View Special Parking Areas	Low	3
View Profile Info	Low	3
View Car Maintenance List	Low	3
View Car Details	Average	4
Total		**30**

2.1.4 Internal Logic Files

Car Info element is composed of many fields, organised in 2 data type groups, and is included in many transactions. We apply a medium weight of 10.

User element has many fields, organised in 3 or more data type groups, so we assign an average complexity weight of 10.

Parking Area is a simple element with few fields and interactions. Thus, it has a complexity weight of 7.

Special Parking Area is a simple element with only few fields and interactions, so we apply a weight of 7, even if its fields belong to 2 groups.

Operator is a simple element with few fields and simple interactions with cars. We apply a weight of 7.

ILF	Complexity	FPs
Car Info	Average	10
User	Average	10
Parking Area	Low	7
Special Parking Area	Low	7
Operator	Low	7
Total		**41**

2.1.5 External Interface Files

Our system interacts with external components for retrieving some information. We can identify them as:

- driving licence validating system: data that came from this system is used to enable a user;
- geolocation and mapping service: this service is largely used to view maps, view elements on maps and get user position;
- payment system: the response of this system is considered to validate the payment;

- physical car internal system: cars internal systems are queried for getting position and technical details on cars.

EIF	Complexity	FPs
Driving Licence	Low	5
Geolocation and Mapping	Average	7
Payment	Average	7
Physical Car	High	10
Total		**29**

2.1.6 Overall estimation

The results of the complexity estimation are provided in the following table.

Type of Component	FPs
External Inputs	36
External Outputs	18
External Inquiries	30
Internal Logic Files	41
External Interface Files	29
Total	**154**

Using this result, we can estimate the amount of total code lines in our applications.

2.2 Cost and effort estimation: COCOMO II

The cost and effort estimation is made using the COCOMO II method.

2.2.1 Scale Drivers

We provide here the table containing figures used in the evaluation. It is based on the following scale drivers:

- Precedentedness (PREC): the value depends on the experience the team has on projects similar to the current one.
- Development flexibility (FLEX): represents the possibility to make changes to the project based on the strictness of the external requirements.
- Risk resolution (RESL): consists in the capacity to solve problems and is strictly related to the risk analysis provided in this document.
- Team cohesion (TEAM): its value represents the capacity of the team members to work together and cooperate
- Process maturity (PMAT): states the level of maturity reached in the process.

Scale Factors	Very Low	Low	Nominal	High	Very High	Extra High
PREC	thoroughly unprecedented	largely unprecedented	somewhat unprecedented	generally familiar	largely familiar	thoroughly familiar
SF_j	6.20	4.96	3.72	2.48	1.24	0.00
FLEX	rigorous	occasional relaxation	some relaxation	general conformity	some conformity	general goals
SF_j	5.07	4.05	3.04	2.03	1.01	0.00
RESL	little (20%)	some (40%)	often (60%)	generally (75%)	mostly (90%)	full (100%)
SF_j	7.07	5.65	4.24	2.83	1.41	0.00
TEAM	very difficult interactions	some difficult interactions	basically cooperative interactions	largely cooperative	highly cooperative	seamless interactions
SF_j	5.48	4.38	3.29	2.19	1.10	0.00
PMAT	Level 1 Lower	Level 1 Upper	Level 2	Level 3	Level 4	Level 5
SF_j	7.80	6.24	4.68	3.12	1.56	0.00

For our project, we will consider a low **PREC** factor (4.96) because we don't have the experience on a similar project, except for some technical skills on technologies.

Since the project will be developed from scratch and is limited only by the use of some external API, we consider a Very high factor for **FLEX** (1.01).

We will assign **RESL** a Nominal (4.24) factor, because of the presence of a detailed evaluation risks analysis.

To **TEAM** factor we assign a level of Very High (1.10) because stakeholders are collaborative and the developers know each other well.

The **PMAT** scale driver has a nominal rating (4.68), due to the current status of the development.

2.2.2 Cost Drivers

Required Software Reliability

This parameter measures the effect produced by possible software failures.

In our case, we consider a nominal rating, because failures that may take place could produce a breakdown and it can be solved by refunding the client.

RELY Cost Drivers						
RELY Descriptors	slightly inconvenience losses	easily recoverable losses	Moderate, recoverable	high financial loss	risk to human life	
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	0.82	0.92	1.00	1.10	1.26	n/a

Data Base Size

Data driver measures the relation between the Database size and the estimated SLOC. The Database size is helpful to determine the effort necessary to produce test data for testing the software.

In our case, the database size is in the order of few gigabytes, so the result falls in the data descriptor corresponding to the high rating.

DATA Cost Drivers						
DATA Descriptors		D/P < 10	10 <= D/P <= 100	100 <= D/P <= 1000	D/P > 1000	
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	n/a	0.90	1.00	1.14	1.28	n/a

Product Complexity

This measure considers the complexity of the different type of operations performed by the system (control, computational, device-dependent, data management, and UI management operations).

In our system, the complexity is nominal.

CPLX Cost Drivers						
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	0.73	0.87	1.00	1.17	1.34	1.74

Developed for Reusability

This parameter states the effort needed to produce code to be reused in the current or future projects.

In our case this is nominal, because the code is used only in the current project and its future evolutions.

RUSE Cost Drivers						
RUSE Descriptors		None	Across project	Across program	Across product line	Across multiple product lines
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	n/a	0.95	1.00	1.07	1.15	1.24

Documentation Match to Life-Cycle Needs

This cost driver measures the level of detail of the documentation with respect to the life-cycle needs of the project.

The documentation we provide is strictly related to system needs and satisfies them without exceeding, so the complexity is nominal.

DOCU Cost Drivers						
DOCU Descriptors	Many life-cycle needs uncovered	Some life-cycle needs uncovered	Right-sized to life-cycle needs	Excessive for life-cycle needs	Very excessive for life-cycle needs	
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	0.81	0.91	1.00	1.11	1.23	n/a

Execution Time Constraint

This rating represents the percentage of available execution time that the system is expected to use on the resource. In other terms, it is the memory usage.

Our software has some background operations, other than standard operations, so memory usage will be high.

TIME Cost Drivers						
TIME Descriptors			<= 50% use of available execution time	70% use of available execution time	85% use of available execution time	95% use of available execution time
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	n/a	n/a	1.00	1.11	1.29	1.63

Main Storage Constraint

This parameter is related to the amount of storage required for the software system with respect to hardware availability.

Our system can be easily stored in actual hardware, because it doesn't exceed their capacity.

STOR Cost Drivers						
STOR Descriptors			<= 50% use of available storage	70% use of available storage	85% use of available storage	95% use of available storage
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	n/a	n/a	1.00	1.05	1.17	1.46

Platform Volatility

This cost driver refers to the regularity of platform changes, intended as hardware and software updates.

For our system, the rating is low, as changes would not be frequent, once the development will be finished and the product tested.

PVOL Cost Drivers						
PVOL Descriptors		Major change every 12 mo., minor change every 1 mo.	Major: 6mo.; minor: 2wk.	Major: 2mo., minor: 1wk.	Major: 2wk.; minor: 2 days	
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	n/a	0.87	1.00	1.15	1.30	n/a

Analyst Capability

This measure consists in the capability of analysts in providing good Analysis and Design and in their ability to cooperate.

The rating for this parameter is set to low, as the analysis that has been made may lack in some details, due to the poor experience of the analysts in working on project of this entity.

ACAP Cost Drivers						
ACAP Descriptors	15th percentile	35th percentile	55th percentile	75th percentile	90th percentile	
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	1.42	1.19	1.00	0.85	0.71	n/a

Programmer Capability

Like in ACAP, this cost driver represents the ability of programmers in developing the system, cooperating, and working efficiently.

In our case, since programmers are skilled and have few years of experience we assign a High rating.

PCAP Cost Drivers						
PCAP Descriptors	15th percentile	35th percentile	55th percentile	75th percentile	90th percentile	
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	1.34	1.15	1.00	0.88	0.76	n/a

Personnel Continuity

This rating represents the personnel turnover.

It has a very high rating, as we wouldn't have a high turnover percentage in our project.

PCON Cost Drivers						
PCON Descriptors	48% / year	24% / year	12% / year	6% / year	3% / year	
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	1.29	1.12	1.00	0.90	0.81	n/a

Applications Experience

The APEX cost driver states the experience of the team in developing the same type of application required by the current project.

This rating is nominal, as the programmers have few experience on such type of projects.

APEX Cost Drivers						
APEX Descriptors	<= 2 months	6 months	1 year	3 years	6 years	
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	1.22	1.10	1.00	0.88	0.81	n/a

Platform Experience

Same as APEX, experience is measured by this cost driver, but with respect to platform. So, it consists in the experience in working on the same type of platform.

Having worked on other projects based on the same kind of platforms, we can consider for the whole team a high rating of this cost driver.

PLEX Cost Drivers						
PLEX Descriptors	<= 2 months	6 months	1 year	3 years	6 years	
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	1.19	1.09	1.00	0.91	0.85	n/a

Language and Tool Experience

This parameter is related to the experience of the team in using the programming language and software tools required by the current project.

Same as the previous rating, we can consider a high rating for this parameter too.

LTEX Cost Drivers						
LTEX Descriptors	<= 2 months	6 months	1 year	3 years	6 years	
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	1.20	1.09	1.00	0.91	0.84	n/a

Use of Software Tools

This rating refers to the level at which the software tool is used.

Because it is being used in an integrated environment, the rating is set to high.

TOOL Cost Drivers						
TOOL Descriptors	edit, code, debug	simple, frontend, backend CASE, little integration	Basic life-cycle tools, moderately integrated	strong, mature life-cycle tools, moderately integrated	strong, mature, proactive life-cycle tools, well integrated with processes, methods, reuse	
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	1.17	1.09	1.00	0.90	0.78	n/a

Multisite Development

This cost driver is based on the site collocation and on the communication support.

As we live in the same city and use wideband communication, the rating can be set to high.

SITE Cost Drivers						
SITE Descriptors	Internatio-nal	Multi-city and multi-company	Multi-city or multi-company	Same city or metro area	Same building or complex	Fully collocated
SITE Communications Descriptors	Some phone, mail	Individual phone, fax	Narrow band email	Wideband electronic communica-tion	Wideband elect. comm., occasional video conf.	Interactive multimedia
Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	1.22	1.09	1.00	0.93	0.86	0.80

Required Development Schedule

This parameter measures the percentage of schedule stretch-out or acceleration with respect to a nominal schedule for a project requiring a given amount of effort.

In our case, the schedule will consider the necessary time for the development and for resolving issues, if needed.

SCED Cost Drivers						
SCED Descriptors	75% of nominal	85% of nominal	100% of nominal	130% of nominal	160% of nominal	

Rating Level	Very Low	Low	Nominal	High	Very High	Extra High
Effort Multipliers	1.43	1.14	1.00	1.00	1.00	n/a

Cost Driver	Factor	Value
Required Software Reliability (RELY)	Nominal	1.00
Data Base Size (DATA)	High	1.14
Product Complexity (CPLX)	Very High	1.00
Developed for Reusability (RUSE)	Nominal	1.00
Documentation Match to Life-Cycle Needs (DOCU)	Nominal	1.00
Execution Time Constraint (TIME)	High	1.11
Main Storage Constraint (STOR)	Nominal	1.00
Platform Volatility (PVOL)	Low	0.87
Analyst Capability (ACAP)	High	1.19
Programmer Capability (PCAP)	High	0.88
Personnel Continuity (PCON)	Very High	0.81
Applications Experience (APEX)	High	1.00
Platform Experience (PLEX)	High	0.91
Language and Tool Experience (LTEX)	High	0.91
Use of Software Tools (TOOL)	High	0.90
Multisite Development (SITE)	High	0.93
Required Development Schedule (SCED)	Nominal	1.00
Total		**0.6472**

2.2.3 Effort Equation

At this point, we can calculate the effort required for the accomplishment of the project. Using the following equations, we will calculate the effort in Person-Month (PM).

$$PM = A \cdot Size^{E} \cdot \prod_{i=1}^{n} EM_i$$

where A is a constant defined in COCOMO II, Size is the size of the project estimated in KSLOC, E is an aggregation of the five scale factors, EM is the effort multiplier.

E is calculated as follow:

$$E = B + 0.01 \cdot \sum_{j=1}^{5} SF_j$$

with B = 0.91, as defined in COCOMO II, and SF stands for scale factors.

First, we calculate E:

$$E = 0.91 + 0.01 \cdot (4.96 + 1.01 + 4.24 + 1.1 + 4.68) =$$
$$= 0.91 + 0.01 \cdot 15.99 = 1.0699$$

Then we compute the size considering respectively lower and upper bounds:

$$Size_{lower} = UFP \cdot 46 = 154 \cdot 46 = 7084\ LOC = 7.084\ KSLOC$$

$$Size_{upper} = UFP \cdot 67 = 154 \cdot 67 = 10318\ LOC = 10.318\ KSLOC$$

The calculation of the product of the effort multipliers follows:

$$\prod_{i=1}^{n} EM_i = 1 \cdot 1.14 \cdot 1 \cdot 1 \cdot 1 \cdot 1.11 \cdot 1 \cdot 0.87 \cdot 1.19 \cdot 0.88 \cdot 0.81 \cdot 1 \cdot 0.91$$
$$\cdot 0.91 \cdot 0.9 \cdot 0.93 \cdot 1 = 0.6472$$

Finally, we get the PM for the lower and upper bound:

$$PM_{lower} = 2.94 \cdot 7.084^{1.0699} \cdot 0.6472 = 15.4571$$
$$PM_{upper} = 2.94 \cdot 10.318^{1.0699} \cdot 0.6472 = 23.1134$$

2.2.4 Schedule estimation

Starting from the result obtained in the previous paragraph, we estimate the duration of the project, based on both the lower and upper bound.

The formulas used are the following:

$$TDEV = C \cdot (PM)^F$$
$$F = D + 0.2 \cdot (E - B)$$

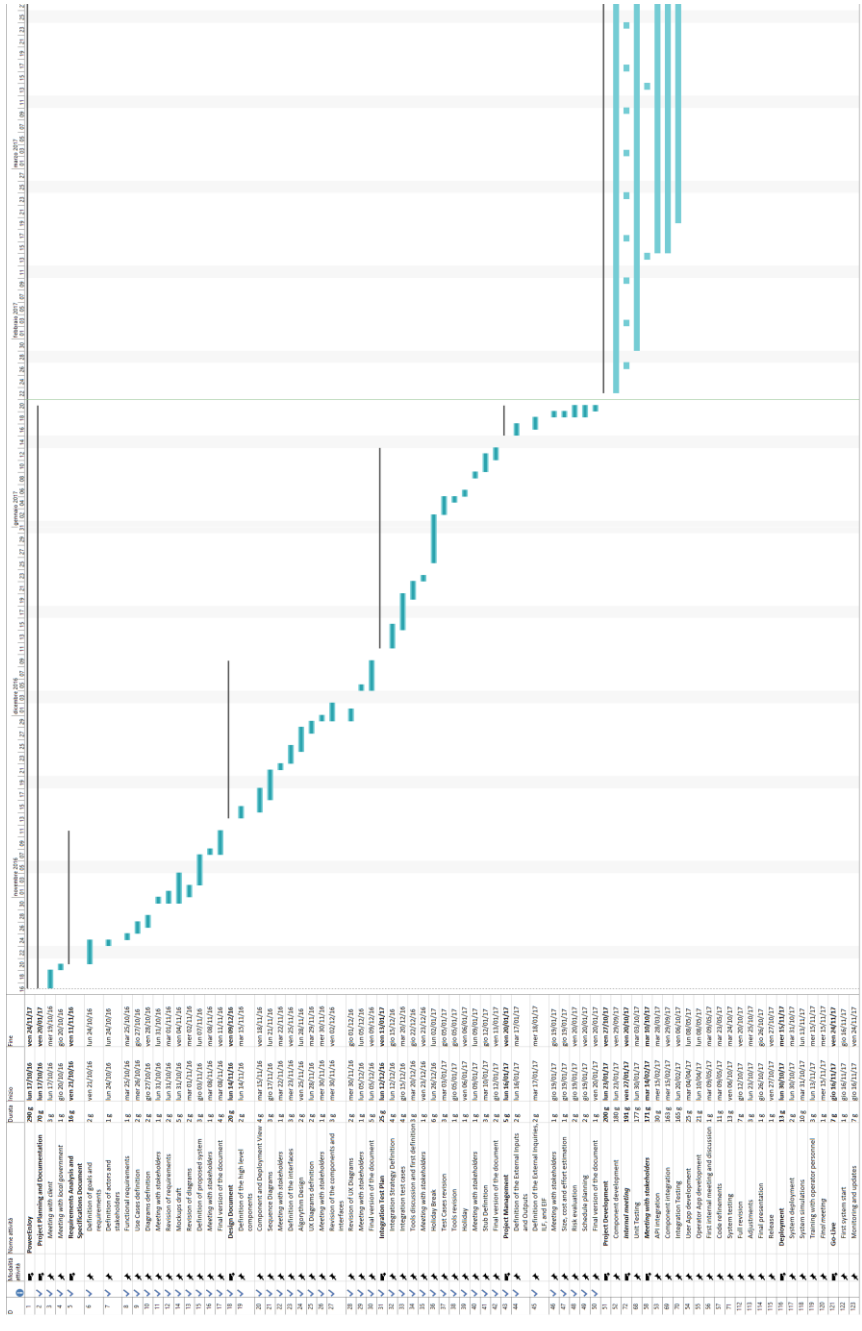
where C = 3.67 (COCOMO II), and D = 0.28 (COCOMO II).

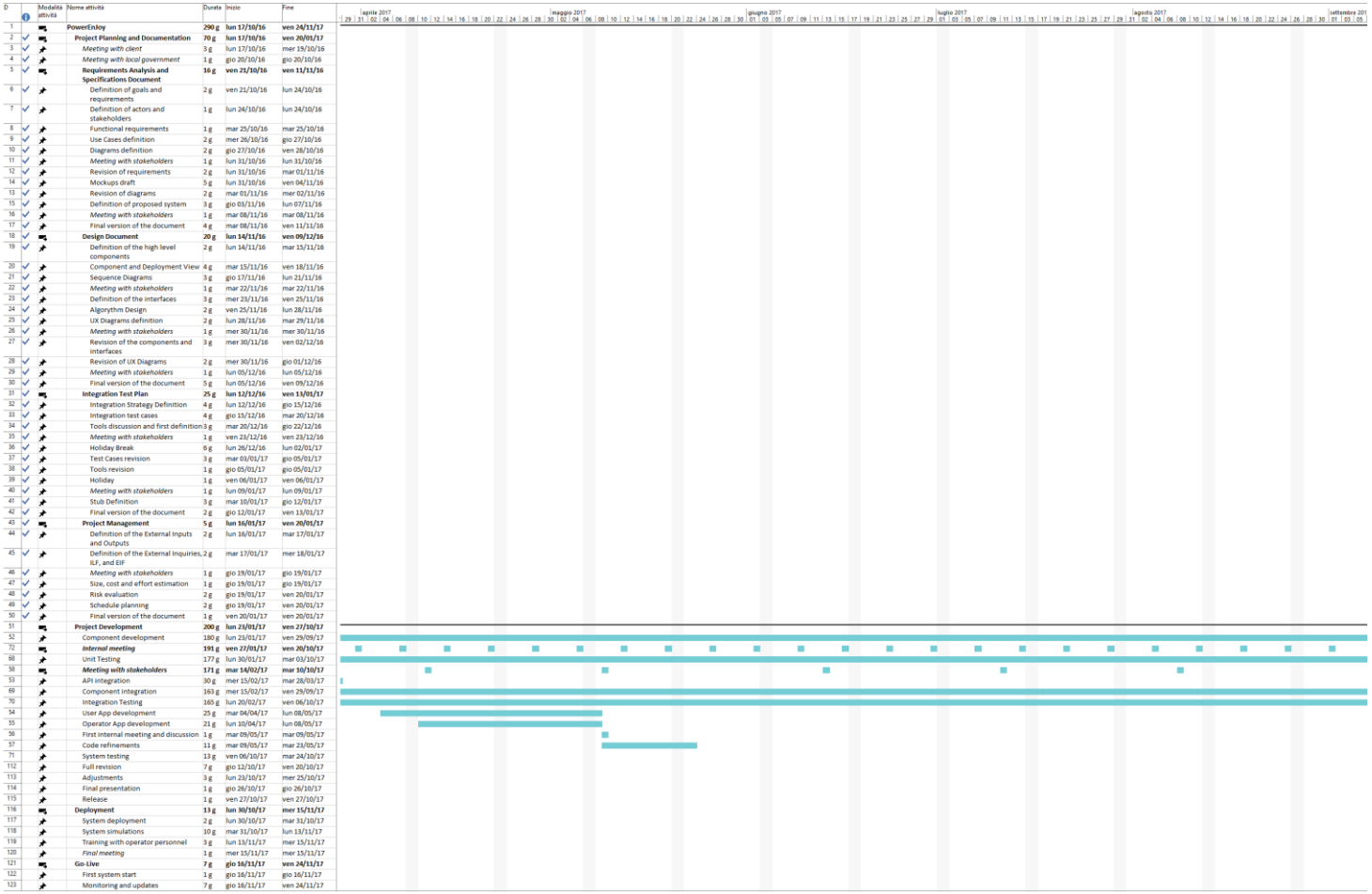
$$F = 0.28 + 0.2 \cdot (1.0699 - 0.91) = 0.31198$$

$$TDEV_{lower} = 3.67 \cdot (15.4571)^{0.31198} = 8.62285\ months$$
$$TDEV_{upper} = 3.67 \cdot (23.1134)^{0.31198} = 9.77606\ months$$

3. Schedule

We provide here the Gantt chart of the schedule, showing the organization of the tasks for the project.





D	Modalità attività	Nome attività	Durata	Inizio	Fine
1		**PowerEnJoy**	**290 g**	**lun 17/10/16**	**ven 24/11/17**
2		**Project Planning and Documentation**	**70 g**	**lun 17/10/16**	**ven 20/01/17**
3		*Meeting with client*	3 g	lun 17/10/16	mer 19/10/16
4		*Meeting with local government*	1 g	gio 20/10/16	gio 20/10/16
5		**Requirements Analysis and Specifications Document**	**16 g**	**ven 21/10/16**	**ven 11/11/16**
6		Definition of goals and requirements	2 g	ven 21/10/16	lun 24/10/16
7		Definition of actors and stakeholders	1 g	lun 24/10/16	lun 24/10/16
8		Functional requirements	1 g	mar 25/10/16	mar 25/10/16
9		Use Cases definition	2 g	mer 26/10/16	gio 27/10/16
10		Diagrams definition	2 g	gio 27/10/16	ven 28/10/16
11		*Meeting with stokeholders*	1 g	lun 31/10/16	lun 31/10/16
12		Revision of requirements	2 g	lun 31/10/16	mar 01/11/16
13		Mockups draft	5 g	lun 31/10/16	ven 04/11/16
14		Revision of diagrams	2 g	mar 01/11/16	mer 02/11/16
15		Definition of proposed system	3 g	gio 03/11/16	lun 07/11/16
16		*Meeting with stokeholders*	1 g	mar 08/11/16	mar 08/11/16
17		Final version of the document	4 g	mar 08/11/16	ven 11/11/16
18		**Design Document**	**20 g**	**lun 14/11/16**	**ven 09/12/16**
19		Definition of the high level components	2 g	lun 14/11/16	mar 15/11/16
20		Component and Deployment View	4 g	mar 15/11/16	ven 18/11/16
21		Sequence Diagrams	3 g	gio 17/11/16	lun 21/11/16
22		*Meeting with stokeholders*	1 g	mar 22/11/16	mar 22/11/16
23		Definition of the interfaces	3 g	mer 23/11/16	ven 25/11/16
24		Algorythm Design	2 g	ven 25/11/16	lun 28/11/16
25		UX Diagrams definition	2 g	lun 28/11/16	mar 29/11/16
26		*Meeting with stokeholders*	1 g	mer 30/11/16	mer 30/11/16
27		Revision of the components and interfaces	3 g	mer 30/11/16	ven 02/12/16
28		Revision of UX Diagrams	2 g	mer 30/11/16	gio 01/12/16
29		*Meeting with stokeholders*	1 g	lun 05/12/16	lun 05/12/16
30		Final version of the document	5 g	lun 05/12/16	ven 09/12/16
31		**Integration Test Plan**	**25 g**	**lun 12/12/16**	**ven 13/01/17**
32		Integration Strategy Definition	4 g	lun 12/12/16	gio 15/12/16
33		Integration test cases	4 g	gio 15/12/16	mar 20/12/16
34		Tools discussion and first definition	3 g	mar 20/12/16	gio 22/12/16
35		*Meeting with stokeholders*	1 g	ven 23/12/16	ven 23/12/16
36		Holiday Break	6 g	lun 26/12/16	lun 02/01/17
37		Test Cases revision	3 g	mar 03/01/17	gio 05/01/17
38		Tools revision	1 g	gio 05/01/17	gio 05/01/17
39		Holiday	1 g	ven 06/01/17	ven 06/01/17
40		*Meeting with stokeholders*	1 g	lun 09/01/17	lun 09/01/17
41		Stub Definition	3 g	mar 10/01/17	gio 12/01/17
42		Final version of the document	2 g	gio 12/01/17	ven 13/01/17
43		**Project Management**	**5 g**	**lun 16/01/17**	**ven 20/01/17**
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113		Adjustments	3 g	lun 23/10/17	mer 25/10/17
114		Final presentation	1 g	gio 26/10/17	gio 26/10/17
115		Release	1 g	ven 27/10/17	ven 27/10/17
116		**Deployment**	**13 g**	**lun 30/10/17**	**mer 15/11/17**
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118		System simulations	10 g	mar 31/10/17	lun 13/11/17
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120		*Final meeting*	1 g	mer 15/11/17	mer 15/11/17
121		**Go-Live**	**7 g**	**gio 16/11/17**	**ven 24/11/17**
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7	✓		Definition of actors and stakeholders	1 g	lun 24/10/16	lun 24/10/16
8	✓		Functional requirements	1 g	mar 25/10/16	mar 25/10/16
9	✓		Use Cases definition	2 g	mer 26/10/16	gio 27/10/16
10	✓		Diagrams definition	2 g	gio 27/10/16	ven 28/10/16
11	✓		*Meeting with stakeholders*	1 g	lun 31/10/16	lun 31/10/16
12	✓		Revision of requirements	2 g	lun 31/10/16	mar 01/11/16
14	✓		Mockups draft	5 g	lun 31/10/16	ven 04/11/16
13	✓		Revision of diagrams	2 g	mar 01/11/16	mer 02/11/16
15	✓		Definition of proposed system	3 g	gio 03/11/16	lun 07/11/16
16	✓		*Meeting with stakeholders*	1 g	mar 08/11/16	mar 08/11/16
17	✓		Final version of the document	4 g	mar 08/11/16	ven 11/11/16
18	✓		**Design Document**	**20 g**	**lun 14/11/16**	**ven 09/12/16**
19	✓		Definition of the high level components	2 g	lun 14/11/16	mar 15/11/16
20	✓		Component and Deployment View	4 g	mar 15/11/16	ven 18/11/16
21	✓		Sequence Diagrams	3 g	gio 17/11/16	lun 21/11/16
22	✓		*Meeting with stakeholders*	1 g	mar 22/11/16	mar 22/11/16
23	✓		Definition of the interfaces	3 g	mer 23/11/16	ven 25/11/16
24	✓		Algorythm Design	2 g	ven 25/11/16	lun 28/11/16
25	✓		UX Diagrams definition	2 g	lun 28/11/16	mar 29/11/16
26	✓		*Meeting with stakeholders*	1 g	mer 30/11/16	mer 30/11/16
27	✓		Revision of the components and interfaces	3 g	mer 30/11/16	ven 02/12/16
28	✓		Revision of UX Diagrams	2 g	mer 30/11/16	gio 01/12/16
29	✓		*Meeting with stakeholders*	1 g	lun 05/12/16	lun 05/12/16
30	✓		Final version of the document	5 g	lun 05/12/16	ven 09/12/16
31	✓		**Integration Test Plan**	**25 g**	**lun 12/12/16**	**ven 13/01/17**
32	✓		Integration Strategy Definition	4 g	lun 12/12/16	gio 15/12/16
33	✓		Integration test cases	4 g	gio 15/12/16	mar 20/12/16
34	✓		Tools discussion and first definition	3 g	mar 20/12/16	gio 22/12/16
35	✓		*Meeting with stakeholders*	1 g	ven 23/12/16	ven 23/12/16
36	✓		Holiday Break	6 g	lun 26/12/16	lun 02/01/17
37	✓		Test Cases revision	3 g	mar 03/01/17	gio 05/01/17
38	✓		Tools revision	1 g	gio 05/01/17	gio 05/01/17
39	✓		Holiday	1 g	ven 06/01/17	ven 06/01/17
40	✓		*Meeting with stakeholders*	1 g	lun 09/01/17	lun 09/01/17
41	✓		Stub Definition	3 g	mar 10/01/17	gio 12/01/17
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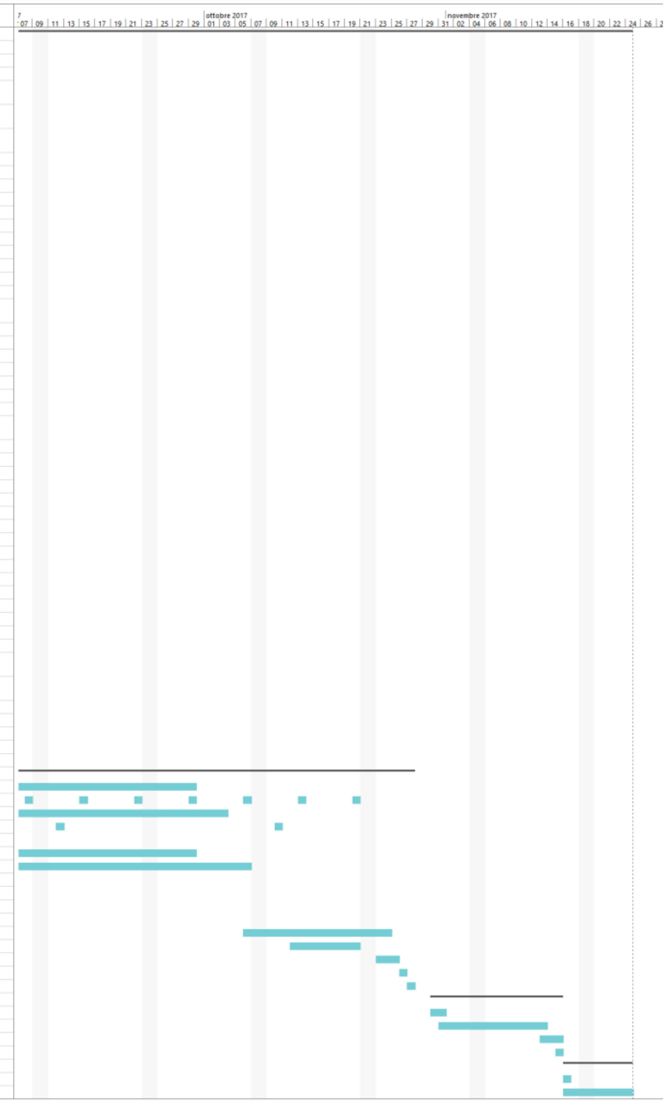

4. Resource allocation

Here is the distribution of the tasks between the team members.

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1	**PowerEnJoy**	**290 g**	**lun 17/10/16**	**ven 24/11/17**	
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5. Risk management

In this section, we reported the studies on risk evaluation and their possible resolutions.

Environment and Equipment Risks

Risk & Consequences	Natural events, such as Earthquake, Snow, Flood, Fire, make the office not practicable for a long time
Probability	Rare
Impact	High
Prevention	None
Correction	Allow programmers to work from home. If necessary, provide internet connection to their home and a VPN connection.

Risk & Consequences	No Internet Connection
Probability	Possible
Impact	High
Prevention	Consider to have a portable Wi-Fi router to provide internet to all the team.
Correction	Use the mobile phone hotspot, an internet key or a portable Wi-Fi router.

Risk & Consequences	No Electricity
Probability	Possible
Impact	High
Prevention	Consider to buy an Uninterruptible Power Supply that allows at least 3 hours of autonomy.

Correction	If this breakdown is known in advance, allow programmers to work from home.

Risk & Consequences	Technical Instrument, such as pc, servers and database, irremediably damaged.
Probability	Unlikely
Impact	Very High
Prevention	Consider to have a replacement equipment, even if less performing. Replacement equipment have to be stored in a different area.
Correction	Use a replacement equipment.

Risk & Consequences	Loss of data in the database
Probability	Possible
Impact	Very High
Prevention	Have a daily backup of the database and database log always on.
Correction	Restore the backup and the database status by the logs.

Personnel Risks

Risk & Consequences	Impossibility to reach the office due to traffic, car crash, car problems, public transports, landslide
Probability	Probable
Impact	Low
Prevention	None
Correction	Wait until the arrival of the employee. If the circumstances allow it and makes it preferable, allow employee to work from home.

Risk & Consequences	An Employee is sick
Probability	Possible
Impact	Medium-High
Prevention	None
Correction	If the prognosis is more than 3 days, consider to reassign the employee's tasks. If the prognosis is longer, about a month, consider to hire another skilled resource.

Risk & Consequences	Absence programmed in advance (marriage, permission, medical examination)
Probability	Possible
Impact	Low
Prevention	None
Correction	Reassign task.

Risk & Consequences	Resignation
Probability	Unlikely
Impact	Medium-High
Prevention	None
Correction	Hire a new skilled employee and start knowledge transfer session.

Project Risks

Risk & Consequences	Requirements changes
Probability	Probable
Impact	High
Prevention	Consider contingency and possible changes.
Correction	Review documentation and re-schedule the plan.

Risk & Consequences	Requirements not understood by the programmer
Probability	Unlikely
Impact	High
Prevention	Plan meetings with analyst
Correction	Plan a meeting with analyst and Rewrite the code

Risk & Consequences	Misunderstanding of the client requirements
Probability	Rare
Impact	Very High
Prevention	Plan ongoing meetings with stakeholders
Correction	Plan a meeting with stakeholders and Rewrite documents

Risk & Consequences	Law change - requirement not compliant
Probability	Rare
Impact	Medium-High
Prevention	None

Correction	Study a solution and Review documentation.

Risk & Consequences	Effort Understimed
Probability	Probable
Impact	High - Very High
Prevention	Add contingency to activity planning
Correction	Consider reassigning/rebalancing tasks, hiring new skilled resources, ask programmers overtime work.

6. Hours of work

To make this document we have spent:

- Sergio Caprara, 18 hours
- Soheil Ghanbari, 1 hours
- Erica Tinti, 18 hours