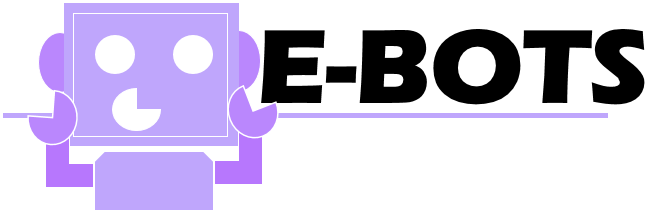
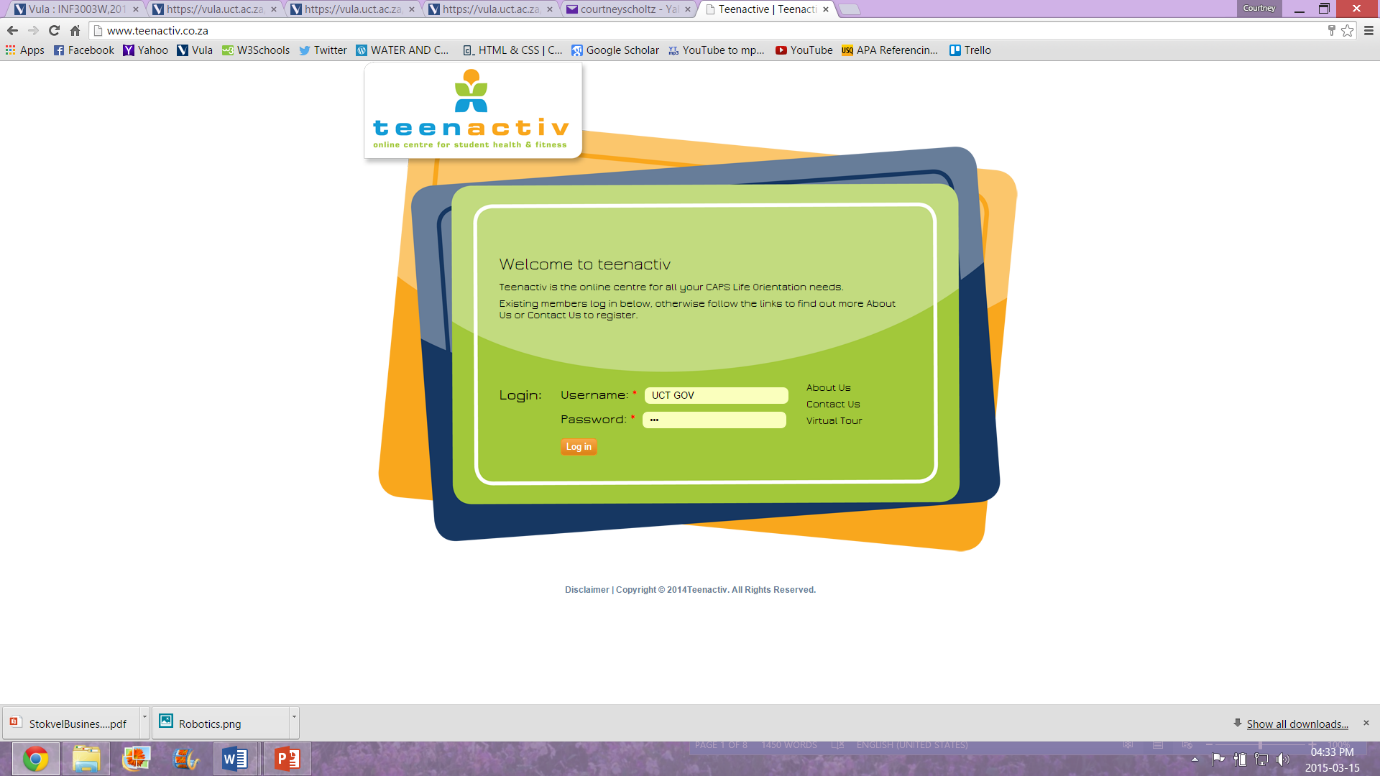
**University of Cape Town**

**INF3003W: Milestone 2 – User Requirements Specifications**



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# 1. Project Definition

|  |  |
| --- | --- |
| **Group Name:** E-Bots | **Group Leader:** Frauke Dietz |
| **Sponsor Name:** Teenactiv | **Contact Person:** Carsten Gertz |
| **Project Manager:** Elsje Scott | **Budget:** 6 Months |
| **Date:** 13/04/2015 | **Project Title:** eduActiv |
| **Project Description:**  To enhance teaching in South Africa, teachers will soon be required to engage in professional development activities. Therefore, there is an opportunity to create a web-based platform that will allow teachers to upload activities and manage their Continued Professional Teacher Development (CPTD) points online and for South African Council for Educators (SACE) members to be able to monitor teachers’ participation in professional development activities.  **Project Goal:**  The goal of this project is to create an interactive and intuitive web-based Continued Education Portal for teachers to manage their required CPTD points and for members of schools and SACE to be able to track teachers’ participation in professional development activities.  **Project Objectives:**   * **Develop an interactive Continuing Professional Teacher Development Portal (eduActiv)**   This portal assists teachers in organising their professional development by managing their CPTD points and activities on their personal Professional Development Portfolio (PDP), while it enables members of schools and SACE to track and monitor teachers’ participation in professional development activities. The portal allows teachers to earn their CPTD points through uploading type 1 activities. Schools can then upload type 2 activies for their teachers. External course providers upload type 3 activities for teachers. Teachers are given the opportunity to communicate via forums and share resources amongst themselves by making recommendations.   * **Provide functionality to generate reports**   Information about teachers’ CPTD points will be compiled in a report for schools and SACE to see teachers’ progress.   * **Provide functionality for automatic email notifications to be sent**   Teachers need to be informed when they haven’t been on the system for a month (30 days). This makes sure that they are constanly updating their portfolio.   * **Include gamification**   Develop gamification elements to be included in the website. This is to increase the usability of eduActiv. This also hopes to make the process of obtaining CPTD points less burdensome, more enjoyable and competitive.   * **Create an accessible and responsive website**   Develop a website that is accessible for all kinds of schools by catering for various devices including personal computers and tablets.   * **Include a prospective member teacher feature**   This will allow teachers to view the basic functionality of the website from the landing page. It also hopes to attract potential members and demonstrate the abilities of the website.  By achieving the system objectives the eduActiv system aims to:   * Provide the opportunity for teachers to upload activities and easily manage their CPTD accredited points on a personal Professional Development Portfolio   Give teachers the opportunity to communicate and share resources related to professional development activities   * Make learning and professional development for teachers more fun by involving user interaction gamification * Provide reports for SACE and school principals to review, compare and track teachers' participation in professional development activities | |
| **Priorities:**   1. ***Schedule*:** This is the given the highest priority due to the fixed deadline (11 September 2015) stipulated by the University of Cape Town (UCT) Information Systems Department for the completion of the project. The project has to be completed by this date to ensure that E-Bots successfully complete the INF3003W course. 2. ***Quality:*** The overall quality of the eduActiv system is very important, since it is being developed as a pilot project for a real client, Teenactiv, and may be potentially deployed to paying users in the future. It is important that the system works correctly and meets all the requirements. This is to maximise the benefits for Teenactiv and will ensure that they are satisfied with their involvement in this project. 3. ***Costs:*** For the purpose of this course, there are no major financial considerations. In this project the primary cost refers to man hours and time spent by E-Bots to design and develop the system. Given that the team consists of full-time IS students, costs are not as critical as the schedule and quality of the system. | |
| **Terms of Reference:**   * The predetermined project deadline is 11 September 2015 * eduActiv will be designed and developed for Teenactiv as a pilot project, which can then be modified or be used as a model for future use * eduActiv will be developed as a web-based application, which will be compatible with various devices (personal computers, laptops, and tablet computers) * All the necessary resources and support required for the successful development of eduActiv are readily available or can be acquired * eduActiv will be developed using ASP.NET MVC5. | |
| **Business Deadline:** 11/09/2015 | **Budget:** 6 Months |
| **Assumptions:** (*time/budget/resources/technical infrastructure*)   * Each teacher will have at least one accessible source to the internet via a personal computer, school computer or tablet computer * The devices used to access the web-based application have the necessary software installed * Users will have a sufficient amount of computer literacy skills * Development of system will take 6 months * Internet will be available at all times * E-Bots has the full support of the project sponsor * Users are willing to adopt the new system * Hardware and software required for the development of the system will be provided * All test data necessary for the pilot implementation of this web-application will be provided by a third-party * From 2016 it will be required for all teachers to obtain CPTD points | |
| **Related Projects:**   * INF3014F E-Commerce website project | |
| **Moral, Ethics & Legal Issues:**   * Insurance of privacy of users’ confidential details * Maintain integrity of data (reporting is based on current, complete and accurate data) * Test data provided by Teenactiv and third parties will be kept securely and will not be used for other purposeseduActiv remains the property of UCT * Teenactiv is not obliged to implement and use eduActiv upon completion of development * Should Teenactiv decide to implement any part of the eduActiv pilot system, E-Bots and UCT are not be liable for any maintenance, damages or costs | |







# 4. Activity Subsystem

The Activity subsystem allows a teacher upload Type 1 Activities. It allows them to upload proof of completion of Type 1 activities and complete a reflection and description of the Activity. By completing these Activities, they will be awardedboth Participation Points as well as CPTD Points.

## 4.1 Activity Diagram

### 4.1.1 Teacher uploads Type 1 Activity



*Figure 4.1 Activity diagram for teacher uploadingType 1 Activity*

## 4.2 Use Case Diagram

The use case diagram of the Activity subsystem shows the various use cases that can be executed within the subsystem.



*Figure 4.2 Use case diagram for Activity subsytem*

## 4.3. Extended Use Case Narrative

### 4.3.1 Upload Type 1 Activity

|  |  |  |  |
| --- | --- | --- | --- |
| ***Use Case Name:***  Upload Type 1 Activity | ***ID:***  1.1 | | ***Importance Level:***  High |
| ***Primary Actor:*** Teacher | | | |
| ***Purpose:***For a teacher to upload a Type 1 activity and obtain CPTD points through the successful upload of the activity | | | |
| ***Stakeholders and Interests:***  Teacher - to gain CPTD points  School - see progress of teachers | | | |
| ***Brief Description:***A teacher uploads a Type 1 activity by completing a reflection, description and uploading proof of completion. After the teacher has uploaded an activity, they are awarded internal and external points. These points are used by the gamification element of the system and to track the progress of teachers. | | | |
| ***Preconditions:***   * The teacher must be registered on the system * The teacher must be logged into the system | | | |
| ***Post Condition:***   * Internal and external points are awarded | | | |
| ***Related Use Cases:***  <<include>> 1.2 Allocate points  <<extend>> 1.4 Award badge or trophy  Game elements subsystem: various use cases | | | |
| ***Normal Flow of Events:*** | | | |
| ***Teacher*** | | ***System*** | |
| 1. Uploads activity | | 1. Details stored in the database | |
|  | | 1. Allocate internal and external points | |
| 1. Edit activity | |  | |
|  | | 1. Changes details in database | |
|  | |  | |
| ***Alternative/Exceptional Flow of Events:*** | | | |

## 4.4 Sequence Diagram

### 4.4.1 Teacher uploads Type 1 Activity



*Figure 4.4 Sequence diagram for teacher uploading type 1 activity*

## 4.5 State Machine Diagram

The state machine diagram below shows the different states which an activity can be in and how it transitions between them.



*Figure 4.5 State machine diagram for an activity*

# 5. Rewards Subsystem

The Rewards subsystem is responsible for awarding badges and trophies. Activities in this subsystem are triggered by activities being uploaded for and/or by a teacher.

## 5.1 Activity Diagram

### 5.1.1 Manage rewards

The Rewards subsystem manages the tracking of points and rewards. Once an activity is uploaded, the subsystem adds the allocated points, it then calculates the specific badge that the user will receive and allocates it to them. Depending on the teacher’s results, a reward can be given.



*Figure 5.1 Activity diagram for managing rewards*

## 5.2 Use Case Diagram

The use case diagram of the Game Elements subsystem shows the various use cases that can be executed within the subsystem.



*Figure 5.2 Use case diagram for Reward subsystem*

## 5.3. Extended Use Case Narrative

### 5.3.1 Update Level

|  |  |  |  |
| --- | --- | --- | --- |
| Use Case Name:  Give Reward | ID:  2.4 | | Importance Level:  High |
| Primary Actor: Reward subsystem | | | |
| Purpose: To manage and control the gamification elements of the eduActiv system. | | | |
| Stakeholders and Interests:  Teachers – view points, badges and trophies | | | |
| Brief Description: Once an activity has been uploaded for a teacher, the subsystem adds the allocated points and calculates the specific badge that the user will receive and allocates it to them. Depending on the teacher’s results, the trophy type will change. The teachers profile is then updated by the teacher subsystem. | | | |
| Preconditions:   * 150 CPTD points gives the user a gold trophy * 100 CPTD points gives the user a silver trophy * Below 100 CPTD points gives the user a bronze | | | |
| Post Condition:   * Update teacher profile | | | |
| Related Use Cases:  <<include>> 2.7. Check number of points | | | |
| Normal Flow of Events: | | | |
| Assessment Subsystem | | Game Elements Subsystem | |
| 1. Activity Uploaded | | 1. Calculate points | |
|  | | 1. Allocate points | |
| Alternative/Exceptional Flow of Events:  4a. No more activities uploaded   * 1. No badge or trophy | | | |

## 5.4 Sequence Diagram

### 5.4.1 Manage Rewards

This sequence diagram only shows the interactions of the various subsystems as the process is triggered by the marking of an uploaded activity, which takes place in the activity subsystem, not by an actor. The following sequence diagram therefore only shows interactions between different subsystems.



*Figure 5.4 Sequence diagram for managing Rewards*

\* Rewards and badges are only assigned to people if they complete certain tasks or receive high enough marks. They do not have to occur and they do not have to occur sequentially.

## 5.5 State Machine Diagram

The state machine diagram below shows the different states in which a reward can be in and how it transitions between them. This is for any game element (trophies and badges). Each instance of any of these rewards can be in any of these states. A reward can be allocated to a specific teacher and is archived when the teacher is archived.



*Figure 5.5 State machine diagram for a reward*

# 6. School Subsystem

The School subsystem allows a school representative to manage their school profile, view their teachers’ profiles, upload Type 2 activities and view reports.

## 6.1 Activity Diagram

### 6.1.1 View teacher profile

The TO-BE activity diagram below details the flow of events for a school representative accessing the profile of a teacher. This is so that they can see their teachers’ performance. It is assumed that the school representative is logged into the system already.



*Figure 6.1 Activity diagram for school representative viewing teacher profile and uploading Type 2 Activity*

## 6.2 Use Case Diagram

The use case diagram below shows what use cases can be performed by actors in the School subsystem. The school representative can be anyone from the school who makes use of the school profile. This could be the principal, head of department, administrator or any other relevant person.



*Figure 6.2 Use case diagram for School subsytem*

## 6.3. Extended Use Case Narrative

### 6.3.1 View teacher profile

|  |  |  |  |
| --- | --- | --- | --- |
| ***Use Case Name:***  Upload Type 2 Activity | ***ID:***  3.4 | | ***Importance Level:***  High |
| ***Primary Actor:***School (This could be a principal, administrator etc.) | | | |
| ***Purpose:***The school can upload Type 2 Activities for a teacher. | | | |
| ***Stakeholders and Interests:***  School - view progress of teachers | | | |
| ***Brief Description:***The school representative upload Type 2 Activities for teachers | | | |
| ***Preconditions:***   * The school representative must be registered on the system * The school representative must be logged on to the system * The school representative must have the right to view their teachers’ performance | | | |
| ***Post Condition:***  Points must be allocated | | | |
| ***Related Use Cases:***  None | | | |
| ***Normal Flow of Events:*** | | | |
| ***Staff Representative*** | | ***System*** | |
| 1. Request teacher profile | |  | |
|  | | 1. Retrieve teacher profile | |
|  | | 1. Display teacher profile | |
| 1. View teacher profile | |  | |
| 1. Upload Type 2 Activity | | 1. Allocate points | |
| ***Alternative/Exceptional Flow of Events:***  1a The school representative requests information that they are not authorised to see  1.1 The system does not show any information as the user is not authorised to view and displays an error message instead | | | |

## 6.4 Sequence Diagram

### 6.4.1 View teacher profile

This assumes that the school representative is logged into the system and is authorised to access their teacher’s profiles. They can only view these profiles, not modify them. The logging in process is illustrated in the sequence diagram for the staff subsystem and the process is the same here.



*Figure 6.4 Sequence diagram for school representative viewing teacher profile*

## 6.5 State Machine Diagram

The state machine diagram below shows the different states in which a school representative can be and how they transitions between them. This state machine diagram is the same as the staff state machine diagram as they can be in the same states.



*Figure 6.5 State machine diagram for a school representative*

# 7. Teacher Subsystem

The Teacher subsystem manages the profiles and points of each teacher. They can view or change their profile and upload Type 1 Activities using the activity subsystem. They can also be assigned rewards (e.g. trophies, badges) by the Reward subsystem.

## 7.1 Activity Diagram

### 7.1.1 Edit teacher profile

*\* Assumption- this activity diagram is dependent on the teacher already being logged in.* 

*Figure 7.1 Activity diagram for teacher editing profile*

## 7.2 Use Case Diagram

The Use Case Diagram below shows who the actors are in the Teacher subsystem and what each actor does.



*Figure 7.2 Use case diagram for Teacher subsytem*

## 7.3 Extended Use Case Narrative

### 7.3.1 Edit teacher profile

|  |  |  |  |
| --- | --- | --- | --- |
| Use Case Name:  Edit profile | ID:  1.3 | | Importance Level:  High |
| Primary Actor: Teacher | | | |
| Purpose: To ensure the teacher’s profile is up to date with current information and details of accomplishments. | | | |
| Stakeholders and Interests: eduActiv, administration staff. | | | |
| Brief Description: A teacher must manage his/her profile so that it is up to date. The system also updates the teacher’s profile with completed activities and progress reports. | | | |
| Preconditions:   * The teacher must be logged in to the system | | | |
| Post Condition:   * Reflect change in database | | | |
| Related Use Cases:  << include>> 1.4 Send automatic email notification | | | |
| Normal Flow of Events: | | | |
| User | | System | |
| 1. Teacher selects option to edit | |  | |
|  | | 2. System displays editable profile | |
| 3. Changes applicable fields | |  | |
|  | | 4. Validate changes | |
|  | | 5. Save changes to database and display confirmation | |
| Alternative/Exceptional Flow of Events:  4a Changes are not valid  4.1 Change is made in incorrect format (e.g. string instead of int for phone number)  4.2 The system does not update the staff details with the incorrect information and displays a meaningful error message  4.3 User can then make another change | | | |

## 7.4 Sequence Diagram

### 7.4.1 Edit teacher profile



*Figure 7.4 Sequence diagram for teacher updating profile*

## 7.5 State Machine Diagram

The state machine diagram below shows the different states a teacher can be in and how they transitions between them. This state machine diagram is the same as the staff state machine diagram as they can be in the same states.



*Figure 7.5 State machine diagram for a teacher*

# 8. Reporting Subsystem

The Reporting subsystem is responsible for generating, saving and exporting reports. It allows a user of the system to specify the report requirements and generate a report based on these. The report can also be saved and generated again at a later date, as well as exported and emailed at any time. Standard reports are also available.

## 8.1 Activity Diagram

### 8.1.1 Create New Dynamic Report

The Reporting subsystem requires that the user (teacher, school representative, SACE member and Admin staff) must be logged in before they can access any reports. If the user is authorised, it allows them to select a specific dynamic report type and if there is data available, they are able to view the report and then export it.

 *Figure 8.1 Activity diagram for viewing report*

## 8.2 Use Case Diagram

The use case diagram of the Reporting subsystem shows the various use cases that can be executed within the subsystem.



*Figure 8.2 Use case diagram for reporting subsystem*

## 8.3. Extended Use Case Narrative

### 8.3.1 Create New Dynamic Report

|  |  |  |  |
| --- | --- | --- | --- |
| Use Case Name:  View Report | ID:  4.2 | | Importance Level:  High |
| Primary Actor: Techer, school representative or staff member | | | |
| Purpose: The user is able to enter report criteria and the system generates the report based on these criteria. | | | |
| Stakeholders and Interests:  Teachers, staff, school representatives, Teenactiv and SACE | | | |
| Brief Description: The user selects the desired criteria for the new report. The system processes and generates the desired report based on these criteria. The user can then view the report, save the report criteria and export the report, if desired. | | | |
| Preconditions:   * The user must be registered and logged in * User must have permission to create a report | | | |
| Post Condition:   * Display the desired report * Display an option to save the report criteria * Display an option to export the report | | | |
| Related Use Cases:  <<include>> 4.3 Check Availability of Data for Report  <<exclude>> 4.6 Save New Report | | | |
| Normal Flow of Events: | | | |
| User | | System | |
| 1. Specify desired criteria | | 1. Process Report Criteria | |
|  | | 1. Generate Report | |
|  | | 1. Display Report, save option and export option | |
| 1. View Report | |  | |
| Alternative/Exceptional Flow of Events:  2a. Data not available for desired report  2.1. The system informs the user that the data is not available for the desired report and the report cannot be generated.  2.2. If the user wants to select a different type of report, return to 1.  Else terminate use case. | | | |

## 8.4 Sequence Diagram

### 8.4.1 Create new dynamic report

This assumes that the user is logged in and authorised to generate a report with the specified data in it. Standard reports will also be available, however the process below is for creating a report with new criteria.



*Figure 8.4 Sequence diagram for creating a new dynamic report*

## 8.5 State Machine Diagram

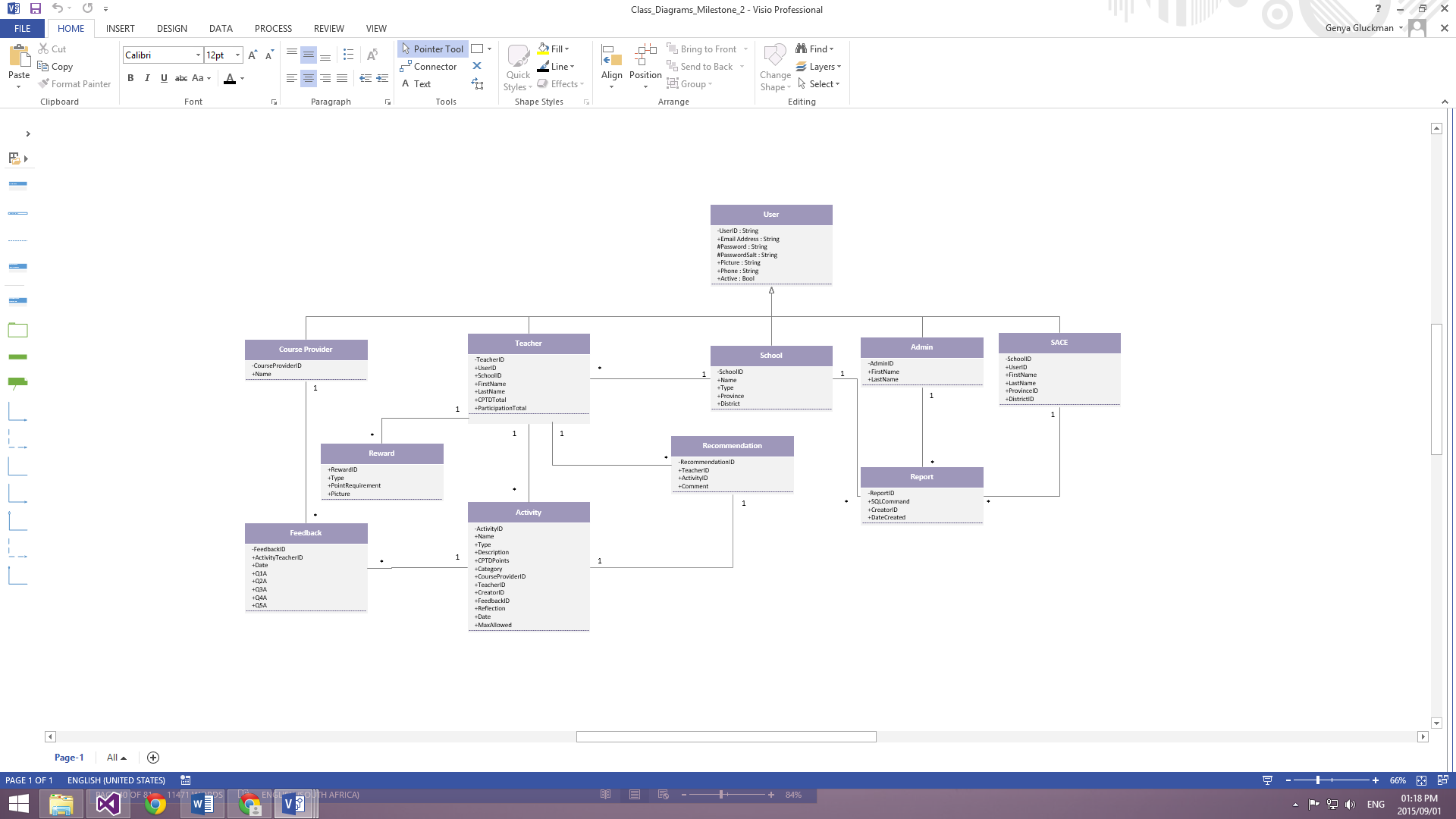
The state machine diagram below shows the different states a report can be in and how it transitions between them. This relates to both standard reports and dynamic reports.



*Figure 8.5 State machine diagram for a report*

# 9. Class Diagram

The analysis class diagram below shows the various classes and their attributes within the eduActiv system and the relationships between the classes.



*Figure 9 Analysis Class Diagram for eduActiv system*

# 10. Use Case Point Estimate

The purpose of the use case point estimate is to calculate the complexity of the eduActiv system that needs to be created, based on the actors in the system. This is done using the use cases identified above, which range from simple (e.g. automatic email notification) to complex (e.g. uploading content). Using these use cases, an estimate for the time and effort required to develop the system can be created.

This estimate is effected by four main factors namely:

* The numbers of actors in relation to their complexity level
* The number of transactions per use case
* The technical requirements for each use case
* The environmental factors

## 10.1 Unadjusted Actor Weighting (UAW)

The UAW assigns a complexity level to each of the actors that were identified in the use cases. The complexity level is assigned based on type of interaction that takes place (namely, through the API (application programming interface), a communication protocol or human interaction using the GUI (graphical user interface)).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Actor Category | Description | Weight | Number of Actors | Score |
| Simple | Actors who interact with the system through a well-defined API. | 1 | 3 | 3 |
| Average | Actors who interact with the system using a protocol-based interface. | 2 | 3 | 6 |
| Complex | Human actors who interact with the system through the GUI. | 3 | 5 | 15 |
| **Unadjusted Actor Weighting (UAW)** | | | | **24** |

## 10.2 Unadjusted Use Case Weighting (UUCW)

The unadjusted use case weighting takes into account each of the use cases and gives them a weighting based on the number of transactions involved in each. This will determine if the use case is **simple** (only access one database entity, has no more than 3 steps and involves less than 5 classes), **average** (accesses 2 or more database entities, has 4-7 steps and uses 5-10 classes) or **complex** (accesses 3 or more database entities, has more than 7 steps and uses more than 10 classes).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Use Case Type | Description | Weight | Number of Use Cases | Score |
| Simple | 1-3 transactions | 5 | 1 | 5 |
| Average | 4-7 transactions | 10 | 4 | 40 |
| Complex | 8 or more transactions | 15 | 2 | 30 |
| **Unadjusted Use Case Weight (UUCW)** | | | | **75** |

## 

## 10.3 Technical Complexity Factors

The technical complexity of the eduActiv system will impact on the time required to develop the system. These factors are each given a weighting from 0 to 5 (0 being no complexity and 5 being very important). A summary of the weighting given to each factor is specified in the table below. A detailed explanation of each factor can be found in appendix 1.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Factor | Description | Assigned Value  (0-5) | Weight | Reason | Weighted Value |
| T1 | Distributed System | 4 | 2 | eduActiv is an online platform that teachers can use to upload activities that they have completed. | 8 |
| T2 | Response time or throughput | 2 | 1 | There may be higher demands on system during certain times (e.g. deadlines for obtaining CPTD points) | 2 |
| T3 | End-user online efficiency | 5 | 1 | The website needs to be as easy to use as some of the users may lack computer skills | 5 |
| T4 | Complex internal processing | 4 | 1 | Calculations will need to be done for reporting purposes | 4 |
| T5 | Reusability of code | 4 | 1 | The eduActiv system is being designed to specifically meet the requirements of Teenactiv | 4 |
| T6 | Ease to install | 2 | 0.5 | The eduActiv system is a web based application which requires a teacher to log into the system | 1 |
| T7 | Ease of use | 2 | 0.5 | The online system will automatically start-up, backup & recover from an unexpected shut-down | 1 |
| T8 | Portability | 2 | 2 | The system will be accessed online. Various web-browsers must be able to render the website correctly. Must be compatible with mobile devices | 4 |
| T9 | Ease of change | 4 | 1 | Custom reports need to be available on an ad hoc basis. The assessments of teachers also need to be reflected straight away | 4 |
| T10 | Concurrency | 3 | 1 | eduActiv will need to be able to service a certain percentage of member teachers at any one time | 3 |
| T11 | Special security objectives | 3 | 1 | Authentification is required to access the online system. Users’ roles will also be managed carefully to give the minimum number of rights required. The system needs to keep track of teacher assessments and provide reliable data to the South African Council for Educators. Audit trails also need to be available | 3 |
| T12 | Direct access for third parties | 3 | 1 | eduActiv is a web-based system and allows transfer protocol interaction to the batch | 3 |
| T13 | Special user training | 1 | 1 | Some users may not be comfortable with computers and therefore need training. However, it will be made as easy to use as possible | 1 |
| **Technical Factor Value (TFactor)** | | | |  | *43* |

## 

## 10.4 Environmental Complexity Factors

The environmental complexity factors are used in a similar way as the technical complexity factors above. However, these factors relate to the environment in which the application will be developed. The EFactor calculated in the table below is then negatively considered when calculating the environmental complexity factor (ECF) in the next section.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Factor | Description | Assigned Value  (0-5) | Weight | Reason | Weighted Value |
| E1 | Familiarity with System | 2 | 1.5 | While studying at UCT the team has had exposure to OO concepts for various courses (INF1003S, INF2007F, INF2009F, INF2011S, INF3003W and INF3014F), but has only completed two entire systems | 3 |
| E2 | Application Experience | 0 | 0.5 | This will be the first application that E-Bots will create. This is also the first time we are developing a CPTD platform and using elements of gamification | 0 |
| E3 | Object Oriented (OO) Experience | 2 | 1 | The team has been working with advanced OO concepts in second and third year as IS majors at UCT | 2 |
| E4 | Lead Analyst Capability | 2 | 0.5 | These skills have been obtained through the courses at UCT | 1 |
| E5 | Motivation | 5 | 1 | The entire E-Bots team is dedicated to producing an excellent system. Time and work management are high priorities. Team members are prepared to help others when required and always finish work on time | 5 |
| E6 | Requirements Stability | 3 | 2 | Through meetings with the sponsor and project manager, the requirements of the system have been outlined | 6 |
| E7 | Part Time Staff | 1 | -1 | The sponsor and project manager have assisted in defining the project and the scope. | -1 |
| E8 | Difficulty of Programming Language | 0 | -1 | Where applicable, Jquery will be used | 0 |
| **Environmental Factor Value (EFactor)** | | | |  | *16* |

## 

## 10.5 Person Hours Multiplier

This multiplier is used to calculate the number of hours the system will take to be developed. It is based on past experience and calculates the number of man hours required per use case. The multiplier used for this project will be 28. The justification for this is provided under section 10.5.2 (Person Hours Calculation).

### 10.5.1Preliminary Calculations

#### Unadjusted Use Case Points (UUCP)

This shows the complexity of the system without considering technical and environmental factors. It shows how many hours the system would take to be developed without considering these factors.

UUCP = UAW + UUCW

= 24 + 75

= 99

#### Technical Complexity Factor (TCF)

(TCF) = 0.6 + (0.01 x TFactor)

= 0.6 + (0.01 x 43)

= 1.03

#### Environmental Complexity Factor (ECF)

(ECF) = 1.4 + (-0.03 x EFactor)

= 1.4 + (-0.03 x 16)

= 0.92

#### Adjusted Use Case Points (UCP)

This is an estimate of the number of person hours that the system will take to be developed. It takes into consideration the technological and environmental factors that impact the project but fails to consider the number of people working on the system, the number of hours that can be given to development per week and the person-hours multiplier.

UCP = UUCP x TCF x ECF

= 99 x 1.03 x 0.92

= 93.81

### 10.5.2 Person Hours Calculations

#### The Multiplier

The multiplier can range from 20 to 30. This is determined based on the experience of the team and should be calculated for each project independently. A higher number represents the relative inexperience of the team.

The multiplier for this project is calculated to be 28. This is based on the environmental complexity factors identified above.

This number is calculated by counting the number of factors that have a rating of less than 3 from E1 to E6 (3 factors are counted), and the number of factors that are greater than 3 for E7 or E8 (no factors are counted).

If the number of factors is 3 or 4, then the multiplier is taken to be 28.

#### Number of Person Hours

This shows the total number of hours that the system will take to be developed. It takes into account all of the factors identified above.

Person hours = UCP x PHM

= 93.81x 28

= 2 626.75 person hours

#### Weeks to develop system

We will assume that each team member will work on the eduActiv project for 4 hours a day, 5 days a week (including weekends). There are 5 team members and we assume that they will all work an equal number of hours.

The calculation below divides the total number of hours by the product of the hours spent per day, the days spent per week and the number of team members.

Weeks required = Person hours

(Hours x Days x Team members)

= 2 626.75 / (4x5x5)

= 26.27 Weeks

It is therefore calculated that this project will take about six and a half months to be completed, assuming the above conditions are met. This does not consider the programming week scheduled for June where the team will be spending 8 hours a day for at least 10 days on the development of the system.

# 11. Effort Estimate in Person Days

The effort estimate in person days is used to define an accurate estimate for the amount of time a project will take. It considers various estimates to try and find this. The abbreviations used for the various estimates are:

* OT – Optimistic Time (Shortest possible time required)
* MLT – Most Likely Time (The expected amount of time required. It will be between the optimistic and pessimistic time)
* PT – Pessimistic Time (Longest possible time required)
* ED – Estimated Duration (Calculation: ED = (OT +(4 \* MLT) + PT) / 6

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TASK** | **OT** | **MLT** | **PT** | **ED** |
| System Definition | 18.5 | 23 | 30.5 | 31.17 |
| Background | 1 | 1 | 1 | 1.0 |
| Situation of concern and opportunity | 1 | 1 | 2 | 1.2 |
| System objectives | 1 | 1 | 1 | 1.0 |
| Critical assumptions and constraints | 1 | 1 | 1 | 1.0 |
| AS-IS activity diagram | 1 | 2 | 2 | 1.8 |
| System scope | 1 | 1 | 2 | 1.2 |
| Package diagram and user-interaction package diagram | 1 | 2 | 3 | 2.0 |
| Prioritise and categorise subsystems | 0.5 | 1 | 1.5 | 1.0 |
| High level business requirements and Alternative solutions | 2 | 3 | 4 | 3.0 |
| Feasibility & risk assessments, Product quality assurance, Implementation plan and Recommendations to management | 5 | 6 | 7 | 6.0 |
| Work breakdown structure and Product structure model | 1 | 1 | 2 | 1.2 |
| High level Gantt chart | 1 | 1 | 2 | 1.2 |
| Review document | 1 | 1 | 1 | 1.0 |
| Management review and sign-off | 1 | 1 | 1 | 1.0 |
| System Analysis | 18 | 29 | 42 | 39 |
| Project definition | 1 | 1 | 2 | 1.2 |
| Activity diagrams | 1 | 2 | 3 | 2.0 |
| Use case diagrams | 1 | 2 | 3 | 2.0 |
| Use case narratives | 2 | 3 | 4 | 3.0 |
| Class diagram | 1 | 2 | 3 | 2.0 |
| Use case point estimate | 1 | 2 | 3 | 2.0 |
| Effort estimate | 1 | 2 | 3 | 2.0 |
| Windows navigation diagram | 1 | 1 | 2 | 1.2 |
| Sequence diagrams | 2 | 3 | 4 | 3.0 |
| State machine diagrams | 1 | 2 | 3 | 2.0 |
| Risk assessment | 1 | 2 | 3 | 2.0 |
| Budget assessment | 2 | 3 | 4 | 3.0 |
| Quality management plan | 1 | 2 | 3 | 2.0 |
| Review document | 1 | 1 | 1 | 1.0 |
| Management review and sign-off | 1 | 1 | 1 | 1.0 |
| System Design | 15 | 21 | 26 | 20.8 |
| UI design | 3 | 4 | 5 | 4.0 |
| Database design | 3 | 4 | 5 | 4.0 |
| Report design | 2 | 3 | 4 | 3.0 |
| Input, output and integrity controls | 2 | 3 | 4 | 3.0 |
| Test planning | 2 | 3 | 4 | 3.0 |
| Requirements validation | 1 | 2 | 2 | 1.8 |
| Review document | 1 | 1 | 1 | 1.0 |
| Management review and sign-off | 1 | 1 | 1 | 1.0 |
| System Build | 59 | 75 | 91 | 75 |
| Build database | 6 | 9 | 12 | 9.0 |
| UI build | 11 | 13 | 15 | 13.0 |
| System build | 40 | 50 | 60 | 50.0 |
| Inputs, outputs and validation controls build | 2 | 3 | 4 | 3.0 |
| Testing and implementation | 11 | 16 | 21 | 16 |
| Test cases | 3 | 5 | 7 | 5.0 |
| System documentation | 4 | 5 | 6 | 5.0 |
| Support documentation | 2 | 3 | 4 | 3.0 |
| User manual | 2 | 3 | 4 | 3.0 |
| Totals | 107.5 | 164 | 210.5 | 181.97 |

The table above shows that the project is likely to take 182 days (estimated duration). If everything goes well, it will only take 107.5 days (optimistic estimation) while if the worst-case scenario is experienced it will take 210.5 days (pessimistic estimation).

# 12. Windows Navigation Diagram

The diagram below gives a basic overview of the eduActiv system. It shows how a user can navigate through the website. The navigation bar (menu items) refers to the controls that are present on each webpage of the website to aid navigation.

*Figure 12 Windows navigation diagram*

# 13. Project Budget (Time)

The project budget is used and updated to ensure that E-Bots is on schedule in the development of the eduActiv system. This is important to ensure that the project will be completed timeously. To date E-Bots has only completed two milestones; the Business Case milestone and the User Requirements Specification milestone. The budget only focuses on these two milestones. The project budget table compares the actual number of days spent to work on components compared to the budgeted days. It allows E-Bots to see if their project is on schedule.

|  |  |  |  |
| --- | --- | --- | --- |
| **TASK** | **Budgeted Days** | **Actual Days** | **Difference** |
| Business Case Milestone | 23.6 | 23 | -0.6 |
| Background | 1.0 | 0.5 | -0.5 |
| Situation of concern and opportunity | 1.2 | 1.0 | -0.2 |
| System objectives | 1.0 | 1.0 | 0 |
| Critical assumptions and constraints | 1.0 | 1.0 | 0 |
| AS-IS activity diagram | 1.8 | 1.6 | -0.2 |
| System scope | 1.2 | 1.4 | +0.2 |
| Package diagram and user-interaction package diagram | 2.0 | 2.0 | 0 |
| Prioritise and categorise subsystems | 1.0 | 1.0 | 0 |
| High level business requirements and Alternative solutions | 3.0 | 3.2 | +0.2 |
| Feasibility & risk assessments, Product quality assurance, Implementation plan and Recommendations to management | 6.0 | 5.8 | -0.2 |
| Work breakdown structure and Product structure model | 1.2 | 1.0 | -0.2 |
| High level Gantt Chart | 1.2 | 1.0 | -0.2 |
| Review document | 1.0 | 1.5 | +0.5 |
| Management review and sign-off | 1.0 | 1.0 | 1 |
| URS Milestone | 29.4 | 29.2 | -0.2 |
| Project definition | 1.2 | 1.0 | -0.2 |
| Activity diagrams | 2.0 | 1.8 | -0.2 |
| Use case diagrams | 2.0 | 2.0 | 0 |
| Use case narratives | 3.0 | 3.2 | +0.2 |
| Class diagram | 2.0 | 2.0 | 0 |
| Use case point estimate | 2.0 | 2.0 | 0 |
| Effort estimate | 2.0 | 2.0 | 0 |
| Windows navigation diagram | 1.2 | 1.0 | -0.2 |
| Sequence diagrams | 3.0 | 3.2 | +0.2 |
| State machine diagrams | 2.0 | 2.0 | 0 |
| Risk assessment | 2.0 | 2.0 | 0 |
| Budget assessment | 3.0 | 3.0 | 0 |
| Quality management plan | 2.0 | 2.0 | 0 |
| Review document | 1.0 | 1.0 | 0 |
| Management review and sign-off | 1.0 | 1.0 | 0 |

Table 13 Project Budget Table (Time)

So far E-Bots has been ahead of schedule. Both deliverables have been completed before the due date. It is important for the team to stick to the schedule so that the project does not run over time and over budget. The project is on track to be finished by the 11th of September 2015.

# 14. Risk Assessment

A risk matrix is used to determine how likely a risk is to occur, what causes and triggers the risk, what could be done to avoid the risk and what to do after the risk occurs. This is done to try and avoid risks and to minimise their impact if they do occur. These risks are divided into three categories being high, medium and low risks. Within these categories the risks are separated into people risks, system risks and technology risks.

## 14.1 High risks:

### 14.1.1 People Risks

**Number 1**

Risk: Difficulty managing group dynamics

Description: There may be disagreements between E-Bots team members which may obstruct and delay productivity

Cause: Clashing personalities

Trigger: Pressure

Mitigation: Communication must occur between team members

Contingency: Mediation

## 14.2 Medium risks:

### 14.2.1 People Risks

**Number 2**

Risk: Lack of knowledge on MVC

Description: The team has no previous experience using MVC

Cause: The team might find it difficult to build the system

Trigger: MVC is only briefly covered in the Systems Development course

Mitigation: Learn how to use MVC efficiently and effectively, before coding begins

Contingency: Get tutor help

**Number 3**

Risk: Lack of help

Description: Tutors and lecturers have limited time so they may not be able to help when needed

Cause: Limited budget for UCT to pay tutors

Trigger: The team gets stuck on a problem that they cannot solve

Mitigation: Source external help online

Contingency: Try use external resources and resources available on the Internet to solve the problem

**Number 4**

Risk: Lack of skills

Description: The E-Bots team might lack the necessary skills to create the eduActiv system (especially experience with implementing gamification) and this may cause a time delay

Cause: A team member does not have sufficient knowledge to complete a task

Trigger: Complex problem or lack of knowledge

Mitigation: Gain the necessary skills to build the system

Contingency: Ask team members or external people for help if there is a problem

**Number 5**

Risk: Scope creep

Description: The project has unrequired functionality

Cause: SMART objectives are not met

Trigger: Broad and vague requirements

Mitigation: Create and follow the SMART principle for defining project and system objectives. That includes, defining objectives that are Specific, Measurable, Achievable, Realistic and Timeous. This will ensure that he project is of a realistic scope and will eliminate scope creep, provided they are followed

Contingency: Reduce the scope of the project

**Number 9**

Risk: Poor time management

Description: Poor time management can lead to the project deliverables and the project solution not being delivered on time

Cause: Poorly followed schedule

Trigger: Time wasted on menial tasks

Mitigation: Include buffers in the schedule and prioritise tasks

Contingency: Put in extra hours of work to make up lost time

**Number 13**

Risk: Teachers might not have the technological skills to use the eduActiv system

Description: This is the first time teachers are using a system to earn CPTD points so they do not have the knowledge to use the system

Cause: The teachers do not complete assessments

Trigger: Teachers do not have the knowledge to complete assessments

Mitigation: The system will be user-friendly and a user manual will be provided online

Contingency: Teachers will have training on how to use the system. A contact page will be available for further individual queries and help

**Number 14**

Risk: Conflict between E-Bots and the sponsor

Description: Unclear functional requirements or lack of feedback may result in conflict between the E-Bots team and the sponsor

Cause: The sponsor will lose interest in the project

Trigger: Clashing interests

Mitigation: Constant communication must be maintained

Contingency: Issues must be solved as soon as possible

**Number 15**

Risk: Teachers reluctance to use the system

Description: This will arise if the teachers transfer their negative feelings about having to do CPTD points to the system

Cause: The teachers do not complete assessments or make use of the platform

Trigger: Teachers lack time or motivation to make use of the platform

Mitigation: The team will try to make the site as appealing as possible by using gamification

Contingency: Increase incentives which will encourage teachers to use the system

### 14.2.2 System Risks

**Number 6**

Risk: Shortage of time

Description: There is an unchangeable deadline of 11 September 2015

Cause: The project is not completed on time or the project is no up to a satisfactory standard

Trigger: Poor time management

Mitigation: Buffers will be used in scheduling and the schedule will be strictly followed

Contingency: The scope will need to be decreased if the project does not finish on time. If it is picked up early enough, the scope may be able to remain unchanged if the schedule can be adjusted

**Number 7**

Risk: Poor quality

Description: The system has not been built to a sufficient standard

Cause: Poor quality management

Trigger: Poor system design

Mitigation: Create and follow a quality assurance plan

Contingency: Improve the quality of the system

**Number 8**

Risk: Loss of data

Description: During development loss of data may occur

Cause: Technological failure or lack of back ups

Trigger: Unexpected system downtime in development environment or power failures

Mitigation: Load shedding schedules will be consulted regularly. Backups will also constantly be created and the Team Foundation Server (TFS) will be used to manage code

Contingency: The team will attempt to recover the data using the above mentioned methods

**Number 10**

Risk: Difficult meeting sponsor's requirements

Description: The sponsor may not approve of our final project solution because it may not meet the sponsor’s requirements

Cause: Requirements are not outlined clearly and correctly

Trigger: Documentations are not accurate and detailed enough

Mitigation: There needs to be continuous requirement evaluation

Contingency: Update the system so that it meets sponsors requirements

**Number 11**

Risk: Difficulty creating a system that adjusts for different screen sizes on various devices

Description: The system needs to be compatible with many different screen sizes (desktops, laptops, tablets and mobile phones)

Cause: Users are not able to view the system on different screen sizes

Trigger: There is a high demand for viewing the system on different screen sizes

Mitigation: Bootstrap will be used to help make the site responsive to the size of the output screen

Contingency: Update the compatibility of the system so that it can adjust to different screen sizes

### 14.2.3 Technology Risks

**Number 12**

Risk: Technology is always changing

Description: Technology is always changing so it is difficult to keep up with it

Cause: The system needs to be compatible with a variety of different environments. The version of Moodle also needs to be updated

Trigger: Technology being outdated

Mitigation: The eduActiv system will need to be updated regularly to support new platforms while still being able to run on old platforms

Contingency: Constantly update the system so that it works with the latest technology

## 14.3 Low risks

### 14.3.1 People Risks

**Number 16**

Risk: Team members may have to deal with personal issues

Description: An unforeseen personal issue may mean that a team member is not able to contribute

Cause: Certain tasks are not completed

Trigger: Personal issues

Mitigation: Nothing can be done to reduce the risk of a team member having personal issues. The impact can be reduced by ensuring that more than one team member is involved in each aspect of the project

Contingency: The team must gain enough knowledge to continue to an extent without the help of the missing team member

**Number 17**

Risk: The sponsor may get sick at any time

Description: The E-Bots team needs to be in constant contact with the sponsor. If the sponsor is sick then this could delay the project

Cause: Certain tasks are not completed

Trigger: The sponsor gets sick

Mitigation: Nothing can be done to stop the sponsor from getting sick

Contingency: The team must gain enough knowledge to continue to an extent without the help of the sponsor

**Number 18**

Risk: Team members may get sick at any time

Description: Team members have certain tasks that they need to do, if they get sick then they cannot do these tasks

Cause: Certain tasks are not completed

Trigger: A team member gets sick

Mitigation: Encourage team members to live a healthy lifestyle

Contingency: The team must then work together and redistribute the tasks that the sick member was supposed to complete

## 14.4 Risk Table

The main table in this section summarises the risks that have been detailed above. It also assigns a status to each risk based on the following criteria in the table below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Likelihood*** |  | ***Consequences*** | | |
| Minor | Moderate | Major |
| Probable |  |  |  |
| Possible |  |  |  |
| Improbable |  |  |  |

*Table 14.1 Risk rating*

Green = Low risk

Yellow = Medium risk

Red = High risk

The threats in red are more likely to occur and will have a larger impact. The team must therefore focus on mitigating these risks to prevent them from occurring.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***Number*** | ***Rank*** | ***Risk*** | ***Probability*** | ***Impact*** | ***Category*** | ***Owner*** | ***Status*** |
| R1 | 1 | Difficulty managing group dynamics | High | Medium | People | Team | Red |
| R2 | 2 | Lack of knowledge on Moodle | Low | Medium | People | Team | Yellow |
| R3 | 3 | Lack of help | Medium | Medium | People | Team | Yellow |
| R4 | 4 | Lack of skills | Medium | Medium | People | Team | Yellow |
| R5 | 5 | Scope creep | High | Low | People | Team Leader | Yellow |
| R6 | 6 | Shortage of time | Medium | Low | System | Team | Yellow |
| R7 | 7 | Unsubstantial quality | High | Low | System | Team | Yellow |
| R8 | 8 | Loss of data | High | Low | System | Team Leader | Yellow |
| R9 | 9 | Bad time management | High | Low | People | Team | Yellow |
| R10 | 10 | Difficultly meeting sponsor’s requirements | High | Low | System | Team | Yellow |
| R11 | 11 | Difficulty creating a system that adjusts for many different screen sizes | Medium | Medium | System | Team | Yellow |
| R12 | 12 | Technology is always changing | High | Low | Technology | Team | Yellow |
| R13 | 13 | Teachers might not have the skill to use the system | High | Low | People | Team | Yellow |
| R14 | 14 | Conflict between the team and the sponsor | Medium | Medium | People | Team | Yellow |
| R15 | 15 | Teachers reluctance to use the system | Medium | Medium | People | External factors | Yellow |
| R16 | 16 | Team members may have to deal with personal issues | Medium | Low | People | Team | Green |
| R17 | 17 | The sponsor may get sick at any time | Low | Low | People | Team | Green |
| R18 | 18 | Team members may get sick at any time | Medium | Medium | People | Team | Green |

*Table 14.2 Risk assessment table*

# 15. Project Quality Management

## 15.1 Version History

It is important to create and store different versions of the eduActiv System during development, to remove errors and to ensure quality control and efficiency over the database and user interface (UI) design. Version control allows for the documenting of version history, including development and distribution, throughout the project lifecycle up to the final review and approval.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Version # | Implemented by | Revision Date | Approved by | Approval Date | Reason |
| **1.0** | E-Bots | 15/06/2015 | Team, Project Manager (Elsje Scott) & Teenactiv (sponsor) | 15/06/2015 | First Version |
| **1.1** | E-Bots | 19/07/2015 | Team | 22/07/2015 | Correction of errors |
| **1.2** | E-Bots | 29/07/2015 | Team | 07/08/2015 | Database changes |
| **1.3** | E-Bots | 10/08/2015 | Team & Teenactiv | 15/08/2015 | User interface (UI) improvements |
| **1.4** | E-Bots | 16/08/2015 | Team | 23/08/2015 | Assessment Included |
| **1.5** | E-Bots | 24/08/2015 | Team | 30/08/2015 | Gamification included |
| **1.6** | E-Bots | 01/09/2015 | Team | 05/09/2015 | Reports included |
| **2.0** | E-Bots | 05/09/2015 | Team, Elsje Scott & Teenactiv | 07/09/2015 | Final version – full functionality |

## 15.2 Introduction

### 15.2.1 Purpose of the Project Quality Management Plan

The purpose of the Project Quality Management Plan is to document the processes and responsibilities that are required throughout the development lifecycle to keep control of and manage the quality for the eduActiv project. The eduActiv Project Quality Management Plan consists of the project’s quality framework, guidelines, application and roles and responsibilities to ensure consistency and quality from start to finish. It consists of 3 sections namely Quality Planning (QP), Quality Assurance (QA) and Quality Control (QC).

The plan was created during the planning phase and involves the tasks that are relevant from the initiation phase right through to the implementation phase. Those who will use the Project Quality Management Plan include the development team, project manager and sponsor, as well as other leaders involved in the support of the project plan.

## 15.3. Project Quality Management Overview

### 15.3.1 Organisation, Responsibilities, and Interfaces

This section describes the primary roles and responsibilities of the project team, project manager and the sponsor.

|  |  |  |
| --- | --- | --- |
| Role | Name | Quality Responsibility |
| Team Manager | Frauke Dietz | Delegate responsibilities and ensure overall quality and effort |
| Operations Officer | Michelle Huggins | Ensure compliance with work requirements |
| External communications officer | Genya Gluckman | Organisation of meetings and correspondence between team and sponsor |
| Internal communications officer | Lyandra Jones | Organisation of meetings with team and project manager, ensure all team members contribute |
| Quality officer | Courtney Scholtz | Review documents to ensure high quality |
| Chief Programmer | Lyandra Jones | Provide assistance with programming concerns and ensure all programming is of a high standard. Ensure full functionality of a working system |
| Chief Researcher | Frauke Dietz | Ensure all assumed knowledge is correct and that new knowledge gained is accurate |
| Chief Documenter | Courtney Scholtz | Provide assistance with document related concerns and ensure all documentation is of a high standard |
| Documentation Collaborator | Genya Gluckman | Compile the documents and ensure that the documentation is of a high standard |
| Project Manager | Elsje Scott | Provide guidance to ensure that the project is of the required standard |
| Project Sponsor | Carsten Gertz (Teenactiv) | Provide quality requirements and provide support to meet these requirements |

### 15.3.2 Tools, Environment, and Interfaces

The table below describes the data elements that will be used to measure project quality and level of conformance to defined quality standards.

|  |  |
| --- | --- |
| Tool | Description |
| Benchmarking | Industry recognised benchmarks |
| Coding standards | Follow industry standards |
| GUI style guide | Adhere to conventional GUI (graphical user interface) standards |
| Project auditing | Adhere to good coding standards |
| ISO standards | Document adheres to ISO (International Organization of Standardization) |
| Technical documents | Adhere to set procedures for documentation |
| Database design guide | Adhere to database design standards including normalisation steps |

## 15.4. Project Quality Management

At the highest levels, Quality Management involves planning, doing, checking and acting to improve project quality standards. The Project Management Institute’s PMBOK Guide (Project Management Body Of Knowledge) breaks the practice of Quality Management into three process groups: Quality Planning (QP), Quality Assurance (QA) and Quality Control (QC). In the next section, the way in which the project will apply each of these practice groups will be defined, as well as how they will be monitored. The control quality standards will also be defined.

### 15.4.1 Quality Planning (QP)

Quality planning is the process by which quality standards are relevant to the project and how the activities performed aim to satisfy them. These activities include: appropriate quality metrics and measures for standards for project processes, product functionality, regulatory compliance requirements, project deliverables, project management performance, documentation, and testing. Quality planning also aims to identify the acceptance criteria for project deliverables and product performance.

Quality planning can be performed through adhering to industry recognised standards relating to GUI style, database design and coding practices. The project will also be audited to ensure that coding standards are being adhered to.

If these standards are adhered to properly there is a higher chance of user acceptance, error-free code and effective interactions between the subsystems.

#### 15.4.1.1 Defining Project Quality

Teenactiv is expected to provide us with all the necessary information that E-Bots will need in order to build the web application and database. This project aims to meet all the user requirements and standards as specified by Teenactiv.

Any additional aspects that need to be considered such as laws, rules or standards associated with the project should be discussed by the E-Bots team with the project manager (Elsje Scott) as well as with Teenactiv.

The goal of this project is to provide teachers with a user friendly platform on which they can earn their CPTD points. Below is a list of the important success factors:

* User acceptance
* Sufficient resources
* Efficient data capturing
* An intuitive design
* Supply accurate reports
* Ensure that reminders are sent out about looming deadlines

The documentation and all the deliverables produced by E-Bots will be submitted to the project manager (Elsje Scott) and the project sponsor (Carsten Gertz) on a weekly basis to evaluate and assess whether the level of quality of the project is appropriate, and whether or not E-Bots is on the right track. The feedback that the project manager and project sponsor provide will be used to improve the level of quality of the project and to ensure that the project is still within the scope and predetermined requirements set out by Teenactiv.

#### 15.4.1.2 Measuring Project Quality

Numerous methods will be used in order to ensure that a high-quality web-based application is delivered. E-Bots will decide on ways in which to measure the results after applying these methods. This allows E-Bots to track whether the methods that are implemented are sufficiently upholding the quality of the project. Methods to be included:

* Unit testing
* Integration testing
* Component testing
* Code walkthroughs (with all E-Bots’ members)
* Project auditing
* Project monitoring
* Coaching and advice
* User acceptance testing

### 15.4.2. Quality Assurance (QA)

The E-Bots team has made quality an important aspect of their project. In doing so, the final system should include several high standard procedures and actions that will help create a high quality solution.

E-Bots is required to meet with the project sponsor and project manager frequently to gain feedback and input to go forward throughout the project’s progression. Each team member is required to review each other’s input, to create equal level of quality across the project. Finally the project manager is obligated to assess the work and provide meaningful feedback on quality assurance. Deadlines should always be met to ensure work is of high quality and nothing was done under stressful and time limited circumstances that could increase inefficiency or negatively impact quality. It will also reduce errors and increase the likelihood of the project’s final hand-in being on time.

#### 15.4.2.1. Analysing Project Quality

In order to analyse project quality, the E-Bots team must ensure quality control measures and reviews are put in place. This will aid in the identification of areas that need more attention and enhancement to the eduActiv system. Finding faults and identifying opportunities for improvement are successful ways in which quality can be enhanced. Organising regular meetings and having discussions will aid this process.

#### 15.4.2.2. Improving Project Quality

Once opportunities for improvements are identified, team members should plan meetings to provide for the discussion and decision-making processes in order to implement solutions. An example of this would be replacing an inefficient code technique with one that will complete the task quicker.

Additionally the team must make necessary improvements and document them to create quality output. The project manager is then kept up to date with these modifications and provides additional feedback and evaluation of quality.

### 15.4.3. Quality Control (QC)

Quality control is focused on ensuring that the requirements stated in the quality assurance section are not only met, but are also of a high quality. It is important to make sure that the head programmer of E-Bots (Lyandra Jones) ensures a high quality coding standard received from each team member. The head programmer will also go through the code and make improvements accordingly. This should be done using weekly walkthroughs with the whole E-Bots team.

The code must be backed up in cloud storage and on other physical hardware such as external hard drives. Code must also be reviewed in order to ensure that good coding standards are being followed, for example, naming standards. The GUI must be intuitive and meet the standard UI design principles (Schneiderman’s 8 Golden Rules) as well as be tested by volunteer users to ensure user friendliness. Along with GUI testing, bugs in the code must also be reported and addressed by the whole E-Bots team. The entire database must be normalised in terms of attributes, tables, primary keys and foreign keys ensuring integrity throughout the database and system.

All final documents and code will be evaluated by the sponsor (Teenactiv) as well as the project manager (Elsje Scott) in order to assess the quality of the eduActiv system. This will ensure a high quality result aided by the approval of users through user acceptance testing in order to produce a successful web application.

# 16. Updated Gantt Chart

See electronic hand-in.

# Appendix 1 – Detailed Technical Complexity Factors

**T1.Distributed System – does system have distributed or centralized architecture?**

0 no transfer of data

1 prepares data for another component

2 data prepared & then transferred

3 if single direction online data transfer

4 if online data transfer in both directions

5 if dynamic processing

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | eduActiv is an online platform that teachers can use to access various resources and Type 3 assessments. They can also upload proof of completion of Type 1 and Type 2 assessments | **Rating:** | 4 |

**T2.Response time or throughput**

0 no requirements

1 no special attention to response times or throughput

2 if response time & throughput critical at peak times

3 if response time & throughput critical during business hours

4 if user performance requirements stringent & require performance analysis in design phase

5 if performance analysis tools needed in design, development & implementation phases

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | There may be higher demands on system during certain times (e.g. if CPTD points have to be obtained by a certain date) | **Rating:** | 2 |

**T3. End-user online efficiency– functions provided by app. May include menus, navigation aids, help, scrolling, F keys, reverse video, highlighting, pop ups, as few screens as possible, multilingual support etc.**

0 if none

1 if 1-3

2 if 4-5

3 if 6 or more with no specific user requirements

4 if 6 or more with stated specific user requirements demanding human factors to be included

5 if 6 or more with stated specific user requirements demanding specific tools & processes be used to demonstrate requirements achieved

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | The website needs to be as easy to use as possible as some of the users may lack computer skills | **Rating:** | 5 |

**T4. Complex internal processing – includes sensitive control &/or app specific security processing, extensive logical processing, extensive mathematical processing, exception processing, multiple I/O possibilities**

0 if none

1 if any 1

2 if any 2

3 if any 3

4 if any 4

5 if any 5

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | Calculations will need to be done for reporting purposes | **Rating:** | 4 |

**T5. Reusability of code – degree to which app will be useable in other apps**

0 if no reusable code

1 if reusable code is used within app

2 if less than 10% of app can be considered more than 1 apps needs

3 if 10% or more of app can be considered more than 1 apps needs

4 if app developed specially to ease reuse. Customizable at source level

5 if app designed specially to ease reuse. Customizable at source level by parameter

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | The eduActiv system is being designed to specifically meet the requirements of Teenactiv | **Rating:** | 4 |

**T6. Easy to Install – ease of conversion & installation**

0 if no special considerations stated by user. No special setup required.

1 if no special considerations stated by user. Special setup required.

2 conversion & installation requirements stated by user. Impact not considered important.

3 conversion & installation requirements stated by user. Impact considered important.

4 in addition to 2, automated conversion & installation tools provided & tested

5 in addition to 3, automated conversion & installation tools provided & tested

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | The eduActiv system is a web-based application which requires a teacher to log into the system before they can gain access | **Rating:** | 2 |

**T7. Ease of use – efficiency & effectiveness of start-up, backup, & recovery**

0 no special considerations stated other than normal backups

1-4 select from list, each feature given below counts as 1 unless noted otherwise

a) Effective start-up, backup & recovery processes provided, but operator intervention required

b) Effective start-up, backup & recovery processes provided, but no operator intervention required

c) Application minimizes need for media handling

d) Application minimizes need for paper handling

5 App is designed for unattended operation. Automatic error recovery.

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | The online system will automatically start-up, backup & recover from an unexpected shut-down | **Rating:** | 2 |

**T8. Portability - degree to which app designed to be installed & operated at multiple sites**

0 only 1 site

1 app designed to operate only under identical hardware and software environments

2 app designed to operate only under similar hardware and software environments

3 app designed to operate only under different hardware and software environments

4 documentation & support plan provided & tested for 1 or 2

5 documentation & support plan provided & tested for 3

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | The system will be accessed online. Various web-browsers must be able to render the website correctly. Must be compatible with mobile devices | **Rating:** | 2 |

**T9. Ease of change – degree app was developed to facilitate change. Select items from list, each item counts as indicated:**

1. Flexible query/report facility to handle simple requests (1)

2. Flexible query/report facility to handle complex requests (>1 file) (2)

3. Flexible query/report facility to handle .complex requests (>1 file) (3)

4. Control data kept in tables & maintained online. Changes take effect next day (1).

5. If changes take effect immediately (real-time) counts as 2.

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | Custom reports need to be available on an ad hoc basis. The assessments of teachers also need to be reflected straight away | **Rating:** | 4 |

**T10. Concurrency – large numbers of users working with locking support?**

0 only 1 user at a time

1 app designed to operate with less than 5 users concurrently

2 app designed to operate with less than 50 users concurrently

3 app designed to operate with less than 100 users concurrently

4 app designed to operate with less than 1000 users concurrently

5 app designed to operate with over a 1000 users concurrently

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | eduActiv will need to be able to service a certain percentage of member teachers at any one time. | **Rating:** | 3 |

**T11. Special security objectives included**

0 if no special considerations stated by user. No special security required.

1 if no special considerations stated by user. Special security required.

2 security requirements stated by user. Impact not considered important.

3 security requirements stated by user. Impact considered important.

4 in addition to 2, automated security tools provided & tested

5 in addition to 3, automated security tools provided & tested

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | Authentification is required to access the online system. Users’ roles will also be managed carefully to give the minimum number of rights required. The system needs to keep track of teacher assessments and provide reliable data to the SACE. Audit trails also need to be available | **Rating:** | 3 |

**T12. Direct access for third parties**

0 if pure batch or stand-alone PC

1 if batch with remote data entry or printing

2 if batch with remote data entry & remote printing

3 if TP front-end links to batch

4 if more than a front-end with one type of TP

5 if more than 1 type of TP protocol

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | eduActiv is a web-based system and allows transfer protocol interaction to the batch | **Rating:** | 3 |

**T13. Special User training required**

0 no user training required

1 one day course required for general users

2 two day course required for general users

3 one week course required for general users

4 two week course required for general users

5 extensive courses required for general users

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | Some users may not be comfortable with computers and therefore need training. However, it will be made as easy to use as possible. | **Rating:** | 1 |

# Appendix 2 - Detailed Environmental Complexity Factors

**E1 Familiarity with system – are people working on project familiar with OO domain and technical details of project?**

0 if first time using OO

1 if team has worked on 1 OO project before

2 if team has worked on 2 OO projects before

3 if team has worked on >3 OO projects before

4 if team has worked on >10 OO projects before

5 if team has worked on >20 OO projects before

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | While studying at UCT the team has had exposure to OO concepts for various courses (INF1003S, INF2007F, INF2009F, INF2011S, INF3003W and INF3014F), but has only completed two entire systems. | **Rating:** | 2 |

**E2 Application experience – what experience do people have with the application?**

0 if first time using working on this type of application

1 if team has worked on one standalone app before

2 if team has worked on several standalone apps before

3 if team has worked on several client/server apps before

4 if team has worked on an enterprise app before

5 if team has worked on several enterprise apps before

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | This will be the first application that E-Bots will create. This is also the first time we are developing a CPTD platform and using elements of gamification | **Rating:** | 0 |

**E3 Object-oriented experience – knowledge of OOP concepts**

0 if team never used OO before

1 if team has 1 years OO working experience

2 if team has 2 years OO working experience

3 if team has >2 years OO working experience, including advanced OO concepts

4 if team has worked on full 3 tier web based apps with advanced OO concepts

5 if team has worked on advanced integrated apps with other OO packages

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | The team has been working with advanced OO concepts in second and third year as IS majors at UCT | **Rating:** | 2 |

**E4 Lead analyst capability – knowledge of the domain**

0 if lead analyst has never used OO before

1 if lead analyst has worked with OO programs

2 if lead analyst has OO experience and knowledge of UML modelling

3 if lead analyst has OO experience and a sound knowledge of UML, Agile modelling etc.

4 if lead analyst has experience with full 3 tier web based apps

5 if lead analyst has experience with large integrated enterprise applications

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | These skills have been obtained through the courses at UCT. | **Rating:** | 2 |

**E5 Motivation – team motivation**

0 if high absenteeism (more than 1 day per person per month)

1 if moderate absenteeism (members miss meetings)

2 if members arrive late for meetings have to be pushed to start work

3 if members mostly on time, usually start work on own, sometimes look for extra work

4 if members always on time, self-start work, always looking for extra work, commitment

5 if team absenteeism is low, try to accomplish meaningful goals, always trying to improve, always trying to help each other, can work independently, and show commitment

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | The entire E-Bots team is dedicated to producing an excellent system. Time and work management are high priorities. Team members are prepared to help others when required and always finish work on time | **Rating:** | 5 |

**E6 Requirements stability – is scope clear and well defined**

0 Scope not well defined

1 URS, WBS & PBM unclear and lacking detail

2 URS, WBS & PBM clear and well defined

3 URS, WBS & PBM clear and well defined, project justified

4 URS, WBS & PBM clear and well defined, project justified, and success criteria detailed

5 All the requirements (URS), all the work (WBS) and all the products (PBM) of the project clearly defined, project justified, and success criteria detailed, and project charter signed.

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | Through meetings with the sponsor and project manager, the requirements of the system have been outlined | **Rating:** | 3 |

**E7 Part time staff – are there part-time staff (consultants) on the project**

0 zero part time staff or consultants

1 part time staff or consultants will do <5% of work

2 part time staff or consultants will do <10% of work

3 part time staff or consultants will do <20% of work

4 part time staff or consultants will do <50% of work

5 part time staff or consultants will do >50% of work

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | The sponsor and project manager have assisted in defining the project and scope | **Rating:** | 1 |

**E8 Difficulty of programming language**

0 if using non structured programming languages e.g. HTML

1 if using structured programming language e.g. Pascal

2 if using OO programming language e.g. C

3 if using OO programming language with full OO capability and advanced features e.g. C++

4 if using event driven OO programming language with full OO capability e.g. Java

5 if using fully integrated OO development environment e.g. .Net

|  |  |  |  |
| --- | --- | --- | --- |
| **Reason:** | Where applicable, PHP will be used | **Rating:** | 0 |