GNG2101 Report: Deliverable B

Mealtime Insulin Calculator - Needs Assessment, Problem Statement, Metrics, Benchmarking, and Target Specifications

Submitted by Team C11

Khalil Aouadi, 300197227

Spencer Henry, 300073281

Mounira Nihad Zitouni, 300190536

Regina Mayani, 300207233

James Couture, 300076065

January 22

University of Ottawa

i.

Abstract

The objective of this report is to evaluate the needs and requirements for our client's mealtime insulin calculator, and to find ways to improve on already existing applications. Our report includes the necessary specifications/parameters provided by the client's statements from our first meeting, and the benchmarking and metrics of other already existing applications.

Table of Contents

‘

Commented [RL1]: Right click to update this table of contents. DO NOT change the contents directly!

List of Figures

Commented [RL2]: Right click on this field to generate list. Do not add contents to the list directly. Make sure Figure captions in the text are added via the "insert caption" tool for this list of figures to work correctly.

List of Tables

Commented [RL3]: Right click on this field to generate list. Do not add contents to the list directly. Make sure Table captions in the text are added via the "insert caption" tool for this list of tables to work correctly.

List of Acronyms

Acronym	Definition
ADHD	Attention deficit hyperactivity disorder
MODY	Maturity onset diabetes of the young
LADA	Latent Auto-immune Diabetes in Adults
mmol/L	Millimoles per litre
mg/dL	Milligrams per decilitre
HbA1c	Test that takes the average blood sugar for the pass two-three months Hemoglobin A1C or A1C

Table 1: List of acronyms giving a background to better understand the underlying terminology

of diabetes.

1 Introduction

In the modern world, cellular technology has significantly improved the lives of humans and have become an everyday necessity for people all over the world. With the development of new mobile applications every day and further developments to general cellular technology, people all over the world can now do things such as check their emails, call friends and family, do work and other daily tasks at a significantly faster rate than they would have in the past.

Not only has technology shown a significant improvement in the lives of your average person, but also those that deal with mental and/or physical abilities. In the case of diabetics, mobile applications have been made to make daily management of their diabetes more organized and faster. While these applications are extremely beneficial and provide many tools that the average insulin user would need, many currently existing applications are too complicated for some users to understand and make imputing and outputting information a difficulty for users.

This document will articulate the problems that we had gathered from our client, Mark during our first meeting. It interprets our clients' comments on existing diabetes management technologies as well as the requirements for the mobile applications we were tasked with developing.

Our client has found that he has a tough time managing his diabetes and feels that current insulin calculating apps currently on the market are too complicated for him. For us to alleviate these problems, a new application will be produced based on the benchmarking, client needs and metrics we have created in this report.

Our goals for this product are to make the application as simple as possible so that insulin calculation is still accurate and precise yet simple for everyday users to use, and to make navigating the application easier for users by making the interface as user-friendly as possible to reduce the risk of human error. Our app will also be able to take a picture of the user's meal, and with this image, determine the nutritional information of the meal. We will also be including a reminder system for users, a PDF-convertible food chart that will focus on the amount of sugar in one's meal, and additional add-ons such as a confidential sharing system and a favorite food section.

This mobile app will not only be useful for the client and other diabetics but will also be useful for the medical field and for those looking to manage their sugar intake. Our application will provide the user's information for health care providers such as dieticians and workout coaches.

2 Client Statements

For this section, the team decided to paraphrase our statements as it helps to better view the information given by the client. The client gave detailed responses that would become too long to quote and lose its meaning; thus, paraphrasing seems more appropriate.

- The client wants to be able to input information about his everyday meals on an application that specifically gives him back the amount of carbohydrates his meals have.
- The client wants an application with an uncomplicated design.
- He also needs reminders to help him recall stuff such as when he should have his next meal or where the hidden sugars in, through push notifications.
- Our client also wants a meal history section where he can see the carbohydrates of his previous meals without having to enter all the information again on the main tab or simply having to change a few elements for his current meal.
- The client uses an android phone, so the application needs to work on android.
- The client also wants mealtime calculator to calculate the beverages, condiments, and all the other things that could eat with his main meal.
- He wants the application to take around two minutes of his time for each use of before each his meal.
- The client also wants to be able to export his meals history.

- The client also discussed about having an overlapping picture of his meal and a pie chart to show the different foods on the picture he took.
- The client would like it to be free.

Need Statements

#	Needs	Importance (1-5)
1	The application works on the most recent version of android.	5
2	The application calculates the amount of carbohydrates from the meal information.	5
3	The application must be able to calculate the amount of carbohydrates for beverages, condiments, and all the other foods that could contain carbs in less than 2 minutes.	5
4	The application provides a simple, user-friendly design for the interface, one that is easy to navigate.	4
5	Application incorporates a meal history that stores information about previous meals to make the application usage faster and more accurate to the carbohydrate intake.	4
6	The meal history can be exported to an excel file.	4
7	Push notifications gives notifications for mealtimes and reminders about hidden sugars.	3
8	Overlapping picture of the meal and a pie chart to show the different foods.	1

9	The application should be available to everyone on Android with a cost of $0.	3

Table 2: Need statements obtained from the client and evaluated according to their importance.

3 Problem Statement

Currently existing apps in the market that help calculate the amount of insulin the user is supposed to take are too complex and non-user friendly due to high numbers of questions and unnecessary options found in the application.

Our goal is to create a simplified version of these existing apps and create a more user-friendly design that will allow users to easily navigate the app and input information at ease. The application must be able to calculate carbohydrates and store past meals with no pre-entered meal information to let the user have a more accurate and faster meal selection.

4 Metrics

In the third table, the following metrics were chosen to determine the way that market products can be evaluated when compared to the needs of the statement. For each metric, an imp (importance value) was given. The following paragraph will go over the logic used to decide the importance of each metric.

For the first metric, correct platform, was given an importance of five. In fact, if the application was made for a different platform, the application would not work for the client and it would make the whole product irrelevant to the client. Even if the product were to work, the client would still not be able to use it and, thus, will not be satisfied.

For the second metric, the functionality was given a four because it is important for the application to be able to calculate the amount of carbohydrates taken by the client. It is important as the application cannot calculate the carbohydrates, making the application useless. To the client the functionality does not need to be perfect in the sense that it does not need to consider insulin: carbohydrate ratios, and therefore making the functionality importance lower from a five to a four.

The third metric being the application use time is particularly important to our client. The client has ADHD, so the questions our application asks must be straight to the point so our user can input information quickly and get results fast. The client gave us a time margin of 120 seconds (around two minutes). Because of the client's condition, the application use time is important.

The fourth metric, number of questions during meals is important because it allows the application to stay simple and have a short usage time. We have noticed that the more questions the application asked, the less user-friendly the application became. The client understands that there has a minimum number of questions in order to fulfill the required functionality. In this case, the importance given to the functionality metric is four. Furthermore, the number of given questions will go hand in hand with functionality.

The fifth metric, simplicity, is important for the client's condition similar to the third metric. The client mentioned looking at other applications and the overly complex types of questions made the app become more of a chore instead being an application that helps the client's lifestyle.

The sixth metric, accurate carbohydrate estimations is important. This is the heart of the application. The objective of the application is to calculate the carbohydrates for the client. The importance is at four instead of five because the client puts more emphasis on the simplicity of the

mobile application. Indeed, it reduces the ability to be as accurate as possible when calculating carbohydrates. It is still important due to its core part as a primary objective of the application.

The seventh metric, cost of products, was quickly mentioned by the client. The importance is mediocre (3). The client wants to have an application he can use for a long time. If the application is well suited to the client's needs, then the cost can be evaluated. If the product is not well suited to the client's needs, the cost becomes irrelevant.

The numbers of importance were mostly giving according to the order of importance the client gave as instructions in the client statement that was later reformed as the need statements. Therefore, the order of metrics has been decided upon which metric the client will cease to consider using. Using this logic, all the metrics were included in table three below.

Metric #	Need #	Metric	Imp	Units
1	1	Correct platform (Android or IOS)	5	Binary (False or True)
2	2, 3, 4, 6, 7, 8	Functionality	4	Subjective (1-5 rating)
3	3	Application Use Time	4	seconds
4	3, 4	Number of questions during meals	4	Number of questions
5	3, 4, 6	Simplicity	5	Subjective (1-5 rating)
6	3, 5	Accurate carbohydrate estimations	4	Subjective (1-5 rating)
7	9	Cost of Product	3	$

Table 3: Metrics obtained from the need statements to qualify and quantify product success.

5 Benchmarking:

For this section, we will be looking at two insulin calculator apps done by other students and at an insulin calculator application currently available on the market (Google Play Store, Apple Store). The following apps are:

1. Mealtime Manager Insulin Calculator App E12

This application, that was made by a previous team, does satisfy some of the basics needs of the application. For example, the application works on Android and has a low average application usage time. However, it severely lacks in other domains. The number of functionalities is limited which is why we gave it a 2 out of 5. Its usage is confusing at certain moments and that directly impact the simplicity metric. The estimation of carbohydrates does work but is not always accurate and since there aren't many questions being asked before the calculation, and with said questions being too vague, they lose their value.
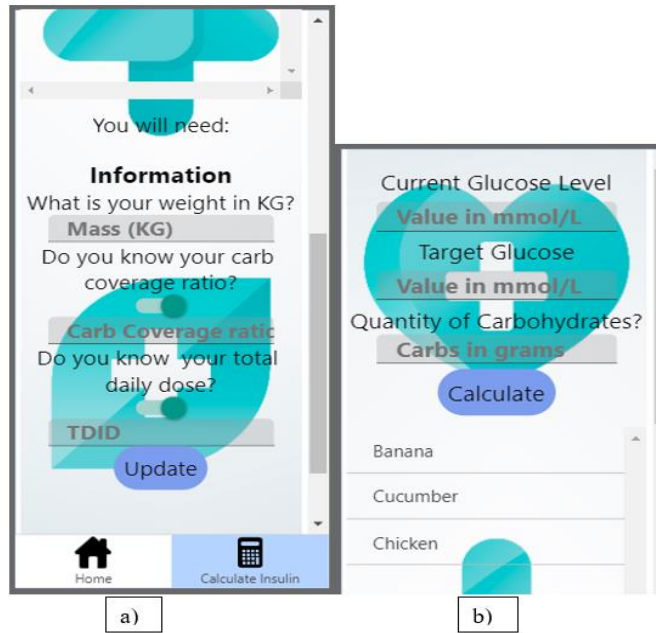
a)   b)

Figure 1 : a) E12 application's Main menu, where all information is entered, b) and calculations
are made.

2. Mealtime Calculator A13

This application, that was made by another previous team, satisfies quite the number of metrics we are looking for. It is on the correct platform and has many features while still having a low usage time. Simplicity is average since it is easier to get lost through the others features thus getting a 3. Despite asking more questions than the other team's application, the carbohydrate estimations made by this app are still not fully accurate.
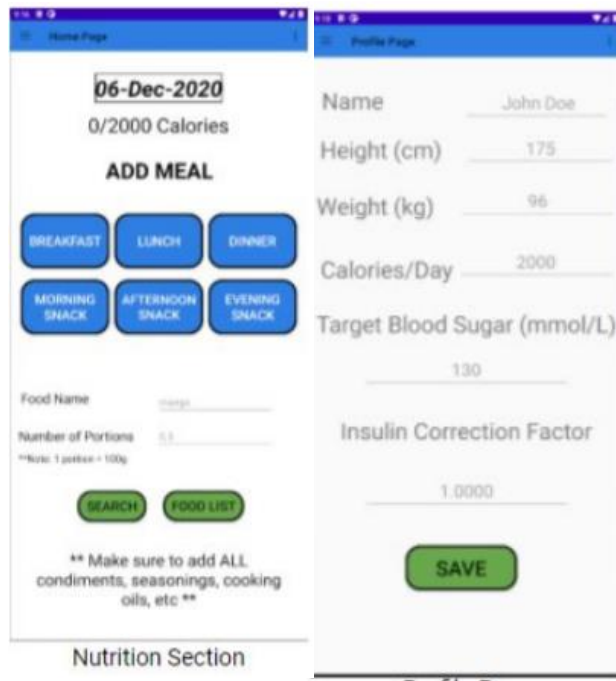

a)   b)

Figure 2: a) A13 application's main menu where meal information is inputted, b) profile page
where user's personal information is inputted.

3. MySugr

MySugr is an application currently available on the Apple and Google Play store. This
application is one of the more popular insulin calculator apps and with good reason. The
application has a variety of tools available for the user, asks very in-depth questions about the user
to get the right calculations, and has a very bright, clean and appealing look to its interface. The
application can connect to blood sugar meters and to Google Fit, and provides data about your
results during a custom period. However, the application is cluttered with many features that would
not be necessary for many users such as its challenge feature, and only provides certain features
such as the report and search features if you pay for their subscription-based service ($3.49 a month
or $31.99 a year). For the reasons told, we decided to give the MySugr application a grade of 2 in
terms of simplicity and a grade of 4 for functionality.
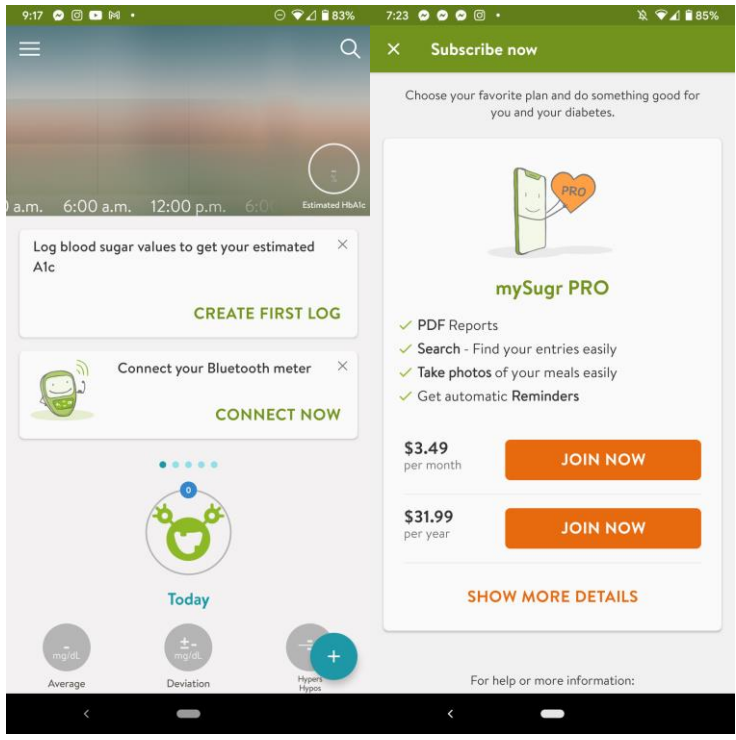
Figure 3: a) MySugr's main menu b) their subscription plan page.

4. Diabetes Carb Counter

This application isn't popular despite being the one that works the best in terms of functionality and our standards. However, while it works the best in those regards, it is still extremely complex to use for users. There is a lot of information being thrown out from all sides and the poor design choices made led us to give the app a 1 in terms of simplicity. It asks about 15 questions which is a high amount but in return it gives a good estimation of carbohydrates. It is also free and works on Android.
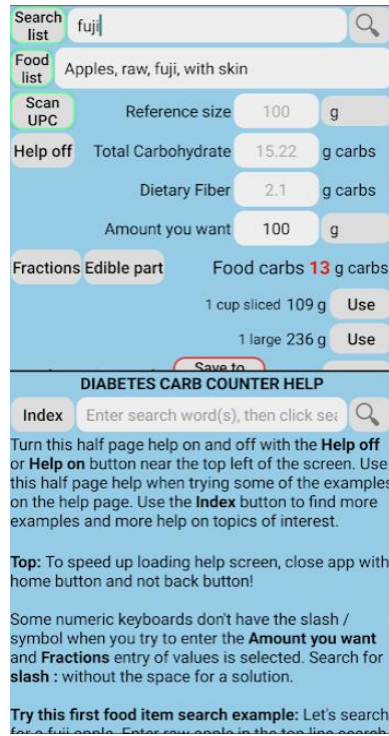
Figure 4: Diabetes Carb Counter main page.

Metric #	Need #	Metric	Importance	Units	E12	A13	MySugr	Diabetes Carb Counter
1	1	Correct platform (Android)	5	Binary	True	True	True	True
2	2, 3, 4, 6, 7, 8	Functionality	4	Subj	2	4	4	5
3	3	Average application use time	4	s	20	20	120	50
4	3, 4	Number of questions during meals	4	# questions	6	9	29	15

5	3, 4, 6	Simplicity	5	Subj	3	3	2	1
6	3, 5	Accurate carbohydrate estimations	4	Subj	3	3	1	4-5
7	9	Cost of Product	3	$	0	0	$3.49/month or $31.99/year for PRO features	0

Table 4: Benchmarking of competitor applications using the metrics used to evaluate the needs of the client.

6 Target specification

#	Metric	Units	Margin	Value
1	Cost of Product	$	0	0
2	Application Use Time	Seconds	<120	<60
3	Functionality	Subjective (1-5 rating)	3-5	4-5
4	Simplicity	Subjective (1-5 rating)	4-5	5
5	Number of questions during meals	Number of questions	<8	<5
6	Correct platform (Android or IOS)	Binary (False or True)	True	True
7	Accurate carbohydrate estimations	Subjective (1-5 rating)	2-4	3-4

Table 5: Targeted value obtained for the metric using benchmarking.

The current target specifications were established after benchmarking and analyzing how the application could outstand what already exist. To begin, the application must work on android as our client uses an android phone. Also, the target for the cost value is targeted to zero dollars since some existing application already compete with this price. Then, the application use time has

been set to be less than sixty seconds in average to reach our principal goal to create an user-friendly application and make it simple to use. This also touches another target which is simplicity. Indeed, simplicity was given a targeted value of five due to the emphasized importance that the client gave. In the same way, it is important to keep the number of questions to a minimum. Also, since simplicity is a key component, the targeted value for the number of questions was decided to be less than five to reduce the average time usage of the application while increasing its simplicity. Next, the value that our application functionality should have is around four to five as it is crucial for the application to have all the needed features that our client wants and that they are operating correctly. Then, the value of accurate carbohydrate estimation was determined to be between three to four because it is essential for the client to have enough details on their carbohydrate so that they can manage their sugar conveniently, but not to an extend where the amount of information is overbearing. Besides, it is important to denoted that we have establish an acceptable margin for each metric so that the client's expectations are met and the final product is up to the standards our client is expecting.

7   Conclusions and Recommendations for Future Work

To help alleviate the challenges of sugar management, the client offered a very insightful understanding of the complexities of daily life for individuals with diabetes. Following his ideas and our brainstorming, we chose our strategy to create an android app focusing on the simplicity and flexibility of its usage as per the client needs. The application would let the client input information about his meals and will, then, output the amount of carbohydrates contained in his meals. While there will be other features such as a meal history or an export setting, we want our application to have practical and convenient features to simplify its use. Furthermore, through the benchmarking process, we found that the currently existing applications were way too complex

compared to the applications designed by school teams. The applications simplicity and average use time are the principal focus of the project.

The client meeting has given our team an outsider point of view regarding the challenges a diabetic person has in finding a non-complex mobile application for sugar management. Moreover, the client meeting helped to centralize our metrics on his beliefs that makes a perfect application. Indeed, the metric of simplicity has guided us in benchmarking with other applications and pinpointing their complexity. In this case, we have decided that the final product will be user-friendly, so our client feels at ease while using the application. Also, it became crucial for our product to become outstanding by having a limited number of questions, an exportable pdf file and to be personalized to the client's needs and requirements. Lastly, the client meeting has impacted our process and future results by allowing us to have a better perception on the demanding product. In fact, we believe that following the target specifications will be the best way to satisfy the desires of the client.

8 Bibliography

MySugr Global - Make Diabetes Suck Less.

www.mysugr.com/en/

"Sign In." *Mealtime Calculator A13 | MakerRepo*,

https://makerepo.com/cgrif027/mealtime-calculator-a13

"Sign In." *GNG2101 - Mealtime Manager Insulin Calculator App - E12 | MakerRepo*,

https://makerepo.com/TanishSwarnan/gng2101-mealtime-manager-insulin-calculator-app-

e12