SOFTWARE PROJECT MANAGEMENT PLAN

Project Enlightenment

Computer Training For Visually Impaired Automation Tool (CTVIAT)

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Document Change Control

The following is the document control for revisions to this document.

Version Number	Date of Issue	Author(s)	Brief Description of Change
1.0	21/10/10	Project Enlightenment	Phase 1 - Preliminary draft for Phase 1
2.0	24/11/10	Project Enlightenment	Phase 1 & 2 – conform to new framework template, update for Phase 2 deliverables
2.1	03/01/11	Project Enlightenment	Update for Phase 2 deliverables

Definition

The following are definitions of terms, abbreviations and acronyms used in this document.

Term	Definition
CTVI	Computer Training for Visually Impaired
RAD	Requirements Analysis Document
CTVIAT	Computer Training for Visually Impaired Automation Tool
JFW	JAWS for Windows
SDD	Software Design Document
ODD	Object Design Document
CPU	Central Processing Unit in a Computer

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OVERVIEW

This plan is for development of the Enable India product by a small group which is called Enlightenment, of senior standing computer engineering students consisting of five individuals: Emmar Kardeslik, Eray Saltik, Ferhat Elmas, Osman Sokuoglu, and Ozge Inan.

The Enable India product is to develop a software product to support the Enable India (EI) that helps visually impaired people. First of all, this project is a term project of software engineering course. Secondly, this project is a registered SCORE project and Kapil Wasmani is the advisor from Microsoft Research.

1.1 Project Summary

1.1.1 Purpose of the System

This paper describes the details of Computer Training for Visually Impaired (CTVI) Automation Tool. The CTVI enables visually impaired students to take some teaching courses followed some training exercises on the computers to test their knowledge at Enable India. Since process of correcting the exercises is currently done manually by trainers, it is an exhaustive and time consuming task. The Automation Tool we present here automates this process. Its main purpose is to make the training program more productive, efficient and accurate.

By automating the training process, the tool also aims to make evaluation process easier, faster and more secure. From an admin or a trainer's perspective, the tool aims to reduce the burden of controlling, correcting and pursuing the testing process. Also, the tool allows creating tests in different modules of instructions(such as editing, word, excel) and in different types(e.g., objective, descriptive or action-based), adding questions to question bank, designing specific question papers to perform examination by both giving question specific assistance to help finish their tests and correcting the exercises when the student fails to handle a question.

1.1.2 Scope of the System

The CTVI Automation Tool is implemented for two kinds of users: vision-impaired students and CTVI trainers (or admins). Those students who are capable of using a computer with the help of Braille-based tools are the primary users of the automation tool. These users require no other additional computer experience.

The CTVI administrators are the main beneficiaries of the Automation Tool. The tool performs all the tasks the trainers perform manually today. What admins are required to do is just to login to the system and use the tool and benefit from the facilities of the tool. The tool will be designed such that all the user related properties will be accessible by any user and (s)he will require minimum knowledge when using the tool. Through this, users can receive more personalized services and obtain relevant information with relatively less effort and time.

1.1.3 Objective and Success Criteria

Security (or a secure platform) is one of the most important success criteria. Since users log in to system with their own accounts, secure maintenance of user-specific data is required. System reliability which means the ability of a person or system to perform and maintain its functions in routine circumstances, as well as hostile or unexpected circumstances is also an important success criterion. For example, when database goes down via a hostile attack, users can login to other users' account without valid password and private data may be revealed since database always returns true. Therefore, if a system is unreliable, it is difficult to ensure system safety or security also. Another important success criterion is scalability which means system should cope with new demands by adding new resources. This can be handled through careful design and implementation of the Automation Tool.

1.1.4 Assumptions and Constraints

Constraints include the following:

- The deadline must be met because EI is planning to upgrade to the automation according to the deadline.
- The budget constraint must be met because the budget is a must to build each part of the project. If the cost was greater than the budget, the project would be closed.
- The product must be reliable and secure because private data may be revealed and the tool may affect the further study of the candidate.
- The architecture must be open so that additional functionality may be added later because the technology is evolving rapidly which necessities new programs to be learnt and these programs may be added to the curriculum.
- The product must be user-friendly because the main users of the tool are visually impaired.

Assumptions include the following:

- The project is designed for and will be tested on general purpose keyboard. However, since the main user group is visually impaired, Braille-based keyboard will be required. Adaptation from general purpose keyboard to Braille-based keyboard should be easy.

- Although communication of the tool with the database is quaranteed by the tool itself, physical and digital security of the database should be guaranteed by EI.

1.1.5 Project Deliverables

The following items will be produced during CTVIAT project development:

- RAD (Requirement Analysis Document) describing the functional and global requirements of the Automation Tool (delivered)
- SPMP (Software Project Management Plan) defines the details of porject planning process(this document).
- ODD (Object Design Document) describes the object design model.
- SDD (Software Design Document) describing the design goals, tradeoffs made between design goals, high level decomposition of the system, concurrency identification, hardware/software platforms, data management, global resource handling, software control implementation and boundary conditions. This document forms the basis of the object design.
- TM (Test Manual) describing the unit and system tests performed on the Automation Tool that we create before delivery.

Last version of the project is supposed to be an automation tool which provides computer training for visually impaired people. The complete product, including user manual, will be delivered until the deadline of the project submission.

1.1.6 Schedule & Budget Summary

The duration, personnel requirements, and budget of each workflow are as follows:

- Requirements workflow (80 days, five team members, 2400 TL)
- Analysis workflow (80 days , five team members, 7870 TL)
- Design workflow (80 days, five team members , 10656 TL)
- Implementation workflow (80 days, five team members, 9360 TL)
- Testing workflow (80 days, five team members, 6240 TL)

The total development time is 80 days, and analysis, design, implementation and testing workflows will go on together because of chosen software development life cycle and preselected staffing. The total internal cost is absolutely 36,526 TL. The details are in open project file.

1.2 Evolution of Project Management Plan

All changes to the project management plan must be agreed to by Kapil and course instructor before they are implemented. All changes should be documented in order to keep the project management plan correct and up to date.

1.3 Document Structure

This plan is organized as follows:

a. Section 1, Project Overview. This section provides an overview of the scope and objectives of the project, the project's assumptions and constraints, reference to the project deliverables, schedule and budget, and a description of the evolution of the plan.

b. Section 2, References. This section provides a list of all documents, policies, templates, processes, and other sources of information referenced in the plan.

c. Section 3, Definitions. This section contains the abbreviations and acronyms required to properly understand this planning document.

d. Section 4, Project Organization. This section identifies interfaces to organizational entities external to the project, the project's internal organizational structure, and defines roles and responsibilities for the project.

e. Section 5, Management Process. This section describes the planning, measurement, tracking, reporting, risk control mechanisms needed to provide management control over the technical processes and product quality, and appropriate project initiation and closeout procedures.

f. Section 6, Technical Process. This section describes the technical solution in terms of a process model and implementation methods, tools, and techniques to be used to develop the various work products, plans for establishing and maintaining the project infrastructure, and the product acceptance.

g. Section 7, Supporting Processes. This section describes processes that are employed to facilitate and control the technical processes and the state of the product. These include, but are not limited to, configuration management, verification and validation, documentation, quality assurance, reviews and audits, problem resolution, and contractor management, and methods to ensure continuous process improvement.

h. Section 8, Additional Plans. This section addresses the logistic support strategy to be applied to increase the system's operational effectiveness.

REFERENCE MATERIALS

All artifacts will conform to the company's and course's programming, documentation and testing standards. Extra artifacts are Project Enlightment.pod which is produced by open project for detailed schedule and cost estimation, tasks.pdf gives detailed information for tasks such as well defined name, resources, estimated completion time with start and finish date, predecessors and reference id, whoiswho.pdf gives mapping between team members and tasks and answers who does what question.

DEFINITIONS and ACCRONYMS

EI Enable India, our client.

SCORE a competition in software engineering.

Roll back is to choose a reference point to return back and to return back this stable point when trainee gave a false answer to give hint and one more try.

Hint is to give guidance trainee to solve problems easily.

GUI is short version of Graphical User Interface.

Objective, Descriptive and Action-based are the types of questions in automation tool.

DAO means Database Access Object.

IDE is integrated development environment.

ODD - Object Design Document

SDD - System Design Document

SPMP - Software Project Management Plan

RAD - Requirements Analysis Document

TM – Test Manual

CTVIAT – Computer Training for Visually Impaired Automation Tool

4. PROJECT ORGANIZATION

4.1 External Interfaces

All the work on this project will be performed by the members of the group Enlightenment. All will meet weekly with Kapil Wasmani and course instructor to report progress and discuss possible changes and modifications.

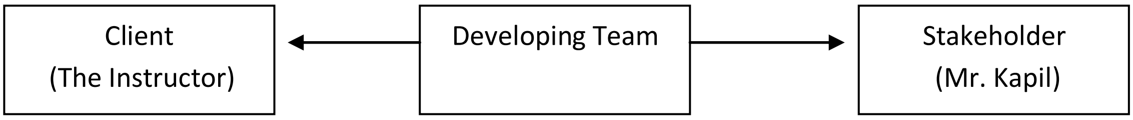

Figure-4.1 High-level interaction of parties

4.2 Internal Structure

The development team consists of Emmar Kardeslik, Eray Saltik, Ferhat Elmas, Osman Sokuoglu and Ozge Inan.

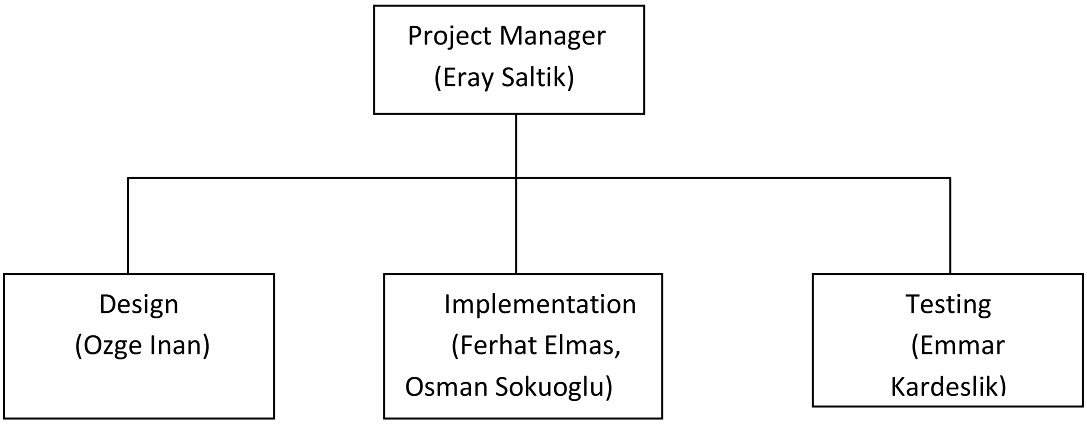

Figure-4.2 High Level distribution of the roles

4.3 Roles and Responsibilities

All group members will participate in all phases of development cycle but each group member has special features so each member will do much of work in her specialized task. Therefore, Ozge Inan firstly will be responsible for design, so testing is Emmar Kardeslik's and implementation; control and documentation are Eray Saltik, Ferhat Elmas and Osman Sokuoglu's. The figure shows the task distributions through the team members . The details are in whoiswho.pdf document.

Task distributions through the team members are specified in schedule_spreadsheet.pdf and schedule_gantt.pdf.

5. MANAGERIAL PROCESS PLAN

5.1 Start-up Plan

5.1.1 Estimation Plan

As previously stated, the total development time is estimated to be 65 days and the total internal cost to be 36,526 TL.

	Eray	Ferhat	Emmar	Özge	Osman
Cost	7344.00 TL	7774.00 TL	6720.00 TL	6336.00 TL	7104.00 TL
Budget	0.00 TL	0.00 TL	0.00 TL	0.00 TL	0.00 TL

Table-5.1 : Cost & Budget Distribution for each team member

Cost and budget distribution for each task during the project development is obtained by software management tool, namely open project. Details are in Project Enlightment.pod file.

5.1.2 Stuffing Plan

All team members are needed for the entire 80 days because everybody will participate and we tried to utilize from resources perfectly. Details are in references. However, below table gives medium details of development.

	Documentation	Design	Analysis	Implementation	Testing
Eray	10	30	10	40	10
Ferhat	10	30	10	40	10
Emmar	10	10	10	10	60
Özge	10	30	30	15	15
Osman	10	30	20	20	20

Table-5.3 : Hourly distribution and mapping of the stuff and the tasks

5.1.3 Resource Acquisition Plan

All necessary hardware is already available except Braille based keyboard which will be used to test system. All inputs from Braille keyboard is just like normal keyboard so tests will be run on normal keyboards. However, if project can be done before deadline, artifacts will be delivered to Enable India for them to test in real environment. Indeed, the only other required hardware is a computer which runs Windows 7. Each group member has qualified computer. Microsoft tools are chosen for development tools which can easily downloaded from DreamSpark. Chosen tools are Visual Studio as IDE (only fully featured development environment for C#), Microsoft SQL Server as database (perfect integration with Visual Studio) and Microsoft Office for design, presentation and documentation (Word, Excel, PowerPoint and Visio). Moreover, a repository is needed which will be supplied by university. Therefore, a SVN client is needed and TortoiseSVN client is chosen because it perfectly integrates with windows explorer and has simple usage. Project also requires Word and Excel APIs in which turns .NET. Some useful CASE tools areNCover and NCoverCop for line by line code coverage and to notice where is untested, NUnit and MbUnit for unit testing which are successful ports of JUnit, and DotNetMock for again unit testing which is a framework and library to facilitate the use of Mock Objects and has perfect integration with NUnit and MbUnit, Systin for System testing, which is a port of Systir from Ruby to C# and allows users to specify plain English text software requirements that can then become executable tests, log4net for logging which is perfectly logging tool from Apache and is familiar to developers. Final remark is that http://www.google.com/microsoft.html is also will be very useful because organization and presentation of Microsoft's materials are always timely and handy. All necessary hardware, software, and CASE tools for the project are already available. The product will be delivered to Enable India as a desktop application and also some scripts will be supplied to configure a database server at local network.

Resource Type	Resource Name
Language	C#
API	.NET4, WinAPI, Office, IE and JAWS APIs
IDE	Visual Studio Ultimate
Database	Microsoft SQL Server
SVN	TortoiseSVN
Unit Testing	NUnit and NUnitCop(C# version of JUnit)
System Testing	Systin(C# version of Systir)
Logger	Log4net from Apache
Search	http://www.google.com/microsoft.html
GUI	Windows Presentation Foundation(WPF) DirectX
Training	code.google.com/intl/tr-TR / edu / tools101 / scm.html code.google.com/intl/tr-TR / edu / tools101 / mysql.html

Table-5.4 : Tool list

5.1.4 Staff Training Program

Firstly, software development life cycle methodologies are studied in websites suggested by instructor. Then, software configuration management is a new concept to team members to work on so some useful documents[1] are reviewed.

Database is the very important part of the project because database design will affect everything from the performance to the security. Therefore, some high-level database concepts are reviewed[2].

Implementation language should also be reviewed[3].

For user-friendly, well-supported and easy-to-implement graphical user interface, Windows Presentation Foundation is chosen but requires some training[4].

Finally, Training of Visio (visually attractive diagrams), open project (management plan) and NUnit (testing and code coverage) are also required.

5.2 Work Planning

5.2.1 Work Activities and Schedulle Allocation

Project Planning	10 Days
Design Phase	15 Days
Initial Implementation(DAO,System Requirements)	10 Days
Function Implementation and Testing	10 Days
Control and Report	15 Days
Additional (extendable) functions (Hint & RollBack) and Testing	10 Days

GUI and user manual	10 Days

Table-5.5 : General Phase Progress and Timeline

Actually, all parts are going on simultaneously since software development cycle is extreme programming but this division emphasize on approxiametely how many days are allocated to high level aggregation of the tasks. Moreover, details are in Project Enlightenment.pod file.

5.2.2 Resource Allocation

Firstly, software development life cycle is determined. Extreme programming is selected as methodology; general principles are explained below table and causes as the following: CTVIAT is not hardware originated project and even purely software originated except Braille tools. This eliminates waterfall methodologies. CTVIAT is not large and expensive project, so not spiral life cycle. Cowboy coding is not formal enough for this software competition. Agile and XP are very similar indeed. However, XP is chosen because:

- XP is more relax,
- Group has two developers who can easily program in pair,
- Group has one designer and one reviewer(documenter) who can review progress, 4)Group has one ambitious tester who can do unit testing of all code,
- Group has one responsive advisor whom group can easily communicate for progress, code, design and changing requirements,
- Program domain is not familiar to staff(Braille for developers), 7)We will code for Word automation first and delay Windows Explorer, Excel, etc. In the beginning, we will put empty functions for these functionalities, after Word automation is completely functional, we will go on them.

Waterfall	Spiral	Agile	XP	Cowboy
-Big Design Up Front -Sequential manner -Used for hardware originated and stable problems -Changes costly -Bug fix in requirements	-Relaxed waterfall -Initial phase BDUF -Second phase prototype, review and improve on incremental(design - code in small motivations) -Usually used in large, expensive and complicated projects -Chosen in game	-Relaxed spiral -No long-term planning and minimal planning in short -Lack of planning, requires small increments -Each increment involves full sdlc	-Some is good, extreme is better(best) -Introduce new principles on top of agile -Programming in pairs -Extensive code review -Unit testing of all code -Implement when needed	-No external management -Lack of formal methodologies -Decrease burden of bureaucracy -Free working -Student level(inexperienced developers and experimental projects) -Chosen as hobby

-Easily markable milestones	development -Agile is chosen in smaller projects	-Changes are welcome -Customer satisfaction by rapid development -Continuous delivery(Live code) -Live code is measure of progress -Coop business and dev -Face-to-face communication -Self organizing team	-Simple and clear code -Expect changes in requirements(via customer and developer) -Frenzy communication	by talented developers -Quick and dirty, code and fix implementation (unreadable source and conflicts in semantics)

Table-5.6 : Comparison of the software development life cycles

The two team members will work separately on their assigned artifacts and three developers will work together. Eray Saltik's assigned role will be to monitor the daily progress of the group, oversee implementation, be responsible for overall quality, interact with the client and help implementation. Team members will meet after three days and discuss problems and progress. Formal meetings with client will be held at the end of each week to report progress and determine if any changes need to be made and meetings with instructor will be held at scheduled timeline by the syllabus. Eray Saltik will ensure that schedule and budget requirements are met. Risk management will also be Eray Saltik's responsibility. Eray Saltik also has overall responsibility for all documentation and has to ensure that it is up to date. Actually, Eray Saltik is the manager. Design is Ozge Inan's responsibility and testing is Emmar Kardeslik's and implementation is controlled by Osman Sokuoglu and Ferhat Elmas. Maximizing user-friendliness and functionalities is Ozge Inan's and minimizing faults Emmar Kardeslik's top priorities.

5.2.3 Budget Allocation

The budget for each workflow is as follows:

Requirements workflow	2400 TL
Analysis workflow	7870 TL
Design workflow	10656 TL

Implementation workflow	9360 TL
Testing workflow	6240 TL
Total	**36526 TL**

Table-5.7 : Cost of the each phase

5.3 Control Plan

Any major changes that affect the milestones or the budget have to be approved by Kapil and course instructor and documented. No outside quality assurance personnel are involved. The benefits of having someone other than the individual who carried out the development do the testing will be accomplished by each person testing another person's work products. Osman will be responsible for ensuring that the project is completed on time and within budget. This will be accomplished through three to meetings with team members. At each meeting, Eray and Ferhat will present period's progress and problems, Özge will present design of next increment and Emmar will present test result of old increments. Osman will determine whether they are progressing as expected and whether they are following the specification document and the project management plan. Any major problems faced by the team members will immediately be reported to Osman.

5.3.1 Requirement Control

For this project, we began with the analysis and elicitation of the objectives and constraints of the Enable India company. The planning for requirements are done through this document and we will use tracebility in requirement management to report back fulfillment of company, in terms of compliance, completeness, coverage and consistency. Requirement management will done through communication between the project team members and Mr. Kapil, and adjustment to requirements changes throughout the client (our instructor). During design, we will compare the results of the design against the requirements document to make sure that work is staying in scope. During the implementation and testing, we will control whether the work and cost stay within schedule and budget, and that the emerging tool does in fact meet requirements or not. A main tool used in these stages are prototype construction and iterative testing. For our project, the user interface will be created as a draft and tested with potential users while the framework of the software is being built. Results of these tests are recorded in a user interface design guide and handed off to the design team when they are ready to develop the interface. This saves their time and makes their jobs much easier.

5.3.2 Schedule Control

Through the weekly meeting of team members, the progress of the CTVIAT project will be compared with scheduled plan and to achive planned progress, some team members will change their current tasks accordingly. Also, feedbacks taken from Mr. Kapil Wasmani and the Client (The Instructure) will be benefited to to handle the schedule progress.

5.3.3 Budget Control

Budget control is based both on objective data (such as time & costs) and on subjective data (such as estimates of the value of the work in progress). In our project, actual budget control is based on the time that the team members spended on the project development. And the budget estimates will be reviewed and revised at each project milestone and we will compare actual cost to the planned cost and budgeted cost.

5.3.4 Quality Control

Quality Control aims to identify whether a product meets its specifications or not and to ensure that the results generated by the testing are correct. For our project "Computer Training for Visually Impaired Automation Tool" since customers' quality requirements are efficiency,reliability, security,etc and project developers quality reqirements are maintainability, reusability ,completing the project on time within the budget , quality control will be made through the weekly meeting of the team members. During these meetings project manager control whether the project development progressing is continuing and project managament plan is followed as expected or not. if a problem is identified, such as lateness on project development ,insufficient budget etc., the project manager will be responsible to solve this issue with team friends. The quality assurance will be concerned with whether the righ test is carried out and right results is delivered to right person at the right time or not. Mr. Kapil will be informed at each step of project development and the team will develop the product according to reviews with Mr. Kapil and feedbacks taken back such that project meets the customers needs. Also quality documentation will be a record of the progress and support continuity of development if the members of team changes.

5.3.5 Project Reporting and Communication

The project manager is the spokesperson for the project, both formally and informally. It is his responsibility to communicate with all stakeholders, including clients(such as the instructor) and Mr Kapil. Communications management, the application of the concepts of communicating to specific project needs, may be formalized and transformed into a software project management plan.

Communication can and must occur continuously; reporting may occur on a time frequency such as weekly or semimonthly, or on an event-driven basis, such as upon the completion of a milestone.

5.4 Risk Management

The possible risk factors that can be faced during project develeopments are as follows:

The customer, visually impaired, although is familiar with using computers during training, he/she was getting help from a trainee to complete the testing process. when using our product the customer will be alone and use the computer by himself. Therefore our product should have a user-friendly interface.

- The product that we are developing is a software rather than a hardware. During developing the product we will has no chance to test the product with proper hardware (just use our own computers) . However, Visually impaired customer will use the product with a Braille –based tool and there is a risk of hardware failure. The feedbacks taken from Mr. Kapil enable us to decrease the risk of such hardware failures.
- Our product will need storage of some information(such as questions,answers,etc.) and the user should have reach necessary info as fast as possible during training. These will be handled through careful design and implentation of the product.
- During the development of the project every team members will be assigned a different task of the project and work on that part. During the testing, developers should compile their code together with other team members' code. There is a risk of incompatiple code parts that leads to failure in testing. During weekly meetings this issues will be covered and the optimal solutions will be argued to decrease the probability of the risk.

5.5 Project Close-out Plan

The project close-out will take place at the end of the project once all goals, objecives and deliverables have been met. In our project, there is no planning for now, because project cannot be withdrawn must be implemented in every possibility.

6. TECHNICAL PROCESS PLANS

6.1 Process Model

The Extreme Programming will be used, because it advocates frequent "releases" in short development cycles which is intended to improve productivity and introduce checkpoints where new customer requirements can be adopted.Also, it includes programming in pairs or doing extensive code review, unit testing of all code, avoiding programming of features until they are actually needed, a flat management structure, simplicity and clarity in code, expecting changes in the customer's requirements as time passes and the problem is better understood.

6.2 Methods, Tools and Techniques

The workflows will be performed in junction with the Extreme Programming. The product will be implemented in C# by using Microsoft Visual Ultimade. The tools that will be used during project develpment can be listed as:

Language	C#
API	.NET4, WinAPI, Office, IE and JAWS APIs
IDE	Visual Studio Ultimate
Database	Microsoft SQL Server
SVN	TortoiseSVN
Unit Testing	NUnit and NUnitCop(C# version of JUnit)
System Testing	Systin(C# version of Systir)
Logger	Log4net from Apache
Search	http://www.google.com/microsoft.html
GUI	Windows Presentation Foundation(WPF) DirectX

Table-6.1 : Tool list

6.3 Infrastructure Plan

The product will be developed using .NET 4.0 running on Windows 7 on a personal computer.

6.4 Product Acceptance Plan

Acceptance of the product by our client will be achieved by an automation tool that satisfies perfectly all requirements that are presented on RAD document, before the deadline.

7. SUPPORTING PROCESS PLANS

7.1 Configuration Management Plan

New versions of software systems are created as they change: For different machines/OS; Offering different functionality; Tailored for particular user requirements. Configuration Management aims to control the costs and effort involved in making changes to a system. In CTVIAT project configurations may be about the addition of the new types of questions all products of the software process namely specifications, designs, programs, test data and user manual have to be managed with an international standard such as IEEE standard for CM. However, in case of a database arrangement all products of the software process do not have to be managed.

7.2 Testing Plan

The testing workflow of the Extreme Programming will be performed. as the new code implemented unit tests will be performed. Since in our project, every team member will be assigned to every task to gain experience in every branch, we will going to take unit tests as follow: when one team member implemented a part of code another member will test his/her code and vice versa. Thus, every member will tale part in testing process, mainly Özge and Emmar.

7.3 Documentation Plan

Documentation will be produced as specified in the Extreme Programming, SCORE and course requirements. Moreover, task assignment is balanced so is implementation phase because each member will participate in implementation and document what s/he implemented.

7.4 Quality Assurance Plan

Quality Control aims to identify whether a product meets its specifications or not and to ensure that the results generated by the testing are correct. For CTVIAT, since customers' quality requirements are efficiency, reliability, security, etc and project developers' quality requirements are maintainability, reusability, completing the project on time within the budget, quality control will be made through the weekly meeting of the team members. During these meetings project manager control whether the project development progress continue and project management plan is followed as expected or not. If a problem is identified, such as latency, insufficient budget, etc, the project manager will be responsible to solve this issue with team friends. The quality assurance will be concerned with whether the right test is carried out and right results are delivered to right person at the right time or not. Mr. Kapil will be

informed at each step of project development and the team will develop the product according to reviews with him and feedbacks taken back such that project meets the customers' needs. Also quality documentation will be a record of the progress and support continuity of development if the members of team changes.

7.5 Reviews and Audits Plan

Every member will write some functionality and document her function specification. Then members will exchange their functions and test these functions according to written spec. Moreover, major test such as integration and system tests will be carried out by Emmar and Özge.

7.6 Problem Resolution Plan

Any major problems faced by team members will immediately reviewed by Mr. Kapil and instructor. Moreover, if any problem is faced in implementation, design can be relaxed and changed.

7.7 Independent Verification and Validation

Two principle objectives of V&V process are to discover of defects in the system and the assessment of whether or not the system is useful and useable in an operational situation. Therefore, to correctly produce the product with minimum number of defects we may need a V&V process at each stage of the software process. In the producing process static verification will be useful with the help of a code analyzer such as FxCop, StyleCop and Gendarme for C#. At the milestones and at the end of the production dynamic verification will be useful in which the system is executed with test data and its operational behavior is observed. Development process and V&V process are dependent with each other because the way followed in development process sometime will be determined by V&V process if there is a defect or a wrong operation during the execution.

7.8 Subcontractor Management Plan

Not applicable here.

7.9 Process Improvement Plan

Process improvement moves attention away from fault-finding or assigning blame and toward working as a team to eliminate wasteful activities and streamline productivity. To apply this, mentality of cooperation among team members will be adopted, instead of competition.

The team brainstorms to identify the base causes of certain difficulties within the process. It will then develop a possible plan for improvement, given these reasons. After implementing the changes, the group then tests for improvement. By comparing the data previously collected with current information, team members can recognize whether the adjustment has moved the project closer to desired results. If successful, it must still be established that the change is practical. If not, the team may return to the planning stage to refine the process. If the change is feasible, the group can either continue with the new process until further revision is necessary or return to the identification stage to discover how else the method can be refined.

8. ADDITIONAL PLANS

Additional components:

Milestones:

CTVIAT will be a teacher which asks questions that are broadly classified into 3 types:

- Objective
- Descriptive
- Action-based

Objective type questions are multiple choice questions where the student is given 4-5 answer options from which student can choose the right answer.

Descriptive type questions have descriptive answer which cannot be compared by program for its accuracy.

Action – based questions require the student to perform a specified task on his computer.

In first milestone, we will provide a live code that satisfy general requirements,

- Exercise topics can be separated into modules (editing, word, excel, etc.)
- Support for mp3 files as instruction and answer.
- Create specific question types(Objective, Descriptive, Action-based)
- The time taken is calculated
- Load old exam
- Repeat old exam

And also accessibility requirements those are keys to answer questions. Moreover, Unicode format and individual login are supported. To supply, general requirements we will provide question preparation template for descriptive and objective type questions. In the second milestone, we will start to support template for action—based questions related to editing, dialog, windows explorer, jaws help, word, excel, and other requested applications. Test control function will be completed. With this function, admin can generate individual reports based on each individual user's performance. In final version, CTVIAT will give hint students and also if necessary or requested by student like another try in a game which probably will entertain students, rollback with some minus points in action-based questions. Very user-friendly GUI also will be working. CTVIAT will make lives of teachers and students much easier.

Security:

A password can be needed to use the product to enable authorized logins. Thus, the admins and visually impaired can benefit program efficiently.

Training:

No training is planned because client is very far from developers but very detailed user manuals will supplied to client. Moreover, if client requests so, some guidance can be done by tele-conference on Skype.

Maintenance:

Corrective maintenance or enhancement can be performed voluntarily because this project has social responsibility but this has not been planned or requested yet.

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