Test Plan

Version 1.1

Revision Signatures

In signing below, each team member acknowledges that he/she has read the following document, given feedback as to the completeness of the document, and checked the document for grammatical and typographical errors.

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Revision History

The chart below demonstrates revisions on the current document:

Version	Changes Made	Date Edited
Version 1.0	*Initial draft to be delivered December 2, 2011*	*12/1/2011*
Version 1.1	*Upgraded content organization and better section definitions applied. Expanded Unit and System Testing sections. Test Case Matrices refined*	*12/10/2011*

Contents

1. Introduction

1.1. Purpose

This document will outline the testing procedure of the *Thera-Touch* system for the 2011 TCU Computer Science Department Senior Design project. The sections included explain the techniques for each part of the testing procedure and are designed to ensure that the *Thera-Touch* system will meet the requirements based on the needs of the Physical Medicine and Rehabilitation Department of Texas Health Resources.

1.2. Scope and Objectives

The objective of *Thera-Touch* is to work with Texas Health Resources and their Director of Physical Medicine & Rehabilitation to develop a system that utilizes the multi-touch technology of the Microsoft Surface in a therapy setting to track patient progress. By using activities that capture accuracy, speed, and other measurable conditions, statistics will be collected and gathered into reports for Physicians and Physical Therapists to review.

The Microsoft Surface framework will provide not only a user-friendly interface, but also a structure that will allow for any additions to be a smooth and simple process. Staff members will have access to a web-based application connected to a database that will allow for adding and editing of user information, specifying the Surface activities and settings used for a therapy session, and generating reports based on information collected from the results of each session. The data captured will be sensitive information and will require complete security throughout all parts of the *Thera-Touch* system. After each part of the system has been developed, testing will be the final steps in guaranteeing all requirements have been met before the final product may be presented to the client.

1.3. Overview

Section 3- *Resource Requirements* - System, Hardware, Software requirements for testing.
Section 4- *Unit Testing* - Describes the unit testing of specific components of the Microsoft Surface Tutorial, Practice, and Activities
Section 5- *System Testing* – Describes the testing methods once a complete system is integrated to evaluate the system's compliance with its specified requirements.
Section 6- *User Acceptance Testing* - A test of requirement specifications by THR
Section 7- *Testing Schedule* - A layout of the testing schedule by Iterations.
Section 8- *Test Case and System Testing Integration* - Tests all requirements in each section outlined in Unit Testing with defined test case scenarios.
Section 9- *Test Control Procedures* - Explains how the reporting of errors, suggestions and approval of changes will occur. Also includes the final results of each iteration of testing procedures.

1.4. References

IEEE Test Plan Outline
http://online.gerrardconsulting.com/iseb/otherdocs/ieee829mtp.pdf

Healing Touch Project
http://brazos.cs.tcu.edu/1011

Microsoft Surface SDK 1.0 Surface
http://msdn.microsoft.com/en-us/library/ee804767%28v=surface.10%29.aspx

Microsoft XNA Framework Class Library
http://msdn.microsoft.com/en-us/library/bb203940.aspx

Microsoft SQL Server Database API
http://msdn.microsoft.com/en-us/library/dd206988.aspx

2. Glossary of Terms

Activity	*A task on the Surface used to assess a patient's cognitive and physical condition*
Freeplay	*An activity mode in which no information is collected or saved to the database. No user login required.*
Microsoft Surface	*A multi-touch tabletop hardware device developed by Microsoft used as the device for therapeutic activities to be performed on.*
Practice	*An activity mode that can be selected from a session before that activity is played in Test Mode. No information is gathered or saved to the database. Activities launched in practice mode run under the same settings that they would in Test Mode.*
Regression Testing	*A testing strategy where previous test cases are tested before the next set of testing begins.*
Session	*A set of pre-determined activities on the Surface that will be used during patient therapy.*
Stress Testing	*Testing the system to verify stability and error-handling when unexpected situations occur.*
Surface Tutorial	*A basic demo to teach the user the basics of how to interact with the Microsoft Surface.*
System Testing	*Testing conducted on a complete integrated system to evaluate the system's compliance with its specified requirements.*
THR	*Texas Health Resources is the client for this project.*
Unit Testing	*Testing that isolates each part of the system to make sure all parts of the project will work individually before putting it all together.*
User Acceptance Testing	*Evaluates the user and client required specifications of the software system developed by implementing testing for this user.*

3. Resource Requirements

3.1. Hardware Requirements

- Microsoft Surface Unit (Version 1.1) running Microsoft Windows Vista 32-bit
- Networked workstation running the *Thera-Link* Web Application in a modern browser
- Wireless access point with wired connections to workstation, database server, and Microsoft Surface

3.2. Software

- Microsoft SQL database 2008 R2
- *Thera-Link* Web Application running on a Microsoft IIS 6.0 web server
- Microsoft .NET Framework 4.0

4. Unit Testing

Unit testing of the *TheraTouch* system shall be divided up into several different parts. Each one of these units is to be tested with the requirements below. The goal of unit testing is to confirm that all individual parts will work separately before the system is integrated as a whole. These tests are divided by project iterations and are listed as follows.

4.1. Iteration #1 Unit Testing

4.1.1. Microsoft Surface *TheraTouch* Testing

- Login sequence and tag recognition works only for registered patients.
- Menu path and GUI navigation is all correct.
- Information sent to and retrieved from the database is correct.
- Staff ID tag placed on Surface will pause the activity.
- A user can start a newly created session.
- Paused activity will then generate pause screen menu to allow user to resume, restart, and quit.
- Framework starts and stops correctly.
- A user shall be able to logout.

4.1.2. *TheraLink* Web Application

- Office Staff will be able to login with valid credentials
- A user should not be able to travel to pages without the correct credentials
- Users shall be able to logout
- Office staff will be able add new users and each field is validated before
- Managers and office staff shall be able to print tags
- Staff members shall be able to view patient data
- Therapists and Managers shall be able to create dynamic sessions

4.2. Activity Testing

Each activity created for the Microsoft Surface framework shall be tested using the following activity testing requirements. Below are the common requirements for all activities followed by each activity's specific requirements.

- User or Staff Therapist should be able to launch the activity
- User shall be able to access every activity in Free-Play mode
- User shall be able to access the menu during any Free-Play activity
- User shall be able to practice this activity on simple settings
- All activities shall have a demo launched before starting
- Each activity shall offer options for preferences and difficulty settings
- All menu buttons on pause menu shall work accordingly
- User shall be able to quit practice mode
- If Staff Therapist throws down their Staff Tag, a pause menu shall display and activity shall pause
- Every activity from a session shall collect data accurately and store it to the database

4.2.1. Memory Match – Iteration #1

- User shall be able to select a card
- Number of cards on screen shall be defined by settings in web application
- When a match is found, the matched cards disappear

4.2.2. Seek the Shape – Iteration #1

- User shall be able to see the shape for a few seconds
- There shall be at least one shape in each quadrant
- The number of shapes shall have been determined by the settings

5. System Testing

System Testing is to occur after all unit testing is complete. After all those requirements have been met, system testing is then completed by iteration and will determine that these specifications below are integrated correctly.

5.1. Database Testing

5.1.1. Iteration #1

- All user information collected is stored in the tables and fields correctly
- All credentials and access levels of staff members is stored correctly
- All activity settings are stored correctly along with the resulting data

5.2. Framework Testing

5.2.1. Iteration #1

- Sessions created from the web application work correctly on the Surface
- All activities work correctly according to their specifications
- Users created from the web application are stored and recognized on the Surface
- All credential levels are recognized by the web application and the Surface

6. User Acceptance Testing

This section will provide the layout for determining if the project has met the requirement specifications of THR. These tests will be done by a user/client to confirm their contentment with each deliverable prior to rollout.

6.1. Performance Usability Testing

Performance testing is a rigorous usability evaluation of a working system under realistic conditions to identify usability problems and to compare measures such as success rate, task time and user satisfaction with requirements.

- Major usability problems are identified that may not be revealed by less formal testing, including problems related to the specific skills and expectations of the users.
- Measures can be obtained for the users' effectiveness, efficiency and satisfaction.

6.2. Stress and Volume Testing

Stress and volume testing can be synonymous with each other. The methods for this type of testing usually involve a heavy load being placed on the system beyond normal usage patterns. This tests the system's response to that load. Errors are to be expected, but increased user satisfaction and acceptance can be achieved with proper error handling of these tests.

7. Testing Schedule

Iteration #1	Testing commences: ***November 29, 2011*** Unit and System Testing: *Framework functionality shall be tested, along with TheraLink, database, and completed activity functionality* Test completion: ***December 13, 2011***
Iteration #2	Testing commences: ***January 25, 2012*** Regression Testing: *Iteration 1 items shall be tested again* Unit and System Testing: *more functions on TheraTouch and TheraLink. More activities shall be added and tested.*
Iteration #3	Testing commences: ***February 15, 2012*** *Iteration 1 and 2 items shall be tested again, along with complete functionality on TheraTouch and TheraLink. More activities shall be added and tested completely.*
Iteration #4	Testing commences: ***March 14, 2012*** *Iteration 1, 2, and 3 items shall be tested again. Entire system shall be tested for completeness and thoroughness. All activities shall be added and tested. Each role shall be tested accordingly.*

8. Test Case and System Testing Integration

8.1. Test Cases for Iteration #1

8.1.1. Test Case #1- TheraLink Login

1.) A staff member will open up a modern web browser using a networked workstation.
2.) They will go to the TheraLink website where they will see the login page. No other pages should display if there is an attempt to browse to other Theralink pages.
3.) They will then attempt to login using their correct credentials.
    a.) If the correct credentials (username and password) are entered correctly, TheraLink should display the home page. The staff member shall then be able to browse through other TheraLink pages.
    b.) If their login fails, an error message will be displayed.
4.) Once logged in, a staff member shall be assigned 1 of the 3 roles.
5.) The staff member shall be able to logout by clicking the logout button or exiting the TheraLink website.

8.1.2. Test Case #2 – Adding a User

1.) When a staff member is logged in with the correct access level they should be able to click on the "Add User" tab.
2.) This will present them with a form that is to be completely filled in.
3.) Once the correct information is filled in and no validation errors are presented:
    a.) They can print a tag with the "Print Tag" button.
    b.) They can save the information with the "Save" button.
    c.) If any duplicates are present in the database, an error message will display.
4.) Printing a tag will result in storing the user's info into the database and a Microsoft Word page being loaded with the user's information and barcode. From here, they can print this page as they normally would in Word.
5.) Saving a user will store all information to the database.

8.1.3. Test Case #3- Create a Session

1.) When a staff member is logged in with the correct access level and they have added a Surface user, they will then be able to create a session for that user.
2.) The "Session Management" Tab should then be selected, followed by the "Add New Session."
3.) The staff member may then search for the specific user for whom they would like to create a session by entering their ID number.
    a.) An invalid ID number will display an error message
    b.) If a current session already exists for the current user, an error message will be displayed and the staff member will need to "Edit a Session"
4.) After a valid session is created, all activities are selectable and can be added to the session.
5.) After each activity is selected and added to the list in the session, the options can be set and then modified to the staff member's choosing.
6.) The list of activities can be edited further by arranging them in different order, adding more activities to the list, deleting activities from the list, and locking the order of activities.
7.) The staff member will then save the session and it shall be stored to the database.

8.1.4. Test Case #4- Perform a Session

1.) Once the session has been added by the staff member, a user can begin their session.
2.) The session may be locked by the staff member and the user must perform the session in the preceding order.
3.) The activities allow for either practice mode to be chosen or for the activity to begin normally.
    a.) If the activity selected is chosen to begin in practice mode, the user may begin the activity without the pressure of any data being captured and stored. They may decide to quit practicing the activity anytime they choose.
    b.) If the activity is chosen to begin normally, the activity shall run through a demo of how to play and then will start. Data is captured and is stored to the database once completed.
4.) If the session is locked, the next activity will proceed.
5.) If the session is not locked, the user may choose the next activity and from the session home screen or choose to quit the session.

8.2. Requirements Traceability Matrix

Requirements Traceability Matrix Testing is performed based on the series of previous test cases above. These cover all requirements in all areas of the defined project. A detailed definition of each test case is given in the below matrices.

Thera-Touch Requirements	**Test Cases**				
	1	2	3	4	5
TTR-01- The Surface Framework shall allow access to Free Play mode without the need to log in					
TTR-02-The Surface Framework shall allow users to log in.					
TTR-03-The Surface Framework shall load the next session for a user, if it exist				X	
TTR-04-The Surface Framework shall throw an error if a valid session is not in the database for a user				X	
TTR-05-The Surface Framework shall allow staff members to interrupt a session with an ID tag					
TTR-06-The Surface Framework shall handle database connectivity for the activities		X	X	X	
TTR-07-Activities shall have a demo that can be launched before starting				X	
TTR-08- Each Activity shall offer options for preferences					
TTR-10-Activities shall capture statistical information on user's responses				X	

Thera-Link Requirements	**Test Cases**				
	1	2	3	4	5
TLR-01- Staff shall be able to login	X				
TLR-02- A staff member shall have 1 of 3 different roles assigned to them	X				
TLR-03- A staff therapist shall be able to add a user		X			
TLR-04- A staff therapist shall be able to provide additional information		X			
TLR-05- Staff and Managers shall be able to print user tags		X			
TLR-06- Office Staff and Managers shall be able to add a user		X			
TLR-07- A staff member shall be able to modify a user information					
TLR-08- Office Staff and Managers shall be edit user information		X			
TLR-09- Office Staff and Managers shall be able to print user tags		X			
TLR-10- Staff therapists and managers shall be able to print user progress reports					
TLR-11- A staff therapist shall be able to create custom reports					
TLR-12- A staff therapist shall be able to save custom reports					
TLR-13- Staff therapists shall be able to choose activities for a user session			X		
TLR-14- Staff Therapists shall then be able to configure activity options			X		
TLR-15- Staff shall have the ability to lock the order of activities in a session			X		
TLR-16- Managers shall have the ability to enter credentials for office staff and staff therapists					
TLR-17- Managers shall be able to give access to the Surface					
TLR-18- All users shall have the ability to logout after use				X	

Database Requirements	Test Cases				
	1	2	3	4	5
DBR-01- The database shall store all of the resulting data from activities in a session				X	
DBR-02- The database shall store all of the settings associated with the resulting data from activities			X		
DBR-03- The database shall store a limited subset of user demographical information		X			
DBR-04- The database shall store information about initial testing/assessment scores					
DBR-05- The database shall store all credentials and access levels for staff members	X				

9. Test Control Procedures

This section will outline and explain problem and error reporting and how changes will be suggested and then made.

9.1. Problem Reporting

Problems found through system and unit testing will be noted of and brought to the attention of the developers as quickly as possible. Not all problems that arise through testing will be of high importance, but the proposal of all possible solutions are to be considered as necessary for the best developmental outcome.

9.2. Revision Reporting

Problems and errors that are found and reported are then to be revised in a timely, but systematic manner. These problems are to be discussed thoroughly with enough detail so that necessary changes, if any, may be communicated to all project group members and revisions may commence smoothly. Notes made by the tester from testing will be used to present to the project group so that any decisions may be discussed and followed through with.