Introduction
The Diabetes Forecast System (DFS) is a tool designed to provide real-time predictions of blood sugar levels (BGL). Forecasts are based on readings from a current diet, latest insulin doses, current workout schedules as well as current sugar levels. These inputs are utilized produced a forecast of BGL for a specific period of time in the future. According to our task analysis and requirements, different additional features were made available in order to improve the user experience and improve the frequency of user input.

Prototype 1 – DFS Iconic Prototype
The iconic prototype incorporates all of the features that we want to include: recording exercise, diet, insulin and blood glucose levels (BGL), but does this mainly with icons instead of words. Predictions and measurements of readings cannot be pictures however, and must be described in words.

General Features
The display will automatically turn off after 2 minutes. The unit is not waterproof; please keep it in the case it comes with. There are pockets in the case for lancets, syringes and two 10 mL unit bottles of insulin. It doesn't look obvious how deletions should be done, but it's easy. The output fields at the bottom of some screens are actually editable, in other words, the items can be removed. To do so, simply double tap and drag the item with the included stylus from the text box to some point outside that box and it will automatically disappear from the list.

HIPAA (Health Insurance Portability and Accountability Act) guidelines prohibit the transmission of medical documents without the owner's permission. For this reason, downloading data from the PDA requires a password. If users should find that they've misplaced the device they can login to the DFS Website and have the PDA remotely locked: the company will send it a message that will freeze the screen and encrypt the data inside. If found again the company will send a message to the device decrypting the data.

BGL Screen
You can get a reading from any screen. Simply insert a test strip into the top right corner
of the meter and the BGL screen will come up. No need to return to the main screen and find the right screen to go to from there. An icon showing a drop of blood will come up indicating that you should use a lancet to prick your finger now. It takes 5 seconds for the system to figure out your BGL once you add a droplet to the test strip. This will be displayed on the screen. After 30 seconds, the display will return to the main screen. Coding your glucometer is normally required based on test strips (numbers can range from 1 - 49, depending on the meter). Test strips come coded with one of these numbers and users are responsible for entering this number in the glucometer before they use any of the strips. If they forget to do this, however, the reading will not be truly accurate. The DFS meter codes strips automatically.

**Main screen**

Displayed are the most recent 5 BGLs. Below this, the readings taken within the past 24 hours are graphed. At the very bottom of the screen is listed any warnings for low readings (this is usually anything < 60, but the number can be manipulated in "Setup") and high readings (anything > 150, again this is adjustable).

**Setup screen**

The button at the top left of the Main screen, "Setup", brings you to the Setup screen where you can adjust several variables, such as the range limits for normal blood glucose levels and what should happen when your blood sugar level is critically low or high (these values are also adjustable, but cannot be set < 40 or > 350). Responses to critical levels could include wirelessly notifying the local police department by calling 911, or sending an urgent call to a relative or friend. This option is adjustable in the Setup section as well. Things such as brightness, contrast, color settings, and sound can be manipulated here as well. The date and time can be set in this section.

Foods can be added along with their nutritional content here. The average serving that you would eat should be included so that you don't need to enter the size of a portion on your plate. This may lead to inaccuracies and a loss of interest in entering foods eaten if it requires that much work. If you eat twice or three times what you normally do, just add the food again as many times as is needed.

Exercise machines that the DFS meter can interact with should be added here. The DFS system comes with a CD that includes drivers, or small pieces of software that communicate between the DFS meter and the electronic device, such as a treadmill, pedometer, or heart rate meter. Connecting to such a device provides the meter with the most accurate information possible.

You should indicate here the type of insulin(s) that you are using. This will allow the meter to make the most accurate BGL forecasts.

If you accidentally submit a record that had misinformation in it, you would want to
delete it. However, giving such privileges has a disadvantage; that being the malicious or unintended deletion of data by others should the device fall into the wrong hands. You can set permissions for the current (and only "logged in") user here. Choose not to give delete permissions if you do not make many mistakes with data entry, and can live with an occasional bad record. Know, though, that permissions can be changed at any point in case an egregious error is made on an entered record.

Downloading information from the PDA to your computer can be done from this screen. This requires a password to comply with HIPAA.

Many screens have a "When" and "Done" button. The "When" button allows you to select an earlier (but not later time) time for when the action occurred, like eating. If, for example, you ate two pieces of fruit three hours ago, but forgot to enter the items at that time, you can include them later, but choose the "When" button and include the right time for when they were done. The "When" button does not need to be tapped if the action to be performed occurred or will occur within 10 minutes prior or will happen in the next 10 minutes.

Food screen
Nutrient info for more than seven thousand foods are included, downloaded from the USDA nutrient database (HYPERLINK "http://www.nal.usda.gov/fnic/foodcomp/search/" http://www.nal.usda.gov/fnic/foodcomp/search/). Select foods that you normally eat and they will be added to the output screen at the bottom of the interface. This output box can be manipulated, i.e., the items listed here can be double-tapped and dragged outside the box by the stylus to remove the item from the list of foods eaten. Either choose the colored diagrams for the types of foods you would eat, or choose specific foods from the list on the right. The list of foods consists of the four most chosen foods from the database of foods. This list may change as the types and frequencies of foods you eat changes.

Exercise screen
Include the amount and intensity of exercise that you do. Since much of diabetes involves making decisions based on approximate information, we suggest the method of entering approximate workout times and intensity levels as an acceptable means of recording exercise habits. Asking users to enter average heart rates and average mile splits for runners, among many other numbers, would be asking too much we feel and is not necessary to making an accurate forecast of future BGL's. The option to download this accurate info from a machine is available and would make predictions more accurate than they could be.

Insulin screen
Simply slide the marker along the rail to indicate the amount of each type of insulin you plan on taking. That's all there is to it, except to know that you press "Done" when the
previous task is completed.

_Laboratory screen_
This screen allows you to look into the past or make an educated guess about the future. Choose a microscope slide to learn about your previous entries concerning diet, exercise, insulin intake or BGL readings. You will be allowed to see a graph of readings from up to 30 days in the past for each of these four domains.

At the bottom of this screen, see forecasts for the next 12 hours. Drag the marker along the rail to the hour in the future that you want to learn more about. The further out you go, the less accurate the forecast given will be. There is no "DONE" or "SUBMIT" button here, once you let go of the marker after dragging it, the prediction will be made from where it is now located.

**Prototype II – DFS Personal edition**
DFS Personal edition consists of a main layout used in every screen. It contains four main buttons at the bottom to move among the main services offered by DFS. These are:
- My Forecast
- My Insulin
- My Diet
- My Journal
At the top left corner, there is a customizable add-on to the interface named “My DFS” where each user will be able to performed costumed-based operations to a particular unit (e.g. changing themes, exporting data to an external device, show other configurations, etc).
At the top right corner, there is a status bar, which by default is in green. It will only change to color red when blood glucose levels are under a dangerous margins. This will serve as an alert to the user. Additional vibration functionality to the device is available via “My DFS” settings configuration.

**Main Screen**
The main screen displays the version number and serves as the main screen to ensure that all services have properly loaded into the system. This indicates that the system is ready to continue. The version number is useful to indicate the type of operating system in use by DFS as it’s currently configured in the unit. This will serve for customer service information and updates.

**My Diet Screen**
This screen will display information about a particular product that the user of DFS is about to take (or has taken). This will allow users to enter information that are relevant to keep a more accurate reading and forecast for DFS. Once a selection is done, users need
to enter the product, quantity and units. Then, users will need to click on “Add” to submit the entry. Additionally, information about the product in question is described for purposes only relevant to DFS and calculating BGL’s.

*My Forecast*
This screen is the main interface for DFS defining brand. It provides an interface to display BGL’s in a configurable period of time. The specific level status is described by a color where red is always a sign of danger. At the bottom, a complete description of the current status is display where current average, max, min and hit percentage (actual vs forecasted results) numbers are displayed. BGL average, max and min are numbers for the current day. The hit percentage is information that refers to the amount of accuracy in comparing forecasted results and actual BGL level. Error margins are based on inaccurate entries in the “My diet” section which could provide inaccurate readings. The Stat line (in the graph) shows real-time information. When the margins go beyond a specific bound, the interfaces displays an alert (red background). It can optionally vibrate and email a list of recipients (e.g. doctors, 911, family, etc) when configured in “My DFS”

*My Insulin*
This screen displays the insulin doses needed and makes recommendations based on fast and slow acting. Moving the arrow level on the measuring bars, displays (and automatically moves the other acting type) It also provides a “Needed coverage” percentage which displays the amount of insulin which is needed an how much of it is covered with the selection. This is a measurement aid for users to be assured of the correct doses when in need. It will also allow to record the entry to ensure accuracy of readings and forecast.
Prototype I
Prototype II
Prototype III