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Disa-Mis "Business Innovation & Informatics"
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Project Plans (VMT)

Realized by

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PROJECT PLANS
Virtual Museum Tour
(VMT)

INDICE

1. <u>Introduction</u>

The Italian economy is mainly based on tourism. In this regard, we have tried to enhance the most successful point, namely the artistic and cultural heritage, giving more attention to museums as a means of attracting tourists to discover our history, culture and tradition.

Day after day, the audience of cultural visitors has increased dramatically, attracting the attention of many companies in integrating computer technology with culture.

Our company, therefore, has thought to invest in this area by proposing a new product to the service of the museums to emphasize its works through augmented reality.

Augmented reality is taking away more and more foot, with the aim of enriching the experience of the user of an exhibition or of turning the streets into open-air museums.

When a visitor enters a museum, the AR can become the means to show the work in its context, provide important details to the user and allow the visualization of related works of art, creating real emotional paths.

The museum becomes, therefore, a real toy in scale 1:1 and the objects are no longer considered "relics" but assume a well-defined form thanks to their contextualization.

The target audience includes all age groups, involving both adults and children. And it is precisely in this area that augmented reality is proposed as a great help for the educational mission of the museums.

1.1.Objectives

To integrate computer technology with the culture was designed to develop an application compatible with Android devices that will allow you to visit a museum and its works of art directly in augmented reality.

A main feature is the complete management of the application through a dedicated centralized software, proposed by us, that will manage the contents, both multimedia and not. In this way, the enabled museums will have full coordination on their files.

In this regard, by downloading the application for free, the tourist can locate, through the map, the various Italian museums adherent.

Thanks to augmented reality it will be possible to group in a single application communication, marketing, technology, tourism, economy and art.

1.2.Assumptions and Constraints

The project manager, to complete the AR app "Virtual Museum Tour" has an adequate number of human resources with excellent experience.

The AR app must be accessible efficiently by both mobile devices and tablets.

The budget for resources is euro 20,000 and has been provided by a European tourism Fund.

The European fund provides for the only time constraint to complete the project by February 2018.

Temporal constraints are mandatory and involve a risk to the quality and success of the project.

The budget for hardware and software has been sponsored by the stakeholders and is Euro 5000.

2. <u>**Project Organization**</u>

2.1.Process model

For this project we decided to use the model V&V.
The V-model is a software process; In particular it is an extension of the Cascade model.
The model instead of descending along a straight line, after the programming phase goes back with a typical V-shape.
The model demonstrates the relationship between each phase of the software development lifecycle and its testing phase.
The V-model achieves a well-structured method, in which each phase is implemented by the detailed documentation of the previous phase.
The testing activities, such as the design phase testing, are carried out before switching to the coding phase and this saves a large project time.
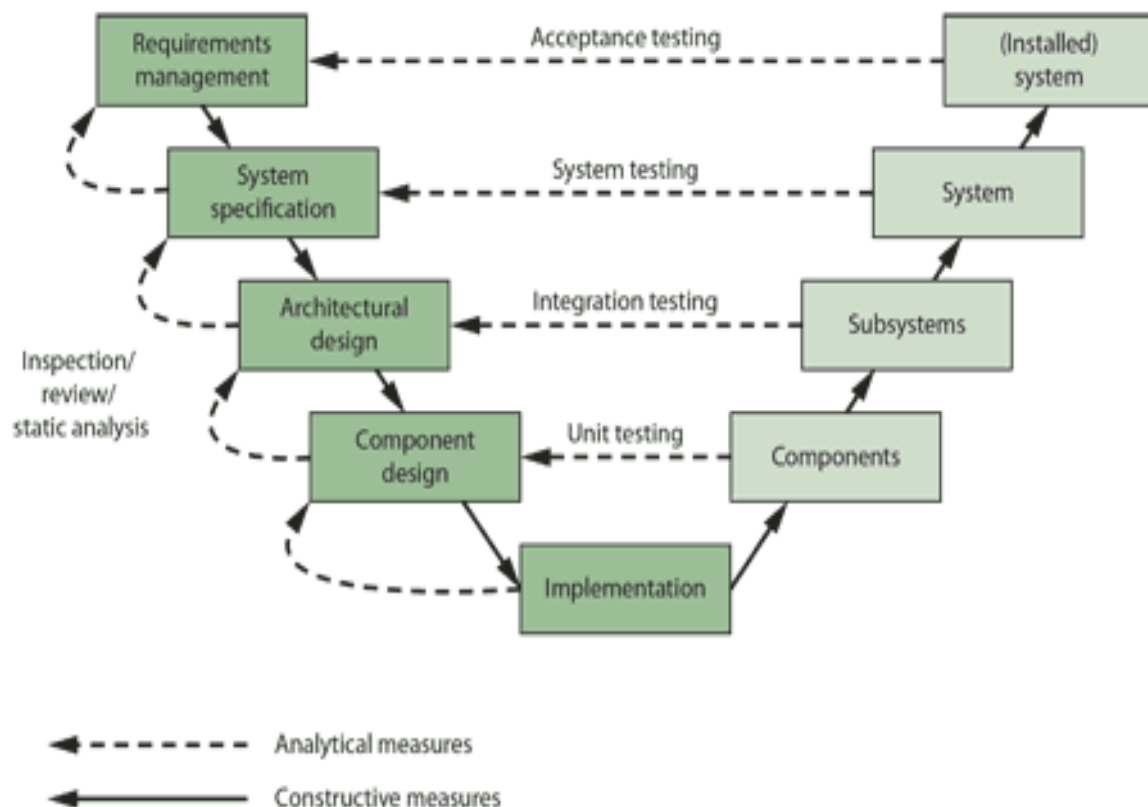
2.2. Organizational structure

The project organization is based on a centralized controlled model.

There is, then, the figure of the project manager that represents the main figure to coordinate the work of the team and supervise the progress of the project.

In addition, there is the figure of the team leader, who represents the responsible, for a given phase, within the team members. The hierarchical structure is not rigid, and the team leader will change often, so as to make all members participate in the same way.

This model has been chosen in order to increase the degree of responsibility perceived by each team member during the various phases. The choice of team leader is made by PM based on the skills and interests of team members.

Also, given the number of members, there may be stages in which the leader team is not unique.

Within the team, there is also the figure of quality assurance that has the task of revising and doing a quality control of the various activities of each phase that will then be managed and assembled by the project manager, producing the reference document.

Finally, the project manager will carry out a further quality control and supervision near the expiration of each document before submitting it to the stakeholders.

The following is the project organization chart:

```
                        ┌──────────────┐
                        │   Project    │
                        │   Manager    │
                        └──────┬───────┘
    ┌──────┬──────┬──────┬─────┼──────┬──────┬──────┐
    ▼      ▼      ▼      ▼     ▼      ▼      ▼
```

Analyst Manager	System Designer	Object Designer	Graphic Designer	Developer	Tester	Quality Assurance
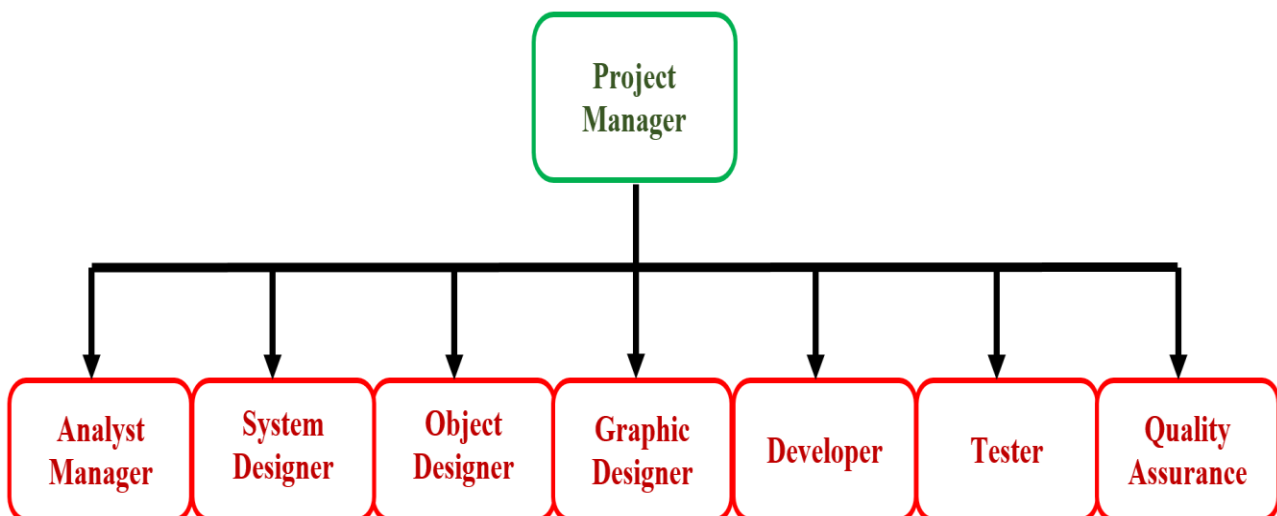
2.3.Role and project resource

Detailed description of the roles for the realization of the project:

Project manager
Project manager; It coordinates and plans its development in order to meet time, demands and costs.

Analyst
Team member gathering and analyzing requirements to be able to understand and accurately define customer requests.

System Designer
Team member of the system architecture and its decomposition in subsystems;
It takes care of the system design phase.

Object Designer
Team member that takes care of the object design phase.

Graphic Designer
Team member that deals with the development of the graphical interfaces of the system.

Developer
Team member who is responsible for the development of the system.

Tester
Team member that verifies the operation of the product software to detect and communicate to programmers any errors.

Quality Assurance
Team member to control the quality of the project in order to prevent errors or defects and to avoid problems with customers.

Resource	Role
Michele Palumbo	**(PM) Project manager**
Angelo Conte	**Quality Assurance, Analyst**
Pietro Cupo	**Analyst, Tester**
Simone Sannella	**System Designer, Object Designer, Developer**
Giacomo Parisi	**Database Manager, Object Designer, Developer**
Domenico Turco	**System Designer, Object Dedigner, Developer**
Marco Benevenga	**Graphic Designer, Developer**
Davide Massa	**Developer**
Pasquale Troisi	**Tester**

2.4. Communication interfaces

A very important aspect to manage and lead during the entire project development process is the communication within the team and communication with the customer and the various stakeholders. The project manager will have the leading role in ensuring effective communication during the project. Furthermore, the PM also has the task of communicating with the various stakeholders involved in the realization of the project. This communication is done in a direct and/or indirect way, via internet communication (skype, email, etc.), calls (telephone, mobile phone) and meeting.

The project manager every 15 days will hold a meeting to check the progress of the project that includes discussions on design issues, implementation and ideas to improve project development and any problems related to team members.

Tools used for communication

Tool	Description
Google Drive	Document sharing for your team.
Google Hangout	Tool that allows synchronous audio/video communication between two or more people.
Telegram	For instant communications
E-mail	Tool that allows asynchronous communication, where each user can send and receive messages, also useful to send and receive attachments regarding the documentation.
Meeting	A tool used to schedule meetings to indicate an event. These meetings include: lectures, seminars, conferences, congresses useful for the development of the project.
Skype	Tool that allows synchronous audio/video communication between two or more people.

Contact team members for communication:

Name	Title	E-mail	Office	Phone	Skype
Michele Palumbo	**Project manager**	michele.p@gmail.com	**0980-555671**	**331-3456823**	**Michele.p**
Angelo Conte	**Quality Assurance, Analyst**	angelo.c@gmail.com	**0980-555672**	**333-8952867**	**Angelo.c**
Pietro Cupo	**Analyst, Tester**	pietro.c@gmail.com	**0980-555673**	**333-2856300**	**Pietro.c**
Giacomo Parisi	**Object D., Database M, Developer**	giacomo.p@gmail.com	**0980-555674**	**328-6754123**	**Giacomo.p**
Simone Sannella	**System D., Object D., Developer**	simone.s@gmail.com	**0980-555675**	**320-5530980**	**Simone.s**
Domenico Turco	**System D., Object D., Developer**	domenico.t@gmail.com	**0980-555676**	**335-6745984**	**Domenico.t**
Marco Benevenga	**Graphic D., Developer,**	marco.b@gmail.com	**0980-555677**	**331-7860921**	**Marco.b**
Davide Massa	**Developer**	davide.m@gmail.com	**0980-555678**	**333-6840890**	**Davide.m**
Pasquale Troisi	**Tester**	pasquale.t@gmail.com	**0980-555679**	**333-7890890**	**Pasquale.t**

3. <u>Risk analysis</u>

3.1. Communication interfaces

Given the very tight times, very accurate risk management is required to ensure a successful project. This section is intended to identify the strategies for risk management and risks that may occur during project development, classified according to the probability and impact on the project's success.

In particular, we will describe the strategies that can be used to limit or avoid a risk occurring or when it is about to occur.

3.2. Risk management approach

The activity of identification, analysis, monitoring and risk management is dependent on the PM, which monitors the team trying to deduce the different issues that can occur. Until the completion of the project will be considered the identified risks and for each of them, depending on the activity of monitoring carried out during the entire period, will identify the current status of the risk. For every risk, as has been anticipated, a strategy is provided to cope with it.

The risks were classified according to two parameters:

- he likelihood that they will occur
- their impact on the good success of the project.

The expected odds are:

- **Low**
- **Medium**
- **High**

The impact is quantified as:

- **Tolerable**
- **Serious**
- **Catastrophic**

Risk Rating Matrix

3.3. Identification and risk analysis

The following tables list the risks. Each column provides the name, i.e. the risk identification, the type of risk, the probability of occurrence and the impact.

N°	Risk	Probability	Impact
1	Abandoning a team component	Medium	Tolerable
2	Unavailability of some team members in certain periods of time	High	Serious
3	Inefficient tools	Low	Tolerable
4	Work product delivered late	Low	Serious
5	Time of the underestimated software development	Low	Serious
6	Inefficient communication between team members	Medium	Serious
7	Passive participation of some team members	Medium	Tolerable
8	Absence by illness of some team members	Medium	Tolerable
9	Low quality of work products	Medium	Serious
10	Bad quality control and monitoring by the quality assurance	Medium	Serious
11	Failure to deliver a document	Low	Serious
12	Failure to complete a task	High	Serious
13	Low consideration of the judgement of the PM	Medium	Tolerable
14	Failure to implement everything that had been planned	Medium	Serious

3.4. Risk planning

The following tables list the risks and strategies for coping with them. Each column provides the name of the risk, i.e. its identification, and the strategy for coping with them.

ID	Strategy
1	Deploying workload on other team members
2	Assigning tasks based on Team component commitments
3	Search for more efficient tools
4	Make the scheduled delivery date to avoid any delays
5	Reduce the functionality to implement
6	Easy-to-use communication tool
7	Assign an important role so as to spur it
8	Redistributing workload on other team components
9	Review the work products before passing them to the PM supervision
10	The PM will assist the quality assurance in the review of the work product products, intervening if necessary
11	Ask the team members to send an unofficial "status report" to PM every two/three days indicating the activity they have done in this period, the hours they consumed, and the percentage of completion on the overall task
12	Perform continuous checks to reallocate resources if you encounter problems in your implementation. Have a reserve of hours in the schedule to use if needed.
13	To show that the criticisms and advice made by the PM are sensible and justified but above all useful for the project. Try to exalt the fact that the common goal of PM and TM is the delivery of a quality project in the times and costs required by the customer.
14	Try to redistribute the load to improve the parallelization of the tasks, or reduce the low-priority functionality to implement or reduce the coverage of the unit test.

4. **Hardware and Software resource requirement**

During the design and development of the project, both hardware and software resources will be needed, some of which already hold the company.

4.1. Hardware resources and costs

The **hardware** resources are:

- **Pc**
  Each member of the group is equipped with a computer so that it can perform the work assigned to it.

- **Router**
  Required to connect to the Internet

- **Android devices** (*smartphone, tablet*)
  Required to test app features

Considering the resources available and the time of delivery of the artifacts we can deduce an estimate of the initial costs related to Hardware Resources for the advancement of the project:

Object	Cost
8 PC	**0 €** (*Already present in the company*)
Routers	**0 €** (*Already present in the company*)
Devices Android: **- 3 Samsung Galaxy 8 edge plus** **- 3 Tablet s**	**2.790,00 €** **2.100,00 €** _____ **4.890,00 €**
Total	**4.890,00 €**

4.2.Software resources and costs

The **software** resources are:

- Software required to create/modify documents (**Office package**)

- UML Graphics Creation software (**StarUML**)

- Software for the realization of the Gantt Chart and charts (**Microsoft Project 2016**)

- DB data management software, required for database creation and management (**MySQL**)

- App code development software (**Android Studio**)

- 3d Image creation software (**Unity 3d**)

Considering the resources available and the time of delivery of the artifacts we can deduce an estimate of the initial costs related to Software Resources for the advancement of the project:

Object	Cost
Package Office	**0 €** (*Already present in the company*)
StarUML	**0 €** (*Already present in the company*)
Microsoft Project 2016	**0 €** (*Already present in the company*)
MySQL	**0 €** (*Already present in the company*)
Android Studio	**0 €** (*Already present in the company*)
Unity 3d	**0 €** (*Already present in the company*)
Total	**0 €**

5. <u>Work Breakdown Structure</u> (WBS)

5.1. Work activities

The tasks will be divided into five macro tasks. The six macro phases are as follows:

1. Phase of <u>Requirement Elicitation and Analysis</u> which includes:

   - Requirement Collections
   - Requirement Analysis

2. Phase of <u>System Design</u>: the system must be designed and decomposed in subsystems.

3. Phase of <u>Object Design</u>: identifies the components that represent the system.

4. Phase of <u>Implementation</u>: where the system is built.

5. Phase of <u>Testing</u>: where the system is tested.

6. Phase of <u>Release</u>: where the user manual, the alpha version and the beta version are released, and finally, the final version

The macros phases are described by the following WBS:
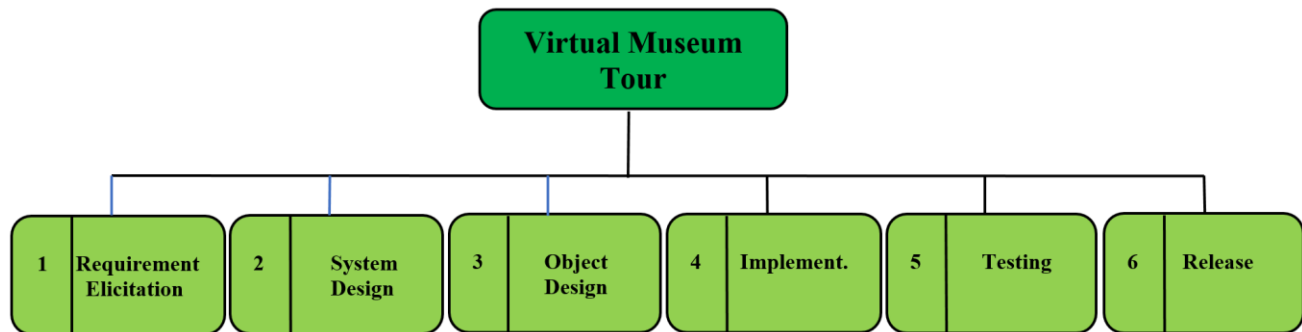
Code WBS	Task	Duration (Days)	Duration (Hours)	Beginning	End
1	Requirement Elicitation	32	160	05/06/2017	18/07/2017
2	System Design	16	80	19/07/2017	09/08/2017
3	Object Design	16	80	10/08/2017	01/09/2017
4	Implementation	46	230	04/09/2017	07/11/2017
5	Testing	16	80	08/11/2017	29/11/2017
6	Release	23	30	30/11/2017	05/01/2018

The following will show you more detailed WBS's to explore the individual macro tasks with the corresponding WBS dictionary.

5.2. WBS Requirement Elicitation and Analysis (Phase 1)

1.1.1	Identification of Actors	
1.1.2	Identification functional and no-functional Requirements	
1.1.3	Identification Relevant scenarios	
1.1.4	Use Case	
1.1.5	Mockup	
1.1.6	Revision	
1.1.7	Assembly RAD draft and supervision	

1.1 Requirements Collection

1 Requirement Elicitation

1.2 Requirements Analysis

1.2.1	Sequence Diagram
1.2.2	Class Diagram
1.2.3	Status Diagram
1.2.4	Revision
1.2.5	Assembly RAD and supervision

Phase	1	Requirements Elicitation and analysis	Responsible: Cupo, Conte			
			Days	**Gross Cost**	**Role**	**Resource**
Sub-Phase	**1.1**	**Requirements Collection**	21	2750,00€	Analyst, Graphic Designer, Quality Assurance, Project Manager	Cupo, Conte, Benevenga, Palumbo
Task Sub-Phase	**1.1.1**	**Identification of Actors**	2	250,00€	Analyst	Cupo
	Description: during this phase the actors will be identified.					
	1.1.2	**Identification functional and no-functional Requirements**	5	625,00€	Analyst	Cupo
	Description: identify both functional and no-functional project requirements and includes various brainstorming activities to identify the real needs of the user.					
	1.1.3	**Identification Relevant scenarios**	4	500,00€	Analyst	Conte
	Description: find scenarios that are placed within tables that identify iterations between user and system.					

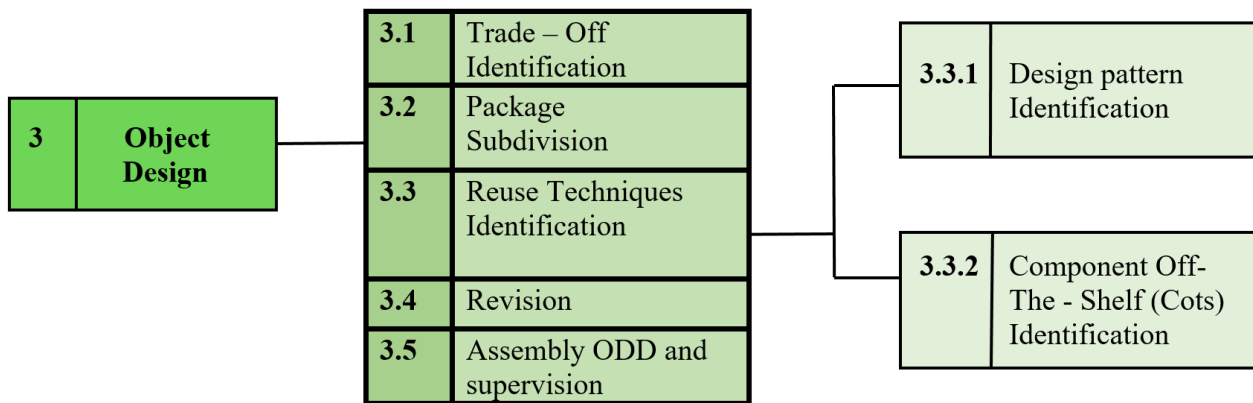|						
	1.1.4	**Use Case**	4	500,00€	Analyst	Conte
Description: identification of use cases and their dependencies.						
	1.1.5	**Mockup**	4	500,00€	Graphic Designer	Benevenga
Description: create mock-up, high-level graphical vision of the project with features.						
	1.1.6	**Revision**	1	125,00€	Quality Assurance	Conte
Description: integration and review of the work products produced by the various team members.						
	1.1.7	**Assembly RAD draft and supervision**	1	250,00€	Project Manager	Palumbo Michele
Description: necessary steps to properly assemble RAD draft through supervision.						
Sub-Phase	**1.2**	**Requirements Analysis**	11	1500,00€	Analyst, Quality Assurance, Project Manager	Cupo, Conte, Palumbo
Task Sub-Phase	**1.2.1**	**Sequence Diagram**	3	375,00€	Analyst	Cupo
Description: create sequence diagrams from the use Cases and objects produced in the previous phases.						
	1.2.2	**Class Diagram**	3	375,00€	Analyst	Cupo
Description: locating objects (entity, boundary, control) from use cases.						
	1.2.3	**Status Diagram**	3	375,00€	Analyst	Conte
Description: creation of state diagrams from the use cases and from the objects produced in the previous phases.						
	1.2.4	**Revision**	1	125,00€	Quality Assurance	Conte
Description: integration and review of the work products produced by the various team members.						
	1.2.5	**Assembly RAD and supervision**	1	250,00€	Project Manager	Palumbo Michele
Description: necessary steps to properly assemble the document (RAD) through supervision.						
1 Phase Total Cost = 4250,00€						

5.3. WBS System Design (Phase 2)

2.1	Design Goals Identification
2.2	Architecture Identification
2.3	Sub – System Identification
2.4	Identification Persistent Data
2.5	Services Identificaton
2.6	Limit Cases Identification
2.7	Revision
2.8	Assembly SDD and supervision
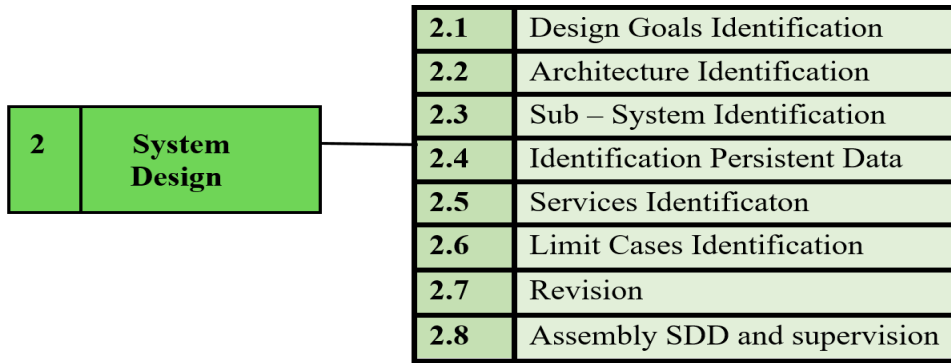
2	System Design

Phase	2	System Design	Responsible: Sannella			
			Days	Gross Cost	Role	Resource
Task	2.1	Design Goals Identification	2	250,00€	System Designer	Sannella
	Description: this phase involves the identification of the design goals that the system will have to support.					
	2.2	Architecture Identification	3	375,00€	System Designer	Cupo
	Description: it is expected to analyse and identify the current architecture of the system.					
	2.3	Sub - System Identification	3	375,00€	System Designer	Turco
	Description: it is expected to identify the proposed architecture of the system and the new sub-systems.					
	2.4	Identification Persistent Data	2	250,00€	System Designer	Sannella
	Description: identification of the data that should be stored in permanent memory.					
	2.5	Services Identificaton	2	250,00€	System Designer	Sannella
	Description: identification of the services offered by the identified sub-systems.					
	2.6	Limit Cases Identification	2	250,00€	Analyst	Cupo
	Description: identify the boundary cases that can occur while using the application.					
	2.7	Revision	1	125,00€	Quality Assurance	Conte
	Description: integration into the SDD of the work products produced by the various team members and the final review of the document.					
	2.8	Assembly SDD e supervision	1	250,00€	Project Manager	Michele Palumbo
	Description: operations necessary to properly assemble the document (SDD) through supervision.					
	2 Phase Total Cost = 2125,00€					

5.4. WBS Object Design (Phase 3)

3	Object Design

3.1	Trade – Off Identification
3.2	Package Subdivision
3.3	Reuse Techniques Identification
3.4	Revision
3.5	Assembly ODD and supervision

3.3.1	Design pattern Identification
3.3.2	Component Off-The - Shelf (Cots) Identification

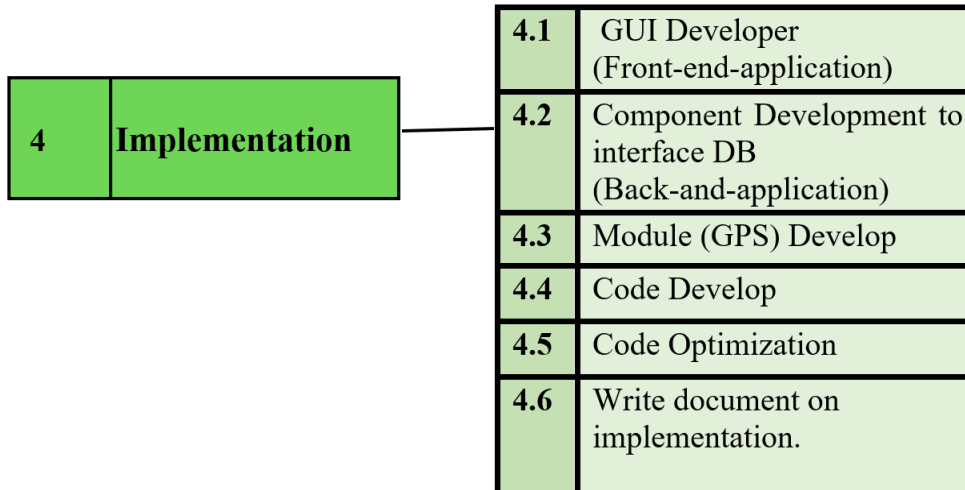| Phase	3	Object Design	Responsible: Parisi			
			Days	**Gross Cost**	**Role**	**Resource**
Task	3.1	Trade – Off Identification	2	250,00€	System Designer	Parisi
	Description: identifying the trade-off of the project					
	3.2	Package Subdivision	4	500,00€	System Designer	Parisi
	Description: find the packages that will contain the classes to implement.					
Sub-Phase	3.3	Reuse Techniques Identification	8	1000,00€	Object Designer, Quality Assurance	Parisi, Sannella,Turco, Conte
	Description: identification of techniques for re-use of components divided into: identification of design patterns and identification of off-the-shelf components (COTS).					
Task Sub-Phase	3.3.1	Design pattern Identification	4	500,00€	System Designer	Sannella
	Description: identify design patterns that will be used during implementation.					
	3.3.2	Component identification Off-The – Shelf(Cots)	4	500,00€	System Designer	Turco
	Description: discovery of the components already available, to be used during implementation					
Task	3.4	Revision	1	125,00€	Quality Assurance	Conte
	Description: integration of the work products produced by the team components and the revision of the Final document.					
	3.5	Assembly ODD e supervision	**1**	250,00€	Project Manager	Michele Palumbo
	Description: operations necessary to properly assemble the document (odd) through supervision.					
3 Phase Total Cost = 2125,00€						

5.5. WBS Implementation (Phase 4)

4.1	GUI Developer (Front-end-application)
4 **Implementation**	
4.2	Component Development to interface DB (Back-and-application)
4.3	Module (GPS) Develop
4.4	Code Develop
4.5	Code Optimization
4.6	Write document on implementation.

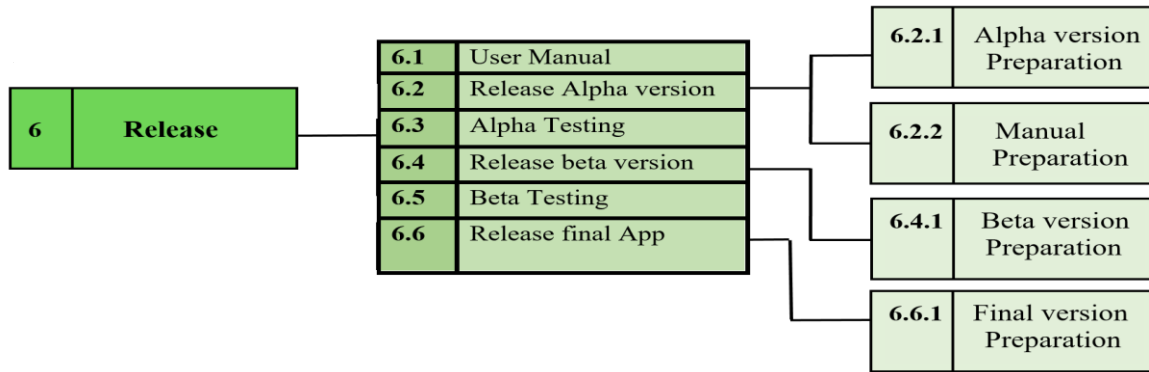| Phase	4	Implementation	**Responsible:** Benevenga, Massa, Turco			
			Days	**Gross Cost**	**Role**	**Resource**
Task	4.1	GUI Developer (Front-end-application)	10	1250,00€	Developer	Benevenga(5), Massa(5)
	Description: development of the Virtual Museum Tour GUI.					
	4.2	Component Development to interface BD (Back-and-application)	4	500,00€	Data Base Manager	Parisi
	Description: development of components for interface to the database in order to simplify the development of the sub-teams and increase the maintainability.					
	4.3	Module (GPS) Develop	5	625,00€	Developer	Massa
	Description: development of the code for the Realization GPS module for the localization (museums images).					
	4.4	Code Develop	21	2625,00€	Developer	Benevenga(6), Turco(5), Massa(5), Sannella(5)
	Description: development of the code for the realization of the Virtual Museum tour app.					
	4.5	Code Optimization	5	625,00€	Developer	Parisi
	Description: optimization of the product code to make it more readable and fluid.					
	4.6	Write document on implementation.	1	250,00€	Project Manager	Michele Palumbo
	Description: operations necessary to correctly assemble the document (Implementation) through supervision.					
	4 Phase Total Cost = **5875,00€**					

5.6. WBS Testing (Phase 5)

5.1	Unit Test
5.2	Integration Test
5.3	Functional Testing
5.4	Usability Test
5.5	Write document on Testing
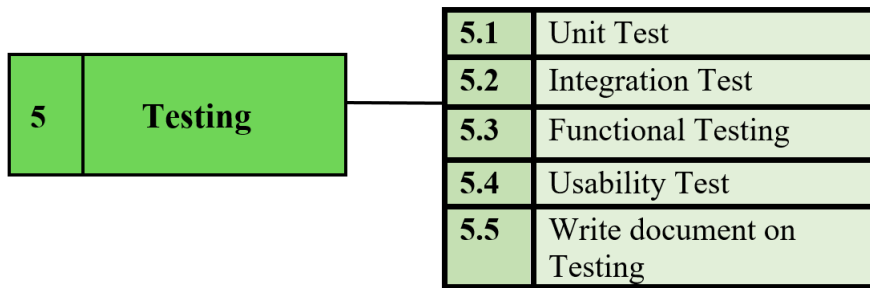
5 | Testing

Phase	5	Testing	**Responsible:** Troisi			
			Days	Gross Cost	Role	Resource
Task	5.1	Unit Test	5	625,00€	Tester	Troisi
	Description: Unit testing of implemented methods and classes and production of the test report document.					
	5.2	Integration Test	3	375,00€	Tester	Troisi
	Description: Testing of integrated subsystems, according to the bottom-up approach.					
	5.3	Functional Testing	3	375,00€	Tester	Troisi
	Description: Testing the functionality of the application					
	5.4	Usability Test	4	500,00€	Tester	Troisi
	Description: Testing the usability of the application					
	5.5	Write document on Testing	1	250,00€	Project Manager	Michele Palumbo
	Description: Drafting document on the various parts of the implementation					
5 Phase Total Cost = 2125,00€						

5.7. WBS Release (Phase 6)

Phase	6	Release	Responsible: Michele Palumbo			
			Days	Gross Cost	Role	Resource
Task	6.1	User Manual	2	500,00€	Project Manager	Michele Palumbo
	Description: create a guideline for using the app.					
Sub-Phase	6.2	**Release alpha version**	2	500,00€	Project Manager	Michele Palumbo
	Description: the version of the app that is still incomplete that includes the most important features to be tested within the company and stakeholders.					
Task Sub-Phase	6.2.1	Alpha version Preparation	1	250,00€	Project Manager	Michele Palumbo
	Description: latest definitions for the release of the alpha version.					
	6.2.2	Manual Preparation	1	250,00€	Project Manager	Michele Palumbo
	Description: latest definitions for the release of the Alpha version manual.					
Task	6.3	Alpha Testing	7	0 €		
	Description: testing the alpha version of the company's components and stakeholders. There is a percentage based on sales for those who adhere to this test.					
Sub-Phase	6.4	**Release Beta version**	1	250,00€	Project Manager	Michele Palumbo
	Description: version of the app that is almost complete to a maximum of 200 download.					
Task Sub-Phase	6.4.1	Beta version Preparation	1	250,00€	Project Manager	Michele Palumbo
	Description: latest definitions for beta release.					
Task	6.5	Beta Testing	10	0 €		
	Description: Beta testing by people included in the 200 downloads.					
Sub-Phase	6.6	**Release final App**	1	250,00€	Project Manager	Michele Palumbo
	Description: full app version available for everyone.					
Task Sub-Phase	6.6.1	Final version Preparation	1	250,00€	Project Manager	Michele Palumbo
	Description: latest definitions for the release of the final version.					
6 Phase Total Cost = 1500,00€						

5.8.Milestone and Deliverable List

In this table, we can see the list of milestones and deliverables. It has been planned that each milestone is associated with a deliverable.
Then, the project manager on the expected dates of deliverables will meet the stakeholders in a meeting in order to illustrate the reference document made.
This is a way to be able to compare and manage any problems that might arise.

| Milestone				Deliverable		Date
M 1	End	Requirements Collection	→	D 1	Release RAD DRAFT	03/07/2017
M 2	End	Requirements Analysis	→	D 2	Release RAD	18/07/2017
M 3	End	System Design	→	D 3	Release SDD	09/08/2017
M 4	End	Object Design	→	D 4	Release ODD	01/09/2017
M 5	End	Implementation	→	D 5	Release Implementation Document	07/11/2017
M 6	End	Testing	→	D 6	Release Testing Document	29/11/2017
M 7	End	Alpha version and Manual	→	D 7	Release Alpha version and Manual	05/12/2017
M 8	End	Beta version	→	D 8	Release Beta version	18/12/2017
M 9	End	Final version	→	D 9	Launch Final APP	05/01/2018

5.9. Cost Baseline

The total estimated cost for completing all stages is **18.000 euros** to additional **750 euros** are added for meetings between the project manager and stakeholders.

On the total budget of **20.000 euros** available, there are **1.250 euros** that will be used in case of overtime. For the *ALPHA testing*, instead is expected a **bonus on sales** for those who will perform the alpha testing.

Costs		
1	Requirement Elicitation & Analysis	4.250,00€
2	System Design	2.125,00€
3	Object Design	2.125,00€
4	Implementation	5.875,00€
5	Testing	2.125,00€
6	Release	1.500,00€
TOTAL		**18.000,00€**
Another Cost		
Meetings between PM and stakeholders		750,00€
TOTAL BUDGET ALLOCATED		18.750,00€
Another cost (Overtime)		1.250,00€
OVERALL BUDGET		20.000,00€
Bonus for Alpha Testing		**%Percentage of sales**
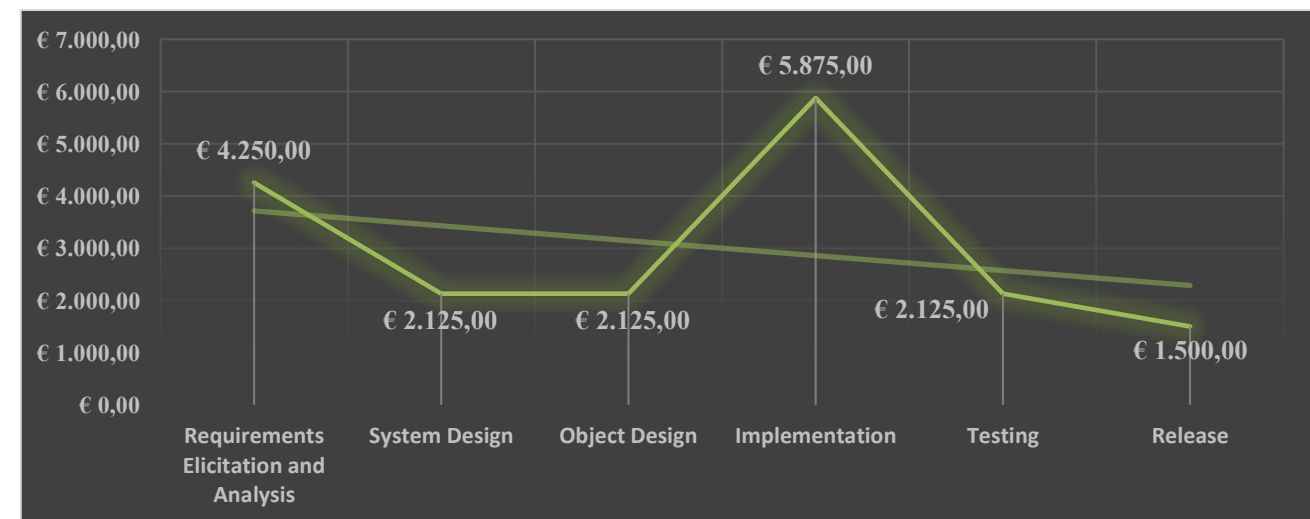
6. <u>**Project Schedule**</u>

In this section, we report all the project planning information that was used to manage the production phases of the application "Virtual Museum Tour".
This planning activity was carried out using the tools provided by the "Microsoft Project 2016" tool, starting with the deliverables/milestones identified in the project's Work Breakdown Structure (WBS).

6.1. Gantt Diagram

The Gantt diagram represents the task scheduling and dependencies between them.
The task schedule is located in the document created with <u>Microsoft Project 2016</u> named **VMTgantt.mpp**

6.2. Resource allocation to activities

Resource allocations to their tasks have been described both within the WBS Dictionary found in the previous section (**Section 5**) and in the **VMTgantt.mpp** document.

6.3. Budget allocation

The only resources used for the project are human resources and are described in the **VMTgantt.mpp** document.

6.4. Estimate time to reach each milestone

The time to reach each milestone (defined in the milestone / deliverables list in **paragraph 5.8**) is described in the **VMTgantt.mpp** document.

7. <u>**Monitoring and Reporting mechanisms**</u>

7.1. Monitoring of work and expected work

At the beginning of each development phase we defined the workload of the activities of a phase. Below are the forecasts made for each phase. The columns provide, respectively, the activity identifier, the name of the task, the actual work performed, the expected work, and the change of work done. The variance of work is calculated as the difference in the actual work columns less work expected by setting this rule also for summary tasks.

7.1.1. Monitoring Requirements Elicitation and Analysis (Phase 1)

ID	Activities name	Forecast	Work	Variation
0	**Virtual Museum Tour**	**660 h**		
1	**Requirements Elicitation and Analysis**	**160 h**		
1.1	**Requirements Collection**	**105 h**		
1.1.1	**Actors identification**	**10 h**		
	Cupo Pietro	10 h		
1.1.2	**Requirements functional and no-functional identification**	**25 h**		
	Cupo Pietro	25 h		
1.1.3	**Rilevant Scenarios identidication**	**20 h**		
	Conte Angelo	20 h		
1.1.4	**Use Case**	**20 h**		
	Conte Angelo	20 h		
1.1.5	**Mockup**	**20 h**		
	Benevenga Marco	20 h		
1.1.6	**Revision Requirements Collection**	**5 h**		
	Conte Angelo	5 h		
1.1.7	**Assembly RAD draft e supervision**	**5 h**		
	Palumbo Michele	5 h		
1.2	**Requirements Analysis**	**55 h**		
1.2.1	**Sequence Diagram**	**15 h**		
	Cupo Pietro	15 h		
1.2.2	**Class Diagram**	**15 h**		
	Cupo Pietro	15 h		
1.2.3	**Status Diagram**	**15 h**		
	Conte Angelo	15 h		
1.2.4	**Revision Requirements Analysis**	**5 h**		
	Conte Angelo	5 h		
1.2.5	**Assembly RAD and supervision**	**5 h**		
	Palumbo Michele	5 h		
2	**System Design**	**80 h**		
3	**Object Design**	**80 h**		
4	**Implementation**	**230 h**		
5	**Testing**	**80 h**		
6	**Release**	**30 h**		

7.1.2. Monitoring System Design (Phase 2)

ID	Activities name	Forecast	Work	Variation
0	Virtual Museum Tour	660 h		
1	Requirements Elecitation and Analysis	160 h		
2	System Design	80 h		
2.1	Design Goals identification	10 h		
	Sannella Simone	10 h		
2.2	Architecture identification	15 h		
	Cupo Pietro	15 h		
2.3	Sub-system identification	15 h		
	Turco Domenico	15 h		
2.4	Persistent Data identification	15 h		
	Sannella Simone	15 h		
2.5	Services identification	5 h		
	Sannella Simone	5 h		
2.6	Limit case identification	10 h		
	Cupo Pietro	10 h		
2.7	Revision System Design	5 h		
	Conte Angelo	5 h		
2.8	Assemblay SDD and supervision	5 h		
	Michele Palumbo	5 h		
3	Object Design	80 h		
4	Implementation	230 h		
5	Testing	80 h		
6	Release	30 h		

7.1.3. Monitoring Object Design (Phase 3)

ID	Activities name	Forecast	Work	Variation
0	Virtual Museum Tour	660 h		
1	Requirements Elecitation and Analysis	160 h		
2	System Design	80 h		
3	Object Design	80 h		
3.1	Trade-Offs identification	10 h		
	Parisi Giacomo	10 h		
3.2	Package Subdivision	20 h		
	Parisi Giacomo	20 h		
3.3	Tecnical reuse identification	40 h		
3.3.1	Design Pattern identification	20 h		
	Sannella Simone	20 h		
3.3.2	Off-The-Shelf component identification	20 h		
	Turco Domenico	20 h		
3.4	Revision Object Design	5 h		
	Conte Angelo	5 h		
3.5	Assembly ODD and supervision	5 h		
	Palumbo Michele	5 h		
4	Implementation	230 h		
5	Testing	80 h		
6	Release	30 h		

7.1.4. Monitoring Implementation (Phase 4)

ID	Activities name	Forecast	Work	Variation
0	Virtual Museum Tour	660 h		
1	Requirements Elecitation and Analysis	160 h		
2	System Design	80 h		
3	Object Design	80 h		
4	Implementation	230 h		
4.1	GUI(Front-End-App) develop	50 h		
	Benevenga Marco	25 h		
	Massa Davide	25 h		
4.2	Component interface Develop DB (Back-end-App)	20 h		
	Parisi Giacomo	20 h		
4.3	Module GPS Develop	25 h		
	Massa Davide	25 h		
4.4	Code Develop	105 h		
	Benevenga Marco	30 h		
	Turco Domenico	25 h		
	Sannella Simone	25 h		
	Massa Marco	25 h		
4.5	Code Optimization	25 h		
	Parisi Giacomo	25 h		
4.6	Write implementation Document	5 h		
	Palumbo Michele	5 h		
5	Testing	80 h		
6	Release	30 h		

7.1.5. Monitoring Testing (Phase 5)

ID	Activities name	Forecast	Work	Variation
0	Virtual Museum Tour	660 h		
1	Requirements Elecitation and Analysis	160 h		
2	System Design	80 h		
3	Object Design	80 h		
4	Implementation	230 h		
5	Testing	80 h		
5.1	Unit Test	25 h		
	Troisi Pasquale	25 h		
5.2	Integration Testing	15 h		
	Troisi Pasquale	15 h		
5.3	Functional Testing	15 h		
	Troisi Pasquale	15 h		
5.4	Usability Testing	20 h		
	Troisi Pasquale	20 h		
5.5	Write Test Document	5 h		
	Palumbo Michele	5 h		
6	Release	30 h		

7.1.6. Monitoring Release (Phase 6)

ID	Activities name	Forecast	Work	Variation
0	Virtual Museum Tour	660 h		
1	Requirements Elecitation and Analysis	160 h		
2	System Design	80 h		
3	Object Design	80 h		
4	Implementation	230 h		
5	Testing	80 h		
6	Release	30 h		
6.1	User Manual	10 h		
	Palumbo Michele	10 h		
6.2	Alpha version	10 h		
6.2.1	Alpha version Preparation	5 h		
	Palumbo Michele	5 h		
6.2.2	Manual Preparation	5 h		
	Palumbo Michele	5 h		
6.3	Alpha Testing	7 giorni	---------------	---------------
6.4	Beta version	5 h		
6.4.1	Beta version Preparation	5 h		
	Palumbo Michele	5 h		
6.5	Beta Testing	10 giorni	---------------	---------------
6.6	Final App Version	5 h		
6.6.1	Launch of the application "Virtual Museum Tour"	5 h		
	Palumbo Michele	5 h		

7.2.Business calendar

Driven by the time constraint imposed by the European fund to complete the application for February 2018, it was decided to rely on a high-capacity team.

Based on this, you could decide to adopt a more flexible calendar.

Here is the work schedule for this project.

As we said, the calendar turns out to be more flexible, including 5 working hours a day for 5 days a week and 2 holidays, Saturday and Sunday.

This schedule will be respected for the duration of the project, which will be from Monday 5/06/2017 to Fri 05/01/2018.

The second part of the table lists the exceptions that coincide with the holidays.

BASIC CALENDAR:	WORKING HOURS
DAYS	**HOURS**
Monday	8.30 – 13.30
Tuesday	8.30 – 13.30
Wednesday	8.30 – 13.30
Thursday	8.30 – 13.30
Friday	8.30 – 13.30
Saturday	No - Working
Sunday	No - Working
EXCEPTIONS	
Any Overtime	According to necessity (max 25 ore)
Holidays / Non - Working	**DATE**
Ferragosto	Tue - 15/08/2017
All Saints	Wed- 1/11/2017
Immacolata	Fri - 8/12/2017
Christmas	Mon- 25/12/2017
Saint Stefan	Tue - 26/12/2017
New Year	Mon - 1/01/2018

7.3. Resource costs for hour/work

Given the high qualification of team members, it was decided not to engage them full time on this project in order to be employed in other major company projects.

Based on this, it was decided to distribute the workload (hours / work) equally among staff members who is 75 hours for each.

The following table contains the definition of human resource costs.

The columns contain the <u>resource identifier</u>, <u>resource name</u>, <u>resource type</u>, and <u>rate</u>.

The scheduled hourly rates are € 50 for the PM and € 25 for the other team members.

ID	RESOURCE	ROLE	RATE
1	Palumbo Michele	Project Manager	50€
2	Conte Angelo	Analyst, Quality Assurance	25€
3	Cupo Pietro	Analyst, Tester	25€
4	Parisi Giacomo	System designer, Object model designer, Database manager, Developer	25€
5	Sannella Simone	System designer, Object model designer, Developer	25€
6	Turco Domenico	System designer, Object model designer, Developer	25€
7	Benevenga Marco	Developer, Graphic designer	25€
8	Massa Davide	Developer	25€
9	Troisi Pasquale	Tester	25€
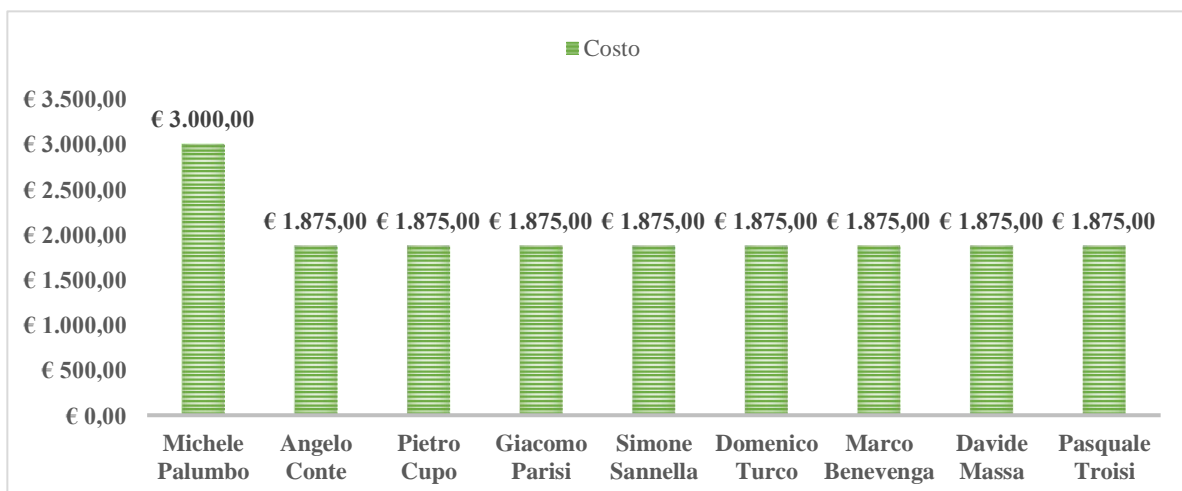
## 7.4.Revision process and Quality control

During the development of the documents of the Virtual museum tour software system is verified and validated through a document called Review checklist, specific to each document.

In addition, quality control is carried out through the same checklists and the measurement metrics are adopted in the *ISO/IEC 9126* standard (Quality assessment standards).

These rules describe a software quality model that is divided into 6 phases:

The revision process steps can be represented by the following diagram:
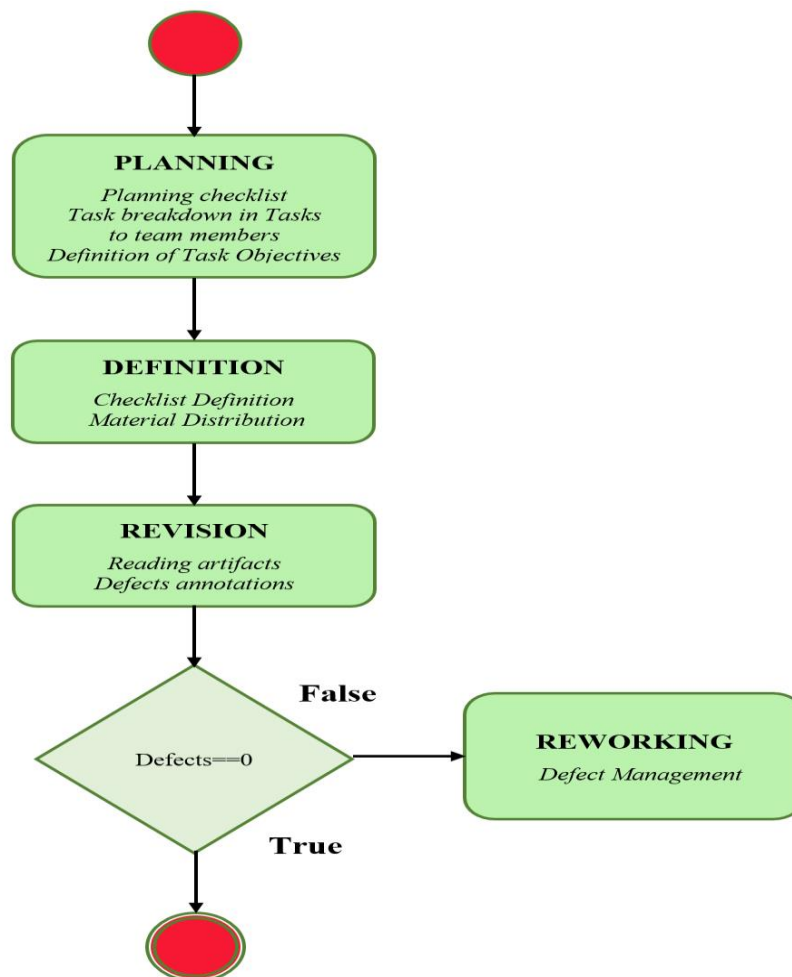
***PLANNING*:** *at this stage the checklist is scheduled, subject to review. The PM will assign the role of auditor to quality assurance and subsequently act as a supervisor in the first person.*

***DEFINITION*:** *a template* **<u>checklist</u>** *is produced that consists of a structure in sections each containing a title. Completed this step, the document will be put on Google Drive sharing with the whole team.*

<u>Example checklist</u>

Id	Description	Evaluation From 1 to 5 (1 indicates insufficient, 5 check-item correct)
Example:	**Requirements Specification**	
1	Have you defined the features, constraints, performance, and any other feature that the system will have to meet the needs of the customer?	4
2	……………..	…..
3	……………..	…..
4	……………..	…..
5	……………..	…..

***REVISION*:** *at this stage, the auditor has the task of reading the artifact, the subject of the inspection and to note any defects. The aim is to find as many flaws as possible.*

REWORKING: *in case the review will not have found defects, the document will be accepted. If not, it will follow a rework phase.*
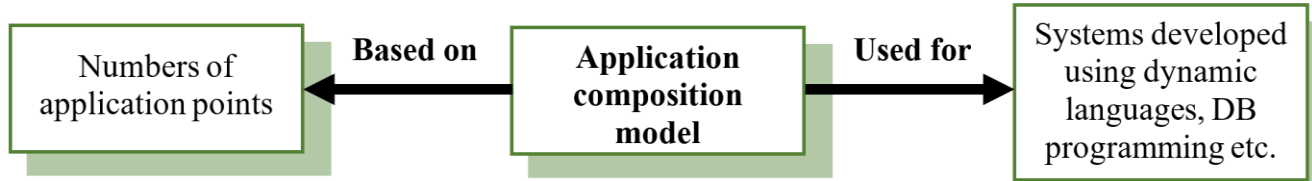
7.5. Communication plan

Event	Rational	Frequency	Deliverable
Team Meetings	**Project discussions, updates on project development**	**Weekly**	**Meeting minutes to be uploaded**
Supervisor Meetings	**Supervisor feedbacks, update on project progress**	**Fortnightly**	**Meeting minutes to be uploaded and updates through email**
Client Updates	**Update client on deliverables after each milestone**	**After each milestone**	**Meeting minutes to be uploaded**
Sharing Sessions	**Peer feedbacks, comments and thoughts about the team**	**Monthly**	**Resolved issues, Peer feedback**
Team Bonding Session	**To maintain team cohesion**	**Monthly**	**Have dinner/movies/outings**

8. **Additional plans**

8.1. **COCOMO II Estimation**

8.1.1. **Estimated person/month effort with Early Prototyping Level**

Numbers of application points	**Based on** ← →	**Application composition model**	**Used for** ← →	Systems developed using dynamic languages, DB programming etc.

Supports prototyping projects and projects where software is developed by composing existing components. Based on standard estimates of developer productivity in application points/month.

Have been identified, simple, average requirements and difficult to screens, reports and forms to find the points of application from which it was removed the percentage of reuse components from which we get the NAP which is the number of new application points to implement.

The team's experience has been highly evaluated due to the large capacity.

Formulas, step by step, for Early Prototyping Level

AP= *APPLICATION POINT*

NAP= *N° OF THE NEW APPLICATION POINT (screen, report e module)*

PROD= *PRODUCTIVITY* $\left(\begin{smallmatrix} 4-7-13-25-50 \\ VL-L-N-M-VM \end{smallmatrix} \right)$

PM= *PERSON/MONTH EFFORT*

STEP 1

$$AP = \sum SCREEN + \sum REPORT + \sum MODULE$$

$$= (N°INPUT\ DATA(SIMPLE) * WEIGHT(SIMPLE)) +$$
$$+ (N°INPUT\ DATA(AVERAGE) * WEIGHT(AVERAGE)) +$$
$$+ (N°INPUT\ DATA(COMPLEX) * WEIGHT(COMPLEX)) +$$

$$+ (N°INPUT\ DATA(SIMPLE) * WEIGHT(SIMPLE)) +$$
$$+ (N°INPUT\ DATA(AVERAGE) * WEIGHT(AVERAGE)) +$$
$$+ (N°INPUT\ DATA(COMPLEX) * WEIGHT(COMPLEX)) +$$

$$+ (N°INPUT\ DATA(COMPLEX) * WEIGHT(COMPLEX))$$

SCREENS	Number and source of data tables		
Number of views contained	**Total <4** (<2server, <2 client)	**Total <8** (2-3 server, 3-5 client)	**Total 8+** (>3 server, >5 client)
< 3	*Simple*	*Simple*	*Medium*
3 - 7	*Simple*	*Medium*	*Difficult*
8+	*Medium*	*Difficult*	*Difficult*

REPORTS	Number and source of data tables		
Number of sections contained	**Total <4** (<2server, <2 client)	**Total <8** (2-3 server, 3-5 client)	**Total 8+** (>3 server, >5 client)
< 2	*Simple*	*Simple*	*Medium*
2 or 3	*Simple*	*Medium*	*Difficult*
> 3	*Medium*	*Difficult*	*Difficult*

COMPLEX	Complexity Weighting		
Type of object	**Simple**	**Medium**	**Difficult**
Screen	*1*	*2*	*3*
Report	*2*	*5*	*8*
Module	*N/A*	*N/A*	*10*

STEP 2

$\% \, reuse =$ **REUSED COMPONENTS**   **REQUIRED COMPONENTS**

0%   **100%**

$$NAP = AP * \left[\frac{(100 - \%REUSE)}{100}\right]$$

STEP 3

PROD	Very low	Low	Nominal	High	Very High
Developer's experience and capability	*4*	*7*	*13*	*25*	*50*
CASE maturity and capability	*4*	*7*	*13*	*25*	*50*

$$PM = \frac{NAP * \left(1 - \dfrac{\frac{\%REUSE}{100}}{100}\right)}{PROD}$$

Estimate calculations Person/Month effort for "*Virtual Museum Tour*"

STEP 1

$$AP = ((25 * 1) + (15 * 2) + (10 * 3))\ (\textbf{\textit{SCREEN}})$$

$$+ ((20 * 2) + (10 * 5) + (5 * 8))\ (\textbf{\textit{REPORT}})$$

$$+ (5 * 10) \qquad\qquad (\textbf{\textit{MODULE}})$$

$$= (85) + (130) + (50) = \textbf{265}\ \ \textit{APPLICATION POINTS}$$

STEP 2

$$\%\ reuse = \textbf{\textit{REUSED COMPONENTS}} \qquad\qquad \textbf{\textit{REQUIRED COMPONENTS}}$$

$$\textbf{10\%} \qquad\qquad\qquad\qquad\qquad\qquad \textbf{90\%}$$

$$NAP = 265 * \left[\!\left[\left(\frac{100 - 10}{100}\right)\right]\!\right] = 265 * 0.90 = \textbf{238,5}\ \ \textit{APPLICATION POINT TO DEVELOP}$$

STEP 3

$$PROD = HIGH = \textbf{25}$$

$$PM = \frac{238.5}{25} = \textbf{9.54}\ \ \textit{PERSON/MONTH}$$

8.1.2. Estimate of Project Duration

Formulas for estimate of Project Duration

$$TDEV = [\![A * PM^{(0,33+0,2*(B-1,01))}]\!]$$

$$A = COSTANT, \mathbf{3.0}$$

$$B = 1.01 + 0.01 \sum_{j=1}^{5} SFj$$

SF= Scale factor Estimation

Name	Very Low (0,05)	Low (0,04)	Nominal (0,03)	High (0,02)	Very High (0,01)	Extra High (0,00)
Precedentedness	Thoroughly unprecedented	Largely unprecedented	Somewhat unprecedented	Generally familiar	Largely familiar	Thoroughly familiar
Flexibility	Rigorous	Occasional relaxation	Some relaxation	General conformity	Some conformity	General goals
Significant risks eliminated	Little (20%)	Some (40%)	Often (60%)	Generally (75%)	Mostly (90%)	Full (100%)
Team interaction process	Very difficult	Some difficult	Basically cooperative	Largely cooperative	Highly cooperative	Seamless interactions
Process Maturity	Level 1	Level 2	Level 2+	Level 3	Level 4	Level 5

Estimate calculations Project Duration for "Virtual Museum Tour"

$$A = 3$$

$$B = 1.01 + (0.01 + 0.04 + 0.03 + 0.01 + 0.01) = \mathbf{1.11}$$

$$TDEV = \left[3 * 9.54^{(0.33+0.2*(1.11-1.01))}\right]$$

$$= \left[3 * 9.54^{(0.350)}\right] = \mathbf{6.60} \; MONTHS$$

(FULL TIME)

This forecast is for a full-time estimate (**eight hours/day**).

In the "*Virtual Museum Tour*" project, however, they were considered **five working hours/day**.