Department of Computer Science and Engineering  
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βeta βlockers  
Wireless Blood Pressure Monitor  

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Scott Phan  
Benjamin Bloom  
Sabreen Alabedredha  

Late Updated: 3 December 2013 @ 11:00:00 PM  
Project Charter
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1. General Organization

1.1 Project Manager
The Project Manager of team Beta Blockers is Ian Jungmann. His responsibilities for the wireless blood pressure monitor project include setting the agenda for team meetings, assigning and delegating tasks and assignments, ensuring that all members are accomplishing their tasks and progressing at an acceptable pace, and finalizing the core components of the project and in which order they will be created. The team members have been assigned specialized areas to manage in order to ensure that no one person has too much control or has too much to manage. These areas include scheduling, budget maintenance, and quality management. Any suggestions must be approved by the project manager and the majority of the team. This will ensure a more democratic approach, and will allow members to focus on a few areas of expertise.

Ian is a computer science major, and has a strong background in programming. He has led teams in many different disciplines, such as software development and robotics in school and industrial settings, and some less technical areas such as band. He is good at delegating tasks to ensure that everyone is working on something that they are good at and enjoy, breaking down complex, creative ideas into small modules to be created, and he believes in open discussion and will not disregard people or ideas. For these reasons, team Beta Blockers has selected Ian Jungmann as project manager.

1.2 Project Oversight
Internal control shall be generally managed by the Project Manager, with each team member managing certain aspects of the project. Hao Nguyen will be in charge of schedule maintenance and ensuring that all members are logging their time appropriately. Major changes to the schedule must be approved first by him. Sabreen Alabedredha will be maintaining the team's budget, thus all purchase orders will be approved and generated by her. Scott Phan will handle quality management as the team gets closer to actual development; he will verify that the product continues to satisfy the requirements and quality conditions that we have specified and agreed to. Benjamin Bloom will be doing risk and change management. All major concerns should be given to him to bring up, and he will be watching over the project to let the team know if we are approaching any risks that we have specified, or if there are any major changes that need to be made to the project.

All approved items will be announced during the team's weekly meeting by the appropriate manager for the team to discuss. From this discussion a verdict will be reached on the item. Weekly status reports will be taken by Hao, which will allow the team to know of issues and concerns early. Emails, phone calls, texts, and other forms of communication will be used to get information out during times when the team cannot meet. In addition, ten minute status meetings will be held on occasion to get crucial information out, in circumstances where there is not a lot of time to discuss things.
External control will be handled by Dr. Zikos, the project sponsor. As sponsor and customer, he will ensure that the project is meeting his requirements, and that it is doing so in a timely fashion. Emails and short, impromptu meetings will be used to relay minor information. Scheduled meetings, currently every three weeks, will be used to give a project status report, to report major changes or developments either from the team or from the sponsor, and to further clarify concepts and bring new information to light as the project continues to pick up steam. In addition, Mr. O'Dell will handle some external control to ensure that the team and the project are fulfilling the requirements of the class itself, and to approve purchases. This will be handled through team and individual status reports and purchase orders, which will be generated by the team to give to him.

1.3 Roles and Responsibilities
Each team member has been assigned roles that fit their skills and interests, to ensure some separation of concerns and to make the process more efficient. Currently, team members have each been assigned one development role, as well as one management role.

Hao Nguyen is in charge of managing the team's schedule, as well as the work plan. He will take weekly status reports to see if the team is still on schedule, and will adjust the schedule and the project plan if need be. He is also the team's lead software developer. He will be leading the development of the web service to ensure that it fits the necessary requirements, especially when it comes to the GUI and the user experience.

Scott Phan will be the team's quality manager. With his extensive knowledge of software development methodologies and procedures, as well as information about health security and safety requirements (such as those specified by HIPAA), he will make sure that the quality of the product is enough to satisfy these requirements. He is also the team's system architect, and will be touching many different areas of the project, assisting where needed depending on the current state of the project.

Benjamin Bloom will handle risk and change management. The team has already mentioned risks that we may run into during the course of this project. Ben will be in charge of alerting the team if any of these risks start to develop, to ensure that the team handles them appropriately. He will also be handling change requests and getting paperwork prepared for those changes. In addition, he will be assisting in the software development, and he will be the team's technical writer, proofreading and cleaning documents so that they can be presented.

Sabreen Alabedredha will be maintaining the team's budget. All purchase orders have to go through her, so that the team can be sure that we are not spending on frivolous things. She will handle the paperwork related to these purchases, as well as the process we will go through to actually acquire these items. As a developer, she will be the team's lead hardware developer, handling any changes that need to be made to the hardware, as well as most of the interfacing that will need to happen between the hardware and portions of the software. She will also be the team's security consultant, so that the team can follow HIPAA guidelines and create a secure product.

Ian Jungmann will be in charge of managing the project as a whole, to ensure that the project is coming along and developing as planned. He will be handling the meetings and the overall processes the team will go through, and all team members will report information tied to their given roles to him. He will also be dealing with most of the back end development of the web service, especially when it comes to data handling and
background processing, as well as integrating the different facets of the project together to form one coherent product.

Dr. Zikos, the project sponsor, will be in charge of ensuring that the project fits his specifications, as well as letting the team know of any changes on his end or concerns he may have. He will also be providing the team with information and knowledge he may have about the domain of the project, to help assist the team with its development.

Mr. O'dell will be supervising the project. He will verify that the team is doing the work necessary to satisfy both the sponsor in terms of the project and the class in terms of the work done and deliverables produced. He will also mentor the team in some ways.

1.4 Project Constraints

The team has identified several constraints for this project, including budget constraints, time constraints, and resource constraints. They are as follows:

- The team will have a working budget of $800.00 US dollars. Upon exhaustion of this budget, the team will need to discuss additional funding with the team sponsor, or use the team's personal finances to complete the project.
- The team has a personnel limit of 5. This number will not change for the duration of the project.
- The project must be completed by May 2014. At this time, the team will be evaluated on what has been produced, and all unfinished functions and modules will be dismissed.
- A few team members are currently working outside of school. The team will need to adapt and be flexible with schedules to accommodate these individuals.
- The team has limited knowledge of the healthcare industry and its practices. Additional research will be needed to overcome this.

1.5 Project Assumptions

Based on the information available to the team currently, the team has made the following assumptions about the project:

- The team will cooperate and communicate efficiently to ensure that all portions of the project are completed and integrated into the system in a timely fashion.
- The team will meet with the sponsor upon reaching certain milestone, when making major changes to the project, and when in need of information or consultation.
- The team will meet at least once a week.
- The hardware for the project will mostly be existing technology that we can interface with.
- While minor changes will be necessary throughout the project, few drastic changes in design or requirements will occur after the concept becomes more finalized.
- The hardware team will research different blood pressure systems thoroughly, contact manufacturers when necessary, and be able to finish the project with the first cuff purchased.
• A Bluetooth enabled blood pressure monitor exists that can send data to a phone, and that can be programmed to be activated using the phone.
• The product will be used by middle-aged consumers
• Data will be secured as much as possible, though some HIPAA requirements may not be applicable or implementable by the end of this project.

1.6 Preliminary Schedule and Cost Estimates

<table>
<thead>
<tr>
<th>Task</th>
<th>Due Date</th>
<th>Hourly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRS Initial Draft</td>
<td>October 9, 2013</td>
<td>48</td>
</tr>
<tr>
<td>Project Plan Initial Draft</td>
<td>October 16, 2013</td>
<td>8</td>
</tr>
<tr>
<td>Project Charter Initial Draft</td>
<td>October 16, 2013</td>
<td>49</td>
</tr>
<tr>
<td>SRS Gate Review</td>
<td>November 1, 2013</td>
<td>10</td>
</tr>
<tr>
<td>System Architecture Design Draft</td>
<td>December 2, 2013</td>
<td>26</td>
</tr>
<tr>
<td>Project Charter Base Line</td>
<td>December 4, 2013</td>
<td>10</td>
</tr>
<tr>
<td>Project Plan Baseline</td>
<td>December 4, 2013</td>
<td>10</td>
</tr>
<tr>
<td>Architecture Design Gate Review</td>
<td>December 11, 2013</td>
<td>10</td>
</tr>
<tr>
<td>Architecture Design Baseline</td>
<td>January 18, 2013</td>
<td>8</td>
</tr>
</tbody>
</table>
2. Scope Statement

2.1 Purpose
The purpose of this product is to allow users to more easily visualize and understand their blood pressure level and overall health. The product will also allow doctors to get information about their patients and how their health is changing, without having to have them in the office or on the phone all the time, which will give them more time to deal with patients with more concerning health issues. The system will authenticate users to ensure security, take standard blood pressure readings, transfer this data securely to the system's servers, and display the collected information to the user and their doctor in various tables and graphs. It will also analyze the data to provide advice and information based on general patterns and previous results.

2.2 Product Definition
The system shall involve a blood pressure cuff, a monitor of some sort to interface with the cuff (such as a smart phone), and a web service. The blood pressure cuff will contain the sensors, pumps, and release valves necessary to allow users to take their blood pressure. The monitor will act as a remote control to turn on and off the device, and to change certain settings. It will also act as the computer for the cuff, doing the computations to get the user's blood pressure and telling the cuff when to start pumping and when to start releasing. In addition, the monitor will transfer the data using its Wi-Fi connection to get the data to the system's servers. The web service shall take all of the data stored and generate interactive, personalized charts and graphs for the user, give the user basic advice and recommendations, and give the user's doctor or caretaker access to their information, to help assist them in staying healthy.

2.3 Intended Audience
The intended audience for this product is middle-aged people, those who are at risk for various blood pressure issues but are still young enough to be able to easily adapt to new technology. The product is especially targeting those that already have high or low blood pressure, to help get their pressure back into a safe range. The product could also be used as a preventative measure and a general health tool.

A second market for this product could be doctors and other caretakers. They could purchase these devices and rent or lend them to their patients for short-term use. This would allow us to reach patients who have an interest in getting their blood pressure into a safe range, but do not wish to continue using the product once this has been achieved. Between these two markets, the product should have a sizeable audience to draw customers from.
3. Cost Management Plan

3.1 Purpose
The purpose of the Cost Management Plan is to help the team maintain the costs of the project in terms of time and money. The plan is meant to manage resources in a way that ensures that the project's critical requirements are met in the most efficient manner while maintaining the budget constraint in the given time frame. The plan focuses on the financial cost of the project, as well as the labor costs.

3.2 Financial Management
The team will be provided a budget of $800 US dollars with which to complete the project. The projects expenses will be managed using the project plan in Microsoft Project, which will be updated by the team's Budget Manager. The Budget Manager is also in charge of handling all purchase requests, for bookkeeping purposes.

Based on initial research of the parts and services that will be needed, the team has found that the project will require around $230 - $625 USDs to complete the project. The breakdown of this estimate is shown in the table below.

<table>
<thead>
<tr>
<th>Item</th>
<th>Low End Cost</th>
<th>High End Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Pressure Monitor</td>
<td>$80</td>
<td>$220</td>
</tr>
<tr>
<td>Web Hosting Service</td>
<td>$25</td>
<td>$180</td>
</tr>
<tr>
<td>Google Play Account</td>
<td>$25</td>
<td>$25</td>
</tr>
<tr>
<td>Android Device</td>
<td>$200</td>
<td>$200</td>
</tr>
<tr>
<td>Total</td>
<td>$330</td>
<td>$625</td>
</tr>
</tbody>
</table>

The research the team has done in regards to the market reveals that there are a variety of parts and services that can be purchased, giving the team flexibility to develop either a low end or high end system that would meet the budget constraint.

The main component for this project is the blood pressure monitor; a working prototype can be built with only a blood pressure monitor if the team elects to run the web service and the mobile app locally on team members’ machines. Not purchasing the web hosting service, Google Play account, or the Android device will cut the financial cost of the project drastically.
3.3 Labor Management

Given the scope of the project, and taking into account other factors such as team makeup and skills, the team has estimated that the project should take approximately 1245 person hours, although this is only a rough estimate and will likely change as the project continues. These hours will be divided amongst the five team members.

The weekly team meetings will be utilized by the team to collaboratively break down major deliverables into various tasks to distribute amongst the members according to their area of expertise. An estimation of labor based on person hours will be made for each task in the project plan. Each member will then be assigned a task that they are responsible for completing in an allotted time period. By recording the time spent through the project plan, the team will be able to keep track of the duration of each deliverable, which will help optimize the labor management and give room for any necessary adjustments in the schedule.

The project schedule will be revised and updated weekly by the Schedule Manager, based on weekly status reports from each team member that describes their week's work. The schedule will be available to all team members online, so that they may view it as they please.
4. Earned Value Management

4.1 Purpose
The team will use the Earned Value Management technique to measure effectiveness of the team's individual and team performance. Each individual task will be assigned a WBS (work breakdown structure), BCWP (budgeted cost of work performed), BCWS (budgeted cost of work scheduled), and ACWP (actual cost of work performed). These measurements will give the team insight on the progress and status of each task throughout the course of the project. This information will be used to adjust and revise the project plan as needed to accommodate for any issues or concerns that may arise. The project will be tracked on Microsoft Project and made available to all team members to view the current project status as they please.

4.2 Measurements
Each individual task will be assigned a WBS, BCWP, BCWS, and ACWP.

- WBS - Number corresponding to the task
- BCWP - Budgeted cost of the task
- BCWS - Planned cost of working on the task
- ACWP - Actual cost of working on the task

WBS will be the number issued to each discrete task in accordance to the project breakdown. Each task will be allocated an initial budget cost (BCWS) and at the completion of each task the team will recorded the actual cost (ACWP).

The earned value of the task will be calculated by a 0% or 100% completion value. Cost earned from the task (BCWP) will only be given at 100% completion. Along with these earned value units, each task will be given a planned start/finish date for when the project is expected to finish from a given start date.

4.3 Performance Analysis
The team will be using performance indices to track individual and team performance. CPI (cost performance index) and SPI (schedule performance index) will be calculated to determine the performances levels. Each task will be analyzed based on its respective CPI and SPI. The equations below show the calculations for determining performance based on CPI and SPI values.

\[ CPI = \frac{BCWP}{ACWP} \]

\[ CPI > 1.0 \quad \rightarrow \quad \text{good performance} \]
\[ CPI < 1.0 \quad \rightarrow \quad \text{poor performance} \]
\[ SPI = \frac{BCWP}{BCWS} \]

\[ SPI > 1.0 \rightarrow \text{good performance} \]
\[ SPI < 1.0 \rightarrow \text{poor performance} \]

4.4 Individual Status Reports
Each member of the team will be required to complete a weekly individual status report, which will describe the tasks they have been working on, how close to complete they are, how many hours have been spent on the task, and the projected start and end dates for the task. These will help monitor the progress of the project on a micro level. An earned value graph will then be generated to give a visual representation of the current and near future status of the project. This graph, in addition to the project plan, will help the team forecast any problems or risks that the team may be heading towards, so that the team can address these problems properly before they occur.
5. Scope Management Plan

5.1 Purpose

The Scope Management Plan describes how the team plans to keep the scope of the project in check and ensure that the project stays on course. Given the time constraint of the project, the team must keep focus and not deviate from the scope as much as possible. The team will use the project's requirements as a base to be built upon. Any major changes that affect the scope of the project will have to be fully processed by the team and its sponsor. This will help to prevent feature creep from affecting the project.

5.2 Stage Development

The project will be broken down into five different stages. Each stage consists of a number of functionalities that will need to be implemented before moving on to the next stage. The team will prioritize the most critical requirements and build up toward advanced/future features. These stages are separated into the hardware and software development of the project and distributed through the course of Senior Design I and II.

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
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</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong></td>
<td><strong>Stage 2</strong></td>
</tr>
<tr>
<td>- BPM Order</td>
<td>- Integration of Communication</td>
</tr>
<tr>
<td>- BP Readings</td>
<td>- Annotations</td>
</tr>
<tr>
<td>- Communication/Data Transfer</td>
<td>- Graph Page</td>
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<tr>
<td><strong>Stage 3</strong></td>
<td><strong>Stage 4</strong></td>
</tr>
<tr>
<td>- Device Authentication</td>
<td>- Website clean up</td>
</tr>
<tr>
<td><strong>Stage 5</strong></td>
<td>- Advice System</td>
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<tr>
<td>- Finger Print Identification</td>
<td></td>
</tr>
</tbody>
</table>

Stage 1 through 3 will be the main critical features of the systems requirements that are mandatory for the project. Further stages in the development will consist of any additional features that the team believes are necessary but within the time span and scope of the project are not the top priorities.
The stages will help the team maintain focus and narrow down the feature creeps that can come up along the course of the project. Each stage is subject to change depending on the challenges that the team will encounter.

5.3 Change Control
If a team member, the team's sponsor, or any other affiliated agent feels that a change to the project is needed, that party will be required to fill out a formal document describing the problem and the proposed change. The team will then review the submitted form to ensure that it does not violate the scope of the project, or to discuss if this change to the scope is acceptable. The team's Change Manager will handle collecting these forms, and will review these forms before discussing the changes in a team meeting. A majority consensus will be needed for the change to be accepted. If conflict arises that the team cannot resolve, the proposal will be brought to the sponsor for further discussion. Minor changes will be reviewed informally by the team and be open to debate. If the change is critical enough it will be treated as a major change and be subjected to full process and review.
6. Work Breakdown Structure

6.1 Purpose
The Work Breakdown Structure is divided into two main phases: Senior Design 1 and Senior Design 2. Senior Design Phase 1 encompasses the main documents and planning of the project, which include the System Requirement Specification, the Project Charter, and the Architecture Design documents.

Senior Design Phase 2 will encompass finalizing the Architecture Design, creating the Detail Design Specification, Test Plan, and wrapping up the project. Prototyping of the system will take place in both phases of the project, but more so during Senior Design 2 when the specifications are finalized by the team and its sponsor.

6.2 MS Project

<table>
<thead>
<tr>
<th>WBS</th>
<th>Task Name</th>
<th>Planned Start</th>
<th>Planned Finish</th>
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<tr>
<td>1</td>
<td>Senior Design Phase 1</td>
<td>Fri 8/30/13</td>
<td>Thu 12/12/13</td>
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<tr>
<td>1.1</td>
<td>SRS</td>
<td>Fri 9/20/13</td>
<td>Fri 11/15/13</td>
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<tr>
<td>1.2</td>
<td>Project Charter</td>
<td>Sat 10/5/13</td>
<td>Wed 12/4/13</td>
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<tr>
<td>1.3</td>
<td>Architecture Design</td>
<td>Wed 11/6/13</td>
<td>Wed 12/11/13</td>
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<td>1.4</td>
<td>Team Meetings</td>
<td>Wed 9/18/13</td>
<td>Thu 12/12/13</td>
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<td>1.5</td>
<td>Sponsor Meetings</td>
<td>Fri 9/20/13</td>
<td>Wed 12/11/13</td>
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<td>1.6</td>
<td>Hardware Research</td>
<td>Fri 8/30/13</td>
<td>Thu 12/12/13</td>
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<td>1.7</td>
<td>Medical Research</td>
<td>Fri 8/30/13</td>
<td>Thu 12/12/13</td>
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<td>2</td>
<td>Winter Phase</td>
<td>Fri 12/13/13</td>
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<td>Mon 1/13/14</td>
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<tr>
<td>3.3</td>
<td>Test Plan</td>
<td>Wed 1/22/14</td>
<td>Wed 2/5/14</td>
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<tr>
<td>3.4</td>
<td>Prototype</td>
<td>Mon 1/13/14</td>
<td>Thu 5/15/14</td>
</tr>
<tr>
<td>3.4.1</td>
<td>Stage 2</td>
<td>Mon 1/13/14</td>
<td>Mon 2/3/14</td>
</tr>
<tr>
<td>3.4.2</td>
<td>Stage 3</td>
<td>Wed 2/5/14</td>
<td>Wed 3/5/14</td>
</tr>
<tr>
<td>3.4.3</td>
<td>Stage 4</td>
<td>Mon 3/10/14</td>
<td>Wed 5/7/14</td>
</tr>
<tr>
<td>3.4.4</td>
<td>Stage 5</td>
<td>Thu 5/15/14</td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td>Project Wrap-up Materials</td>
<td>Thu 5/15/14</td>
<td>Thu 5/15/14</td>
</tr>
</tbody>
</table>
7. **Quality Management Plan**

7.1 **Purpose**
The Quality Management Plan sets general guidelines for the team to ensure that all the system requirements are met. Abiding by the guidelines established in this section allows the team to control and maintain the actual quality of the product throughout the stages of development.

7.2 **Documentation Management**
Any written document by individual team members for a given deliverable will be handed to an assigned Documentation Manager. The Documentation Manager will then handle general grammar and punctuation corrections and formatting, as well as proofread the document and give the team an overall summary for the collection or report upon completion. This will give the team a chance to review and revise the collection or report cooperatively, with the Project Manager coordinating the effort. Once the Project Manager approves of the document, it will be archived as a soft copy and submitted if needed. Documents of critical importance will also be printed as a hard copy and stored in a secure area.

7.3 **Software Management**
All software components are to be stored on the source control system GitHub as they are updated by their individual developers. GitHub is a distributed source control system that maintains a full source compilation on each machine that has synchronized with it. There will be a reviewing and preservation process in order to prevent confusion during the development, deployment, and maintenance of the source code.

1. **Immediate, Unreviewed Source Code** updates are to be committed to a branch dedicated to the “unreviewed” version of the respective systems. The unreviewed version of the system build will be reviewed on a schedule by the Software Manager for compliance with clarity, functionality, and documentation before being transferred into the “reviewed” master branch.

2. **Reviewed, Untested Source Code** will be compiled exclusively with respect to their system branch and tested in regards to expected output. If this succeeds, the system branch will then be transferred over to the “tested” master branch.

3. **Tested Source Code** is source code that has been tested with respect to its unit or system. Source code in this branch will then await a full integration test with regard to its system. The Testing Manager and/or the System Architect will verify its stability and validity in regards to the active project stage requirements. If successful, the system branch in focus will be transferred over to the “stable” master branch.

4. **Stable Source Code** pertains to its intended functionality with accepted integrity and validity. This will be working source code that the team intends to preserve for future development.
7.4 **Hardware Management**

All hardware components will be under review by the hardware sub-team, who expect the components to be primarily electrical. The sub-team will conduct electrical compliance tests to ensure the components are of acceptable quality to be used safely in the product. The System Architect will oversee the compatibility of the components into the overall hardware system and manage its effectiveness onto the overall system. The hardware components will undergo the following review checks before being accepted into product integration:

1. Before opening the package, the System Architect and hardware lead will cooperate to confirm the validity, integrity, and compliance of the hardware component with the system design.
2. Before integrating the component into the system, tests will be performed by the hardware subteam in order to confirm its integrity.
3. When integrating with the system, tests will be performed to verify the system’s integrity and compliance to the project requirements particularly in regards to the addition of the component.

7.5 **Design Process**

The process for designing entails satisfactory research regarding compliance with requirements specified in the System Requirements Specification. The team is currently implementing a variant of the waterfall lifecycle design process. When the team is unsure of a problem they need to overcome in order to proceed onto the next implementation stage, experimentation is encouraged. In the case of hardware, certain technology is expected to use project expenditures in order to verify an approach, if possible, and not excessively exceeding the allocated experimentation budget.

7.6 **Test Plan**

The Test Plan will have a Test Manager in charge of the overall testing scheme in coordination with the team’s System Architect. The Test Plan will intimately reference the System Requirements Specification to verify the product’s compliance to the project requirements. The Test Plan will be reviewed and revised by the team and the project sponsor before testing and results will be reported to the sponsor allowing for feedback on how to proceed with further modifications and/or testing.
8. Communications Plan

8.1 Purpose
Clear and consistent communication amongst the team and individuals who will be working closely with the team is critical. The Communications Plan will help ensure that there are clear lines of communication for everyone to use. All team members will be expected to utilize these guidelines. The plan will cover internal and external communications, as well as source and document control.

8.2 Internal Communication
The team has decided to meet on Fridays, weekly, while working on the project. This will be the team’s primary time to discuss project planning, current status of work, and what the next tasks will be. The team can schedule additional meetings per week if the workload requires it. In addition to the weekly meetings, the team will conduct short scrum-style meetings throughout the week to discuss quick questions or assignments. Outside of these meetings, the primary means of communication among the team are email and text messaging. The team has also agreed to submit weekly reports to make sure everyone adheres to the project plan.

8.3 External Communication
The team has two main external individuals to communicate with. The first is the project's sponsor. There are several lines of communication with the sponsor; the main one used will be email. Communicating through email allows the team to keep the sponsor updated on the project's progress, as well as providing a way to ask basic questions. In addition, the team will meet with the sponsor upon reaching certain milestones, when making major changes to the project, and in certain other circumstances. The other major contact is Mr. O’Dell. The team’s main method of communicating with Mr. O'Dell will be in class and through the team's various individual status reports. In addition, the team will use team status meetings to communicate how it is progressing on the project.

8.4 Source and Documentation Control
The team will use Google Drive to save and share documents. There will be a folder shared amongst all the team members that will provide access to all versions of the team's documents. Within this folder will be a subfolder for each of the assigned papers. All team members will place their completed sections into the respective subfolders. It will then be the responsibility of one of the team members to put all the sections together. This will allow the documents to be reviewed concisely by the other members upon compilation.

This phase of the project does not involve source code. However, in Phase 2 of the project, where development is critical, the team will use GitHub or a similar program for source code version control.
9. Change Management Plan

9.1 Purpose
During the planning and developing of large products, change can be a constant factor. The volatility of the market, when combined with the long schedules required to finish a major product, causes an extreme amount of uncertainty about key features of any project. In addition, complications may arise that force teams to alter the project to either work around the problem or work with the problem. While the team has done its best to plan ahead and get a good grasp of what needs to be done and what can be done, changes will occur, and the team must be prepared to handle these changes. A well-documented and thought out plan will help alleviate the problems that changes will create.

What follows will be the team's Change Management Plan for when a change to the project occurs. This change could be initiated by a team member, the team sponsor, or the team supervisor. The change could be in regards to hardware, software, documents, requirements, or any other facet of the project. Regardless of circumstance, the team must be prepared to handle and accept changes.

9.2 Roles and Responsibilities

Project Sponsor
In the event that the Project Sponsor wishes to instigate a change to the project, it will be the responsibility of the sponsor to bring it to the attention of the team, be it via email or face-to-face discussion. In this situation, the team will meet to discuss the change if it is a minor adjustment. If the change is major, the team will meet as a group with the sponsor to discuss the change. If the change seems reasonable and easy to deal with, the team will commit during this meeting. Otherwise, the team will meet in private to assess the situation, discuss how this will affect the team, the project, the schedule, and any other factors, and then get back to the sponsor, either to agree with the sponsor or to further discuss it. Upon acceptance, the sponsor will fill out a Change Request Form for the team records, and the change will be documented in further paperwork iterations.

If the change is suggested by a team member, the team will assess the situation on its own. If the team feels that the change is of moderate proportion, the sponsor will be notified at the next meeting, via email, or in some way that gets the point across at the sponsor's convenience. If the change is determined to be severe, the sponsor will be notified immediately. Discussion will occur regardless, and the sponsor will be allowed to approve or reject the change. If accepted, the team will fill out a Change Request Form, and document the change.
**Project Manager**
The Project Manager will provide time during each meeting for the Change Manager to discuss any changes that have been requested through him, so that the team may discuss the change and choose whether to accept it or reject it. Changes that have not gone through the change manager can be discussed at the end of this time, though the necessary paperwork will be needed at some point. If an agreement cannot be reached on a change decision, the Project Manager has the final say. If there continues to be disagreement, the change may need to be brought to the Project Sponsor. The Project Manager will not overrule the majority on a decision. In this regard, the project manager will be treated as a regular team member when it comes to changes, barring certain extreme circumstances.

**Change Manager**
The Change Manager will be in charge of handling change requests made by the team. The manager will listen to the team member's request, and decide how important and how reasonable it is. If they feel it suitable, the Change Manager will fill out a Change Request Form or have the team member do so. Afterwards, the manager will discuss the request during the allotted time, and open the floor to discussion. The manager can also bring up changes that they felt may be reasonable, but were not comfortable enough to fill out paperwork for, if they feel it necessary. Change requests that are not reasonable or necessary will be ignored. Minor changes and changes that do not impact the project in any significant way can bypass the Change Manager and go directly to the team or the Project Manager. The Change Manager is also responsible for documenting all changes made to the project, through the request forms and through the various other documents that must be edited.

**Project Team**
Members of the project team can request changes to the project by discussing the change with the Change Manager, as listed above. The team will be allowed to discuss the change requests during the appropriate time in a meeting, and to vote on a change if there is conflict between team members regarding its necessity, with no member outweighing the other in the vote. The team will also be able to discuss changes brought up by the project sponsor or the project supervisor, and will be responsible for evaluating how it will affect the different aspects of the project. If the change is deemed too catastrophic to the project, the team can request that the change be further discussed to address these concerns.

**Other Stakeholders**
Mr. O'Dell, the Project Supervisor, will be alerted to any severe changes to the overall project. Other changes will be addressed during team and individual status reports. If necessary, the Project Supervisor has the right to request changes of his own, which will be addressed in a way similar to how project sponsor requests are handled. No other stakeholders have been identified yet that will require their own process.
9.3 Review and Approval Process
As reported above, if a team member wants to request a change to the project, they will need to discuss it with the Change Manager. The Change Manager may or may not fill out paperwork for the request, depending on how strongly they feel about it. Regardless, if it is considered important, the Change Manager will bring it up at the next meeting. Team members will be allowed to discuss the change, and a decision will be reached. If it is approved, the paperwork will be filed if it hasn't been already, and the team will discuss how much of an impact it will have. Minor changes will not be reported to any superiors. Moderate changes will be reported to the Project Sponsor when possible, be it via email or during a meeting, and they will be mentioned in the team's next status report. Severe changes will be reported to the sponsor and the supervisor immediately for approval. If the team rejects a change, it will be dismissed. If there is conflict, a vote will be taken. If the vote is not enough to produce a convincing result one way or the other, it will be brought to the sponsor.

If a change is requested from the Project Sponsor or the Project Manager, the team will discuss it with the appropriate person to ensure that the request is understood, unless the change is so minor that the team does not feel it necessary. If the change is acceptable to the team, the team will agree to it during this meeting. If there is any doubt about the change, the team will later discuss it amongst themselves, and come up with a verdict. If they find that it is acceptable, they will report so. If they deem that it may be too drastic or cause too much conflict, they will meet again with the appropriate person to discuss concerns and possible consequences. If a change is at some point approved, the appropriate paperwork will be filled out to ensure proper documentation.

9.4 Change Identification, Documentation, Implementation and Reporting
The Change Request Form will allow the person requesting a change to address what the change is, why the change is needed, how it will affect the project, how any affected areas will have to be handled, and a general section for other comments. It will have spaces for the date, the signature of the person requesting the form, the Change Manager, the Project Manager, and the other team members. A space will be left for the rating of the change (minor, moderate, severe), as well as spaces for the project sponsor and project supervisor if the severity of the change warrants it.

The Change Manager will be in charge of collecting these documents, and maintaining a list of what needs to be changed in what documents. Any changes to the schedule will be handled by the Schedule Manager, changes to the budget will be given to the Budget Manager, and any other needed changes will be assigned as they occur.
10. Risk Management Plan

10.1 Purpose
The following plan will establish a system for the team to identify and deal with the risks it may encounter while working on the project. This plan will be used by the Project Manager to identify, categorize, prioritize, and track the risks in the process of development. A risk is defined as anything that will slow down or halt the team’s progress on the project plan. This plan will give the team guidelines for how to deal with anything that may arise.

10.2 Roles and Responsibilities

Project Sponsor
The Project Sponsor is responsible for giving his expert opinion on the project and its domain. He will also help the team clarify project ideas and give input about both the technical and the medical aspects of the project. The sponsor is who the team will talk to if a major problem arises.

Project Manager
The Project Manager is responsible for overseeing the project. He will be responsible for making sure the team follows the risks plans. He will also keep the team focused and on track with the project schedule. He is also responsible for communicating any risks that the sponsor may bring up to the rest of the team.

Project Team
The team is responsible for bringing possible risks to the group’s attention as soon as possible. The team shall discuss any such risks in the weekly team meetings. Also, the team will follow any risk plans that are laid out. This will ensure that the team can keep risk impact to a minimum.

Risk Manager
The Risk Manager is responsible to keep the risks encountered in the project to a minimum. He shall assess the risks raised by the other team members, as well as identify any others that may arise. The Risk Manager is also responsible for creating a plan to manage the risks. He shall be responsible for reporting all risks and risks plan actions to the Project Manager.
10.3 Risk Identification
All team members are responsible for reporting any perceived risks to the Risk Manager. However, it will be the responsibility of the Risk Manager to actively look for potential risks. Once risks are identified, the Risk Manager will document them and create a plan to manage those risks. The risk plans will be discussed with the entire team so that everyone knows how to deal with any current and future risks. This will allow the team to mitigate the impact of risks and keep the project on schedule.

10.4 Risk Triggers
Risk triggers are events or performance characteristics that warn of the occurrence of risk events. The following have been identified by the team as risk triggers:

1. Missing team deliverable deadlines.
2. Gate Review failure
3. Divergence from project plan
4. Divergence from SRS
5. Lack of cohesion among team
6. Lack of team focus
7. Inability to construct hardware correctly.

10.5 Risk Analysis
The following table shows the risks that have been identified by the team. It shows the probability of the risk occurring and its estimated cost to the production schedule.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Probability (%)</th>
<th>Cost (Days)</th>
<th>Risk Exposure (Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware not interfacing correctly</td>
<td>50</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Developer Gold Plating</td>
<td>40</td>
<td>14</td>
<td>5.6</td>
</tr>
<tr>
<td>Monitor and website not integrated correctly</td>
<td>30</td>
<td>21</td>
<td>6.3</td>
</tr>
<tr>
<td>Encryption unable to meet HIPAA standards</td>
<td>25</td>
<td>14</td>
<td>3.5</td>
</tr>
<tr>
<td>Team unable to manage time properly</td>
<td>20</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>34.4</strong></td>
</tr>
</tbody>
</table>
### 10.6 Risk Severity

The following table shows the severity of the identified risks. It is ordered by priority. The table shows the resolution as well as the trigger for each risk.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Priority</th>
<th>Resolution</th>
<th>Trigger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware not interfacing correctly</td>
<td>High</td>
<td>Further research or using a design with different hardware</td>
<td>Unable to start working with the hardware</td>
</tr>
<tr>
<td>Encryption unable to meet HIPAA standards</td>
<td>High</td>
<td>Heavy research into HIPAA requirements and possible getting expert help.</td>
<td>Data encryption not aligned with HIPAA rules.</td>
</tr>
<tr>
<td>Developer Gold Plating</td>
<td>Medium</td>
<td>Clear agreement among all team members about features in the project</td>
<td>Creating functions that do not adhere to the base requirements</td>
</tr>
<tr>
<td>Monitor and web site not integrated correctly</td>
<td>Medium</td>
<td>Research into web design and data transmission</td>
<td>Unable to use monitor data on the website</td>
</tr>
<tr>
<td>Team unable to manage time properly</td>
<td>Low</td>
<td>Frequent status reports</td>
<td>Team members missing internal deadlines</td>
</tr>
</tbody>
</table>
10.7 Risk Response Planning
Planning is vital so that team can properly address the risks mentioned above and any others the team may encounter. Evaluating and planning for these risks will be led by the Risk Manager, but it will be a team effort to refine and follow the laid out plans. The Risk Manager will create strategies to reduce the effects of risk to a level that allows the project plan to be completed as close to on time as possible. The main strategies for risk response planning the Risk Manager will use are listed below:

- Research – The team has agreed to do a lot of research at the beginning of the project to fill in knowledge gaps. The is especially important in reducing the risks associated with the hardware component of our project
- Watch – All team members have agreed to be conscious of risks and to regularly report any problems that may arise
- Accept – some of the risks encountered are unavoidable. The team will simple have to deal with them the best of their abilities

This plan will show how each risk will be managed and who will be responsible for it.

10.8 Risk Documentation and Reporting
A detailed list will be kept of the identified risks in a spread sheet that will be stored in the team’s Google Drive. The sheet will be available for all members to view. It will be the responsibility of the Risk Manager to keep the spread sheet up to date with any new information that may arise. All other members shall be responsible for talking with the Risk Manager if they feel that the spread sheet if lacking any information.

10.9 Risk Control
New and future risks will be discussed in team meetings when they arise. Risk management plans will be thoroughly documented by the Risk Manager and made available to all team members so that the team can follow the plan together. The entire team is responsible for researching and mitigating any risks identified.
11. **Procurement Plan**

11.1 **Purpose**
The Procurement Plan will set out the guidelines for making purchasing decisions throughout the project. These guidelines will be followed by the team in order to submit a purchase request for the project. Following these guidelines will ensure that all purchases are assessed thoroughly and that they are necessary for the completion and delivery of the product. This plan also lists and describes the roles and responsibilities of the team members, the Project Sponsor, and the Project Stakeholders in regards to procurement management.

11.2 **Roles and Responsibilities**

**Project Sponsor**
The Project Sponsor will provide advice on the purchases made toward the project.

**Project Stakeholders**
All Project Stakeholders, including Mike O’Dell and the Department of Computer Science Engineering, will be consulted before making a final purchase decision and will be kept informed of the progress of purchase requests.

**Project Manager**
The Project Manager will be making the final decision on proposed purchases and will be responsible for taking purchase requests to the project department head.

**Project Team**
The team will be responsible for researching and proposing the needed components and services. The team has assigned a Budget Manager who will be responsible for deciding which products would be most suitable for the project. The Budget Manager will also be handling the paper work involved for making a purchase, and the documentation involved.
11.3 Required Project Procurements and Timing
The Procurement Phase is planned to begin immediately after the System Requirements Specifications gate review is complete. Beginning the Procurement Phase at this time ensures that the team will have all of the necessary components in order to begin development in January 2014. That way, problems that may potentially arise due to equipment or services can be handled early, which will allow the team to mitigate risk better and will help the team stay on schedule. If the procurement of components is delayed from the planned date, then the team expects to have all the required components, or at the very least be in the process of obtaining them by the end of Detailed Design.

11.4 Description of Items/ Services to be acquired
The main component for the completion of the wireless blood pressure monitor project is the blood pressure monitor. Other minor expenses have not been included. The monitor that has to be purchased must be researched thoroughly to determine its compatibility and adaptability to the project requirements.
12. Project Closeout Report

12.1 Purpose
The project closeout report is intended to create a final submission and analysis of the project. In this report, the project team will perform an overall final review on the project to ensure that all administrative, personal and financial issues have been resolved. All documentation will be collected for this report to be available for future development of the product.

12.2 Administrative Closure

12.2.1 Were the objectives of the project met?
Upon the closing of the project development, there will be an evaluation by the team and the sponsor to determine the status of the product with regards to the System Requirements Specification. All requirements that are not fulfilled will be enumerated in the closeout report.

12.2.2 Archiving Project Artifacts
All documents created during the development of the project will be maintained by hard and soft copies. The hard copy will consist of the documents printed and aggregated in a large binder. The soft copies will be stored on a single CD and possibly released to the public domain by means of a source control management tool such as GitHub. Engineering notebooks used for the project will be collected and archived for future reference. The following lists the primary documents to be collected:

- Copies of Purchase Requests
- Presentation Documents
- System Requirements Specification (SRS)
- Architecture Design Specification (ADS)
- Detailed Design Documents
- Project Charter (this)
- Project Plan (MS Project File)
- Testing Plan Documents
- Status Reports
- Technical Documents
- User Manual

12.2.3 Lessons Learned
At the end of the project, the team will compile a summary of major issues that the team dealt with during the development of the project. This will also include a log of change requests that were submitted during project development as a reference for future developments.
12.2.4 Final Customer Acceptance
After finalizing the product prototype for the intended purposes of the project, the team will conduct a meeting with the sponsor to verify the compliance of requirements and identify ones that the product did not comply with. The decision will then be given to the sponsor as to how to further proceed with the product. If the sponsor decides the product is not ready to proceed, a future plan will be drafted to get the product to comply will the specified requirements.

12.2.5 Financial Records
All purchases will be documented by the Budget Manager and incorporated into the final closeout report.

12.2.6 Final Project Performance Report
An overall performance report will collect analyses and comments by the project team and sponsor pertaining to how the project was managed, schedule performance, cost performance, impact of change requests and achievements. The report will then be reviewed by the team and the sponsor.