CMPT 275

Project Plan

By Team X

Project Group #10

27/09/2017

Project Website
https://sites.google.com/view/blackbox21o

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0. Revision History

Revision	Status	Date	By
1.0	Template of Project Proposal	Sept 18th, 2017	Aaron
1.1	Revise assignment plan and add information for each part	Sept 21th, 2017	All
1.2	Detailing and formatting	Sept 22th, 2017	All
1.3	Included app name	Sept 23th, 2017	All
1.4	Final formatting + Pictures	Sept 25th, 2017	All
2.0	Format Rebrand Revision	November 25th, 2017	Jerry

Table 1: *Revision History*

App Name: Personal Emotion Trainer (P.E.T.)

Catchy Phase: “Bridging the gap between words and emotions”

1. Project Summary

Autism is a complex developmental disability affecting about 1% of the world population [1]. Autism is often characterized by issues in communication (both verbal and nonverbal), repetitive behaviours and social challenges [2]. Autism is a spectrum disorder (also known as ASD), meaning it has different severity levels and effects patients in different ways. Our aim is to provide a tool to people living on the low to mid spectrum of ASD which will help them develop the ability to process and respond to human emotions and understand social norms.

The name of the application is called Personal Emotion Trainer (P.E.T.). P.E.T. is a behavioral training game for autistic patients to teach them about the basics of facial expressions and emotions to help develop social cognition. The age range of the targeted audience is yet to be determined but will probably be between the ages of four to eighteen years old. This application is based on a therapy used in the field called emotion cards [3]. Emotion cards are cards with faces depicting different expressions. Often the subjects are asked to determine what the faces and expression are representing which emotions. P.E.T. will be an iOS application that trains patients with autism on how to recognize different expression such as happy, sad, or anger to help them comprehend social behaviour.

P.E.T. will feature multiple training/game modes. The initial mode of gameplay will involve showing the player a picture, text, video, or cartoon of an expression or social situation and having them label it. A progression system will keep track of the player's progress and a form of reword (coins, credit, etc.) will be given for correctness. Eventually an emotion recognition feature will be implemented. This feature involves the camera and will ask users to replicate emotion shown, the emotion recognition software will measure the attempt. The mechanism used to label the emotional will be designed around the capabilities of the patient. Some options for the interface include voice, text, quiz, or computer aided facial emotion recognition. Gameplay data would be sent to a remote database linked to individual user account for further analysis. This would allow parents or doctors to keep track of the patient's progress in social cognition.

The project can be logically broken down into two major components, the application on the mobile device and the web portal backed by a remote database. The iOS mobile application will contain the user interface and the playable game in which the patient interacts with. The web portal with remote database will display statistics and analysis sent from the app. Furthermore, the web portal will be accessible from any web browser.

2. Project Overview

2.1 Purpose

Autism is a neurodevelopmental disorder which impairs a person's ability for social interaction, communication and other cognitive abilities [3]. Several studies [3, 4] suggest evidence for poor recognition of emotions from facial expression among autistic patients. This can cause difficulties in social interactions, maintaining relationships and even employment [5]. Some tools that were suggested to help teach children included emotion cards, a set of cards with different faces, and several DVDs which use characters to teach emotions [3]. As a behavioural training program, this application is designed to teach the fundamentals of facial expressions and the emotions behind those expressions through the mobile device. It will help patients with autism to better understand and identify emotions and therefore improve their social behaviour.

2.2 Users & Assumptions

The main stakeholders for this application will be the users. Our basic assumptions are given for the target audience. We are covering mid range autism (High-functioning autism, Asperger syndrome) [6]. Users are expected to be able to navigate through a mobile device or tablet. We expect they will have basic understanding of simple text and pictures as well as not hearing or visually impaired. However, if the user is illiterate, we will accommodate to that by providing text to voice instructions. Management and installation of the software can be done by the user's guardians. Data generated from the application can be used for doctors for progression analysis.

2.3 Features & Technology

An entertaining and educational training game	iOS Mobile Application
Definitions of basic facial expressions	Development through XCode 9.0
Ability to share and store photos	Swift 4.0, Cocoa Pods
Integration with device's camera	Facial Recognition API: Affectiva SDK
Tutorial on gameplay and instructions	Database and Backend: Firebase SDK
Tracking of player's statistics	Web Porta:, Google Site

3. Overall Architecture

The overall system architecture will consist of three different components. The first component is the part of the system contained on the iOS device. This is shown in blue below, consisting of the application that will run on the device and its local SQL database (for storing facial image data and questions about these images).

The second component (shown below in purple) of the system is our internal server which will be used to store game statistics for a user account. This will be implemented using a REST API and a SQL database on a server running in the cloud (Amazon Web Services).

The third component (shown below in pink) consists of the external APIs that will be used. A text-to-speech API will be used to support those with reading difficulties. An emotion recognition diagram will be used to implement the facial recognition portion of the game.

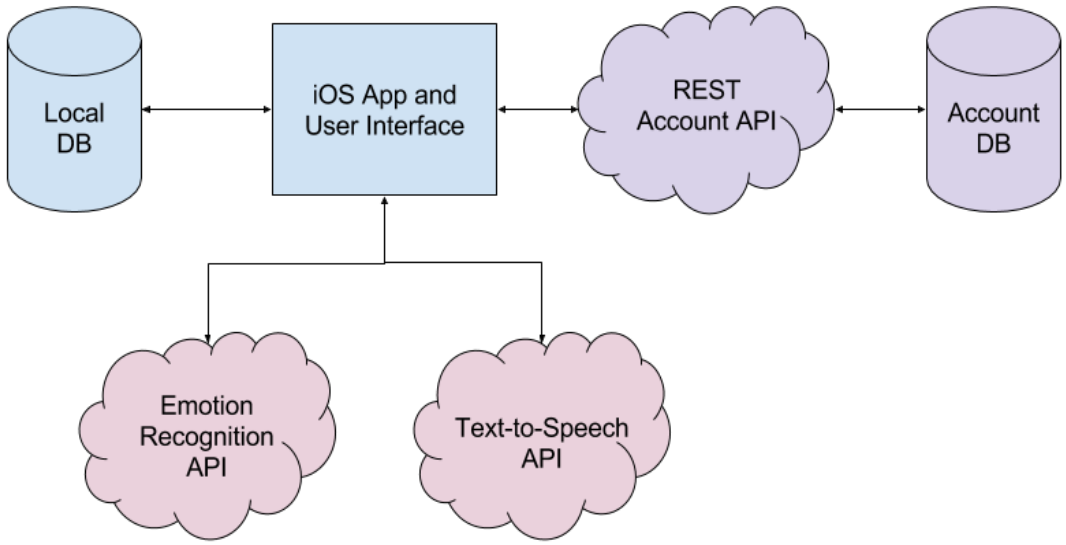

Figure 1: System Architecture Diagram

The application will be developed in three versions.

3.1 Version 1

The first version will be the foundational structure of the application. This will include the user interface, user account, a reward system and the core structure of the game where the player must recognize and identify the emotion displayed on the screen via multiple choice. These images can be either from stock photos, or a selection of personal photos that is stored onto the mobile application. The basis for data transfer will be done by a web portal backed by a remote database

3.2 Version 2

With the foundational structure created, the second version can be focused on improving quality of the gaming experience by including multiple game modes. Such the implementation of the facial recognition feature to the application, where the player must now replicate the emotion through the camera to win. As well as to develop a database.

3.3 Version 3

The final version will not include many new features, it will be used as UI and runtime improvements and cleanup. This version will allow for polishing and testing of the application, and for developing a demo plan. This time is also allocated for integration of emotion recognition API if not done previously.

4. Project Planning

4.1 Meeting Schedule and Team Communications

Group 10 will meet in person at least once a week on Mondays at 1:30pm at SFU Burnaby. After the initial meeting, more meetings will be scheduled based on the demands of the project. Meeting minutes will be used to record and document meeting info and development update. Both meeting minutes and meeting agenda will be uploaded to the group website.

Outside of weekly meetings, the team will communicate primarily via Facebook Messenger. Google drive will be used for cloud storage and sharing of documents and collaborating to create assignments. Github will be used as the development platform for hosting and reviewing the application code.

4.2 Group Site

Group website: *https://sites.google.com/view/blackbox21o/home*

The google website contains a link to the Github repository, a schedule of team meetings, deliverables for assignments, and description for the project as well as team member info.

4.3 External Communications

The group is currently in contact with the Autism Mentorship Initiative of SFU Centre for Disabilities for more information about Autism Spectrum Disease. The group will also maintain contact with Prof. Herbert Tsang for consultant and feasibility of the project. The potential stakeholders will be the user base of the product, which includes people under our target audience mentioned previously.

4.4 Configuration Control Software

The group will use Github as the primary version control software. Each member will be able to access the core code freely for development and testing.

4.5 Budget

There is no budget for this project. All resources used must be obtained for free. We can accomplish this by using open source tools, Azure and the Microsoft DreamSpark program contain some emotion recognition APIs. The development tools for the IOS platform are also freely available from Apple. Firebase is an open source database platform provided by google.

Time will be the resource allocated for this project. Each member will work on tasks simultaneously to a combined 12-hour work week.

5. Project Schedule

Key Tasks	**Start Date**	**End Date**	**Deliverables**
Project Proposal	Sept 18th, 2017	Sept 27th,2017	Project Plan + Website
Gather all requirements	Sept 27th, 2017	Oct 5th, 2017	Requirements Document
Organize & break down requirements (which requirements for which version)	Sept 27th, 2017	Oct 13th, 2017	Requirements Document & Initial Design
Deliver Requirements	Sept 27th, 2017	Oct 16th, 2017	Requirements document
Use requirements to develop initial design	Sept 27th, 2017	Oct 16th, 2017	Initial Design
Deliver Version 1	Oct 17th, 2017	Nov 6th, 2017	Assignment 3
Deliver Version 2	Nov 7th, 2017	Nov 20th, 2017	Assignment 4
Deliver Version 3	Nov 21st, 2017	Dec 4th, 2017	Assignment 5

Table 2: *Key Tasks and Deliverables*

ID	Task Name	Duration
1	BrainStorming	1 day
2	Proposal	2 days
3	Website Development	5 days
4	Project Plan	7 days
5	*Assignment 1 - Project Plan + Website*	
6	Requirements (User Manual)	13 days
7	Initial Design Document	8 days
8	- System design	7 days
9	- UI design	7 days
10	QA Plan	13 days
11	*Assignemnt 2 - Requirements and Initial Design*	
12	Prototype Development	15 days
13	- UI development	14 days
14	- Database development	10 days
15	Unit testing and debug	7 days
16	Documentation	5 days
17	Presentation development	6 days
18	*Assignment 3 - Version 1 + Presentation*	
19	Version 2 development	10 days
20	- Main Feature Implmentation (API integration)	10 days
21	Test and debug	3 days
22	Documentation	5 days
23	*Assignment 4 - Version 2*	
24	Version 3 development	10 days
25	- UI and runtime improvements	10 days
26	Test and debug	7 days
27	Documentation	4 days
28	Final Presentation development	6 days
29	*Assignment 5 - Version 3 + Final Presentation*	

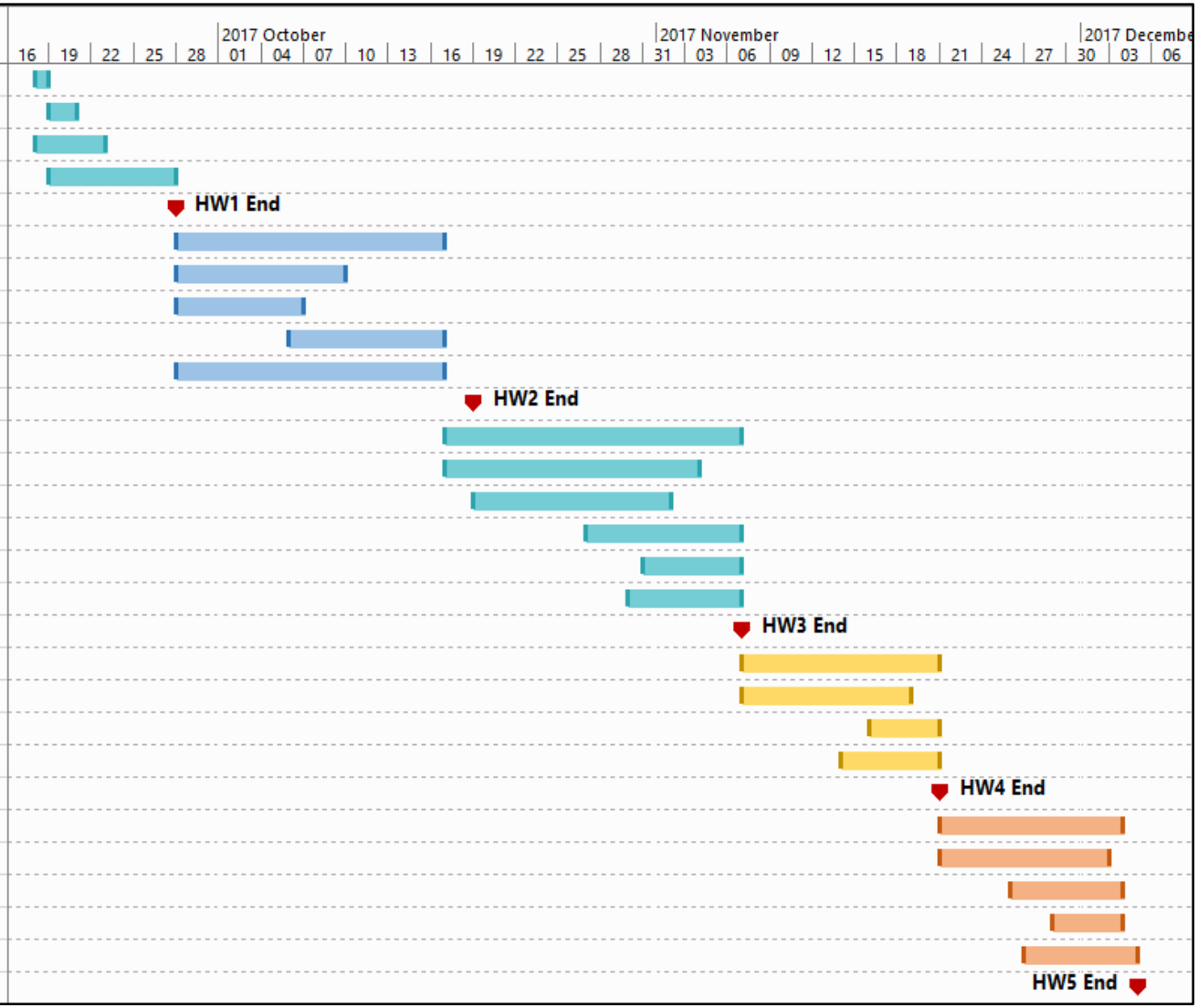

Figure 2: Gantt chart

6. Risk Management

The team is incurring the following potential risks by starting development on this application. These risks are ranging in severity from Very High to Low. However, the team has taken steps to mitigate these risks before the application development begins.

Risk	Consequence	Severity	Mitigating Factor
Team members have no experience with iOS	Initial speed of development may be low as developers are hindered by the learning curve	Very High	The team's previous development experience, including some Android app experience
Underestimating development time during project planning	Missed deadlines, features not delivered on time	High	The team has taken measures to extensively plan meetings and development time
Overestimating the utility of our app for autistic people	The app will not be useful for a wide enough range of our expected users	High	The team is in contact with the SFU Centre for Disabilities and their autism mentorship initiative.
Team members unable to complete work due to health or personal issues	Remaining team members will incur a higher workload	Medium	The team has discussed how to handle absences and sharing of a potentially increased workload
Being unable to access software services (APIs, cloud computing) due to having no budget	Some features of the app will not be implemented properly or the team will incur personal costs	Medium	The team has researched potential free APIs and cloud computing services
Not all team members have access to Macs	Some team members will not be able to use their personal computers to develop the app	Low	The CSIL labs and the library at SFU both contain Macs with XCode

7. Project Organization and Staff Planning

Name: Ivana Jovasevic

Email: ijovasev@sfu.ca

Background: Ivana is a Computer Engineering student. Having completed CMPT 128, 225 and ENSC 251 and is comfortable with object oriented development. She is most proficient in C and C++ and enjoy working on software projects. She has limited web development and IOS development experience, but is excited to learn more in this course.

Role: Project Manager

Responsibility: Ivana is the team manager during the course of the project. She is responsible for communications between the team members, ensuring completion of assignment and submission of assignments, as well as email correspondence and calling/organizing meetings.

Name: Shayne Kelly II

Email: skellyii@sfu.ca

Background: Shayne is a senior Computer Engineering student having worked co-op terms in embedded systems and app development. Shayne mainly has experience programming in C, Java, and Python, as well as some web development. He has worked for 8 months in an avionics company, as well as 8 months on automated tests and test tools for an Android app. He also worked with Continuous Integration (Jenkins) and test tools that interface with automated CI and continuous delivery of software.

Role: Development and Data Management

Responsibility: Shayne is responsible for the application development, mainly the development of the user interface. Additionally, he is also in charge of network components of the project, ensuring functionality of databases and servers.

Name: Jerry Liu

Email: liuyal@sfu.ca

Background: Jerry is a Computer Engineering student with backgrounds in C++, python, and GUI applications. He has good working knowledge of software engineering from previous course work and as well as from co-op experience. Previously Jerry worked two semesters as a co-op student under a professional research laboratory (LAEC). He provided development for custom data analysis software in both MATLAB and python as well as building and maintaining various testbeds. Jerry have also briefly worked on database design and management for LAEC.

Role: QA and Documentation

Responsibility: Jerry is responsible for maintaining and updating the project website, as well as testing and quality assurance of product. He is also in charge of creating and maintaining consistency for documentation.

Name: Aaron Nguyen

Email: ahn6@sfu.ca

Background: SFU provides courses that introduced Aaron to some technical skills and projects. Some key projects that stood out is a VHDL parser project that highlights C++, and Object Orientated Programming under Linux OS with Eclipse. Another major project that highlights some technical background is a development of a Linked List, which introduced the idea of classes and structures in C++. During Aaron's Co-op, he mainly focused on C++ development in Visual Studios. The tasks proved his ability to develop, debug, QA, and test his own work and other co-workers work. Some software that was introduced was Github, mergeDiff, and Bugzilla for bug tracking.

Role: Development & QA

Responsibility: Aaron will be responsible for development and progress of the project. He will also work on quality assurance and provide test cases.

Name: Peter Saffold

Email: psaffold@sfu.ca

Background: Peter is a Computer Engineering student with background in software engineering. Previously he worked eight month for Sierra Wireless conducting software testing mainly for GPS and internet connectivity. Peter has a solid one year experience in module Java coding.

Role: Project Development

Responsibility: Peter is responsible for project development and feature development of application, as well as to provide general vision for scope of project.

8. References

[1] A. Society, “Facts and Statistics,” Autism Society, 2016. [Online]. Available: http://www.autism-society.org/what-is/facts-and-statistics/. [Accessed: 24-Sep-2017].

[2] “What is Autism,” Autism Speaks EN. [Online]. Available: http://www.autismspeaks.ca/about-autism/what-is-autism/. [Accessed: 24-Sep-2017].

[3] Raising Children Network, “Emotional development in children with autism spectrum disorder,” *raisingchildren.net.au,* para. 4, n.d. [Online]. Available: http://raisingchildren.net.au/articles/autism_spectrum_disorder_emotional_development.html. [Accessed: Sept. 23, 2017]

[4] S. Griffisths, et al., “Impaired Recognition of Basic Emotions from Facial Expressions in Young People with Autism Spectrum Disorder: Assessing the Importance of Expression Intensity”, *Journal of Autism and Developmental Disorders,* vol. 47, pp 1 - 11, 2017. [Online]. Available: https://doi.org/10.1007/s10803-017-3091-7.

[5] Howlin P. (1997), “Autism and Asperger Syndrome, 2nd” *Autism: Preparing for Adulthood*. Routledge, London, pp. 5–15, Jan. 1996.

[6] Autism Support of West Shore, “Types of ASD”, *asws.org,* para. 2, 2014. [Online]. Available: https://www.asws.org/WhatisAutism.aspx.

9. Appendix - Team Minutes and Agenda

Meeting Agenda #0

Group 10 Meeting Agenda 0		**Date**: 09/18/2017	**Location**: ASB
Meeting called by:	Jerry Liu	**Type of meeting**:	Introduction & Brainstorming
Facilitator:	Shayne Kelly II	**Note taker**:	Ivana Jovasevic
Timekeeper:	Aaron Nguyen		
Attendees: All			
Agenda			
Topic		**Presenter/ lead**	**Time Allotted**
1. Team member introduce themselves.		Individual team member take turn	5 min
2. Assign roles for the project team		Individual member	5 min
3. Brainstorming project ideas		Project manager	30 min
4. Document meeting		Note taker and project manager	10 min

Meeting Minutes #0

Group 10: Team X
Purpose of Meeting: Introductory
Date/Time: 09/18/2017 1:30pm - 2:20pm
Chair: Ivana Jovasevic
Attendee: Everyone
Absent: N/A

Topic	**Discussion**	**Action/Decision**	**Person Responsible/ Due Date**
1. Introductions	Group member introduced themselves briefly to the group	Got to know each other as group members	N/A
2. Weekly Meeting Schedule	Compared our weekly schedules to determined meeting date	Decided on Mondays 1:30 to 2:20 for meetings	N/A
3. Role Assignment	Assign roles based on past experience	Assigned project roles	N/A
4. Brainstorm ideas	Develop ideas for project and decide on feasibility	Produced list of ideas for voting and finalization	N/A

Meeting Agenda #0.5

Group 10 Meeting Agenda 0.5		**Date**: 09/21/2017	**Location**: ASB
Meeting called by:	Aaron Nguyen	**Type of meeting**:	Assignment 1 Planning
Facilitator:	Shayne Kelly II	**Note taker**:	Ivana Jovasevic
Timekeeper:	Peter Saffold		
Attendees: All			
Agenda			
Topic		**Presenter/ lead**	**Time Allotted**
1. Team name		Aaron Nguyen	5 min
2. Finalize Project Idea		Peter Saffold	5 min
3. Determining role responsibilities		Shayne Kelly II	10 min
4. Assignment 1 work assignment		Ivana Jovasevic	20 min
5. Discuss project scope and features		Jerry Liu	20 min

Meeting Minutes #0.5

Group 10: Team X
Purpose of Meeting: Introductory
Date/Time: 09/21/2017 4:30pm - 5:30pm
Chair: Ivana Jovasevic
Attendee: Everyone
Absent: N/A

Topic	**Discussion**	**Action/Decision**	**Person Responsible/ Due Date**
1. Team Name	Deciding group name	We will be Team X	N/A
2. Finalize project idea	Finalize project idea	Idea finalized to be behaviour training game	N/A
3. Determining role responsibilities	Decid roles based on experience	Assigned specific project roles	Everyone
4. Divide up work for Assignment 1	Discussed parts to assignment 1	Assigned parts and duties for assignment 1	Everyone
5. Discuss project scope and features	Specify core of app and versions	Will need to be continued on next meeting	Everyone

Meeting Agenda #1

Group 10 Meeting Agenda 1		**Date**: 09/25/2017	**Location**: ASB
Meeting called by:	Aaron Nguyen	**Type of meeting**:	Assignment 1 Finalization
Facilitator:	Jerry Liu	**Note taker**:	Ivana Jovasevic
Timekeeper:	Peter Saffold		
Attendees: All			
Agenda			
Topic		**Presenter/ lead**	**Time Allotted**
1. Review website against requirements		Aaron Nguyen	30 Min
2. Review project plan with requirements		Shayne Kelly II	20 Min

Meeting Minutes #1

Group 10: Team X
Purpose of Meeting:
Date/Time: 09/25/2017 1:30pm - 2:20pm
Chair: Ivana Jovasevic
Attendee: Everyone
Absent: N/A

Topic	**Discussion**	**Action/Decision**	**Person Responsible/ Due Date**
Review website against requirements	Ensure our website meets all requirements	We need to add a few additional items to our website which are listed below in action items.	Shayne, Jerry
Review project plan with requirements	Ensure our project plan meets all requirements	We need to add a few additional items to our project plan which are listed below in action items.	Ivana