**Requirement Gathering 2nd Prototype**

**Group:** Proyecto de Programacia

* **Data Collection**

*(1) As a [User/Administrator], I want to collect [Baby Hospital Number] so that [these could be used as valuable research resources in the future.] to relate to baby demographics if needed*

*(2) As a [User/Administrator], I want to collect [Glucose Concentration Data] so that [it could be used for real-time monitoring of baby’s health status.]*

*(3) As a [User/Administrator], I want to collect [Skin Glucose Current Data] so that [it could also be used for real-time monitoring after calibration.]*

*(4) As a [User/Administrator], I want to collect [Calibration Parameters] so that [the concentration curve could be adjusted and plotted more accurately.]*

*(5) As a [User/Administrator], I want to collect [Lag Time] so that [plots could be correctly plotted and presented accurately.]*

Note:

(1) Glucose Concentration Data: Glucose Concentration Data: discrete concentration value entered by User/Administrator

(2) Skin Glucose Current Data: discrete signal value directly from the sensor

(3) Skin Glucose Concentration Data: discrete concentration value calculated by calibrating Skin Glucose Current Data

(3) Timestamp: in the format 'date/hour/minute/second'. The timestamp is set as default to the time of entering, but should include the possibility of applying a correction factor (e.g. 1/5/10 minutes ago) in case log was not immediate after measurement.

(4) Event: Free text comment which illustrate the action performed at certain time point, every event information is time stamped.

(6) Lag Time: the time between sample leaving the body and analyzed by the sensor. This is set to 10min as default but could be changed with the administration priority

* **Data Processing**

*(1) As a [User/Administrator], I want to [calibrate the signal data] so that [signals in the current/voltage form could be transformed into concentration, which makes it easily to be understood and could be used for clinical analysis directly.]*

*(2) As a [User/Administrator], I want to [match the timestamp with the concentration measurement/event] so that [correct monitoring result could lead to the accurate clinical solution.] – we are not changing baby treatment at this point. The time stamp allows us to realate the sensor concentration changes to the blood glucose values and the events.*

*(3) As a [User/Administrator], I want to [perform post processing] so that [the graph could be plotted more clearly and the hidden trend within the time series could be found more easily.]*

Note:

For post signal processing, we could apply these operations:

(1) Stationary Detection: The Autocorrelation (ACF) could be plotted and normally a stationary time series would have a short-term correlations

(2) Trend Removement: the trend could be removed by fitting a linear regression + subtraction, smoothing, differentiation or applying nonlinear transformations (log...)

 (3) Model Fitting: the time series might be fit into several models like White Noise Model, Autoregressive(AR) Model, Random Walk Model, Moving Average(MA) Model or Autoregressive Moving Average(ARMA) Model for researching purpose. I would also add savitski-golay filter – this is calculationally very efficient and is good for time series that may have peaks of response.

* **Data Plotting**

*(1) As a [User/Administrator], I want to plot [Glucose Concentration with respect to Time] so that [the long-term trend of the glucose concentration could be presented, and any unusual variation could be detected with the matching time information.]*

*(2) As a [User/Administrator], I want to plot [Skin Glucose Concentration with respect to Time] so that [the long-term trend of the skin glucose concentration could be presented, and any unusual variation could be detected with the matching time information.]*

*(3) As a [User/Administrator], I want to plot [Event with respect to Time (in the same plots as (1) & (2))] so that [it shares the same time axis with the concentration plots such that all of them could be looked at together and the trend in the plot might be more reasonably explained.]*

*(4) As a [User/Administrator], I want to plot [Glucose Concentration with respect to Skin Glucose Concentration] so that [the correlation between these 2 concentrations could be evaluated for more accurate clinical diagnosis.] - better to say for device validation.*

*(5) As a [User/Administrator], I want to plot [Bland-Altman Plot for Glucose Concentration and Skin Glucose Concentration] so that [the agreement between these paired measurements could be determined and used in clinical diagnosis.] – for device validation*

* **Permission Control**

*(1) As a [User/Administrator], I could [log in using a unique ID and a matched password] so that [only users given permission could use this app.]*

*(2) As a [User/Administrator], I could [change my password] so that [I could have more safety protection for my account.]*

*(3) As an [Administrator], I could [change other User’s password (User only)] so that [I could manage the organization and help User in case they forget the password.]*

*(4) As a [User/Administrator], I could [add Blood Glucose Measurement Information with Timestamp and User ID (stored for data transparency, but not displayed)] so that [it could be compared against skin glucose measurements.]*

*(5) As a [User/Administrator], I could [add Event Information with Timestamp and User ID (stored for data transparency, but not displayed)] so that [it could be analyzed with concentration data and might be able to explain some unusual trends in the plot.]*

*(6) As a [User/Administrator], I could [correct the input data made by my ID within a certain time interval (5min) (and reflect such change in a change log)] so that [any errors could be corrected while the database is under protected.]*

*(7) As a [User/Administrator], I could [check the detailed description of event or concentration at certain time point] by [typing in a specific time or clicking on the time graph] so that [I could understand more details with higher accuracy.]*

*(8) As an [Administrator], I could [correct any input data made by any User ID with no time limit (and reflect such change in a change log)] so that [the data stored in the database is well organized and remains accurate.]*

*(9) As an [Administrator], I could [change the Calibration Setting] so that [a more accurate prediction could be achieved from the modified calibration curve.]*

*(10) As an [Administrator], I could [add/delete other User’s account] so that [I could manage the organization.]*

*Don't forget to have the possibility (after the test phase) of a log file that record that data has been changed and by who. – you don't need to read it, but it helps maintain data integrity.*