Semester 2 2016

Automated Self-Service Food Ordering System

2001ICT Project Management Workbook

YASIN CAKAR, Lachlan Horsey, CONNOR MCINTYRE, AnnaBelle Murrell & Sam Wren

Contents

[1. Project Charter 3](#_Toc464491738)

[1.1 Company Information 3](#_Toc464491739)

[1.2 Stakeholder Analysis 13](#_Toc464491740)

[1.3 Communication Strategy 15](#_Toc464491741)

[1.3.1 Team Members 15](#_Toc464491742)

[1.3.2 Burger Me 15](#_Toc464491743)

[1.3.3 Griffith University 16](#_Toc464491744)

[1.3.4 Contractors 16](#_Toc464491745)

[1.3.5 Customers 16](#_Toc464491746)

[2 Project Scope Statement 17](#_Toc464491747)

[2.1 Product Scope Description 17](#_Toc464491748)

[2.2 Product Deliverables 26](#_Toc464491749)

[3 Work Breakdown Structure 31](#_Toc464491750)

[3.1 WBS Tree 32](#_Toc464491751)

[3.2 WBS Table 33](#_Toc464491752)

[4 Estimation 35](#_Toc464491753)

[4.1 Choice of Technique 35](#_Toc464491754)

[4.2 Justification 35](#_Toc464491755)

[4.3 Estimation 36](#_Toc464491756)

[5 Schedule 39](#_Toc464491757)

[6 Change Control Plan 42](#_Toc464491758)

[6.1 Change Control 42](#_Toc464491759)

[6.1.1 Change control approach 42](#_Toc464491760)

[6.1.2 Change control procedure 45](#_Toc464491761)

[6.1.3 Audits and review 47](#_Toc464491762)

[6.2 Configuration Management 48](#_Toc464491763)

[6.2.1 Configuration items 48](#_Toc464491764)

[6.2.2 Configuration Management System 50](#_Toc464491765)

[7 Risk Management Plan 51](#_Toc464491766)

[7.1 Risk Management Strategy 51](#_Toc464491767)

[7.2 Risk Monitoring Strategy 57](#_Toc464491768)

[7.3 Risk Register 60](#_Toc464491769)

[7.4 Project Quality Management 66](#_Toc464491770)

[8.0 Project Review 70](#_Toc464491771)

[8.1 Success criteria 70](#_Toc464491772)

[8.2 Project Achievements 71](#_Toc464491773)

[8.3 Schedule reporting 72](#_Toc464491774)

[8.4 Review of Techniques 73](#_Toc464491775)

[8.5 Lessons Learned 75](#_Toc464491776)

[9.0 Project Management 77](#_Toc464491777)

[9.1 Status Summary 77](#_Toc464491778)

[9.2 Task List 80](#_Toc464491779)

[9.3 Time Sheets 83](#_Toc464491780)

[9.3.1 Annabelle Murrell 83](#_Toc464491781)

[9.3.2 Yasin Cakar 86](#_Toc464491782)

[9.3.3 Sam Wren 87](#_Toc464491783)

[9.3.4 Lachlan Horsey 88](#_Toc464491784)

[9.3.5 Connor McIntyre 90](#_Toc464491785)

[9.4 References 91](#_Toc464491786)

[9.4.1 General 91](#_Toc464491787)

[9.4.2 Standards 91](#_Toc464491788)

# Project Charter

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Ver. | Author | Addition/Alteration |
| 1/8/16 | 1 | Everyone | 1.1 company information |
| 5/8/16 | 2 | Everyone | 1.2 stakeholder analysis |
| 10/8/16 | 3 | Annabelle Murrell | 1.1 company information (business experience, project description) |
| 12/8/16 | 4 | Sam Wren | 1.1 company information (business experience) |
| 12/8/16 | 5 | Annabelle Murrell, Lachlan Horsey | 1.1 company information (business description) |
| 19/9/16 | 6 | Annabelle Murrell | Fixed up and added to success criteria with suggestions from first submission |

## 1.1 Company Information

**Project Title:** Automated Self-ServiceFood Ordering System

**Project Manager:**  Lachlan Horsey

**Company Name:** Interactive Systems Development Solutions (ISDS)

**Head Office:** 68 Elizabeth St 7th Floor

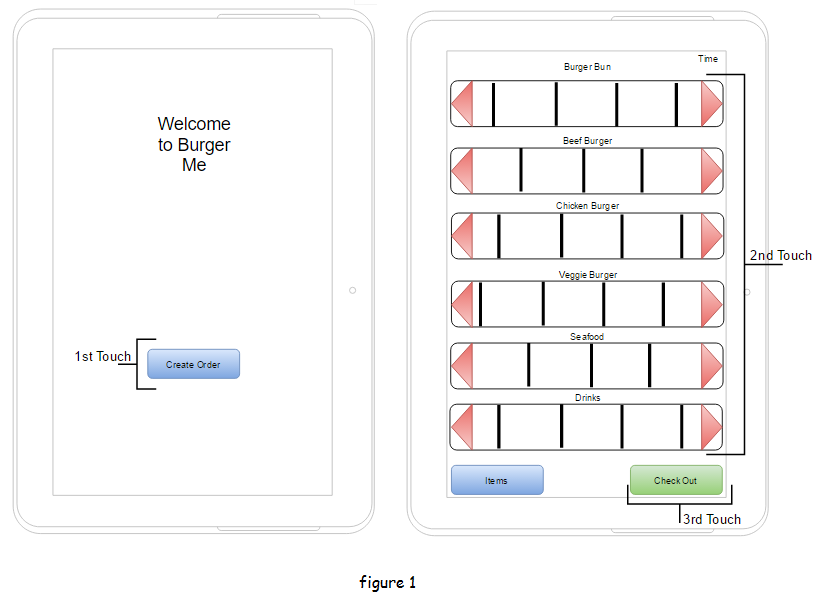
**Website:** <http://www.isds.com.au>

**Team Members:** Yasin Cakar, Lachlan Horsey, Connor McIntyre, Annabelle Murrell & Sam Wren

**Business Experience:** ISDS is an IT firm comprised of undergraduate students. ISDS develops new and innovative ways to help improve customer-business relations. Our headquarters is currently situated in Brisbane’s CBD with the focus on creating a difference in our local areas while starting to branch out to international countries.

Other services provided include: Information, Communication and Technology Evaluation of Systems, Unique Staff Training, Resources & Risk Analysis Management and Maintenance of Information Systems.

**Project Description:** ISDS is developing an automated self-serving food system for Burger Me. Burger Me is one of the café restaurants at the Griffith University’s Nathan Campus. Doing so will create a better experience for customers and reduce staff workloads. The idea of this system is to develop a method, which will help make ordering food more time efficient and effective for both the customers and business. The system will allow customers to choose their desired dish by selecting from the wide variety of options such as QLD Barramundi with Chips or any range of burger. Utilizing a set of easy to use kiosks located at the front of the store. This system is designed to make the ordering and waiting time shorter. This will be achieved by a three-touch process *(see figure 1)* for the kiosk and by allowing the staff to prepare the meals rather than serving customers at the front desk.

The project is to be completed over the course of half a year starting August 1st 2016 and ending February 13th 2017. Construction work is due to be completed during university holidays starting November 2016 and ending February 2017.

**Project Objectives and Success Criteria:**

For the success of this project, the profit of the business will increase and the waiting time will decrease. Fast company magazine have identified (2004) that fast food companies that adopted the use of the new system were experiencing, that customers were on average spending 30% more money, 20% more likely to upscale their meals when prompted by the kiosk with staff productivity rising by 9.5% on average when compared to the traditional face-to-face method of ordering.

The broad objectives of the project include the following: profits increase and help students, staff and visitors with their schedule. There are two primary types of benefits to our proposed system, one to Burger Me and to the customers. The shop benefits follow as such; increased customer turnover, increased profits, minimise misunderstanding between staff and customers and less chance of mistakes made on orders. Customer benefits include; less wait time for meals, faster service and easier to create their dietary or favourite selects.

**How do we measure the success of this system?**

The project success criteria are the principles the project must follow and complete for the project to be declared as successful or not. The successful completion of the project depends on multiple variables. Constraints such as the cost, time, resources, risks and scope are the main focus of the project's success. Other aspects required such as the effectiveness of the application and ease of use must also be met. The following must meet the requirements for the project to be completed and successful:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Measure** | | | **Success** | | |
| Cost | | | The project team has established the maximum budget the project can cost for it to be effective without impacting the project, its goals and maintaining quality standards | | |
| The project follows and stays within or under the budget specified | | |
| The project is cost effective | | |
| The project team are able to track and report on the progress of costs | | |
| Time | | | The project team manages deadlines successfully | | |
| A schedule of all tasks and deadlines are kept on record so the project team can determine if the project is on track or in danger of not reaching its objectives | | |
| The project team is organised and has a layout of the project timeline | | |
| Resources | | | Adequate resources are allocated to tasks to allow successful completion | | |
| Resources are used efficiently to stay on budget | | |
| Risks | | | Risks are effectively accounted for | | |
| Appropriate risk management strategies have been implemented to handle these risks | | |
| Scope | | | Does not suffer from scope creep as the project progresses | | |
| When project tasks are completed, the correct results and deliverables are produced in a high quality manner | | |
| The project meets the requirements and objectives specified in the scope | | |
| Effectiveness | | | Fulfils the project’s objectives and purpose | | |
| The project was completed in a time efficient and cost effective manner | | |
| Ease of use | | | The interface created is easy to understand and navigate | | |
| Instructions are clearly labelled | | |
| **Project Objectives** | **Success Criteria** | | **Person Approving** |

**Scope:**

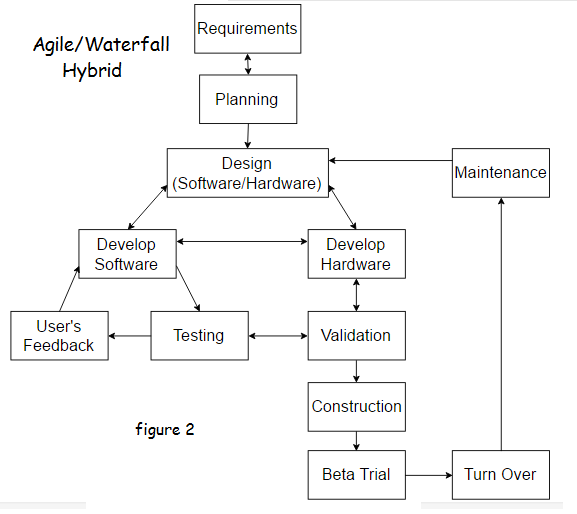
|  |  |  |
| --- | --- | --- |
| Customer screen:  Develop and implement a customer based interactive display that allows customers to view the current menu, pricing and deals, allow them to make orders and pay via EFTPOS. | Upon completion of the implementation of the features, the graphical user interface (GUI) should be extremely user friendly due to the nature of the venue. Usually described as ‘so simple a child could do it’ in this case, the system should be that simple. | Sam Wren  Connor McIntyre |
| If the system is implemented correctly, customer wait times should be reduced heavily as staff are free to prepare more food and do not need to be serving customers at the registers. In addition customers should be happier with the efficiency and productivity of Burger Me due to the decreased wait times. | Connor McIntyre  Sam Wren |
| Staff screen:  Implementation of a staff terminal, which allows staff to view current orders and update current order statuses.  Another screen to give staff the ability to update menu and pricing of products. | Once the system is implemented correctly, staff will have an easy to use administration screen allowing for problems to be solved quickly in the event that something goes wrong. | Annabelle Murrell  Sam Wren |
| Successful system implementation will further decrease the wait time between customers as in the event that a customer makes a mistake that requires staff to fix (looking at similar systems elsewhere, this happens frequently) staff are able to fix the issue quickly enough that the customers are not hindered. | Yasin Cakar  Connor McIntyre |
| Staff will be able to prepare more meals per hour due to not having to serve as many customers at the counter as a result of the system being implemented properly. Instead of having to manually create orders, customers do that part themselves and staff simply prepare the food and supply it to the customers. | Lachlan Horsey  Yasin Cakar |
| Documentation | In the unlikely event of customers not being able to understand how to use the system, staff will be able to use the thorough documentation to teach the customers how the system works. | Lachlan Horsey  Annabelle Murrell |

**Time:**

|  |  |  |
| --- | --- | --- |
| A duration of a year’s time commencing from August 2016 and finishing by early February 2017. | The project will be completed at or before the due date, ensuring that construction doesn’t get in the way of students studying. | Project Team |

**Cost:**

|  |  |  |
| --- | --- | --- |
| Completion of the system falls within the specified budget goals | The resulting total project cost meets or falls within the estimated price set out by the budget. | Griffith University  Lachlan Horsey |

**Approach:**    
The particular software development lifecycle or SDLC, chosen for this project is an Agile/Waterfall Hybrid. This model allows the project team and hardware team to use the waterfall approach to install the devices that are specified and grants the software team the ability to use agile development for faster product delivery. The hybrid SDLC involves constricted interaction between the software and hardware teams, as each part of the system relies upon each other concluding simultaneously. The Waterfall method gives the project team the ability to predict the budget, time and the requirements needed for the completion of the project. In using the agile method, the software can be easily iterated upon without altering the scope of the project significantly.

**Advantages of the Agile/Waterfall Lifecycle**

1. The Client knows what to expect such as time & cost.
2. The Waterfall section provides documentation which allows for the system to be improved.
3. Changes can be made after the plan is set in motion if the client wishes to make altercations.
4. Improvements to the system can be added on due to the latest developments.
5. The cycle allows for user feedback for the desired goal to be achieved.
6. Testing warrants that any bugs in the program will be taken care of.
7. Due to the amount of testing and reprogramming, the software can be launched at any time. This can ensure that some form of system is in place close enough to the due date.
8. When the project is turned over, the papers that were recorded will help prevent any back lashes.

**Start and Finish:**

Start Date: 03/10/2016

Finish Date: 17/02/2017

Latest Finish Date: 25/02/2017

Working Schedule:

* Monday to Friday
* 7am to 5pm

Holiday Schedule:

* 23rd of December to 2nd of January for Christmas and New Year’s.
* 26th of January for Australia Day.

These dates are optimal due to the students and staff being vacated from the campus because of semester break (see 3 Work Breakdown Structure).

**Budget:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Self Service Kiosk** | **Cost** | **Per** | **Quantity** |  | | 42" touch screen display | $3,500 | /Kiosk | 2 |  | | Kiosk Stands | $150 | /Kiosk | 2 |  | | kiosk Structure | $500 | /Kiosk | 2 |  | | Electronic Wires | $6.80 | /Meter | 100 |  | | EFTPOS Machines | $75 | /Kiosk | 2 |  | | Cash Dispensers | $125 | /Kiosk | 2 |  | | Note/Coin Acceptors | $300 | /Kiosk | 2 |  | | **Sub-total** | $9,830 |  |  |  | |  |  |  |  |  | | **Labour** | **Cost** | **Per** | **Quantity** | **Time (hours)** | | Civil Construction | $38 | /Hour | 5 | 100 | | R&D | $32 | One time | 2 | 150 | | Staff Training | $19 | /Staff Member | 4 | 2 | | **Sub-total** | $23,874 | | **Kiosk Installation** | | Physical Installation | $38 | /Kiosk | 4 | 20 | | Electrical | $38 | One time | 3 | 45 | | Health and Safety Auditing | $42 | One time | 1 | 8 | | **Sub-total** | $8,506 | |  |  | | **Company's Pay** | **Cost** | **Per** | **Quantity** |  | | Project Management | $25,000 | One time | 1 |  | | **Sub-total** | $25,000 | | **TOTAL** | $67,210 | | **Minimum Cost** | $70,000 | | **Maximum Cost** | $75,000 | |

## 1.2 Stakeholder Analysis

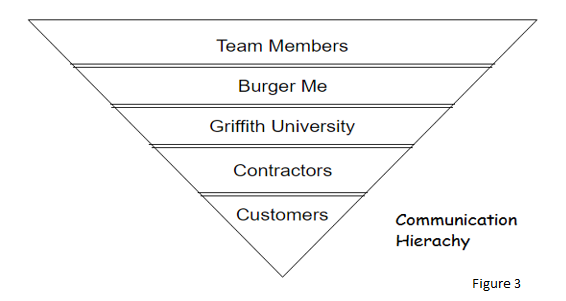
**Name of Client Liaison:** Burger Me

|  |  |  |  |
| --- | --- | --- | --- |
| **Stakeholders Analysis Key** | | | |
| **Code** | **Reference** | **Code** | **Reference** |
| **IN** | Internal | **St** | Supporting |
| **EX** | External | **H** | High |
| **Py** | Primary | **M** | Medium |
| **Sy** | Secondary | **L** | Low |
| **Ld** | Leading |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Stakeholders Analysis | | | | | | | | | |
| No | Name | IN / EX | Project role | Contact info | Contact method | Type | Role | Priority | Expectations/ requirement |
| 1 | Lachlan Horsey | IN | Project Manager | [lachlan.horsey@griffith.edu.au](mailto:lachlan.horsey@griffith.edu.au) | Email, meetings | Py | Ld | H | Completion to project, within budget, on time |
| 2 | Project team | IN | Project Team | [annabelle.murrell@griffith.edu.au](mailto:annabelle.murrell@griffith.edu.au)  [sam.wren@griffith.edu.au](mailto:sam.wren@griffith.edu.au)  [yasin.cakar@griffith.edu.au](mailto:yasin.cakar@griffith.edu.au)  connor.mcintyre@griffith.edu.au | Email, meetings | Sy | St | H | Completion of project, within budget, on time |
| 3 | Burger Me | IN | Patron | [food@griffith.edu.a](mailto:food@griffith.edu.au)  [07 3735 3780](mailto:food@griffith.edu.au) | Email, phone number | Py | Ld | H | Fully function system that benefits them |
| 4 | Campus Life | IN | Users | N/A | Posters, Griffith website, social media | Sy | St | L | Effective and efficient ordering systems |
| 5 | Griffith CEO  Professor Ian O’Connor | IN | Sponsor, approvals | [ian.oconnor@griffith.edu.au](mailto:ceo@griffith.edu.au) | Email, meetings | Py | Ld | H | Within budget, on time |
| 6 | Griffith CTO  Professor David Grant | IN | Sponsor | [David.grant@griffith.edu.au](mailto:David.grant@griffith.edu.au) | Email, meetings | Py | Ld | M | Budget |
| 7 | 208 Software Pty Ltd | EX | Developer  Programmers | [office@208softwareptyltd.com.au](mailto:office@208softwareptyltd.com.au) | Email, meetings | Sy | St | H | Project completes required functions |
| 8 | Ashley Deuble | IN | Manager of IT Security | [ashley.deuble@griffith.edu.au](mailto:ashley.deuble@griffith.edu.au) | Email | Sy | St | M | Secure the cyber safety of the system |
| 9 | Head of Office | EX | Sponsor | [tony.sheil@griffith.edu.au](mailto:tony.sheil@griffith.edu.au) | Email | Sy | St | L | Within budget and on time |
| 10 | Facilities Management | EX | Maintenance | [IThelp@griffith.edu.au](mailto:IThelp@griffith.edu.au) | Email, meetings | Py | St | L | Faults and updates |
| 11 | Public Relations | IN | PR | [pr@griffith.edu.au](mailto:pr@griffith.edu.au) | Email | Sy | St | L | Notified of critical changes |
| 12 | Civil Contractors | EX | Performing Organisation | [headoffice@civilcontractors.com.au](mailto:headoffice@civilcontractors.com.au) | Email, meetings | Py | Ld | M | Understanding system requirements |
| 13 | Peter Huynh | IN | Business Analyst | [peter.huynh@griffith.edu.au](mailto:peter.huynh@griffith.edu.au) | Email, meetings | Sy | St | M | Assist with business decisions, monitor business progress |

## 1.3 Communication Strategy

Certain Stakeholders hold a higher value of interest and greater stake within the project; as illustrated in *figure 3.* The top most slice represents the most significant interaction between stakeholders and the lowest slice expresses the least.



### Team Members

Team members will have the highest level of communication within the project. They will be in constant contact with each other through whichever means of communication is needed. Communication will range from formal too informal, depending upon the circumstances of contact. All documentation regarding the project will be made available to team members at all times with formal team meetings taking place weekly, to keep everyone up to date.

### Burger Me

As Burger Me are the clientele of the project they will require frequent updates regarding relevant progress of the project and any changes to be made that will impact them. Communication with the business will be conducted through the use of formal meetings and email exchanges.

### Griffith University

Griffith University also requires a high level of communication with the project team as they are the sponsor of the project and are directly affected. Communication will be held through the use of emails and formal meetings when required. They will be updated about any changes that occur.

### Contractors

As contractors are an outside entity they do not require as much information about the project. However, they will need to be kept up to date with information regarding the system that is being developed. In order to allow them to make changes as needed; this information will be given and received through the use of emails.

### Customers

Customers have the least stake within the project process and thus do not require constant updating of project details. As the beneficiary of the new system they will need to be made aware of the proposed end product. This information will be provided informally via posters, social media and official university outlets.

# 2 Project Scope Statement

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Ver. | Author | Addition/Alteration |
| 12/8/16 | 1 | Annabelle Murrell, Lachlan Horsey | 2.1 Product scope description |
| 21/8/16 | 2 | Yasin Cakar | 2.2 Product deliverables |
| 17/8/16 | 3 | Annabelle Murrell | 2.1 Product Scope Description |
| 19/8/16 | 4 | Sam Wren | 2.1 Product Scope Description |
| 22/8/16 | 5 | Sam Wren | 2.2 Product Scope Description |
| 23/8/16 | 6 | Annabelle Murrell | 2.2 Product Scope Description |
| 22/9/16 | 7 | Connor McIntyre | 2.1 Product Scope Description |

## 2.1 Product Scope Description

The project being delivered by ISDS, will involve designing and developing an automated self-serving food system for the on-campus fast food outlet, *Burger Me* at the Nathan campus. The kiosk system must allow customers to browse the menu, order their meals themselves as well as view the summary of their order. The customer must also be able to pay by either cash or EFTPOS and receive an order number with the receipt. This will in turn create a more efficient and effective order of operations around the business. The maximum budget that has been allowed is $80,000. All aspects, features and development must stay within or under the given budget. The project commencement will begin August 1st 2016 and conclude on February 13th 2017 to give the developing team time to create and assemble the system and kiosks into *Burger Me* during university holidays.

The system would require the following:

|  |  |  |  |
| --- | --- | --- | --- |
| **Hardware Requirements** | | | |
| **Code** | **Requirement** | **Priority** | **Reasoning** |
| HR.1 | Two kiosks must be provided to the Café *Burger Me* | Mandatory | Considering the size of the shop and with the average number of customers in mind, two kiosks will be implemented into the outlet to help customer flow and reduce queue times. |
| HR.2 | Cabling should be discrete and not an impairment to the look of the venue | Mandatory | If the cabling that has been run for the kiosks impairs the store visually, customers will be less inclined to buy food from Burger Me and would be more likely to use a different store. Meaning that cables required by the kiosks need to be neat, tidy and hidden away. |
| HR.3 | The Database of food must be kept up to date ensuring that customers can buy all the food offered by the store | Mandatory | In the event that the database wasn’t updated enough, customers would be unable to buy food and Burger Me would be losing out on profit in most situations. The menu at Burger Me is constant enough that the Database would not require updating very often. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Software Requirements** | | | |
| **Code** | **Requirement** | **Priority** | **Rationale** |
| SR.1 | The interface created must be self-explanatory, easy to navigate and understand with a three touch system being implemented to order. | Mandatory | It’s important for the customer to be able to order their meal as easily as possible with minimum touches necessary so they get the best experience. |
| The easier and more enjoyable the experience is, the more likely the customer will return. |
| SR.2 | The customer must be able to pay with either cash or EFTPOS. | Mandatory | Some users prefer one option of paying, while others prefer another so it’s essential to have both so all customer needs are met. |
| SR.3 | A confirmation of order must be given to the customer as well as an order number once they have chosen their desired meal. | Mandatory | It’s important for the customer to have a record of what they have ordered in case a mistake. |
| It is mandatory for the customer to receive an order number so they can collect their food as easily as possible and to reduce the risk of misplaced orders. |
| SR.4 | Orders must have the ability to be modified. | Mandatory | Orders must be able to be modified in case the customer changes their mind or forgets to order something. |
| SR.5 | The software must be installed on all of the kiosks located at Burger Me. | Mandatory | The software must be installed on the kiosks so the self-serving food system will work. |
| SR.6 | The software must be up to date with the industry standards. | Mandatory | Software must be up to date so it can perform all of the required tasks. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Documentation Requirements** | | | |
| **Code** | **Requirement** | **Priority** | **Reasoning** |
| DR.1 | All documentation that covers the system will be provided to staff for reference. | Mandatory | It is important for the staff to have a reference for the system in case there is a technical problem. |
| DR.2 | Documentation will be provided in both electronic and hard copy formats. | Desirable | It is desirable for the documentation to be in both formats so the staff have multiple copies. |
| DR.3 | Documentation must include:   * User manual * System manual * Software support numbers (if the system malfunctions and you are unable to fix it) * Software manual * Hardware manual | Mandatory | It’s mandatory to have all of this in the documentation so the staff knows how to operate the system and what to do if there is a problem. |
| DR.4 | Documentation must include installation process of the software | Mandatory | It is important to include the installation process in the documentation so technical staff can easily start the system up. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Training Requirements** | | | |
| **Code** | **Requirement** | **Priority** | **Reasoning** |
| TR.1 | Training for staff member will be available online as well as hands on. | Mandatory | Two training options are available to staff to help them learn and understand the system appropriately. People also have different learning methods, so it’s important to provide more than one method to satisfy everyone. |
| TR.2 | An automated self-serving food ordering system manual must be provided to staff. | Mandatory | The staff must have access to the user manual for the system so they can have a guide on how to operate it. |

|  |  |
| --- | --- |
| **Hardware Acceptance Criteria** | |
| **Code** | **Acceptance Criteria** |
| HAC.1 | Hardware is installed at Burger Me restaurant on the Griffith University Nathan Campus |
| Two kiosks are available for customers to use. |
| HAC.2 | The installed kiosks are not visually impairing to the overall look of the establishment, either in the design of the kiosks themselves or the cabling that has been run to power and access them. |
| HAC.3 | A database of Burger Me’s current menu is to be kept up to date allowing for the kiosks to provide customers with the ability to order all of the food available at the store. |

|  |  |
| --- | --- |
| **Software Acceptance Criteria** | |
| **Code** | **Acceptance Criteria** |
| SAC.1 | Software installed has an easy to use interface |
| Three touch ordering system is implemented |
| SAC.2 | Customer can pay via cash and or EFTPOS |
| SAC.3 | An order and reference number is printed out once the order has been placed |
| SAC.4 | Orders are able to be modified |
| SAC.5 | Software is installed on all of the hardware kiosks at Burger Me |
| SAC.2 | Software is up to date with the industry standards |

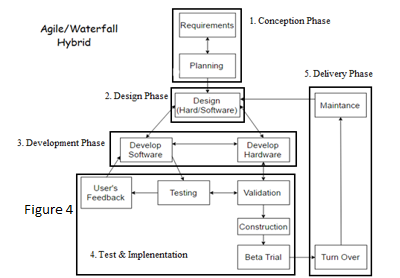
|  |  |
| --- | --- |
| **Documentation Acceptance Criteria** | |
| **Code** | **Acceptance Criteria** |
| DAC.1 | All documentation is provided for the staff members at Burger Me |
| DAC.2 | Documentation is provided in both electronic and hard copy |
| DAC.3 | Documentation includes user manual |
| Documentation includes system manual |
| Documentation contains software support numbers |
| Documentation contains both software and hardware manuals |
| AC.4 | Documentation includes installation process of the software |

|  |  |
| --- | --- |
| **Training Acceptance Criteria** | |
| **Code** | **Acceptance Criteria** |
| TAC.1 | Staff have access to online training as well as hands on training |
| TAC.2 | Training manuals are provided to staff at Burger Me |

**User Stories:**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Customer** | **No** | **Staff** |
| 1. | “I want to be able to easily navigate the system and be able to order food without difficulty.” | 6. | “I want to be able to view the status of the order.” |
| 2. | “I want to be able to be able to pay using EFTPOS and/or cash at the kiosk.” | 7. | “I want to be able to update the status of the order when needed.” |
| 3. | “I want confirmation of my order through the means of a receipt with an order number.” | 8. | “I want to be able to view customer orders and their order number so I can hand out orders easily.” |
| 4. | “I want to be able to correct my order if I make a mistake.” | 9. | “I want to have access to update the menu options and product pricing when required to.” |
| 5. | “I want there to be more than one kiosk so I can order my food as fast and efficiently as possible.” | 10. | “I want there to be multiple kiosks so the customer flow is continuous and faster.” |

## 2.2 Product Deliverables

Product deliverables are objects that will be provided come completion of the system. These can be either tangible; physical objects or intangible; non-physical objects. The tangible products delivered by this system include the hardware and software elements of the system as well as the physical user manuals provided to staff. Non-tangible products consist of the training that will be made available to employees and the support and maintenance provided for the system.

To ensure the deliverables are met to the clients’ satisfaction, a clear understanding of each stakeholder’s expectations and requirements to deliver a suitable product are necessary. For the success of the product deliverables, the project team will need to be in charge of providing quality to the system that is defined within the scope, the agreed schedule and the budget.

Interactive Systems Development Solution (ISDS) will offer this service through a five phase project plan. The phases are: 1. Conception, 2. Design, 3. Development, 4. Testing & Verification and 5. Delivery, as seen in *figure 4*.

ISDS has a unique approach to provide solutions to the IT industry. By implementing a rigid waterfall structure to ensure optimum quality while capitalising on the adaptable nature of software with an agile approach to make incremental developments based upon the customer feedback during the Development as well as the Testing and Implementation phase to provide the client with the most ideal and desired results whilst still providing a concise time frame for completion.

In the final Delivery Phase of the completed product, the clientele will receive introductory training sessions on the automated ordering system, a learner handbook for employees, user manuals as well as product warranty.

Below is a structured view of the deliverables required by the project, the hardware and component categories, the standards that are required to be fulfilled and their respective governing bodies. The categories are the different stages of development, from physical unit installation through to staff training, the standards are the set of rules that the product must legally adhere to, and the standard body is the governing body that’s defines the standard.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Product Deliverables | | | | | |
| Code | Deliverable | Components | Description | Standard | Standard Body |
| PD.1 | Hardware | PD.1.1  Installation | Hardware is installed in compliance with Australian and International Standards | -Electrical Safety Regulation 2013, Section 6 | Queensland Government |
| -AS/NZS 3000:2007 Electrical installations (the Wiring Rules)  -AS/NZS 3012:2010 Electrical Installations – Construction and demolition sites  -AS/NZS 3017:2007 Electrical installations – Verification guidelines  -AS/NZS 3760:2010 In-service safety inspection and testing of electrical equipment  -AS/NZS 4836:2011 Safe working on low-voltage electrical installations and equipment | Standards Australia |
| PD.1.2  Hardware  Certification | Electrical Appliance Safety Verification | AS/NZS 60335.2.82 Amusement machines and personal service machines | Standards Australia |
| PD.1.3  Approval and Test specification | Ensure Electronic Hardware meets general requirements | AS/NZS 3100:2009 | Standards Australia |
| PD.1.4  Regulatory compliance mark for electrical and electronic equipment | Specific requirements for particular regulatory applications | AS/NZS 4417.2:2012 | Standards Australia |
| PD.1.5  Hardware Testing/  Verification | Hardware Design Specification Document  Hardware Inspection Report  Beta Trial Assessment | Internal Company Standards  ISO Standards – ICS 19.080 Electrical and electronic testing | ISDS  International Standards Organisation |
| PD.1.6  Equipment Quality Verification | Hardware Quality Compliance with international standards | ISO – ISO Standards – ICS 43.040.10: Electrical and electronic equipment | International Standards Organisation |
| PD.1.7  Functional Safety | Ensure safe operability of electronic hardware | IEC 61508  Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems (E/E/PE, or E/E/PES). | International Electro technical Commission |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Code | Deliverable | Components | Description | Standard | Standard Body |
| PD.2 | Software | PD.2.1  Functioning System | System and software is designed based on an internationally recognised framework and process | ISO/IEC/IEEE 15288:2015 | International Standards Organisation  International Electro technical Commission  Institute of Electrical and Electronics Engineers |
|  |  | PD.2.2  Appropriate Software life cycle adopted. | Design technique for the software application selected specifically based on the nature of the software application | ISO/IEC 12207:2008 | International Standards Organisation  International Electro technical Commission |
|  |  | PD.2.3  Software Requirements Specifications | Software Requirements Specifications drafted and Implemented by well renowned standards | IEEE 830 - Software Requirements Specification | Institute of Electrical and Electronics Engineers |
|  |  | PD.2.4  Software Design Description Implementation | Software design based on a 6 step (section) process | IEEE 1016 – Recommended Practice for Software design Description | Institute of Electrical and Electronics Engineers |
| PD.3 | Training | Training Plan | In-depth guide outlining the activities to be covered in the delivery phase. | ISDS-ITM0 – Induction Training, Module 0 | ISDS |
|  |  | Automated Self-Service Food Ordering System User Manual | User Manual serving as operational guide to use the Ordering System. | ISDS-ASSFOS-AU – User Manual | ISDS |
|  |  | Automated Self-Service Food Ordering System User Instructor’s Manual | Instructors manual to train recruited staff to operate the staff terminal to process customer orders. | ISDS-ITM1 – Induction Training, Module 1 | ISDS |

To see references to standards documentation, see Section **9.4.2 Standards**

# 3 Work Breakdown Structure

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Ver. | Author | Addition/Alteration |
| 23/8/16 | 1 | Sam Wren | Initial WBS tree structure |
| 24/8/16 | 1.1 | Sam Wren | Phases 1-3 drafted |
| 25/8/16 | 1.2 | Sam Wren | Phases 4-6 drafted |
| 26/8/16 | 2 | Sam Wren, Lachlan Horsey | Finalisation of tree |
| 26/8/16 | 2.1 | Sam Wren | WBS table |
| 13/9/16 | 3 | Sam Wren | WBS |

## 3.1 WBS Tree

## 3.2 WBS Table

|  |  |  |  |
| --- | --- | --- | --- |
| **ID** | **Task Name** | **Duration (Days)** | **Predecessors** |
| 1 | Burger Me |  |  |
| **1.1** | **Conception** |  |  |
| **1.1.1** | **Requirements** |  |  |
| 1.1.1.1 | Evaluation & Recommendation | 2 |  |
| 1.1.1.2 | Develop Project Chart |  | 1.1.1.1 |
| 1.1.1.2.1 | Develop Scope | 3 | 1.1.1.2 |
| 1.1.1.2.2 | Identify Stakeholders | 2 | 1.1.1.2.1 |
| 1.1.1.2.3 | External/Internal Communication | 2 | 1.1.1.2.2 |
| 1.1.1.2.4 | Time | 1 | 1.1.1.2.3 |
| 1.1.1.3 | Sponsor Review Project Chart | 2 | 1.1.1.2 |
| 1.1.1.4 | Project Chart Approved | 1 | 1.1.1.3 |
| **1.1.2** | **Planning** |  |  |
| 1.1.2.1 | Set Project Plan | 3 | 1.1.1 |
| 1.1.2.2 | Initiate Project Team Meetings | 1 | 1.1.2.1 |
| 1.1.2.3 | Develop Project Plan | 2 | 1.1.2.2 |
| 1.1.2.3.1 | Risk Management Plan | 3 | 1.1.2.3 |
| 1.1.2.4 | Request Plan Approval | 1 | 1.1.2.3.1 |
| 1.1.2.5 | Plan Approved | 1 | 1.1.2.4 |
| **1.2** | **Design** |  |  |
| 1.2.1 | Design Hardware & Software | 3 | 1.1 |
| 1.2.2 | Validation & Verification | 1 | 1.2.1 |
| 1.2.3 | Design Approved | 1 | 1.2.2 |
| **1.3** | **Development** |  |  |
| **1.3.1** | **Software** |  |  |
| 1.3.1.1 | Programming | 10 | 1.2 |
| **1.3.2** | **Hardware** |  |  |
| 1.3.2.1 | Hardware Development | 5 | 1.2 |
| **1.4** | **Testing** |  |  |
| 1.4.1 | Verify & Valuation | 4 | 1.3 |
| 1.4.2 | User’s Feedback | 1 | 1.4.1 |
| 1.4.3 | Approved | 1 | 1.4.2 |
| **1.5** | **Implementation** |  |  |
| 1.5.1 | Facility Construction | 18 | 1.4 |
| 1.5.2 | Installation | 10 | 1.5.1 |
| 1.5.3 | Beta Testing | 5 | 1.5.2 |
| **1.6** | **Delivery** |  |  |
| **1.6.1** | **Turn Over** |  |  |
| 1.6.1.1 | Staff Training | 1 | 1.5 |
| 1.6.1.2 | User Manual | 14 | 1.5 |
| 1.6.1.3 | Support | 1 | 1.5 |
| **1.6.2** | **Maintenance** |  |  |
| 1.6.2.1 | Updates | 0 | 1.6.1 |
| 1.6.2.2 | Fixtures | 0 | 1.6.1 |

# 4 Estimation

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Ver. | Author | Addition/Alteration |
| 15/09/16 | 1 | Sam Wren | 4.1, 4.2, 4.3 |
| 16/09/16 | 2 | Annabelle Murrell | 4.1, 4.2 |
| 23/09/16 | 3 | Connor McIntyre | 4.1 Expansion, 4.2 fixed grammar |
| 17/09/16 | 4 | Sam Wren | Add three-point method into estimation |

## 4.1 Choice of Technique

For estimation to be calculated to an acceptable level the listed techniques will be put into use:

* Interactive Systems Development Solutions
  + This estimates the time, effort, risk and resources.
* Three Point Estimation
  + This estimates the Budget, Staff Training, the Schedule Timing and Hardware Procurement

## 4.2 Justification

**Interactive Systems Development Solutions**

The Agile Estimation was chosen as it was found to be the most suitable technique for the Agile/Waterfall Hybrid approach. The Agile Estimation enables the project team to implement new User Stories towards the project. But why is this estimation technique best suited?

1) It rules out any need for re-evaluation. As the software team is using an Agile SDLC, it allows them to adapt and learn what is required for a perfect system.

2) The points are based upon the teams work ability. The points delegated to each section are constructed from the team’s previous work performance. Giving the team a clear understanding on which story has a higher level of importance.

3) Directs the clients to ask more appropriate questions. As the SDLC allows for user feedback, meaning additional user stories will be inserted. This is because in developing the software, the best method is trial and error. By giving the testers a chance to evaluate, the team can improve and adjust any requests or recommendations.

Story points make up the structure of the table (*see 4.3 Estimation*) and specify the effort required to implement the user story. These are critical to the project outline as they give the project team an outline of how long tasks will take in order and the amount of effort, risk and resources that should be put into that specific task.

## 4.3 Estimation

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Interactive Systems Development Solutions** | | | | | | |
| ID | User Story | Time | Effort | Risk | Resources | Total |
| U1 | “I want to be able to easily navigate the system and be able to order food without difficulty.” | 2 | 1 | 1 | 1 | 5 |
| U2 | “I want to be able to pay using EFTPOS and/or cash at the kiosk.” | 1 | 1 | 1 | 1 | 4 |
| U3 | “I want confirmation of my order through the means of a receipt with an order number.” | 1 | 1 | 1 | 1 | 4 |
| U4 | “I want to be able to correct my order if I make a mistake.” | 2 | 1 | 1 | 1 | 5 |
| U5 | “I want there to be more than one kiosk so I can order my food as fast and efficiently as possible.” | 1 | 1 | 1 | 2 | 5 |
| U6 | “I want to be able to view the status of the order.” | 1 | 1 | 1 | 1 | 4 |
| U7 | “I want to be able to update the status of the order when needed.” | 1 | 1 | 1 | 1 | 4 |
| U8 | “I want to be able to view customer orders and their order number so I can hand out orders easily.” | 1 | 1 | 1 | 1 | 4 |
| U9 | “I want to have access to update the menu options and product pricing when required to.” | 2 | 1 | 1 | 1 | 5 |
| U10 | “I want there to be multiple kiosks so the customer flow is continuous and faster.” | 1 | 1 | 2 | 2 | 6 |
| Total | | | | | | 46 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Time (h)** | **Effort** | **Risk** | **Resources** |
| 1 = < 12 | 1 = 1 – 2 | 1 = Low | 1 = Low |
| 2 = 12 – 24 | 2 = 2 - 3 | 2 = Medium | 2 = Medium |
| 3 = 24 – 36 | 3 = 3 – 4 | 3 = High | 3 = High |
| 4 = 36 – 48 | 4 = > 4 |
| 5 = > 48 |

**Three Point Estimation**

By using this method, the below deliverables’ costs can be accurately calculated.

The three points in this estimation are:

* Optimistic
* Most Likely
* Pessimistic

These three variables are used to calculate the ‘Expected’. This is done through the use of the formula: .

Total Budget

* Optimistic: $75,000
* Most Likely: $67,210
* Pessimistic: $75,000

Staff Training

Schedule for Training

* + Optimistic: 0.5 Day
  + Most Likely: 1 Days
  + Pessimistic: 2 Days

Budget for Training

* + Optimistic: $900
  + Most Likely: $1,000
  + Pessimistic: $1,200

Schedule Timing

* Optimistic: 86 Day
* Most Likely: 92 Days
* Pessimistic: 99 Days

Hardware Procurement

* Optimistic: $9,500
* Most Likely: $9, 830
* Pessimistic: $10,000

# 5 Schedule

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Ver. | Author | Addition/Alteration |
| 11/9/16 | 1 | Annabelle Murrell | Created draft of schedule |
| 24/09/16 | 2 | Sam Wren | Final Version |

Below is the Schedule Structure Tree which displays the Tasks, Task Time, Total Time, Slack and Critical Path. The critical path illustrated has been chosen as it minimises slack time and wait time and ensures the project is completed on time and in the most efficient manner possible. As to the dates see attached document, Schedule.xlsx.

**Schedule Structure Tree**



The Critical Path is defined as the minimum time allowed for a task to be completed. In the image above the critical path lines are black and the non-critical path is in purple. This path is chosen due to each task alone the black lines having zero slack time (time allowed before a task must start), meaning that if a task is delayed, it pushes all the other tasks to a later date.

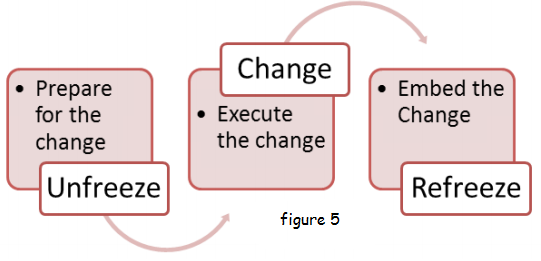
# 6 Change Control Plan

**Revision History**

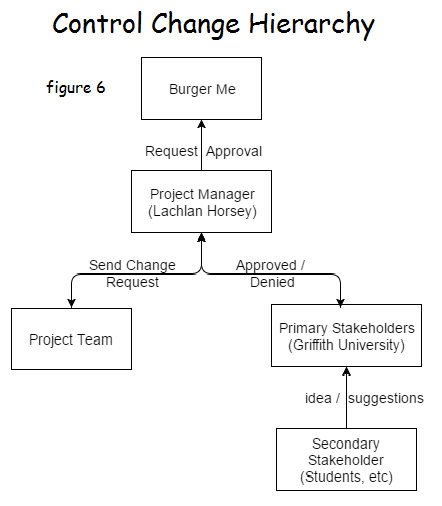
|  |  |  |  |
| --- | --- | --- | --- |
| Date | Ver. | Author | Addition/Alteration |
| 19/9/16 | 1 | Sam Wren | 6.1.1 & 6.1.2 Draft |
| 19/9/16 | 2 | Annabelle Murrell | 6.1.3 Audits and Review |
| 19/9/16 | 3 | Annabelle Murrell | 6.2.1 Configuration Items |
| 22/9/16 | 4 | Annabelle Murrell and Lachlan Horsey | 6.1.3 Audits and Review  6.2 Configuration Management |
| 24/9/16 | 5 | Sam Wren | 6.1.1 & 6.1.2 Final |
| 25/9/16 | 6 | Sam Wren | 6.1 & 6.2 |

# 6.1 Change Control

## 6.1.1 Change control approach

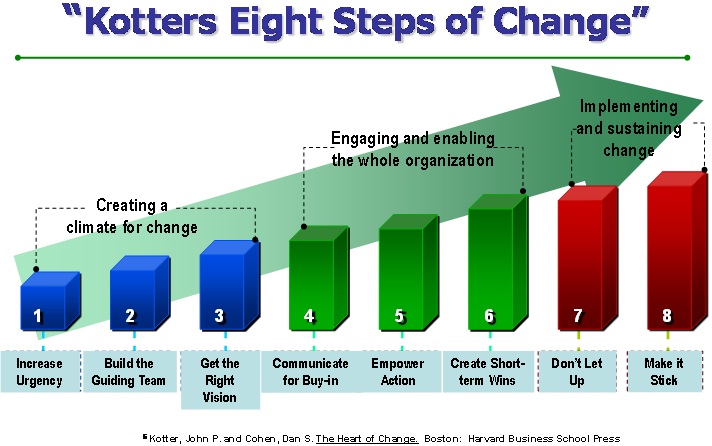


In order to change the control of the project a particular process will be undertaken, to appraise every suggested change. This particular process is called the Unfreeze, Change, Refreeze or more commonly known as Lewin’s Control Change Model (*figure 5*). Lewin’s model states that for something to change like an ice cube, it first requires the cube to begin to unfreeze (the preparation for change). This stage will be completed by using the Control Change Hierarchy (*figure 6*). The hierarchy in which correlates to the level of control with the project manager requesting approval of all changes, that have been assessed by the project team, from the head stakeholder, Burger Me. After Burger Me has addressed the change, the project manager alerts the stakeholder of the desired change status; whether it be denied or approved. If the change has the approval of Burger Me, the project team will now have to discourse a management plan towards any remaining issues towards the change; such as, cost, time or otherwise.



Once the preparation stage is over the change can commence. At this point in the change this is where the project team hears any uncertainties that the stakeholders have regarding the modification. The change section can take a while and that is why communication is key at this phase in the process, by explaining the benefits and how it will affect the stakeholder. After the project team has descripted the key points, the stakeholders may have questions concerning the alteration. Any questions that require action involving the change must be immediately resolved, included any issues that maybe unclear. Once any and all questions have been answered, the implantation of the change can begin (Refreeze).

In the case that time constraints are of utmost importance, Kotter’s 8 Step Change would be the alternate choice to Lewin’s change model as it does not require the project to halt whilst the change is implemented. The below figure illustrates the 8 steps of Kotter’s change model. The biggest difference between Lewin’s model and this model is that Kotter’s model breaks the change down into smaller changes allowing the project to continue progressing whilst a change is implemented.



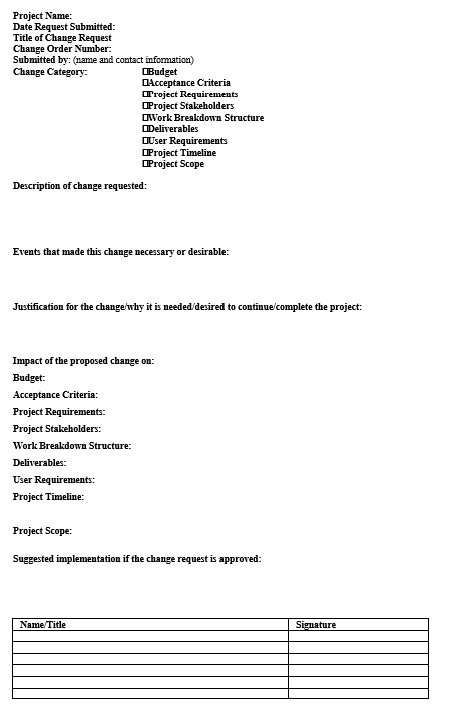
But how does the project team assess the change?

1. Identify the category of the change.
2. List all the benefits.
3. How does the change affect the project in terms of cost and time?
4. Does the change have a low, medium or high risk?

## 6.1.2 Change control procedure

|  |  |
| --- | --- |
| Change Request Submittal | These changes will be implemented by the use of a Request Change Form (*view Change Request Disposition*), which will be discussed at the weekly project team meetings. The team will determine if the change is essential or nonessential. If any control changes are critical, than the team member must schedule a meeting with the project manager instantly so the manager can organise for the request to be assessed as soon as possible. However, the secondary stakeholders cannot use a Request Change Form but are able to send any ideas through to a primary stakeholder with a link in the Griffith Black Board Page, which will be provided. |
| Change Request Tracking | As there maybe multiple requests, the Project Manager will need to have an up to date status of all change requests. This system can be applied by the use of a record that catalogues; the stakeholder who sent the form, the category, approval or rejection, the date received and date notified (*table below*).  **Record kept.**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | ID | Name | Category | Approved/  Denied | Date Received | Date Notified | Importance | | R1 |  |  |  |  |  |  | | R2 |  |  |  |  |  |  | |
| Change Request Review | To help save time between meetings of Burger Me and the project manager, any changes associated with the project scope can be accepted by the project team. |

**Change Request Disposition**



## 6.1.3 Audits and review

It is mandatory for the project manager and project team to hold regular meetings to discuss the progress of the project. It is essential that the project team stays up to date with progress, so they can inform the project manager on the requirements, goals, project scope and time constraints are being met and notify them of any changes that must occur. Upon a change being suggested an entry into the Change Request Record will be made. This Record will document current and past change requests made to the Project Manager, allowing any variances to be easily identified.

In the case that a variance is found from the project scope, the project manager will conduct an audit through the use of a team meeting with the required team members. In the weekly meetings the project manager will discuss with the team the irregularities that have occurred, how they transpired and how to ensure the project runs smoothly in the future, maintaining and following the project scope correctly.

# 6.2 Configuration Management

## 6.2.1 Configuration items

This project includes the following configuration items that the changes could affect:

* Budget
* Acceptance Criteria
* Project Requirements
* Project Stakeholders
* Work Breakdown Structure
* Deliverables
* User Requirements
* Project Timeline
* Project Scope

These items will be baselined against the following procedure:

|  |  |  |
| --- | --- | --- |
| ID | Configuration Item | Baseline |
| CI1 | Acceptance Criteria | * ANSI/EIA 649-1998 * MIL-STD-973 * The change will be approved by the Project Team alongside Burger Me and Griffith CEO. * Baseline: - 1.1 Company Information, Project Objectives and Success Criteria |
| CI2 | Budget | * ANSI/EIA 649-1998 * The budget will involve revaluation. * Baseline: - 1.1 Company Information, Budget |
| CI3 | Deliverables | * ANSI/EIA 649-1998 * MIL-STD-973 * Revaluation of the deliverables. * Baseline: - 2.2 Product Deliverables |
| CI4 | Project Requirements | * ANSI/EIA 649-1998 * The change will result in the Project Team redefining scope, budget and duration. |
| CI5 | Project Scope | * ANSI/EIA 649-1998 * Any change to the scope may affect the current state and cause for a revaluation of the scope. * Baseline: - 2.1 Product Scope Description |
| CI6 | Project Stakeholders | * ANSI/EIA 649-1998 * Any change to the Stakeholders need to be revaluated. * Baseline: - 1.1 Company Information, Stakeholder Analysis |
| CI7 | Project Timeline | * ANSI/EIA 649-1998 * Results in the re-estimation. * Baseline: - 1.1 Company Information, Start & Finish. 3 Work Breakdown Structure |
| CI8 | User Requirements | * ANSI/EIA 649-1998 * Any change will be re-evaluated. |
| CI9 | Work Breakdown Structure | * ANSI/EIA 649-1998 * If any task in the breakdown structure is affected by any change, will result in the WBS outline being revaluated. * Baseline: - 3 Work Breakdown Structure. |

To see documentation for ANSI/EIA 649-1998 and MIL-STD-973 visit: <http://www.minerva-plm.com/media/41966/WHITE-PAPER-Consistancy%20Through%20Configuration.pdf>.

## 6.2.2 Configuration Management System

Management of configuration items will be handled by the Control Board which contains the Project Manager, spokesperson from Burger Me, Griffith CEO and CTO, Peter Huynh and Tony Shell. This board will be in charge of the oversite of all configuration changes, and will give the final say and making adjustments that are necessary for a successful product.

**Responsibilities within the Board**

Project Manager:

* Recording all configuration items being changed,
* Organise the meetings,
* Giving the configured items a new baseline standard if approved.

Burger Me:

* The final say on approval.

Griffith CEO & CTO, Peter Huynh and Tony Shell:

* Approval of funding and duration.

As the members of the board will be busy with other duties, if the change has a low effect to the systems, the Project Team can give an approval providing all requirements are kept within the boundaries. After a change has been made, the baseline that it was compared to, has to be edited and incrementally versioned.

# 7 Risk Management Plan

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Ver. | Author | Addition/Alteration |
| 1/10/16 | 1 | Sam Wren | 7.1 Risk Management Strategy, |
| 6/10/16 | 2 | Team | 7.3 Risk Register |
| 9/10/16 | 3 | Annabelle Murrell | 7.3 Risk Register |
| 12/10/16 | 4 | Annabelle Murrell | 7.1 Risk Management Strategy |
| 13/10/16 | 5 | Sam Wren & Annabelle Murrell | 7.1 Risk Management Strategy, 7.3 Risk Register |
| 14/10/16 | 6 | Lachlan Horsey | 7.3 Risk Register table |

## 7.1 Risk Management Strategy

**Range of Benefits from Risk Management**

* Less Surprises.
* Utilization of Opportunity.
* Better-quality of Planning, Performance & Effectiveness.
* Economy & Efficiency.
* Enhanced Stakeholder Relations.
* Improved Data for Decision Making.
* Greater Reputation.
* Accountability, Assurance & Governance.
* Personal Wellbeing.

**Steps to Manage Risk**

According to PMBOK (Project Management Body of Knowledge – 5th Edition) there are 5 steps for managing risks:

1. Risk Management Planning
2. Risk Identification
3. Qualitative & Quantitative Risk Analysis
4. Risk Response Planning
5. Risk Control

**Risk Management Planning**

Risk planning is the guidelines to which a risk will be handled against. In order for a successful implementation of a risk management plan certain questions have to be addressed which cover a wide range of content:

* Why is it important to postpone or have immediate action taken against a risk?

The content:

* + Risk Probability & Impact
  + Risk Documentation
* What is the specific risk & what mitigation activities must be taken?
  + Risk Categories
  + Methodology
  + Risk Documentation
* Who will implement the risk mitigation?
  + Roles & Responsibilities
* When will mitigation milestones occur?
  + Budget & Schedule
* What necessary requirements are needed?
  + Risk Documentation
  + Contingency Plans
  + Fall back Plans

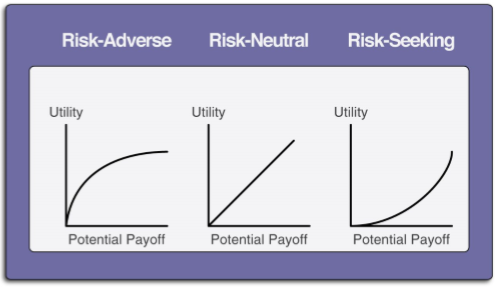
**Risk Identification**  
Identifying the risks within the project involves determining which problem might cause an issue to the project and have those risk characterises documented into a risk register. These issues can affect the schedule, budget, resources and/or technical risks. Over the years there have been three identified areas of criteria relating to risks within the projects software; Business Risks (Client & Target Environment), Project Risks (Team Environment) and Technical Risks (System Complexity, New Technologies & Environment). The recorded keep of the documented characterises will contain the following:

* A Key ID
* Event or Risk
* Probability
* Impact
* Preventative Steps
* Response

Now it’s time for the team to begin recognizing any risks that may occur, which can be done through the use of tools and techniques, which follow:

* Information Gathering Technique
  + The best way to gather information is by brainstorming. A meeting with key stakeholders, led by the project manager in the early weeks of the conception phase. In this meeting the members will have an opportunity to give any thoughts they may have. A team member will take note all suggestions.
  + If a risk is thought of after the meeting, a document will be available for ideas to be suggested to the project manager.
* SWOT Analysis
  + Strength, Weakness, Opportunities & Threats.
  + This part has to be done by someone who has expert judgement and can be someone within the team or outsourced by a third party. For each of the suggested risks that were taken in the brainstorm meeting, the SWOT analysis technique can devise which risk is more significant.
* Assumptions Analysis
  + After the risks have been ranked, the project team are now able to generate scenarios and look at the effect that they have on inaccuracy, instability, inconsistency and/or incompleteness.
* Documentation Review
  + As the project will get documents throughout the life of the project. The project manager needs to revise as minor risks could slip through unchecked.
* Risk Utility
  + Risk Utility is how a person reacts to a risk. It is measured by satisfaction of the projects possible improvement from the solution towards a risk (potential payoff). There are three kinds of risk utility, those who seek risks, adverse and neutral (*see Risk Utility Diagram to the side*).

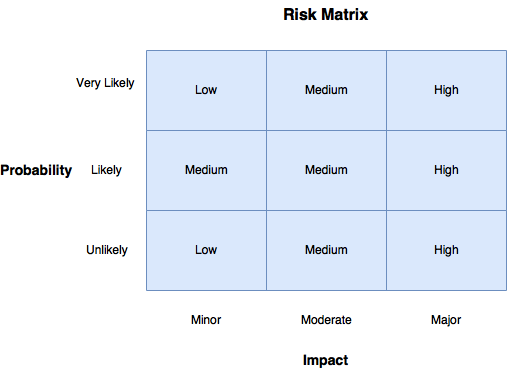
**Risk Utility Diagram**



* + Risk Seeking – Satisfaction increases when payoff is at higher risk,
  + Risk Adverse – Satisfaction decreases when payoff is at higher risk,
  + Risk Neutral – Satisfaction is balanced.

**Qualitative & Quantitative Risk Analysis**Qualitative risk analysis evaluates the probability of a risk occurring as well as the impact the risk will have. The risks are prioritised in order of most threatening and allows the project manager to manage the documented risks. This process is completed during the project life cycle multiple times in accordance to the risk management plan.

* Risk probability and impact assessment
* Determines the likelihood of a risk occurring and the impact it will have on the project. It specifies the occurrence probability as well as the impact, time frame, causes and the interrelationships of the risks. This allows the project team to order risks by priority and employ resources to lessen the change of risks occuring.
* Probability and impact matrix
  + - Allows project team to analyse and document the risk occurrence as well as the consequence level.



**Figure 7:** Specifies how severe the risk is using the probability of it occurring and the impact it will cause.

* Risk data quality assessment
* Defines the quality of information in accordance to the specified risk. It is essential that the information is of the highest quality so a consistent risk management plan may be presented.
* Risk categorization
* Assigns the specified risks into categories (risk source, root cause, project phase, project area affected). This allows the project team to identify what contributes to the risk response with ease.
* Risk urgency assessment
* Identifies the risks that are the most threatening and urgent.
* Expert judgement
* Defined in the risk analysis and assessment of the project. It can be sourced from the project team or an external source.

Quantitative risk analysis takes place after qualitative risk analysis if it is necessary for extra processes. It involves numerical analysis of the risks in occurrence and produces decision-making information.

**Risk Response Planning**

The method for determining and developing any actions and options, in order to improve the unlikelihood of any threats. In developing a risk plan for certain events, it requires each risk to have a defined suitable strategy.

* Strategies for Negative Risks or Threats
  + ‘Avoidance’ of a risk entitles changing of the project plans estimation of risks,
  + ‘Transference’ is shifting the responsibility and consequences to a third party,
  + ‘Mitigation’ reduces the probability of a risk,
  + ‘Acceptance’ is coming up with a contingency plan.
* Strategies for Positive Risks or Opportunities
  + ‘Exploit’ is the Project Team getting a positive advantage from a risk,
  + ‘Share’, allows the Project Team to bring the risk to a third party to safeguard that the risk will provide an advantage to the organisation,
  + ‘Enhance’ is capitalising on the likelihood of risks to ensure a positive outcome.
* Contingent Response Planning
  + Plans put forth for selected events or risks,
  + Risks are closely monitored.
* Expert Judgement

**Risk Control**

Risk control contains the development and process of tracking the specified risks, monitoring the outstanding risks and identifying new risks. Risk control also ensures the implementation of risk plans and the evaluation of the success in reducing the identified risk.

* Risk Reassessment
  + This method allows for the group to recognize when a risk has been completed and when a new issues arises.
* Risk Audits
  + The project manager studies the success of the risk responses in order to manage the risk and their causes.
* Technical Performance Measurement
  + The technical performance is measured in the defects of the risk to determine an adequate judgement of the projects success.
* Reserve Analysis
  + By comparing the level of risk to the schedule and budget of the project, giving the project manager the ability to create an acceptable project plan.
* Meetings
  + Providing a weekly update of the project and getting the rest of the team members on the same page of up and coming events.

## 7.2 Risk Monitoring Strategy

The purpose of Risk Monitoring and Control is to manage, maintain and prevent further risks within the project, this is done by tracking identified risks as well as to identifying possible potential risks throughout the implementation of the project.

Risks are inherent in all projects and can affect any aspect of the project, risks have implications on the scope, time, cost, quality, stakeholder requirements and the effort put into the project. Effective risk management is essential for project management and control. Therefore, Risk Monitoring is important in ensuring effective risk management.

The purpose of the Risk Management Process is to “*identify, analyse, treat and monitor the risks continuously*.” (ISO/IEC 15504-5:2012, 2012). It also notes that the process is continuous and is designed to address the risks throughout the entirety of the system/product/service. Thus the Risk Management Process has the ability of being “*applied to risks related to the acquisition, development, maintenance or operation of a system*.” (ISO/IEC 15504-5:2012, 2012).

Risk monitoring occurs after risks have been identified and analysed, these risks can be found in the Risk Register. Monitoring risks ensures the effectiveness of Project Risk Management plans are carried out, in brief this includes:

* Correct execution of plans,
* Review of plans,
* Update, and
* Derive lessons

These steps are necessarily for the primary objectives of the monitoring process which is to track identified risks, monitor residual risks, identify new risks, ensure that risk response plans are executed at the appropriate time, and evaluate their effectiveness throughout the project life cycle.

The Risk Monitoring strategy is as follows, see figure 8.

1. Keep the planning current and the project manager should ensure that periodic risk reassessment, including risk identification, analysis, and response planning, is repeated at reasonable intervals, or in response to project events-without generating excessive administrative overhead.
2. Check whether all of the approved unconditional response actions are included and defined in the Risk Response Plan in the current project management plan. If this is not the case, then then the appropriate action is to be taken such as invoking the change management plan. Response specification for each such risk should include a description of any corresponding trigger conditions.
3. Risks and the project environment is being continually monitored for any change of probability or potential of risks, risk triggers to be updated in the event of any change.
4. Risk owners and risk action owners should be briefed on any changes that may affect their responsibilities.
5. Identified mitigation changes to be updated in the Risk Response Planning.
6. The impact of change to budget, time, effort and stakeholders is updated.

In addition to regular status reviews, periodic audits should be performed to determine strengths and weaknesses in handling risks within the project. This should entail identifying any barriers to effectiveness or keys to success in risk management, recognition of which could lead to improvements in risk management of the current or future projects.

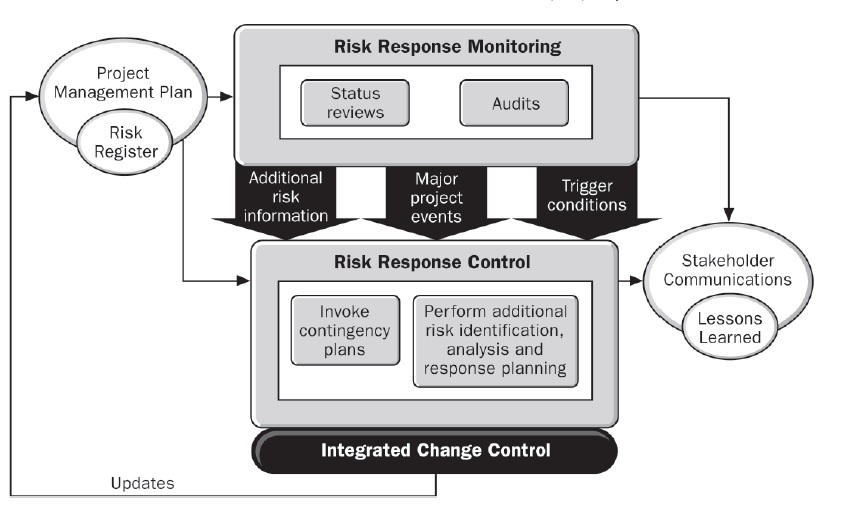


Figure 8: Schematic Representation of the Monitor and Control Risk Process

At the end of the project, an integrated analysis of the risk management process should be carried out with a focus on long-term process improvements.

At project closure, the project manager should ensure a description has been given of the closure of every risk in the risk register, for example (a) did not occur, (b) occurred and contingency plan invoked; or (c) occurred and impact to the project scope (i.e., time, cost, and quality).

Following the Risk Monitoring Strategy is crucial throughout the project, particularly throughout the iterative phases of the project to minimise consequences of negative risks and optimise benefits of positive risks.

In addition to tracking and managing the risk response actions; risk monitoring and controlling assists in providing improvements to the management of the current project as well as provides lessons for use in future projects.

## 7.3 Risk Register

|  |  |
| --- | --- |
| **Key** | |
| B | Business Risk |
| P | Project Risk |
| T | Technical Risk |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ID** | **Event or Risk** | **Probability** | **Impact** | **Preventative steps** | **Response** |
| B1 | Burger Me liquidates | Low | High | N/A | Take the project to another client |
| B2 | Sponsor drops out of the project | Low | High | Receive necessary funding before project commences | Look for more funding and re-evaluate the budget |
| B3 | Essential stakeholders drop out | Low | High | Sign contract before the project commences as well as necessary funding | Look for more funding and stakeholder support |
| B4 | Business Plan Failure | Low | High | Ensure Burger Me agrees with the goals of the system | Provide necessary documentation which details on a contingency plan. |
| Redesign the appropriate components of the system that fail to meet expectations |
| B5 | Late delivery of materials | Medium | Medium | Use a reliable supplier to ensure the best chance of materials arriving on time | Contact supplier and query location of items |
| Cancel the order and find a different supplier |
| B6 | Lost / misdirected shipments of your product | Low | High | N/A | Replace order and find a different carrier |
| B7 | Delayed construction | Low | High | Ensure Burger Me facility is prepared for construction to start and necessary pre-construction checks are completed | Facilitate required preparation to proceed with construction as quick as possible |
| B8 | Equipment/ tool breakdown | Medium | Medium | Ensure the best quality of tools and equipment is being used | Replace the tools with more suitable ones |
| B9 | Material costs increase | Low | Medium | Have a contract with the supplier to have a fixed price | Find a more cost efficient supplier to purchase the material |
| B10 | Poor employee morale | Low | High | Communicate with the employee to ensure that they are satisfied | Provide decent down time for the employee/s |
| B11 | Project goes over budget | Medium | Medium | Have a detailed list for the estimated budget as well as a backup budget | Re-evaluate the budget and implement the backup budget if needed |
| P1 | Team member quits | Low | Medium | Contracts T&C until project completion | Hire another employee |
| P2 | Project Manager steps down | Low | High | Contracts T&C until project completion | Allocated team member steps up as new project manager |
| Provide a team member with inner project workings |
| P3 | Project Schedule is disrupted | Medium | Medium | Create a timeline with the earliest possible task completion dates as well as a backup timeline for the latest possible completion dates | Initiate the backup timeline |
| P4 | Low quality materials | Low | High | Purchase the best quality | Purchase better material |
| P5 | Increased utility rates | Low | Medium | Ensure budget facilitates an increase in utility rates | Reallocate resources in budget |
| P6 | Design lacks flexibility | Low | Low | Ensure design is not one dimensional and can expand in the future as required | Redesign system as necessary to facilitate changes |
| P7 | Design fails peer review | Medium | Medium | Have multiple testing to have the best satisfaction | Re-evaluate the design to meet the standards of the users |
| P8 | Burger Me staff cannot attend training | Medium | High | Organise with staff to select a suitable time and date for everyone | Re-organise another staff training seminar |
| P9 | Team members have negative attitudes towards the project | Low | Medium | Identify any issues that a team member has towards the project | Work with team member to improve their moral |
| P10 | Lack of commitment from functional managers | Low | High | Identify any issues that each manager may have as the project is moving forward | Hold a meeting between affected parties and discuss how to improve their commitment to the project |
| T1 | System Crash | Low | Medium | Conduct adequate user testing before the system is implemented | Contact technical support and follow directions provided |
| T2 | Software is behind schedule | Low | Medium | Ensure programming team is qualified for task | Re-evaluate the schedule |
| T3 | Hardware is behind schedule | Low | High | Ensure hardware developer understands the requirements of the system | Re-evaluate the schedule and make changes to software as required |
| T4 | Technology components aren't compliant with standards | Low | High | Ensure components are from reputable suppliers | Organise with suppliers an exchange for goods that are compliant with standards |
| T5 | Technology components lack stability | Low | High | Research items prior to commitment of purchase | Redesign system to use higher quality components |
| T6 | Components or products aren't maintainable | Low | High | Research items prior to commitment of purchase | Weigh up cost vs benefit of whether maintainability is worth redesigning system around new components |
| T7 | The software interface doesn’t work with the hardware | Low | High | Ensure cooperate development between software and hardware teams | Discuss between both teams to fix issues |
| T8 | The user is unsure on how the system works | Medium | Medium | Ensure adequate information is advertised to customers | Provide further information to customers and ensure staff can answer any queries they may have |

## 7.4 Project Quality Management

Ensuring that the project satisfies the user, is the purpose of project quality management. The projects budget, scope and time all play a part as each area needs to be managed on equal grounds as they all go hand to hand.

There are there stages of quality management (view *Project Quality Management Process Diagram* below):

* Quality Planning
  + Identifies the level of standards of the projects quality and compare it against how satisfied the user will be.

**Project Quality Management Process Diagram**

* Quality Assurance
  + To ensure the user is satisfied, the project needs to be evaluated against the performance to the standards of quality defined in Quality Planning
* Quality Control
  + This phase monitors the results of the project
  + Making sure that the standards are met
  + Finds ways to improve the quality
    - If improvements towards quality are found, then the process restarts

In quality management there are dire factors in which take place:

* Customer Satisfaction
  + For this section to be met, the team needs to understand the customer’s needs and ensure these needs are managed
* Prevention Over Inspection
  + Normally the cost of avoiding an error is less than having it fixed.
* Management Responsibility
  + Management is responsible for providing the necessary resources to give the project its best chance of success
  + All acting board members need to accept the requirements in order for the greatest success possible
* Processes Within Phase
  + Plan – Do – Check – Act

**Plan Quality Management**

The first stage contains the identification of the quality standards which are relevant to the project and determining how to satisfy the users. Listed below are a few techniques that the team will use:

* Cost – Benefit Analysis
  + Compares the implementation cost to the implementation quality cost as a representation as to how the project will benefit
* Cost of Quality
  + There are five categories to cost quality:
    1. Prevention Cost
       - The execution of the project is error-free or well within an acceptable error range
    2. Appraisal Cost
       - The output of the process is to standard quality
    3. Internal failure Cost
       - The cost to correct the error before the user obtains the product
    4. External Failure Cost
       - The cost to correct the error after the user obtains the product
    5. Measurement & Test Equipment Cost
       - The equipment cost to deliver the best level of quality to the user without or with minimal errors
* Seven Basic Quality Tools

1. Cause & Effect Diagrams
   * This process is also known as a Fishbone Diagram or an Ishikawa diagram
   * By using a problem statement, the diagram can identify the cause of the problem and why they are occurring
2. Flowcharts
   * A Process Map
   * This demonstrates how a problem occurs, in the step which it happens
3. Check Sheets
   * These are ideal for when the project team is gathering information and/or organising facts
4. Pareto Diagrams
   * Also known as the 80-20 rule
   * This rule stages that 80% of all problems are regularly due to 20% of causes
   * A diagram that shows all the results in the order of which they frequently occur
   * Identifying them within their category
5. Histogram
   * More commonly known as a bar chart
   * Describes the tendencies, dispersions and statistical distribution shape
6. Control Charts
   * Displays the results over time
7. Scatter Diagrams
   * Correlation Charts
   * Explains the changes through the use of plotting dots along a X and Y axis

* These seven techniques are used in quality planning by using the outcomes of these charts for comparison
* Benchmarking
  + Looks at similar projects and compares their activities to the ones that the project team is using
  + This helps to determine areas of enhancement, performance measures and practices to avoid
* Design of Experiments
  + This looks at how the quality management plan effects the cost of the project through tests which identifies factors that can ‘influence’ the project
* Statistical Sampling
  + Has a handful of people used to examine the quality of the project
  + If the best technique is used than the cost of the project can be reduced
  + A formula of how big the sample size should be is:

**Perform Quality Assurance**

After the planning has been finalized and set in motion, it’s time to ensure that the standards are met. Below are some techniques that can be used:

* Quality Management & Planning Tool
  + Tools and Techniques used for the previous stages can also be used here
* Quality Audit
  + Is to improve the projects performance from past lessons
  + Audits may be done by a third party or by a member of the project team
  + These audits can take place at either a random time or at scheduled intervals
* Process Analysis
  + Identifies areas of the project that requires improvements

**Quality Control**

The third phase puts the plans into practice. By monitoring the results of the plans, can help determine whether the standards are satisfactory but if the standards are unsatisfactory then the quality gets re-evaluated (starts the whole Project Quality Management Process over).

Tools and Techniques, defined by PMBOK:

* Seven Basic Quality Tools
  + Listed in the planning stage
* Statistical Sampling
  + Listed in the planning stage
* Inception
  + A review of the process, by either external or an internal source, to ensure that the defined standards are met
* Approved Change Request Review
  + Is an important part of quality control
  + Makes sure that the change is correctly implemented

# 8.0 Project Review

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Ver. | Author | Addition/Alteration |
| 13/8/16 | 1 | Annabelle Murrell | 8.1 Success Criteria |
| 12/10/16 | 2 | Annabelle Murrell | 8.5 Lessons Learnt |
| 17/10/16 | 3 | Lachlan Horsey, Annabelle Murrell | 8.3 Schedule Reporting |

## 8.1 Success criteria

The success and completion of the project relies on the overall success of the team as a whole. The most important aspect of any project is communication within its team. Communication within the group allows all members to understand and hear each other’s ideas and opinions and help individuals view the project in different manners. Determining the goals of the project straight up is key to the project’s success and also depends on the team’s communication. It is essential to outline roles and responsibilities for individuals and the group as a whole. For the team to reach their goal, roles should be allocated depending on individual’s strengths and weaknesses. Time management is a crucial part of any project and being able to complete tasks by deadlines. Being able to work both as a team and individually is also a vital part of a project. Being able to contribute ideas as well as give constructive feedback helps the team reach their full potential.

* Communication
  + Frequent meetings
  + Use of multiple communication methods, email, phone calls etc.
  + Discussion during workshops
  + Give each other feedback
  + Help other team members when needed
* Define Roles and Responsibilities
  + Review each team member’s strengths and weaknesses and allocate roles accordingly
  + Ensure team members know their roles and responsibilities
* Establish goals of the project
  + Collaborate ideas and initiate common goals
* Time Management
  + Create a timetable that has when each task must be completed
  + Remain organised
  + Complete tasks before the deadlines
* Work ethic
  + Working as a team
  + Taking the initiative and working individually
  + Maintaining a positive outlook
  + Providing morale to team

## 8.2 Project Achievements

|  |  |  |
| --- | --- | --- |
| Projects Achievements | Success Criteria | Details |
| Workbook develops through successive sections | Workbook sections are allocated amongst the Project Team | * Each team member produces allocated workbook sections * Project Team integrates sections together |
| Satisfies the markers expectations | The Workbook’s sections are completed to an acceptable standard of assessment objectives | * Section requirements are understood by the team member * Made use of provided examples & workshops |
| The revised version/s of the Workbook are satisfactory | Feedback/s from previous submissions & drafts are integrated | * Understand feedback requirements * Make the necessary changes to suit the requirements |
| Effective Communication | Team Members are able to effectively communication during development of Workbook | * Understanding of topic ideas and terminology * Convey project ideas by using: frequent meets, email, team member feedbacks |
| Team Meetings are productive | Defined individual task requirements to support the general objective | * All Team Members understand individual team member tasks & overall object |
| Effective Time Management | Team has completed Workbook sections before deadline, the late finish date. | * Create a timetable that has the due date of each task * Complete tasks before deadlines |
| Final Workbook delivery satisfies all requirements of Marking Criteria | Analysed and understood all Marking Criteria requirements | * Marking Criteria requirements have been implemented |

## 8.3 Schedule reporting

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Deliverable | Planned Deadline | Actual Deadline | Planned Size Estimate (words) | Actual Size Estimate (words) |
| 1.1 Company Information | Aug 19 | Aug 26 | 1500 | 1661 |
| 1.2 Stakeholder Analysis | Aug 19 | Aug 26 | 250 | 280 |
| 1.3 Communication Strategy | Aug 19 | Aug 26 | 300 | 322 |
| 2.1 Product Scope Description | Aug 22 | Aug 26 | 1300 | 1286 |
| 2.2 Product Deliverables | Aug 22 | Aug 26 | 750 | 756 |
| 3.1 WBS Tree | Aug 23, Sep 13 | Aug 26, Sep 23 | 0 | 0 |
| 3.2 WBS Table | Aug 23, Sep 13 | Aug 26, Sep 23 | 200 | 190 |
| 4.1 Choice of Technique | Sep 18 | Sep 23 | 50 | 16 |
| 4.2 Justification | Sep 18 | Sep 23 | 200 | 229 |
| 4.3 Estimation | Sep 19 | Sep 23 | 250 | 290 |
| 5 Schedule | Sep 19 | Sep 23 | 100 | 129 |
| 6.1.1 Change Control Approach | Sep 20 | Sep 23 | 350 | 366 |
| 6.1.2 Change Control Procedure | Sep 20 | Sep 23 | 200 | 213 |
| 6.1.3 Audits & Review | Sep 20 | Sep 23 | 150 | 167 |
| 6.2.1 Configuration Management | Sep 20 | Sep 23 | 250 | 243 |
| 7.1 Risk Management | Oct 12 | Oct 17 | 150 | 164 |
| 7.2 Risk Monitoring Strategy | Oct 12 | Oct 17 | 1250 | 1207 |
| 7.3 Risk Register | Oct 12 | Oct 17 | 500 | 528 |
| 7.4 Quality Management | Oct 12 | Oct 17 | 700 | 920 |
| 8.1 Success Criteria | Oct 15 | Oct 17 | 300 | 267 |
| 8.2 Project Achievements | Oct 15 | Oct 17 | 200 | 205 |
| 8.3 Schedule Reporting | Oct 15 | Oct 17 | N/A | 391 |
| 8.4 Review of Techniques | Oct 15 | Oct 17 | 300 | 250 |
| 8.5 Lessons Learned | Oct 14 | Oct 17 | 500 | 519 |
| 9.1 Status Summary | Oct 15 | Aug 26, Sep 23, Oct 17 | 1000 | 921 |
| 9.2 Task List | Oct 16 | Aug 26, Sep 23, Oct 17 | 250 | 260 |
| 9.3 Time Sheet | Oct 16 | Aug 26, Sep 23, Oct 17 | N/A | 1014 |

Overall, we met most of the planned deadlines and all of the actual deadlines. We set the planned deadlines a couple days before so we could have some time to read over the work and make alterations if needed. Failure to meet these estimated deadlines was a result of conflicting schedules between team members which at times caused a halt in work as we were waiting on work before we could continue working on the project. The word count of each deliverable at time of completion was close to the predicted size that was estimated at project start. By setting these estimates as a rough guide, the project was kept concise.

## 8.4 Review of Techniques

**Estimation**

Estimation was used during the course of the project. This allowed for the development of a more detailed project plan without needing to provide an accurate workbook for Burger Me. It allowed for the group to create additional user stories during the course of the project which improved the viability of the proposed system to be used in the store. Without estimating the needs of a self-service machine, the system would not be able to achieve many of the functions required by customers.

**Three-Point Estimation**

Three-point estimation was used while estimating the breakdown of work, the budget allocated, and various other parts of the Workbook. It allowed the team to assess the longest and shortest possible times for each event, as well as the best and worst case scenario for the budget of the systems implementation.

**Time Management**

During the completion of the Workbook, the group carefully managed the time taken to complete the various sections as it allowed the group to ensure that all deadlines were met. This ensured that in the event that a mistake was made, there was adequate time to fix these issues before submission.

**Version Control**

When completing the Workbook, the group decided that version control would be used. This ensured that no work was erased when merging content from different versions of the project document. While this measure was taken, the team in general needed to make a greater commitment to it as there were several instances where versions needed to be updated due to duplications.

## 8.5 Lessons Learned

What Worked

* The ability to work as a team and individually
* Communication
* Helping each other when needed
* Listening to other team member’s ideas
* Organisation
* Able to give constructive feedback to each other
* Distributing tasks
* Getting work done by deadlines
* Taking initiative and doing extra work if needed

What Didn’t Work

* Scheduling team meetings where everyone could be present
  + Differing schedules
  + Not enough meetings planned
* Team conflict
  + Agreeing on the same aspect
* Time management
* Versioning of project document

Lessons Learnt

One of the most important lessons learnt whilst completing the workbook is to have the assessed sections finished at an earlier date. During the process of developing the Workbook, the team had agreed to have each section accomplished with time to spare; however, leading to the due date certain parts of the document was still uncomplete. Although the team submitted, it created stress and uncertainty regarding its completion. If the assignment was to be completed again, a timetable would be best advised as it gives the team a structure which gives a greater assurance of timely completion, team morale and efficiency. Time management is very important when completing any project and for this one, it would also allow us extra time to revise, edit and add to the section thoroughly.

Another valuable lesson learnt is the importance of version control when working as a collaborative team. The approach throughout this assignment was to incrementally increase the version of the document by changing the file name. This process worked rather slightly but with multiple team members working on different tasks which led to confusion as to who had the most recent file version. Assembling the separate tasks into one document, proved to be difficult. In the future it would be more time effective to use a common platform such as Google drive which would allow all members to work on the same document at the same time.

A lack of coordination defined by the directors and the overall project team, as there were fewer meetings than actually needed as the group partakes in other activities, making it hard to find a suitable time and length, in order for the minimum process of collaboration to proceed. This led to sections of the Workbook being left or forgotten and segments going against what has previously been stated. This was due to team members hesitating to suggest their range of availability.

One of the final noteworthy lessons learnt by the team during the process of completing the assignment was that the team needed to find more time to meet up and work on the assignment together (*As stated before*). The times we did manage to get together to work on the assignment were the times that most work got done. The worked ended up being done individually rather than as a group, increasing the amount of time needed for proofreading and the like. It would be more beneficial for the team to meet up and work on the assignment together as the work done during that time was of a higher quality as the team could collaborate on it together easier.

# 9.0 Project Management

## 9.1 Status Summary

**Status Summaries Audit 1**

**Status Summary 1**Date: 5/8/16  
Are we on track: Yes  
We have currently finished most of section 1.1, 1.2 and have started on 1.3, but must add more detail in depth. Our group meets up weekly to work on the workbook as a group. Progress is going well, but more time must be spent doing work outside of university if we want to finish on time. Our group is working well together and are helping each other accordingly when needed.

**Status Summary 2**Date: 17/8/16  
Are we on track: Yes  
We are currently over half way through section 1 of the workbook and are on task to finish on time. We have filled out most of the sections required, but must add more information and refine it so it covers all the aspects it must in detail. We are still having weekly meetings where we meet up and work on the workbook as a team. As we meet up on Fridays, we must schedule another day next week so we can finalise it as a group before it is submitted. Progress is being made smoothly and the group is working well together.

**Status Summary 3**Date: 24/8/16  
Are we on track: Yes  
We are up to date with the assessment and just need to add a couple extra details in some parts before we submit the first section on Friday. We will finish up everything on Thursday after the workshop and edit minor details Friday morning to assure everything is in order for submission later that day. We have continued to meet up Friday mornings to work as a group, help each other when needed and discuss our ideas.

|  |  |  |
| --- | --- | --- |
| **Section** | **Estimated Time Spent** | **Actual Time Spent** |
| 1.1 Company Information | 1 hour | 1.5 hours |
| 1.2 Stakeholder Analysis | 2 hours | 2 hours |
| 1.3 Communication Strategy | 1 hour | 1.5 hours |
| 2.1 Product Scope Description | 1.5 hours | 1.5 hours |
| 2.2 Product Deliverables | 2 hours | 2 hours |
| 3.1 WBS Tree draft | 1 hour | 2 hours |
| 3.2 WBS Table draft | 1 hour | 2 hours |
| 9.1 Status Summary | 10 mins | 20 mins |
| 9.2 Task List | 5 mins | 5 mins |
| 9.3 Time Sheet | 5 mins | 5 mins |

**Status Summaries Audit 2**

**Status Summary 4**Date: 5/9/16  
Are we on track: Yes  
We are currently half way through the second audit and well on our way to completing it on time. We have met up after a couple of the Thursday workshops as Friday mornings were starting to interfere with some of the member’s timetables. We need to continue to meet up so we can work together and help each other when needed. There has been an issue with agreeing on some of the ideas, but we are working through it as a group and discussing our reasons.

**Status Summary 5**Date: 24/9/16  
Are we on track: Yes  
The team is up to date with the assignment, we just need to add a few alterations in particular parts of the assignment before the submission date in a couple days. The team has met up on some Thursdays after the workshop to work on the assignment together, but should probably try to meet up more often for the next assignment. We have worked as a group on some parts as well as doing individual work and have helped each other when needed.

|  |  |  |
| --- | --- | --- |
| **Section** | **Estimated Time Spent** | **Actual Time Spent** |
| 3.1 WBS Tree | 1.5 hours | 2 hours |
| 3.2 WBS Table | 1.5 hours | 1 hour |
| 4.1 Choice of Technique | 30 mins | 45 mins |
| 4.2 Justification | 1 hour | 1 hours |
| 4.3 Estimation | 1 hour | 40 mins |
| 5 Schedule | 2 hours | 1.5 hours |
| 6.1.1 Change Control Approach | 2 hours | 1.5 hours |
| 6.1.2 Change Control Procedure | 2 hours | 1.5 hours |
| 6.1.3 Audits & Review | 1 hour | 1 hour |
| 6.2.1 Configuration Management | 1.5 hours | 1.5 hours |
| 9.1 Status Summary | 10 mins | 20 mins |
| 9.2 Task List | 5 mins | 5 mins |
| 9.3 Time Sheet | 5 mins | 5 mins |

**Status Summaries Audit 3**

**Status Summary 6**Date: 4/10/16  
Are we on track: Yes  
Some team members have worked on the third audit during mid-semester break, so we are currently on track. We have started section 7.1, 7.2 and have already done some of part 8 from other audits. We have a team meeting held for after the workshop on Thursday to work on the project as a team and designate sections. We will also be meeting next Thursday and Friday as well to ensure we get the project finished on time.

**Status Summary 7**Date: 14/10/16  
Are we on track: Yes  
The team has finished most of the third audit and are just finishing up on the required sections and fixing mistakes from the second audit. We held a team meeting after the Thursday workshop and on Friday morning, but not every member was able to attend due to conflicting timetables. We have already completed some of section 8 from the last audits so we just have to finish up on that and finish off section 7.2 and 7.3. Communication and agreeing on ideas have improved since the last audit, which has made a big change. We are currently on schedule to finish and hand in the last audit on the due date next week.

|  |  |  |
| --- | --- | --- |
| **Section** | **Estimated Time Spent** | **Actual Time Spent** |
| 7.1 Risk Management | 2 hours | 1.5 hours |
| 7.2 Risk Monitoring Strategy | 1.5 hours | 1 hours |
| 7.3 Risk Register | 2 hours | 40 mins |
| 8.1 Success Criteria | 1 hour | 1 hour |
| 8.2 Project Achievements | 1 hour | 1.5 hours |
| 8.3 Schedule Reporting | 1 hour | 1.6 hours |
| 8.4 Review of Techniques | 1 hour | 2 hours |
| 8.5 Lessons Learned | 1 hour | 1 hour |
| 9.1 Status Summary | 10 mins | 20 mins |
| 9.2 Task List | 5 mins | 5 mins |
| 9.3 Time Sheet | 5 mins | 5 mins |

## 9.2 Task List

|  |  |  |  |
| --- | --- | --- | --- |
| **Task** | **Allocated to** | **Due Date** | **Status** |
| 1.1 Company Information | As a Team | Aug 26 | Complete |
| 1.2 Stakeholder Analysis | As a Team | Aug 26 | Complete |
| 1.3 Communication Strategy | As a Team | Aug 26 | Complete |
| 2.1 Product Scope Description | Lachlan Horsey & Annabelle Murrell | Aug 26 | Complete |
| 2.2 Product Deliverables | Yasin Cakar | Aug 26 | Complete |
| 3.1 WBS Tree | Sam Wren | Aug 26, Sep 23 | Complete |
| 3.2 WBS Table | Sam Wren | Aug 26, Sep 23 | Complete |
| 4.1 Choice of Technique | Sam Wren | Sep 23 | Complete |
| 4.2 Justification | Sam Wren & Annabelle Murrell | Sep 23 | Complete |
| 4.3 Estimation | Sam Wren | Sep 23 | Complete |
| 5 Schedule | Annabelle Murrell & Sam Wren | Sep 23 | Complete |
| 6.1.1 Change Control Approach | Sam Wren | Sep 23 | Complete |
| 6.1.2 Change Control Procedure | Sam Wren | Sep 23 | Complete |
| 6.1.3 Audits & Review | Annabelle Murrell | Sep 23 | Complete |
| 6.2.1 Configuration Management | Annabelle Murrell & Lachlan Horsey | Sep 23 | Complete |
| 7.1 Risk Management | Sam Wren & Annabelle Murrell | Oct 17 | Complete |
| 7.2 Risk Monitoring Strategy | Yasin Cakar | Oct 17 | Complete |
| 7.3 Risk Register | Sam Wren & Annabelle Murrell | Oct 17 | Complete |
| 7.4 Quality Management | Sam Wren | Oct 17 | Complete |
| 8.1 Success Criteria | Annabelle Murrell | Oct 17 | Complete |
| 8.2 Project Achievements |  | Oct 17 | Complete |
| 8.3 Schedule Reporting | Annabelle Murrell & Lachlan Horsey | Oct 17 | Complete |
| 8.4 Review of Techniques |  | Oct 17 | Complete |
| 8.5 Lessons Learned | Everyone | Oct 17 | Complete |
| 9.1 Status Summary | Annabelle Murrell | Aug 26, Sep 23, Oct 17 | Complete |
| 9.2 Task List | Sam Wren | Aug 26, Sep 23, Oct 17 | Complete |
| 9.3 Time Sheet | Individually | Aug 26, Sep 23, Oct 17 | Complete |

## 9.3 Time Sheets

### 9.3.1 Annabelle Murrell

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Time spent | Task | Comments |
| 5/8/16 | 1.5 hours | 1.1 Business experience, business description | Brainstormed ideas about business and wrote about experience and description |
|  | 10 mins | 9.1 Status Summary | A summary of what the group has completed so far and how the project is going |
| 11/8/16 | 2 hours | 1.2 Stakeholder Analysis | Created table of stakeholder analysis and started to work on it |
|  | 1 hour | 8.1 Success Criteria | Started writing success criteria |
| 12/8/16 | 1.5 hours | 2.1 Project Scope Description | Started to write scope description |
| 13/8/16 | 1 hour | 8.1 Success Criteria | Continued to add to success criteria |
| 17/8/16 | 1.5 hours | 2.1 Project Scope Description | Continued to write scope description |
|  | 10 mins | 9.1 Status Summary | A summary of what the group has completed so far and how the project is going |
| 23/8/16 | 1 hour | 2.1 Project Scope Description | Continued to add to scope and create the requirements and acceptance criteria |
| 24/8/16 | 10 mins | 9.1 Status Summary | A summary of what the group has completed so far and how the project is going |
| 11/9/16 | 30 mins | 5 Schedule | Created a draft of schedule |
| 19/9/16 | 30 mins | 1.1 Success Criteria | Fixed up some points and added more information with suggestions from first submission |
|  | 1 hour | 6.1.3 Audits and Review | Started writing audits and review |
|  | 30 mins | 6.2.1 Configuration Items | Created table and started to write configuration items and their baselines |
| 23/9/16 | 1.5 hours | 4.2 Justification | Made alterations and additions to the estimation justification |
|  | 1 hour | 6.1.1 Change Control Approach | Made additions |
| 6/10/16 | 30 mins | 7.3 Risk Register | Brainstormed risks that may occur and created table with necessary information about each of them |
| 9/10/16 | 1 hour | 7.1 Risk Management Strategy | Added information and diagram to section |
| 11/10/16 | 10 mins | 8.5 Lessons Learnt | Wrote a lesson about time management |
| 13/10/16 | 1 hour | 7.1 Risk Management Strategy, 7.3 Risk Register | Put more detail into the risk management strategy and added more risks and relative information |
| 15/10/16 | 10 mins | 9.1 Status Summary | Added in a final status summary |
| 17/10/16 | 30 mins | 8.3 Schedule Reporting | Created a table and added content into the schedule |
| 17/10/16 | 0.5 hour | Editing and formatting |  |

### 9.3.2 Yasin Cakar

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Time spent | Task | Comments |
| 05/08/2016 | 0.5 hour | 1.1 Company Information | Discussion, Perusal and editing |
| 05/08/2016 | 1 hour | 1.2 Stakeholder Analysis | Brainstormed ideas, cooperated during initial drafting. |
| 12/08/2016 | 1 hour | 1.3 Communication Strategy | Developed Communication hierarchy, wrote about communication strategies. |
| 15/08/2016 | 2 hours | 2.2 Product Deliverables | Research, write up and tabulation of findings. |
| 18/08/2016 | 0.5 | 3.2 WBS Table | Suggestions and Editing |
| 25/08/2016 | 0.75 (45min) | 2.2 Product Deliverables | Added references |
| 15/10/2016 | 3.5 hours | 7.2 Risk Monitoring Strategy | Topic Research  Write-up |
| 17/10/2016 | 3 hours | 8.5 Lessons Learned | Editing and Elaborating with Sam Wren |
| 17/10/2016 | 1.5 hours | 7.2 Risk Monitoring Strategy | Editing and adding further detail. |

### 9.3.3 Sam Wren

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Time spent | Task | Comments |
| 5/8/16 | 1.5 hours | 1.1 Business experience, business description | Brainstormed ideas about business and wrote about experience and description |
| 11/8/16 | 1 hour | 1.2 Stakeholder Analysis | Made additions to stakeholder analysis table |
| 12/8/16 | 2 Hours | 1.1 Business experience, business description | Editing & adding |
| 13/8/16 | 1 hour | 2.1 Project Scope Description | Expanded upon project scope |
| 14/8/16 | 0.5 hours | 2.1 User Stories | Created user stories |
| 17/8/16 | 1 hour | 1 Budget | Created template for budget |
| 25/8/16 | 2 hours | 3.1 WBS Tree  3.2 WBS Table | Working on the draft |
| 26/8/16 | 2 hours | 3.1 WBS Tree  3.2 WBS Table | Finish Draft |
| 1/9/16 | 4 hours | Part 1 | Editing |
| 15/9/16 | 2 hours | 4.0 Estimation | Drafting |
| 15/9/16 | 5 hours | 4.0 Estimation  5.0 Schedule  6.1 Change Control | Starting a draft |
| 17/9/16 | 2 hours | 6.1 & 5.0 | Editing |
| 24/9/16 | 4 hours | 4.0 Estimation  5.0 Schedule  6.1 Change Control | Finalizing drafts |
| 25/9/16 | 3 hours | 6.2 Configuration Management | Finalizing |
| 1/10/16 | 6 hours | 7.1 Risk Management Strategy | Starting |
| 6/10/16 | 2 hours | 7.3 Risk Register | Started |
| 13/10/16 | 8 hours | 4. Estimation  5. Schedule  7.1 Risk Management Strategy  7.3 Risk Register | 4 & 5 – Fixing up from last submitting  7.1 & 7.3 – Continuing |
| 15/10/16 | 6 hours | 7.4 Project Quality Management | Started |
| 16/10/16 | 8 hours | 7.4 Project Quality Management | Finished |
| 17/10/16 | 8 hours | 8.2 Project Achievements  8.5 Lessons Learnt | 8.2 – Completed  8.5 – edited & completed |

### 9.3.4 Lachlan Horsey

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Time spent | Task | Comments |
| 5/8/16 | 1.5 hours | 1.1 Business experience, business description | Brainstormed ideas about business and wrote about experience and description |
| 11/8/16 | 1 hour | 1.2 Stakeholder Analysis | Made additions to stakeholder analysis table |
| 13/8/16 | 1 hour | 2.1 Project Scope Description | Expanded upon project scope |
| 14/8/16 | 0.5 hours | 2.1 User Stories | Created user stories |
| 17/8/16 | 1 hour | 1 Budget | Created template for budget |
| 19/8/16 | 1.5 hours | 1.3 Communication Strategy | Developed a pyramid diagram and wrote descriptions for each slices |
| 26/8/16 | 0.2 hour | 3.0 WBS Tree | Made changes to wbs tree |
| 10/9/16 | 1 hour | Document Formatting | Added cover page, table of contents, general formatting |
| 22/9/16 | 1 hour | 6.2 | 6.2.1,6.2.2 |
| 23/9/16 | 1.5 hours | Document formatting, proof reading | General formatting and revision changes |
| 25/9/16 | 0.7 hours | Formatting, proof reading | Getting document ready for submission |
| 17/10/16 | 1 hour | 6.1.2 Change control procedure | Added second change model |
| 17/10/16 | 0.3 hours | 8.3 Schedule Reporting | Word estimations for table |
| 17/10/16 | 0.5 hour | Editing and formatting |  |
| 17/10/16 | 2.5 hours | Review and editing | Revision in preparation for final submission |

### 9.3.5 Connor McIntyre

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Time spent | Task | Comments |
| 17/08/16 | 3 Hours | 1 Budget | Filled out part of budget |
| 6/08/16 | 1 Hour | 1.1 Company Information | Fixed and filled out company information |
| 13/08/16 | 0.75 Hours | 1.3 Communication Strategy | Fixed spelling/formatting errors |
| 20/08/16 | 2 Hours | 2.2 Product Deliverables | Fixed mistakes and formatting issues |
| 26/8/16 | 0.2 hour | 3.0 WBS Tree | Made changes to WBS tree |
| 25/08/16 | 2 Hours | Entire Document Proofreading | Proofread and formatted entire doc |
| 31/08/16 | 1.5 Hours | More Proofreading | Proofread doc again |
| 11/09/16 | 2 Hours | Entire Document Proofreading | Proofread and formatted entire doc |
| 22/09/16 | 1.5 Hours | 1.1 Company Information – Success Criteria | Fixed and added to success criteria |
| 22/09/16 | 1 Hour | 2.1 Product Scope Description – Hardware Requirements | Expanded on Product Scope Description and Hardware Requirements. |
| 23/09/16 | 1 Hour | 4.1 Choice of Technique | Expanded on 4.1 |
| 23/09/16 | 0.05 Hours | 4.2 Justification | Fixed grammar |
| 23/09/16 | 0.05 Hours | 6 Change Control Plan | Fixed formatting |
| 15/10/16 | 0.5 Hours | 8.5 Lessons Learned | Added a lesson |

## 9.4 References

### 9.4.1 General

*Base36.com. (2013). Agile & Waterfall Methodologies – A Side-By-Side Comparison | Base36. [Online] Available at: http://www.base36.com/2012/12/agile-waterfall-methodologies-a-side-by-side-comparison/ [Accessed 13 Aug. 2016].*

*Johnson, E. and Johnson, E. (2013). Agile-Waterfall Hybrid: Smart Approach or Terrible Solution?. [Online] Intland Software. Available at: https://intland.com/blog/agile/agile-waterfall-hybrid-smart-approach-or-terrible-solution/ [Accessed 13 Aug. 2016].*

*Anand Vishwanath (2013). How do we estimate? [Online].* [*http://info.thoughtworks.com/rs/thoughtworks2/images/twebook-perspectives-estimation\_1.pdf*](http://info.thoughtworks.com/rs/thoughtworks2/images/twebook-perspectives-estimation_1.pdf) *[Accessed 23 Sep. 2016].*

*"Agile Estimation: 9 Reasons Why You Should Use Story Points". Agilebuddha.com. N.p., 2016. Web. 24 Sept. 2016.*

*"CM Standards, ANSI/EIA-649-1998 And MIL-STD-973 (1992) Relative To CMII". N.p., 2016. Web. 25 Sept. 2016.*

*"Configuration Management - Sebok". Sebokwiki.org. N.p., 2016. Web. 25 Sept. 2016.*

*"Lewin's Change Management Model: Understanding The Three Stages Of Change". Mindtools.com. N.p., 2016. Web. 24 Sept. 2016.*

### 9.4.2 Standards

*“Electrical Safety Regulation 2013”. legislation.qld.gov.au. N.p, 1 July 2016. Pdf. 20 Aug. 2016*

*“AS/NZS 3000:2007 Wiring Rules”. Standards Austaralia. N.p. 10 Jan.2012. Pdf. 20 Aug. 2016.*

“AS/NZS 3012:2010 Electrical installations—Construction and demolition sites”. *Standards Austaralia. N.p., 22 June 2010. Pdf. 20 Aug. 2016.*

“AS/NZS 3017:2007 Electrical installations—Verification guidelines”. *Standards Austaralia. N.p., 23 Oct. 2007. Pdf. 20 Aug. 2016.*

“AS/NZS 3760:2010 In-Service Safety Inspection and Testing of Electrical Equipment” ”. *Standards Austaralia. N.p., 30 Sep. 2010. Pdf. 20 Aug. 2016.*

“AS/NZS 4836:2011 Safe working on low-voltage electrical installations and equipment” ”. *Standards Austaralia. N.p., 1 Apr. 2013. Pdf. 20 Aug. 2016.*

AS/NZS 60335.2.82-2015 Household and similar electrical appliances (2015) [Online]. <http://www.asnzs.org/asnzs-603352822015-household-and-similar-electrical-applianc-p-16666.html> [Accessed 20 Aug 2016]

“Approval and test specification –General requirements for electrical equipment” *Standards Austaralia. N.p., 30 Oct. 2009. Pdf. 20 Aug. 2016.*

“AS/NZS 4417.2:2012 Regulatory compliance mark for electrical and electronic equipment”. *Standards Austaralia. N.p., 29 June 2012. Pdf. 20 Aug. 2016.*

*International Standards organisation. ICS 19.080 Electrical and electronic testing [Online]*

*Available at: http://www.iso.org/iso/iso\_catalogue/catalogue\_ics/catalogue\_ics\_browse.htm?ICS1=19&ICS2=080 [Accessed 20 Aug. 2016]*

*International Standards organisation.* ICS 43.040.10: Electrical and electronic equipment *[Online]*

*Available at: http://www.iso.org/iso/iso\_catalogue/catalogue\_ics/catalogue\_ics\_browse.htm?ICS1=43&ICS2=040&ICS3=10 [Accessed 20 Aug. 2016]*

*“IEC 61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems” International Electrotechnical Commission. N.p., 30 Apr. 2010. Pdf. 20 Aug 2016.*

*“ISO/IEC/IEEE 15288:2015 Systems and software engineering -- System life cycle processes” International Standards organisation, N.p., 15 May 2015. Pdf. 20 Aug 2016.*

“ISO/IEC 12207:2008 Systems and software engineering -- Software life cycle processes” *International Standards organisation, N.p., 1Feb. 2008. Pdf. 20 Aug 2065.*

“830-1998 - IEEE Recommended Practice for Software Requirements Specifications” Institute of Electrical and Electronics Engineers, N.p., 20 Oct. 1998. Pdf. 20 Aug 2016.

*“1016-2009 - IEEE Standard for Information Technology--Systems Design--Software Design Descriptions” Institute of Electrical and Electronics Engineers, N.p., 20 July 2009. Pdf. 20 Aug 2016*

"List Of Potential Risks". *Groups.engin.umd.umich.edu*. N.p., 2016. Web. 13 Oct. 2016.