1.4 Target Summary

In order to ensure forward progress in creating the voting machine, certain targets and metrics need to be setup. With a majority of the work being based on software, and the machine being primarily built for large scale elections, time each component of the functional decomposition takes will play a major role. Furthermore, several targets will have to be created to ensure both physical and cyber security to protect the integrity of the election. The targets and metrics are primarily setup to accurately deliver a reliable product that meets not only customer needs, but user needs as well. For this project, there are 8 different targets which will determine whether we are successful in building a feasible voting machine for complex and large scale elections.

Target 1 quantifies election site registration time. This target is necessary to ensure that users are not spending an excessive amount of time getting an access card for the computer. This target also minimizes the long queue time to wait for the voting machines. The marginal value of 5 minutes was based on the time it took for the average user to fill out the voter registration form and time it takes to program the card. Based on testing between 5 users it took 3 minutes to complete the registration form to sign up to vote. An additional 2 minutes was added to account for the time it takes to program the card in order to access the computer. The ideal value was chosen by dividing the the time it takes to program the card by two and adding form registration. To assess whether the target has been successfully achieved, the election registration time of team 306 voting machine will be timed from start to finish. The importance of this target is rated at 4 because an increase in registration time could cause increased wait times for large scale voting such as government elections. Failure to meet this target would result in excessively long queue times as well as an increased vote time per person.

Target 2 quantifies user interface response time. This target is necessary to ensure responsive design between when the user interacts with the user interface and when a reaction appears on the screen display. The marginal value of 0.1 seconds was chosen based on background research on acceptable wait times for web users. Based on research in article “A study of Tolerable Waiting Time: How Long Are Web Users Willing to Wait” by Fiona Fui-Hoon Nah, on average, users that used computers to browse the web expected a time of 0.1 seconds. After that time period, users began to notice severe lag or began to think that there action did not register. The ideal value of 0.05 seconds was chosen by dividing the value in half. To assess whether the target has been successfully achieved, the difference between each user interaction and user interface reaction will be calculated to make sure it meets the marginal value. The importance of this target is rated at 3 because even if there is some noticeable lag, a simple message or loading bar could show the user that their interaction has been recorded if time is higher than marginal value. Failure to meet this target would result in building a voting machine that does not satisfy our user need of building a responsive and user friendly interface .

Target 3 quantifies the speed of encrypting voter information and ballot choices. This target is necessary to ensure voter information is securely transferred in a secure and timely fashion. It is ideal to transfer information as quickly as possible, so that the information is safe on a secure server. The marginal value of 10 seconds was based on background research of the industry

standard for encrypting time. The ideal time was set to match the industry standard. Attempting to improve upon the industry standard made us concerned with cutting corners to increase speed, possibly compromising security. This was unacceptable. To assess whether the target has be achieved by the computer timer information of how long the encryption took. The importance was rated as a 5 because if this process doesn't work properly the entire project will be a failure. Failure to meet this criteria would mean the security of the voting process is inadequate.

Target 4 quantifies the user choices receipt printing time. This target is necessary to ensure the responsiveness of the process and to record physical evidence of the vote of each user. This target also ensures the availability of backup data regarding the individual vote of each user. The marginal value of 1 second was based on the time It took for an average printer to print out the voter choices receipt or any receipt. Based on testing between different receipt printers in stores and movie theaters it took 3 second to complete the printing process for average receipts in movie theaters where the user ends up with an average of 3 receipts including ticket, seat numbers and purchase receipt . To assess whether the target has been successfully achieved, the printing time of the receipt will be calculated with the help of a timer to make sure it takes the less amount of time possible in order to make the process quicker for the users. The importance of this target is rated at 2 because the efficiency of the process is crucial for the voters when deciding whether to vote or not, if the process is efficient the users will enjoy the voting process and come back. Failure to meet this target would result in an inefficient process with a lack of physical evidence of the votes in case of any inconvenience.

Target 5 quantifies voting time. This target is necessary to ensure that users are not spending an excessive amount of time in the system. This target also minimizes the long queue time to wait for the voting machines. The marginal value of 10 minutes was based on the time it took for the average user to fill out the ballot and submit his/her vote. Based on testing, it took users 7 minutes to vote after being registered. An additional 3 minutes were added to account any confusion that the user experiences during the process. The ideal value is the time that it takes to a user to vote without experiencing any confusion. The importance of this target is rated at 3 because it would improve the vote rate, but there are also parts that are in control of the user. Failure to meet this target would result in excessively long queue times.

Target 6 quantifies the time it take for the programmed ballot to be uploaded to the voting system computer. This target is necessary to make sure each computer can receive the proper ballot in a reasonable time. The target is to minimize the amount of time it takes to get every machine ready for the client to be used by the voter. There are an average of 22 different decisions on each ballot in America per election. This isn't a lot of data and should be able to be uploaded relatively quickly. Since this ballot will be uploaded to the computer before voting starts, it is low priority. We valued this importance at a 1 since it doesn't slow down the overall voting process for the user. An ideal time of 30 seconds would be necessary for uploading the ballot to the system.

Target 7 quantifies the amount of force is applied to the sensors on the electronic voting machine to sound the alarm. It is necessary to make sure that unauthorized personals do not have a chance to tamper with the voting machines. This sets off an alarm that will alert voting officials at the precinct. This offers real time security for the voting machines. It will also deters people

from committing voting fraud. The marginal value 22 N was decided by the looking at the data sheet for pressure sensors and averaging the value. The ideal value was chosen by matching the given the higher end of the sensitivity range for sensors. To assess whether the target has been successfully achieved, someone from Team 306 will attempt to physically tamper with the voting machine to see if the alarm makes any noise. The target is rated at 5 because it is extremely important part that would ensure a sense of security to both the voter and the election officials that the votes are indeed safe. Failure to meet this target would result in the inability for the voters to trust whether their vote was counted for the candidates and policies they chosen.

Target 8 quantifies how user friendly the voting machine will be. This target is necessary to ensure how easy to use will the machine be. If it is "friendly" to the user meaning if it is not difficult to learn or understand how to use it. It must be simple and straightforward by providing quick access to features. It must be reliable in the sense that it will not malfunction or crash because if not then it will cause frustration to the users. The goal is to provide a good experience to the voter, the interface will be easy to update, intuitive to avoid users having issues when using them and effective at error handling. Three main features are going to be addressed: color, language and font. For color, the machine will use the 60-30-10% rule, which basically uses a dominant color 60% of the time, a secondary color 30% and a 10% goes to a color that helps to make the accents. This combination is known to be pleasant for human eyes since it allows the user to perceive the elements gradually. For important information the machine will use contrasting color to make the user pay more attention to it (Red and Green). For language, the machine will display the information in english, for since is the main language used by our primary market (US Government). For font, the machine will use letter with clear distinction in the forms. According to a study in 2008 by the Department of Psychology at the University of Victoria, the important part of fonts are their terminations, this makes the font more easy to identificate. Therefore, the machine will have fonts that are legible, modest (avoid complex fonts), flexible in size and resolution, low stroke contrast between letter shapes, loose letter spacing because letters that are too close to each other could be hard to read for the user, and with wide proportions. Failure to meet this target would result in an inefficient process with many users disapproval and possibly a large amount of invalid votes.

Appendix C: Target Catalog

Target No.	Need	Metric	Imp.	Units	Marginal Value	Ideal Value
1	Efficiency, Protect from online and physical threats	Registration and card setup	4	min	5	4

2	Responsiveness, Acquire vote from user	User Responsiveness with Computer	3	sec	0.1	0.05
3	Responsiveness & Efficiency, Transfer data to secure server	Communication with server (Encryption of user ID and ballot)	5	sec	10	10
4	Responsiveness, Record physical evidence, Acquire vote from user	Printing User choices Receipt	2	sec	1	0.5
5	Efficiency	Voting Process	3	min	10	7
6	Efficiency	Downloading Ballot Software	1	sec	60	30
7	Physical Security	Alarm Sensitivity	5	N	22	22
8	User Friendly	Font Size, Language, Colors	4	Y/N	Y	Y