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Student Number(s)

Yutong Xiao - 862480
Huy Truong - 933965
Jiangyue Yan 886958
Zohaib Mahtab - 824291
Hong Thanh Vo - 932602

Group Code (if applicable): Group 5 Daddy

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Student Name:	Yutong Xiao, Huy Truong, Jiangyue Yan, Zohaib Mahtab, Hong Thanh Vo
Lecturer/Tutor:	Dr Greg Wadley
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MAY 2019

HiBaby Empowering Future Parents



D5

Group 5 Daddy

PREPARED BY:

Yutong Xiao - 862480
Huy Truong - 933965
Jiangyue Yan 886958
Zohaib Mahtab - 824291
Hong Thanh Vo - 932602

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HEALTH CONDITION

The journey to pregnancy is filled with a wide range of emotions. It could be fun, exciting and emotional or it could be stressful and apprehensive. Couples who try to conceive and suffer from infertility issues go through an incredible amount of stress both psychologically and socially. On the other hand, once pregnant, expecting mothers suffer from anxiety, loneliness, hormonal changes and severe mood swings at every stage which if left uncontrolled can lead to prolonged mental health problems.

In fact, antenatal depression can lead to adverse pregnancy outcomes such as stillbirths and neonatal deaths (Ogbo et al., 2018). Lacking social support, which composed of informational, instrumental and emotional support, has been proved to be the major risk factor (Adewuya et al., 2007; Bayrampour et al., 2015).

ANTENATAL DEPRESSION

6%

Pregnant women in Australia have experienced antenatal depression (Ogbo et al., 2018).

30%

Pregnant women in south Australia have depressive symptom over seven-month period (Ogbo et al., 2018).



TREATMENT APPROACH

Vision

Navigating future parents throughout their pregnancy journey and cultivating the relationship between pregnant women with their loved ones.

Objectives

Empower family members, such as husbands, by giving a tool which enhances their knowledge of pregnancy while promoting bonding between pregnant women and their partners and family relatives

HiBaby also lift off the extra-burden of information seeking while providing a user-centric solution to mental health support.





KEY USERS



Pregnant Women

The primary user of the app is the woman who is either pregnant or trying to conceive. She will have access to reliable and easy-to-comprehend tailored information at her fingertips.

She is also able to share her concerns and communicate her emotions with her partner or other carers. The app will allow her to effectively talk to the GP or Specialist during consultation time by maintaining the prioritised list of questions and other concerns.



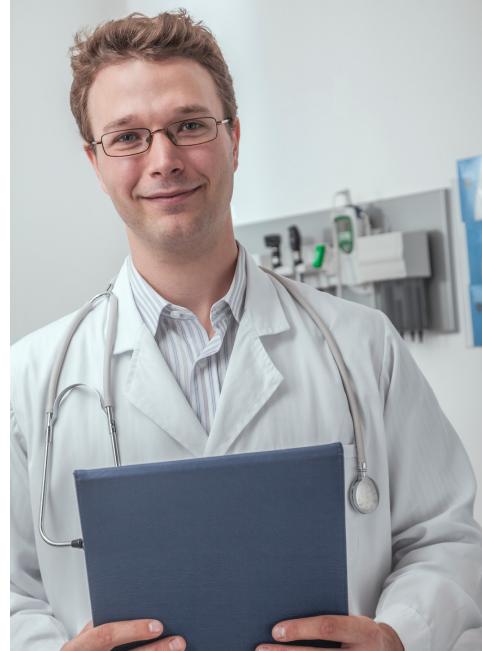
Partner/Family Relatives

The other key user of the app is the woman's partner or caregiver, whom by using the app can gain insight into the woman's emotional state, get useful information and extend their support proactively. The app will provide them with the ability to review the information, suggestion and milestones recommended by the app throughout the various stages of pregnancy.



Health Professionals

The app also allows GP/Pregnancy specialist to quickly identify patient concerns by having access to a pre-recorded list of questions. Hence, wasted consultation time waiting for the patients to recall their questions can be eliminated, and thus speed up the consultation process.



DESIGN CONSTRAINTS

TECHNOLOGY

Because 88% of Australian own at least a smartphone (Deloitte 2017), our app is designed with a simplified interface and coupled with detailed step-by-step instructions to allow any person with normal smartphone skills can operate the app with ease.

The app is developed with responsive design in mind so it can dynamically adjust its interface to suit with different screen resolutions. Initially, only IOS and Android OS are supported and we plan to extend support for other smartphones OS in the future.



DESIGN CONSTRAINTS

REGULATORY

Our app did not meet the definition for medical devices because it is not intended to treat or diagnose any health conditions but rather a tool to provide supplement information and manage healthy pregnancy; hence regulation from Australian Therapeutic Goods Administrations do not apply (Australian Department of Health, 2018).

However, the Privacy Act 1988 is applicable as users personal information will be collected and processed by our app. The user will be notified about the collection of their personal information and need to give consent before able to use the app.

We thrive to protect users privacy and ensure that their personal information will solely be used to operate the app and not to be disclosed with 3rd parties without consent.



DESIGN CONSTRAINTS

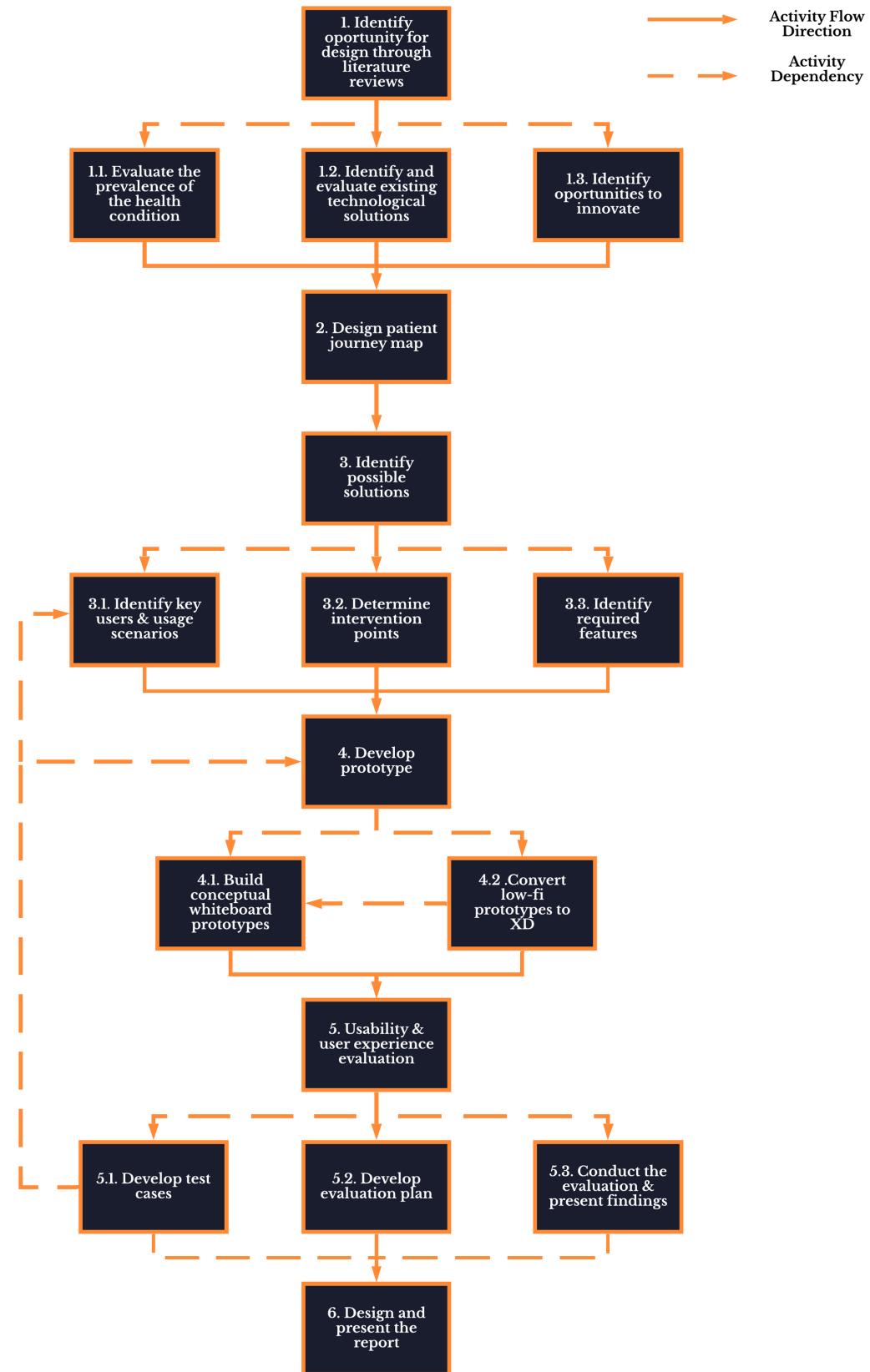
ENVIRONMENT

Our app requires constant data connection to properly operate, which can increase Radio Frequency (RF) radiation exposure to the users.

Although RF radiation is very unlikely to pose threats to pregnant women (James, A., 2019), we still take extra caution to ensure our app only establish data connection when it is absolutely necessary (e.g fetching answers for questions from the users).



DESIGN METHODOLOGY



PATIENT JOURNEY



PATIENT JOURNEY

Understanding the patient journey map helps to identify pain points, which are what the users want or wish to have but cannot at a temporal moment. By bringing the information and activities that the users are going to need or want up front in the most effective (just-in-time) manner, the solution saves their time and efforts

and potentially prevent unfavourable and undesirable events from happening.

Figure 1 illustrates the overall patient journey map which guides the creation of emotion-focused patient journey maps. These are used to produce five key scenarios of the solution, which are discussed in the Scenario section.



Figure 1: Overall Patient Journey Map.



"
**Roses are red.
Violets are blue.
And, I am a chatbot.**
"

Sophia

Q

I experience
vomiting. Should I
worry?

A



Vomiting is
common in the
first trimester.
Don't worry!

> DETAILS



Thank you for
liking my answer.
Hope it is helpful
for you.

DESIGN OVERVIEW

"Provides future parents with tailored information based on their pregnancy conditions while promoting a stronger couple relationship."

As stated in part one, existing technological interventions tend to shove information from multiple sources to the patient – failing to provide a tailored user-centric and credible experience. This information overload causes a confusing mess of sheer untrustworthiness – both for the user and to their caretakers.

Secondly, the interventions fail to provide a mechanism between a woman and their partner to bond and interact with each other.

This communication gap builds a behaviour in women where they tend to jump online for mental support first before talking to their family members – developing a sense of loneliness.

Lastly, without time tracking of information, existing interventions lack a journey-type experience to the user – where they can keep track of their historical searches and concerns.

DESIGN OVERVIEW

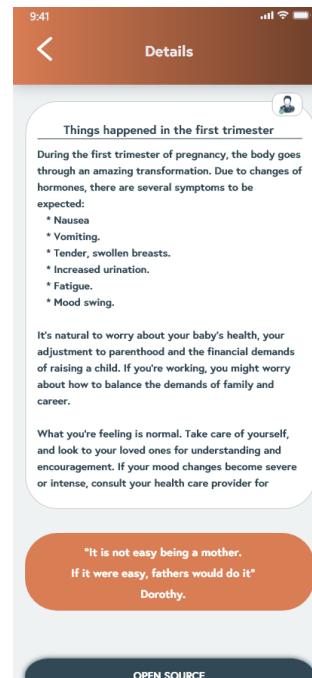
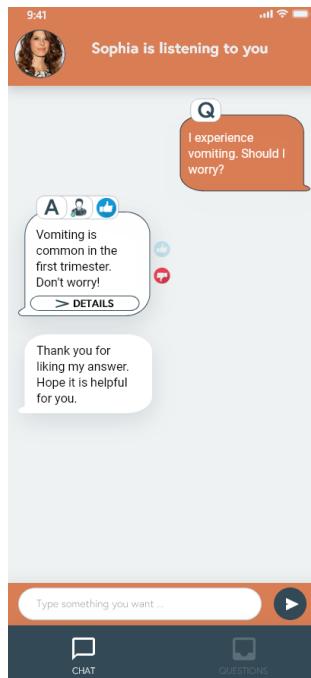
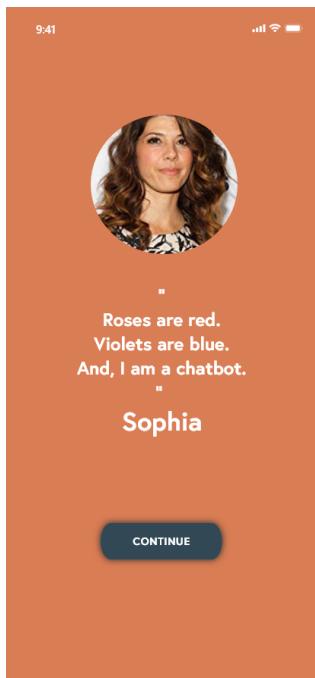
Sophia “the personalised midwife”

HiBaby features a characterised virtual assistant ‘Sophia’ giving the users a feeling that they have always someone by their side who is listening to them.

Sophia is characterising a 40-year-old experienced midwife who’s trained to provide professional advice to the women and their family members.

Sophia will progressively learn patient health and mental condition and will suggest tips and answer to users queries, based on the updated medical information.

Sophia will empower women by providing them with emotional supports and building up their confidence when they feel lonely.



DESIGN OVERVIEW

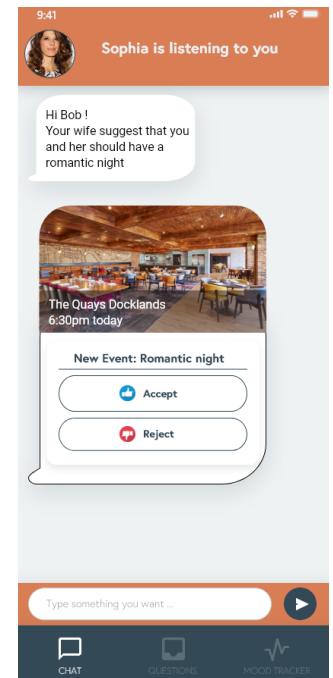
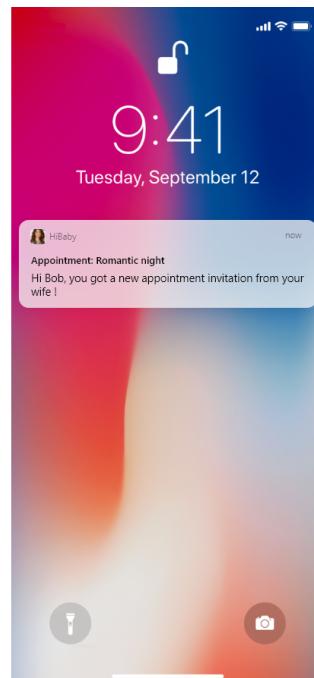
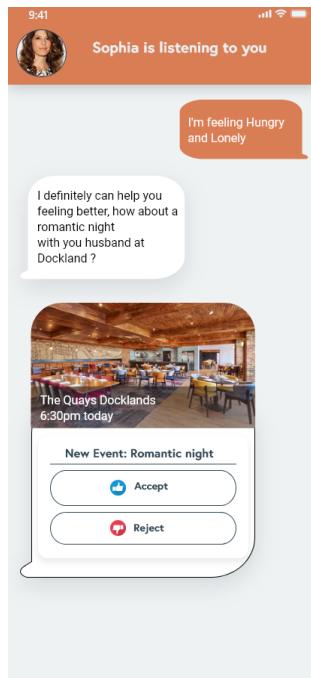
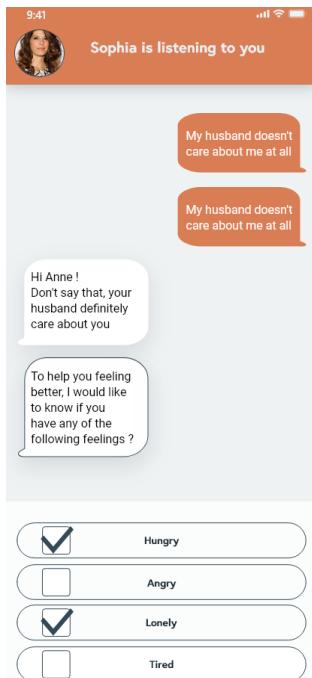
Sophia “the counsellor”

Sophia will deliver insightful messages and tips that help the partner and other family members to show kind gestures and connect to the woman.

For instance, when Sophia notices loneliness vibe from the mom-to-be, it will provide helpful tips to deal with the situation and initiate a conversation with her partner giving him a heads-up.

It will for e.g. suggest the wife have a little date night with her husband if she feels lonely. Sophia subsequently notifies her husband: “Hey Bob, your wife is feeling lonely these days. How about a romantic dinner this evening?”

Consequently, the pregnant woman suffering deserted can initiate a dating invitation which Sophia will deliver intimately to her loved one.



DESIGN OVERVIEW

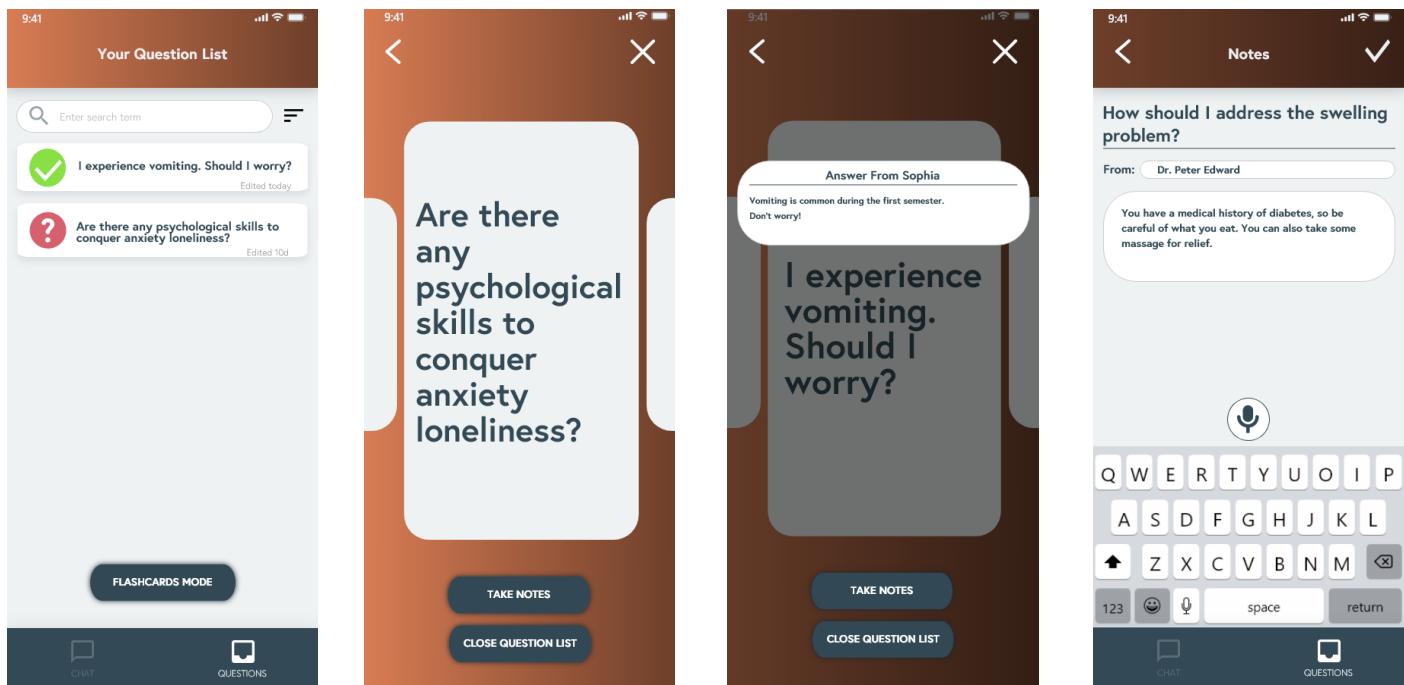
Sophia “the smart organiser”

Sophia will take the burden off the pregnant women to worry about maintaining a list of issues they are facing.

It will keep track of their concerns and smartly organise into reusable form on a “Frequently Asked Questions and Answer (FQA)” platform. The knowledge base will be maintained by a medical content team.

The users will have the option to provide their feedback in the form like or dislike action on the displayed answer.

If the appropriate result is not found, the question will be added to a “to-be-answered” list which can be discussed with the doctor later – hence efficiently utilising the consultation time to ask the right questions.



DESIGN OVERVIEW

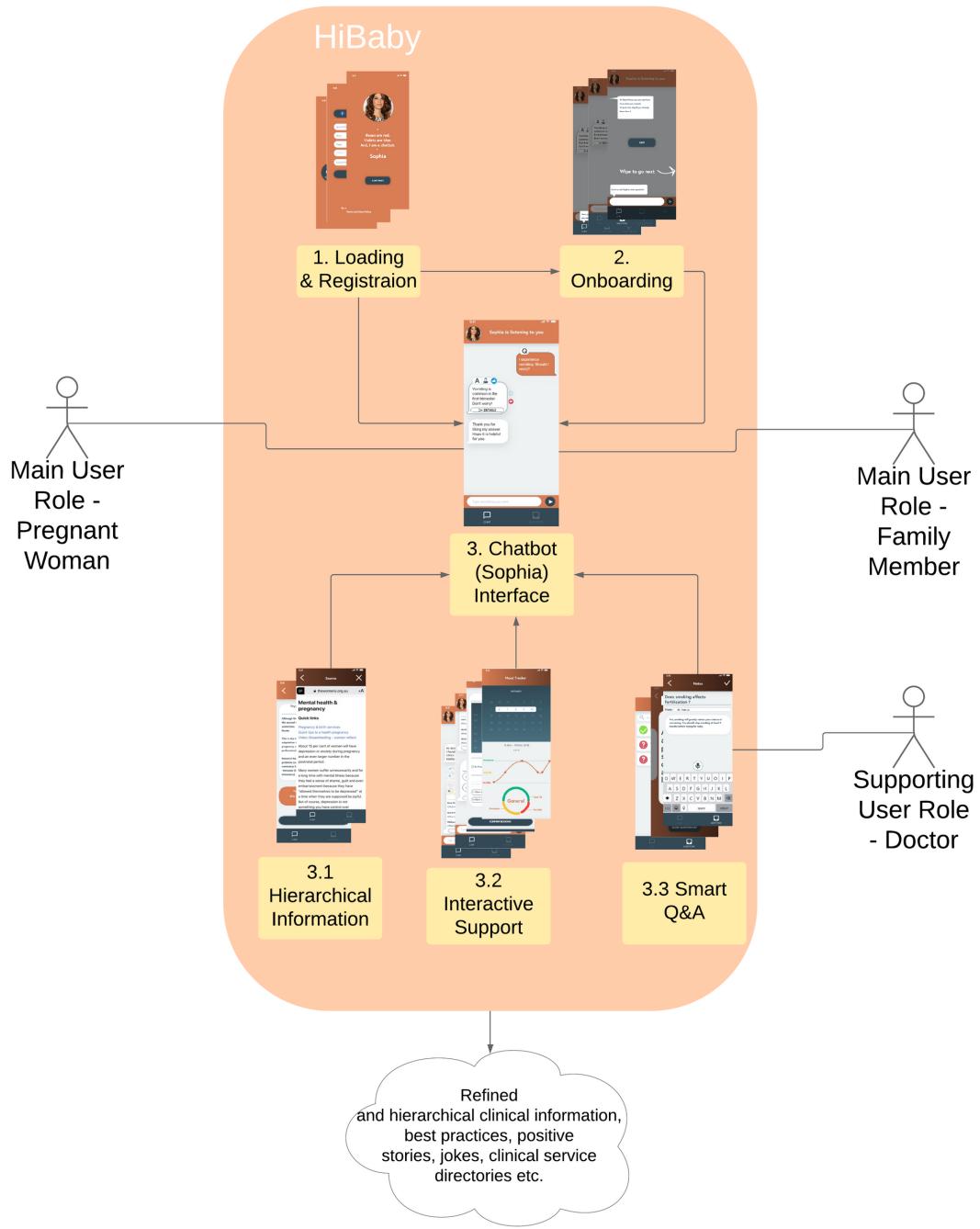


Figure 2: Overall functionality of HiBaby.

Figure 2 provides visualisation of the overall HiBaby functionality. Pictures of actual design process and design art-board can be found in the Appendix section.

MAJOR SYSTEM FEATURES

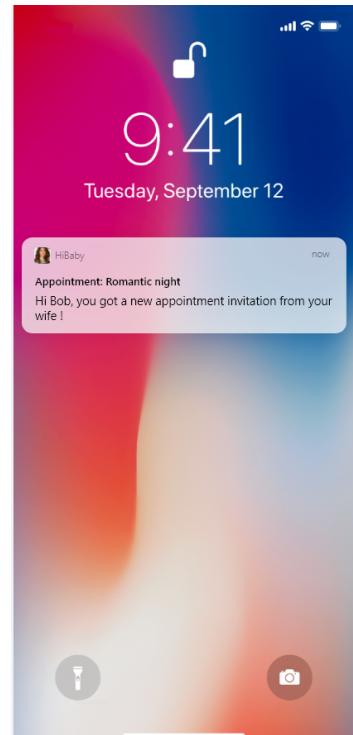
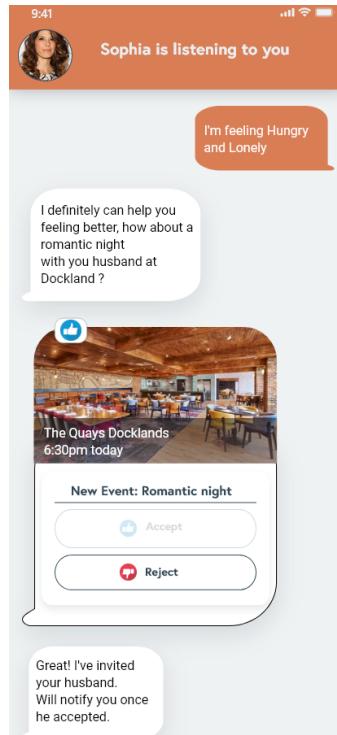
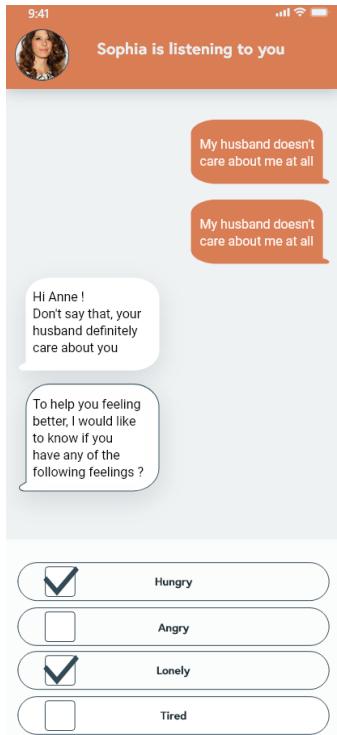
INTERACTIVE SUPPORTS

The proposed detailed design provides interactive supports in two aspects, namely the interactive support between the application and the pregnant woman, together with the interactive support between the pregnant woman and the caregivers.

The pregnant woman can interact with the application for any requests that she demanded. Acting as a chatbot, the app takes users' requests, search keywords of the requests and return specific information for the pregnant women. She can request further information or reply to the application that the information provided is not useful.

To enhance interactive user experiences, the application also works as an "intermediary" between pregnant women and her caregiver. For example, the application will gather data about pregnant women's feeling every day in the form of chatting to the woman.

If the application receives the information that the pregnant woman is lonely, it will schedule a dating event with her caregiver and send the notifications to both of the users.

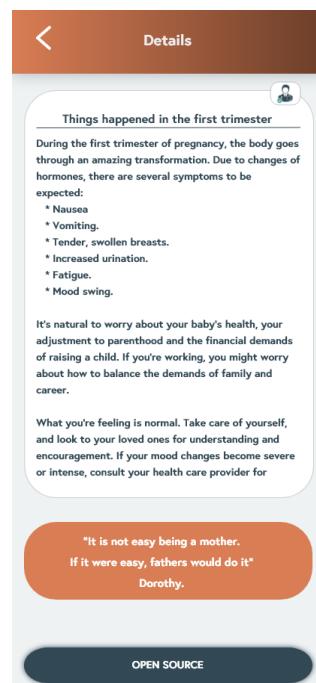
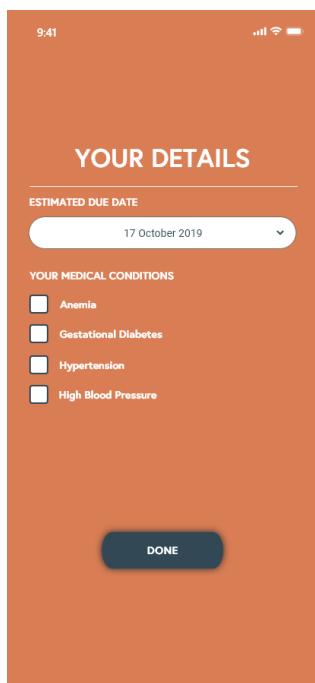


PRE-PROCESSED HIERARCHICAL INFORMATION

The application divides the journey into 5 phases, namely prenatal, 1st - 3rd trimesters and the postnatal phase. The pregnant women will be asked to input data about the pregnant trimester she is at when the women is registering to the application.

Then, for each specific problems the women is meeting during each phase, the “chatbot” will provide 3 levels of hierarchical information from a very general tip to a very detailed granularity.

In this design, users can have the rights to obtain the details of information “as the level of detail” as the user desires, which avoids the problem that they are overwhelmed by the amount of information, as well as leaving the potential that they are still able to obtain enough detailed information if they want.

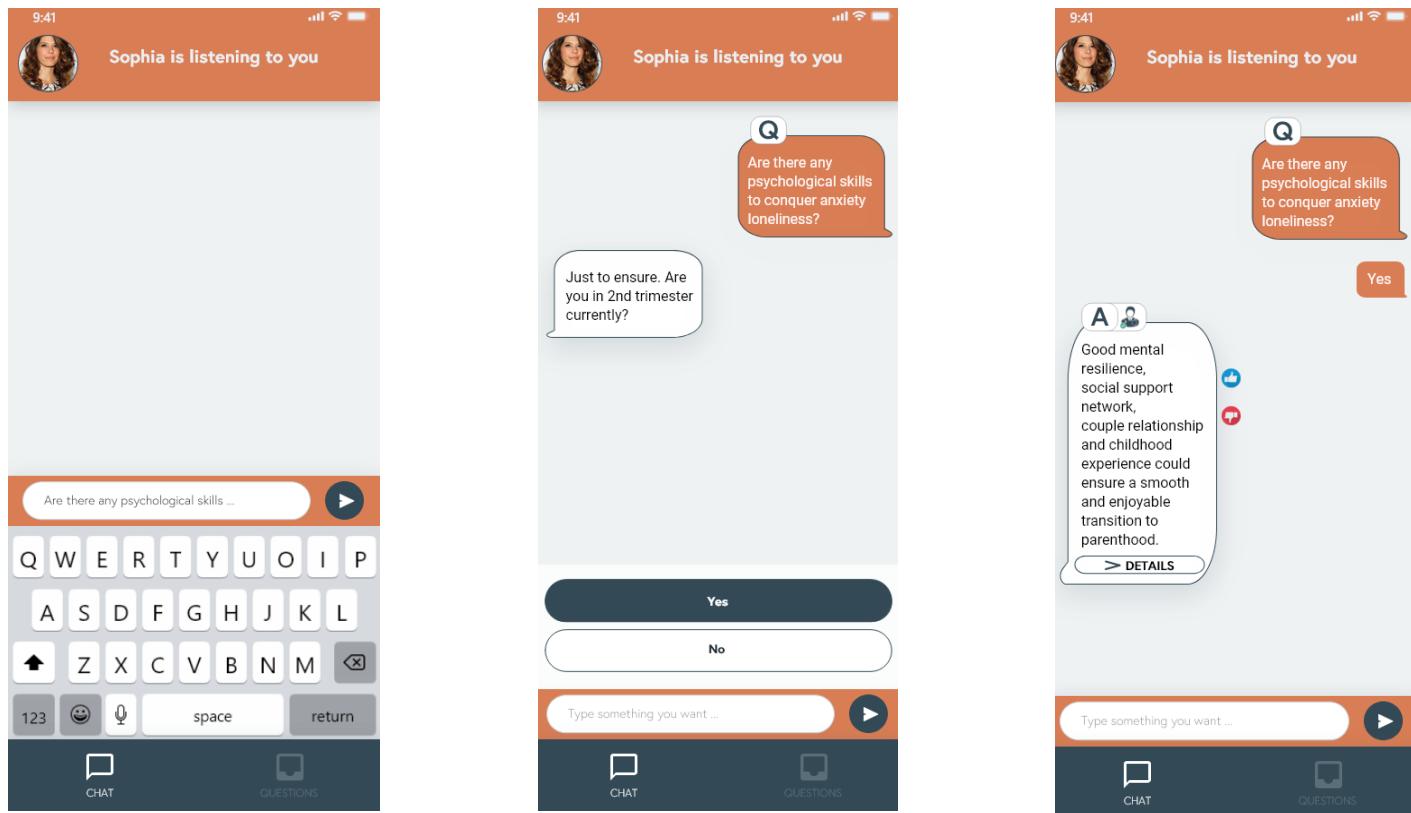


SMART QUESTIONS AND ANSWERS

Based on its interactive and hierarchical characteristics, the application is designed to conduct the “Q & A” as many other applications may also do in a smart way. Instead of providing users a long list containing frequently asked questions, the application give users answers as they query.

As shown in the following process, users can just propose a question in a form of chatting to the chatbot.

Then if the application detects that the question proposed is a frequently asked question, the conversation box will be labelled a “Q”. The returned answer will contain a label “A”, and the correspondences between the proposed questions and the returned answers would be clearly demonstrated by the interface.

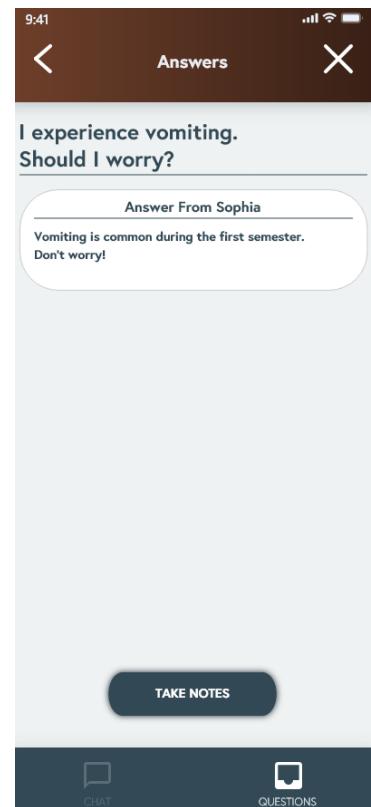
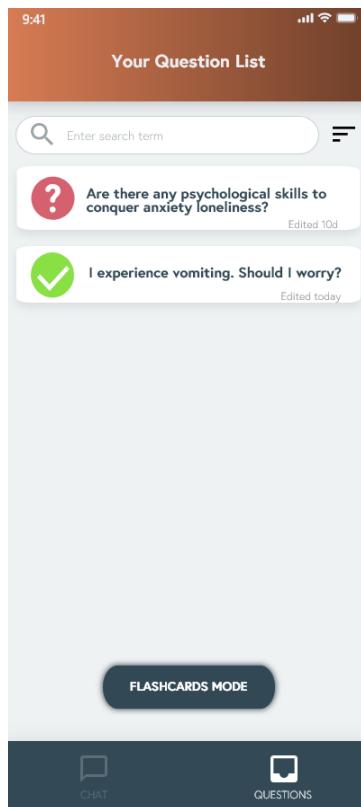
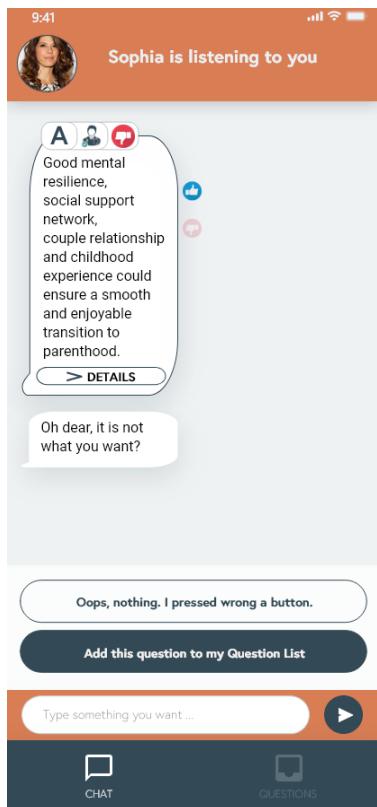


SMART QUESTIONS AND ANSWERS

Description

If the returned answer is endorsed by clinical professions, an icon with a doctor would appear, to notify the pregnant women that this answer is endorsed. Also, the user can choose whether the answer is helpful or not.

If they are still confused about the answer, they can choose “add the question to the question list”, so that they can express the concerns to clinicians during consultation times, which not only improve consultation efficiency but also prevent omission of important questions during consultation.



SCENARIOS



SCENARIO 1

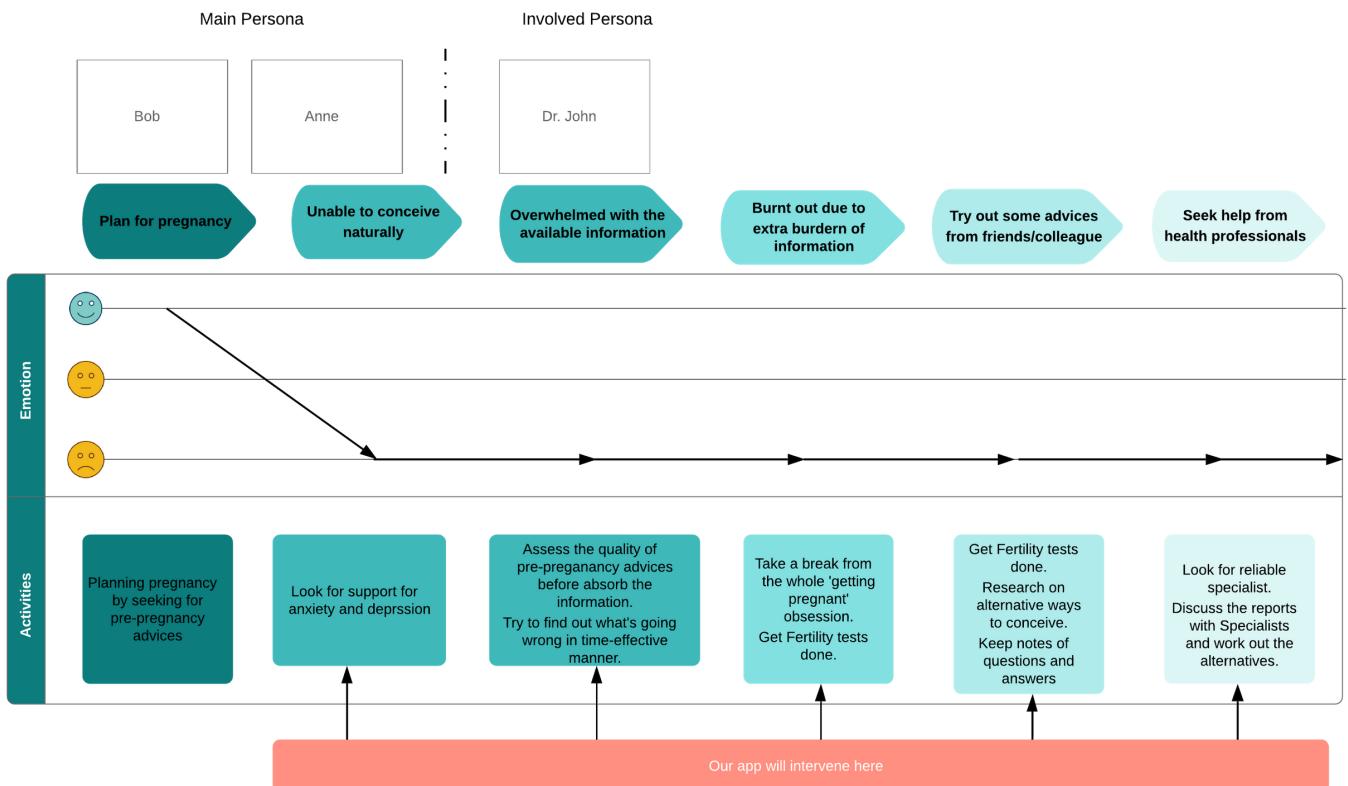


Figure 3. Patient Journey (Pre-pregnancy).

Description - Produced from fig. 3

Bob and Anne have been trying to have a baby for a while without success. As Anne was losing her hope, Bob has heard someone talking about the HiBaby app and wanted to give it a try.

After finishing the tutorial [1] and registration [2], he asks Sophia for tips on how to increase their chances of conceiving [3]. Sophia provides him with a summarised answer with an option to go the details [4]. As Sophia suggests Bob to have a fertility consultation, it displays a list of nearby fertility clinics [5] together with the earliest consultation times [6].

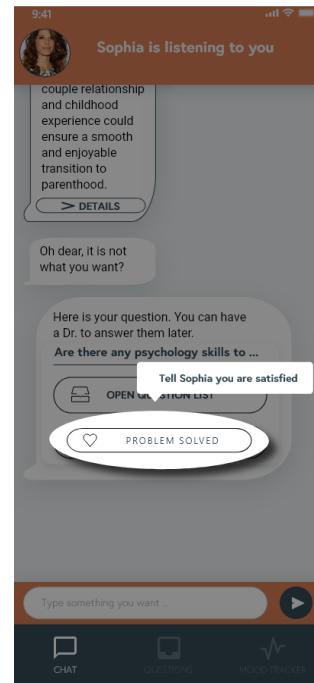
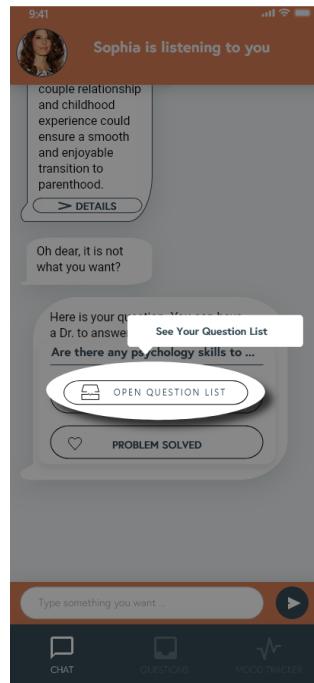
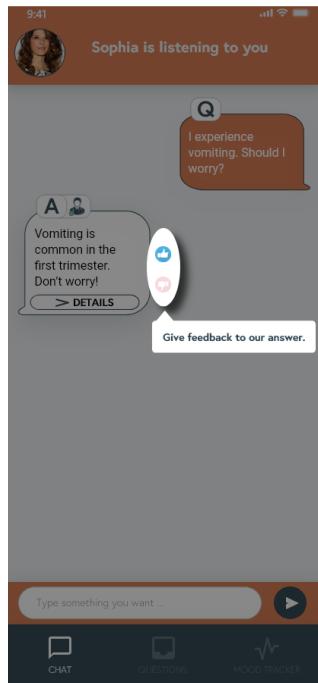
After selecting a suitable time, Sophia offers to invite his wife to the consultation [7]. Bob agrees with this and writes some notes which Sofia then delivers to his wife [8].

Upon receiving the invitation from Bob [9], Anne agrees to go with him [10]. Sophia then suggests a list of common questions to ask at the fertility consultation [11] and offers to save them to the questions list so Anne can refer later at the consultation [12]. When arrived at the clinic, Anne presents her question lists to the doctor [13], which she can directly record the answers to her questions [14].

SCENARIO 1



SCENARIO 1

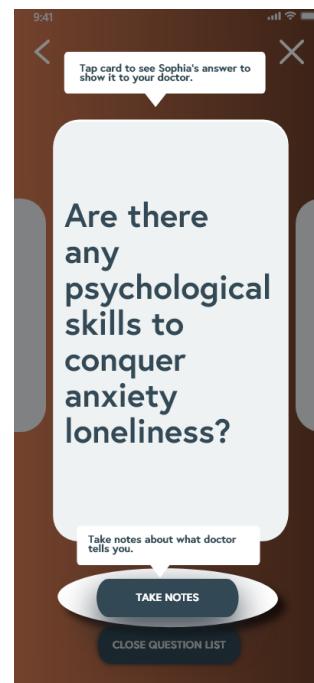
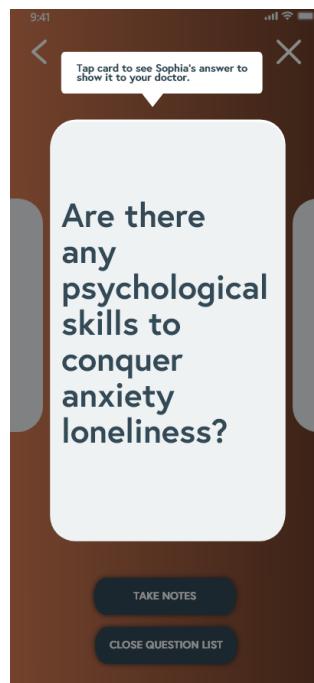
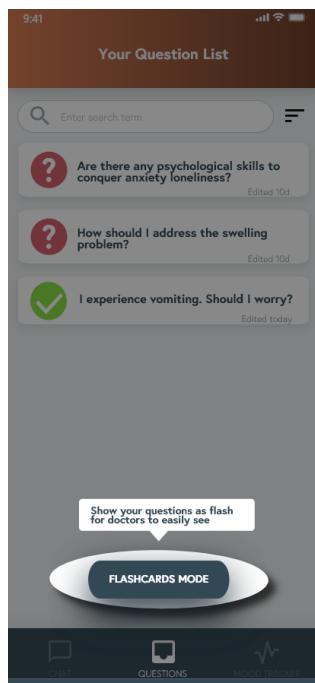


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[1.10]

[1.11]

[1.12]



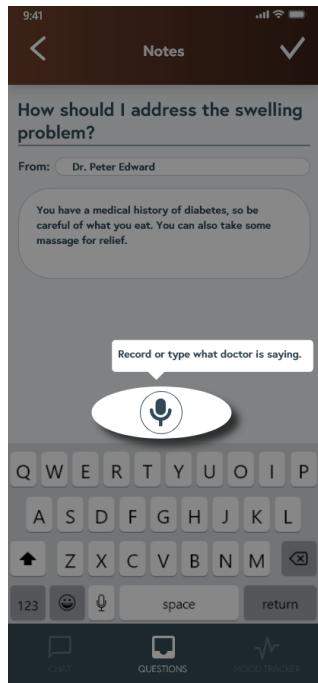
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[1.14]

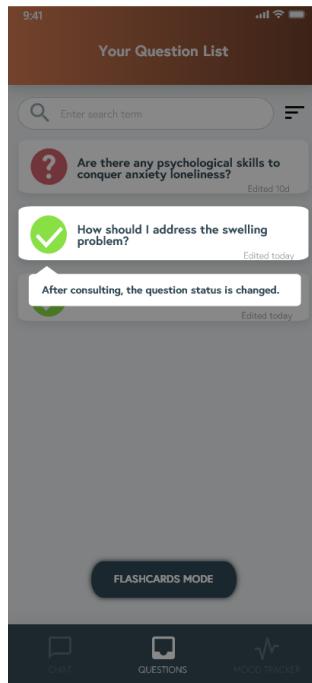
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[1.16]

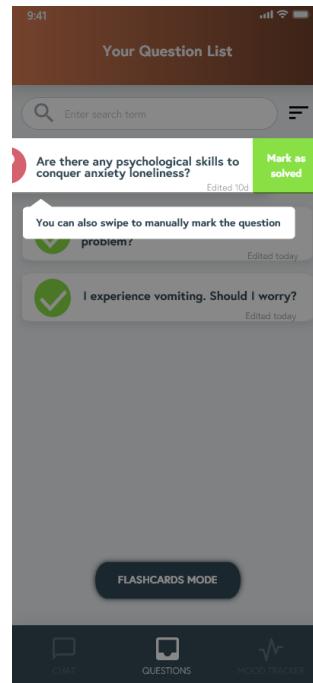
SCENARIO 1



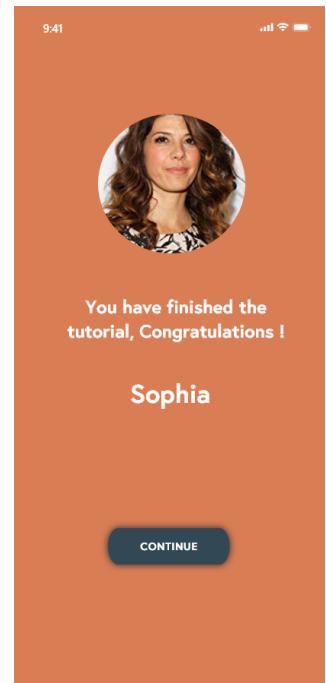
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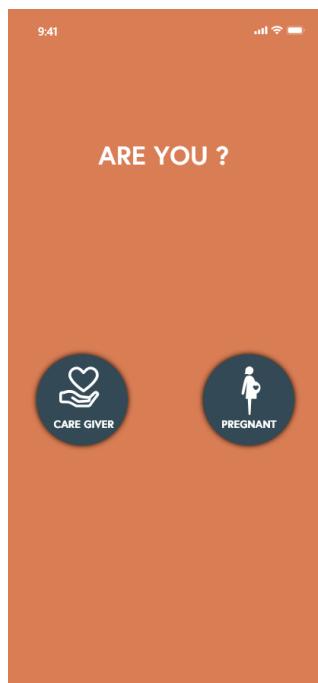
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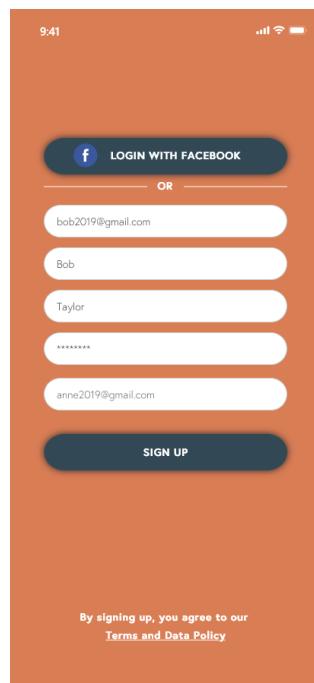
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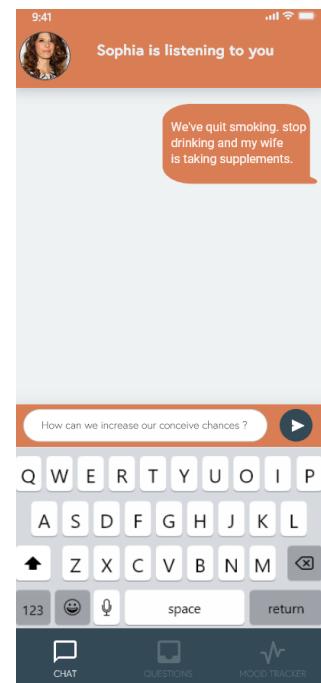
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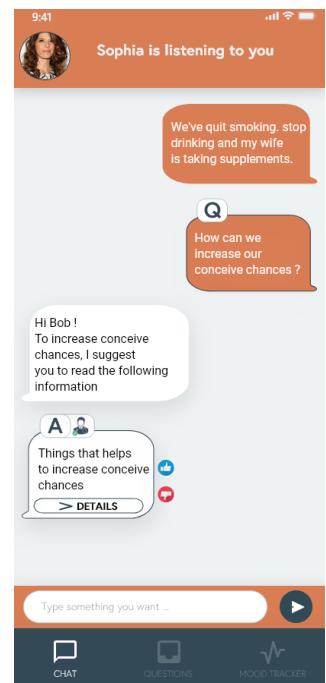
[2.1]



[2.2]



[3]

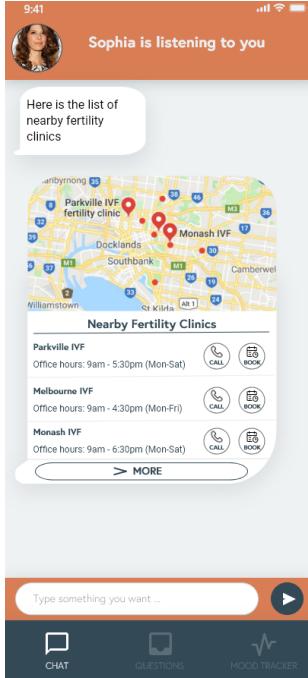


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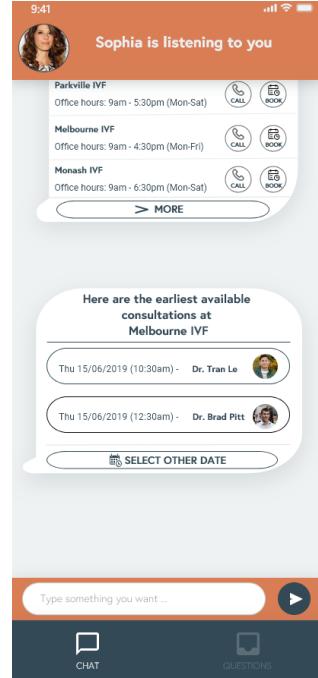
SCENARIO 1



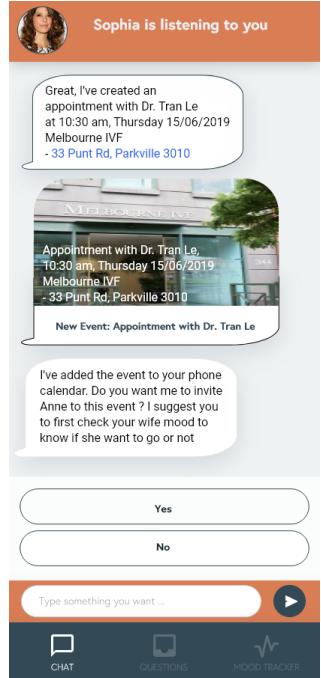
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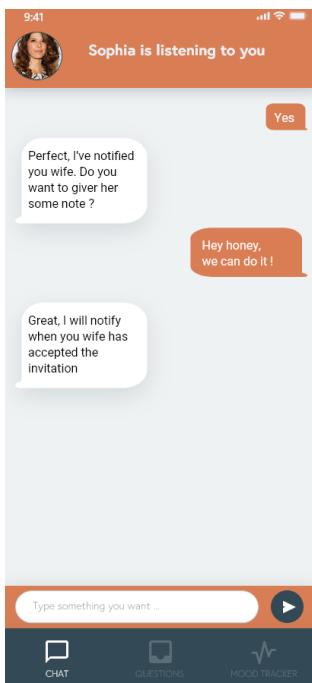
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[6]



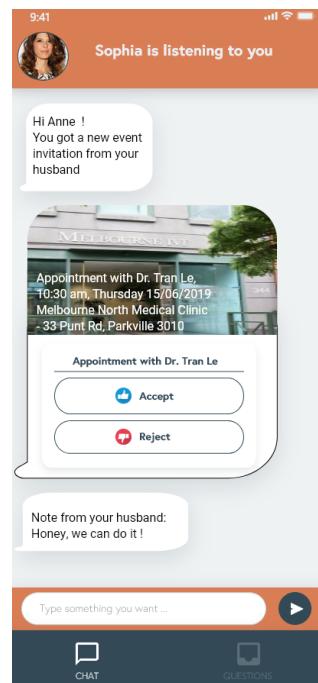
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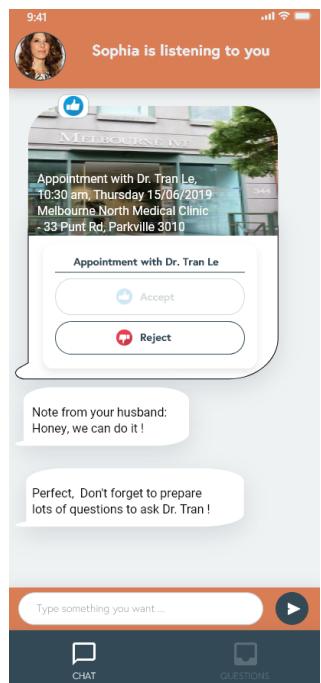
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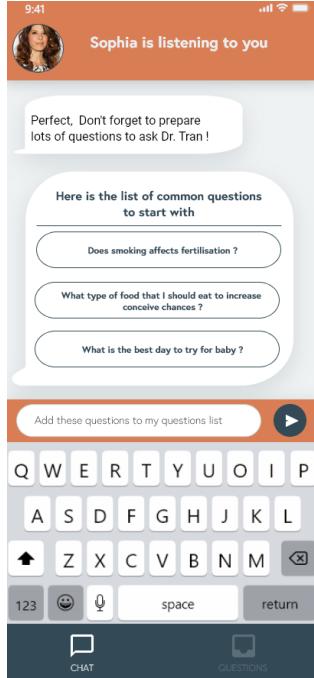


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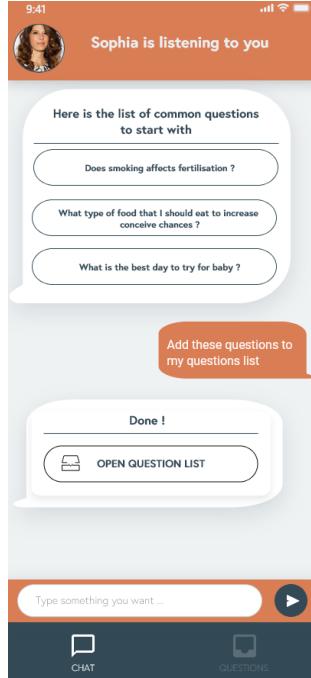


[10]

SCENARIO 1



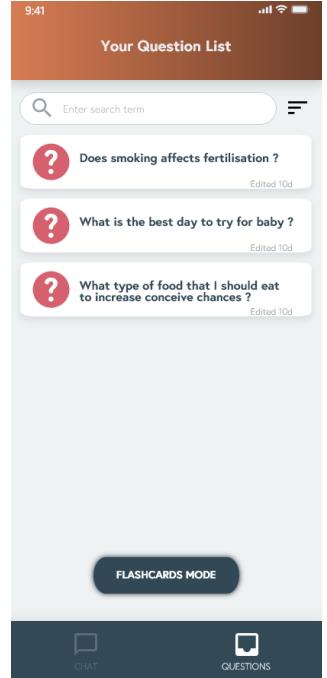
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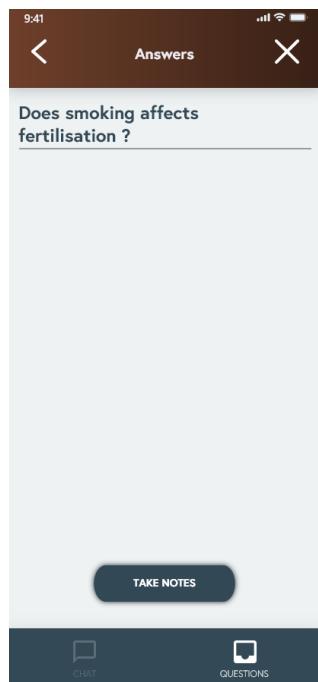
[12]



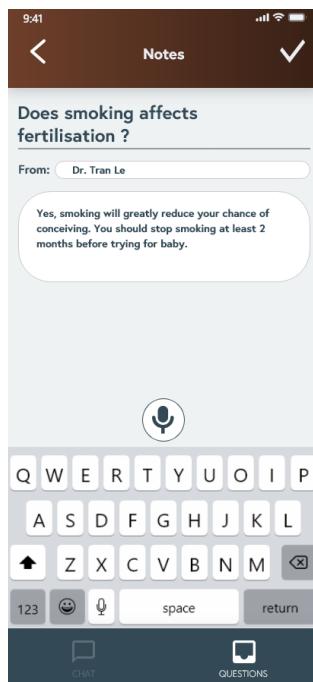
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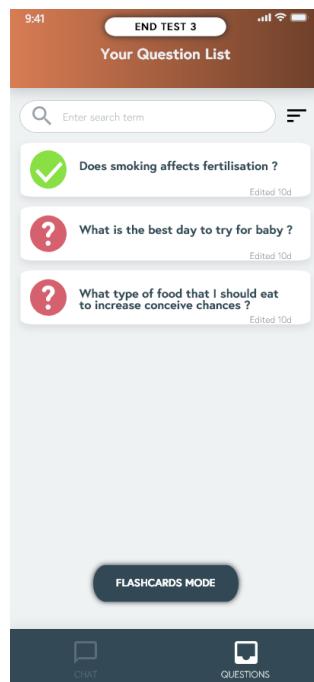
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[14.1]



[14.2]



[14.3]

SCENARIO 2

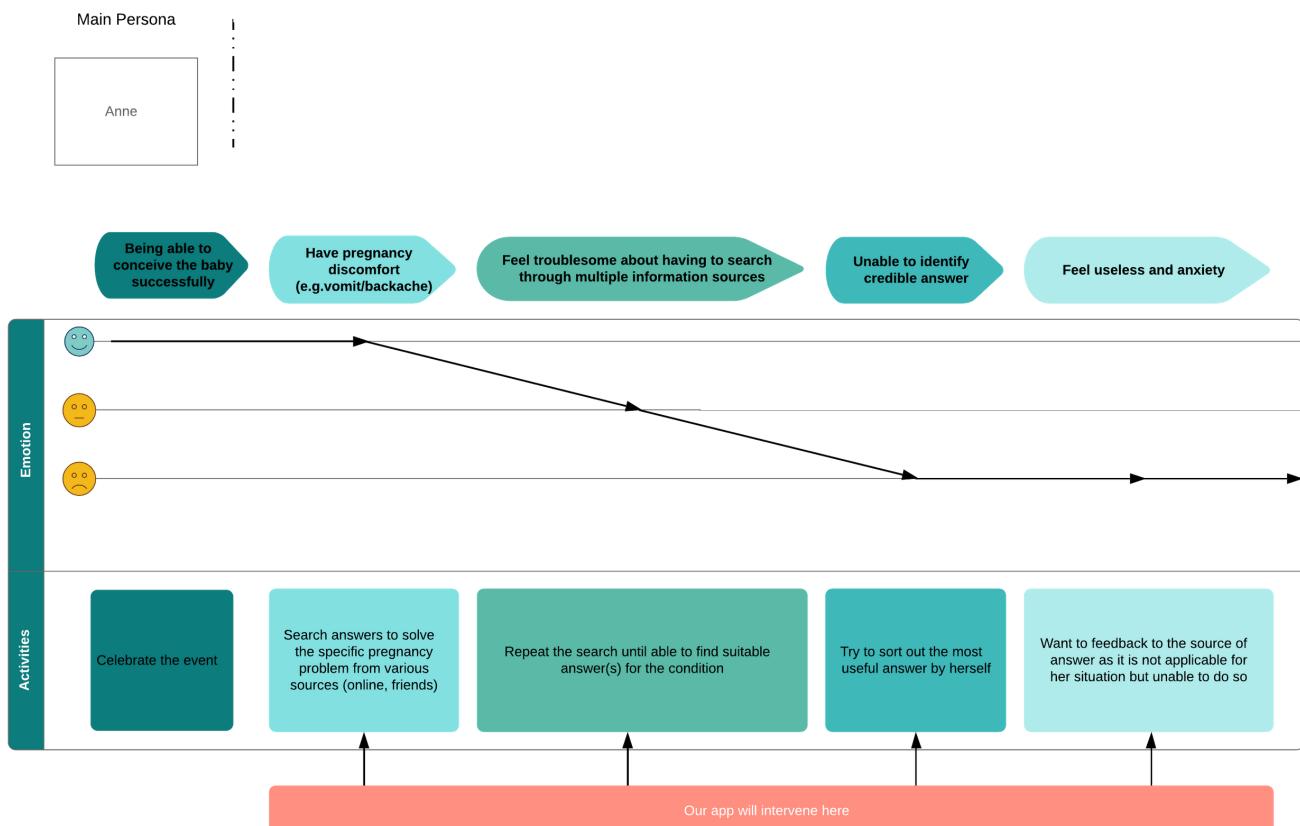


Figure 4: Patient Journey (First Trimester).

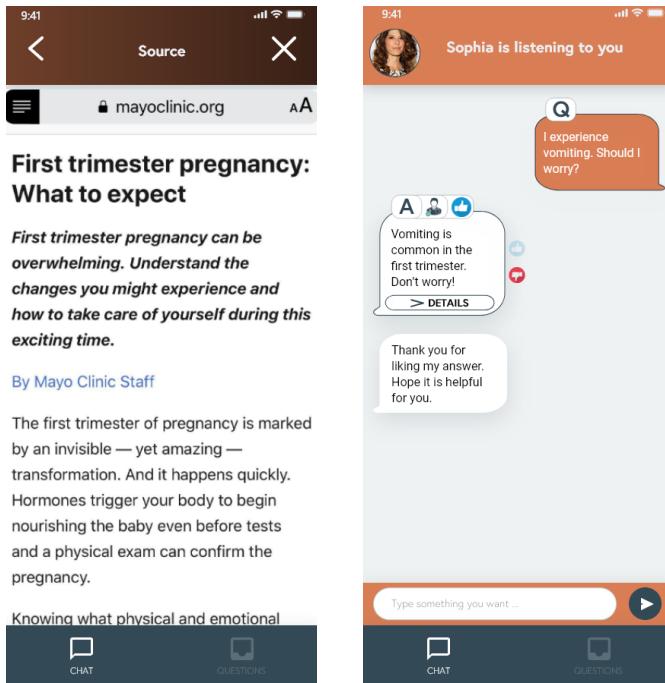
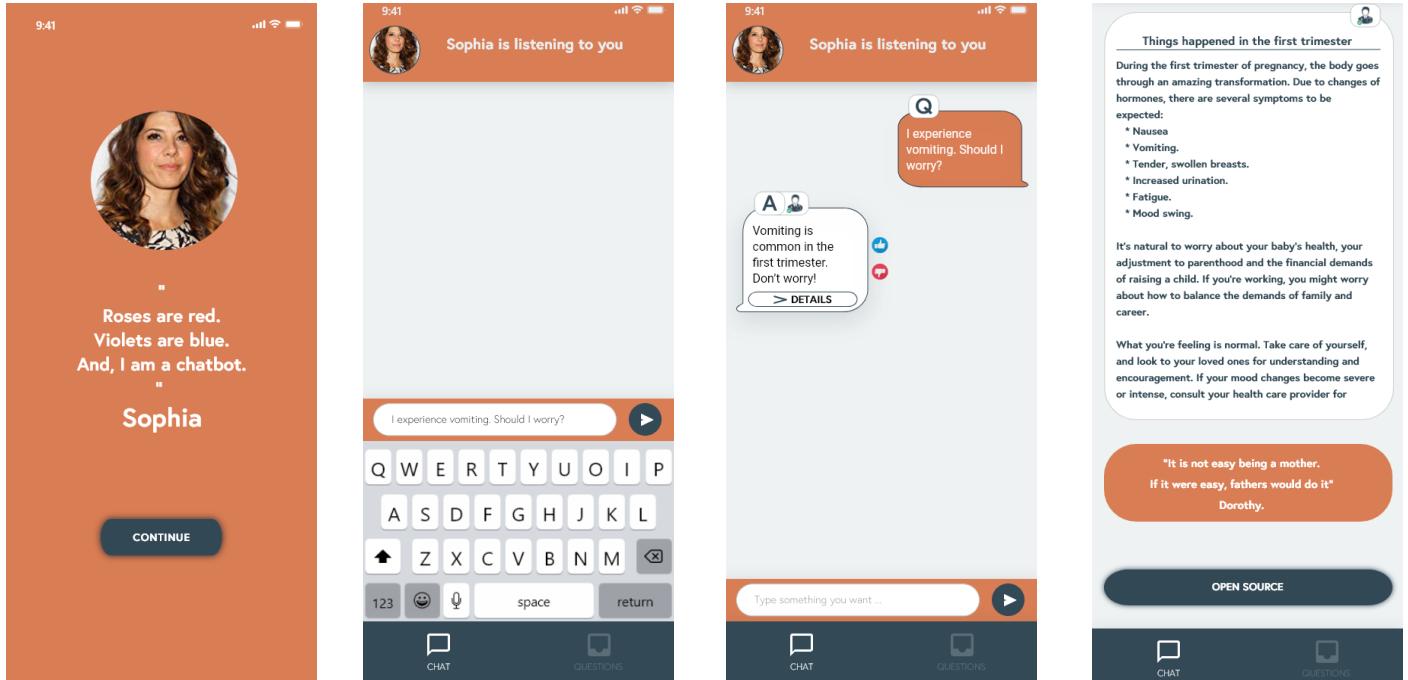
Description - Produced from fig. 4

Bob and Anne's baby have conceived successfully and Anne is progressing into the first trimester. One day, Anne experiences vomiting and she wants to ask Sophia if it is normal or not [1]. Sophia first provides a summary of the answer to reassure Anne [2].

As Anne want a detailed answer for her condition, Sophia provides more comprehensive information with the option to go to the knowledge source of the answer [3].

To be extra cautious, Anne proceeds to view the answer source [4]. After satisfied with the answer, Anne gives feedback to Sophia by up voting the answer [5].

SCENARIO 2



SCENARIO 3

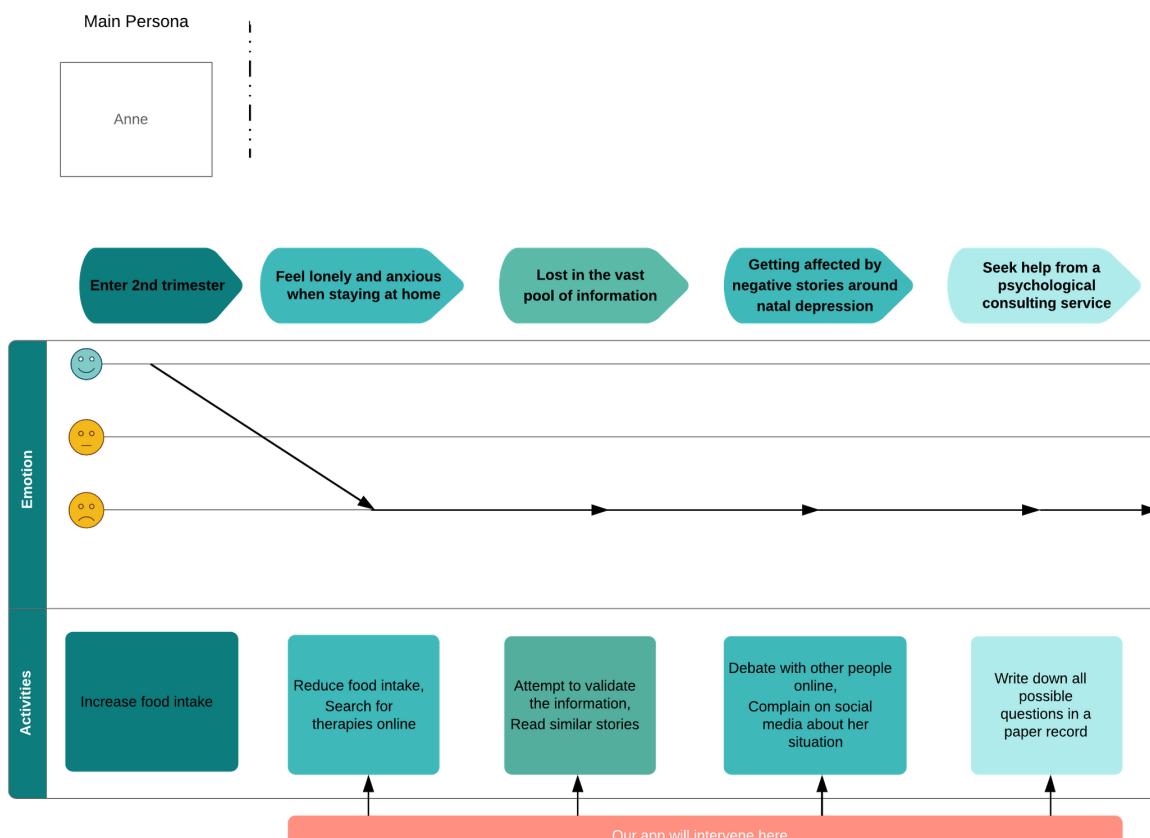


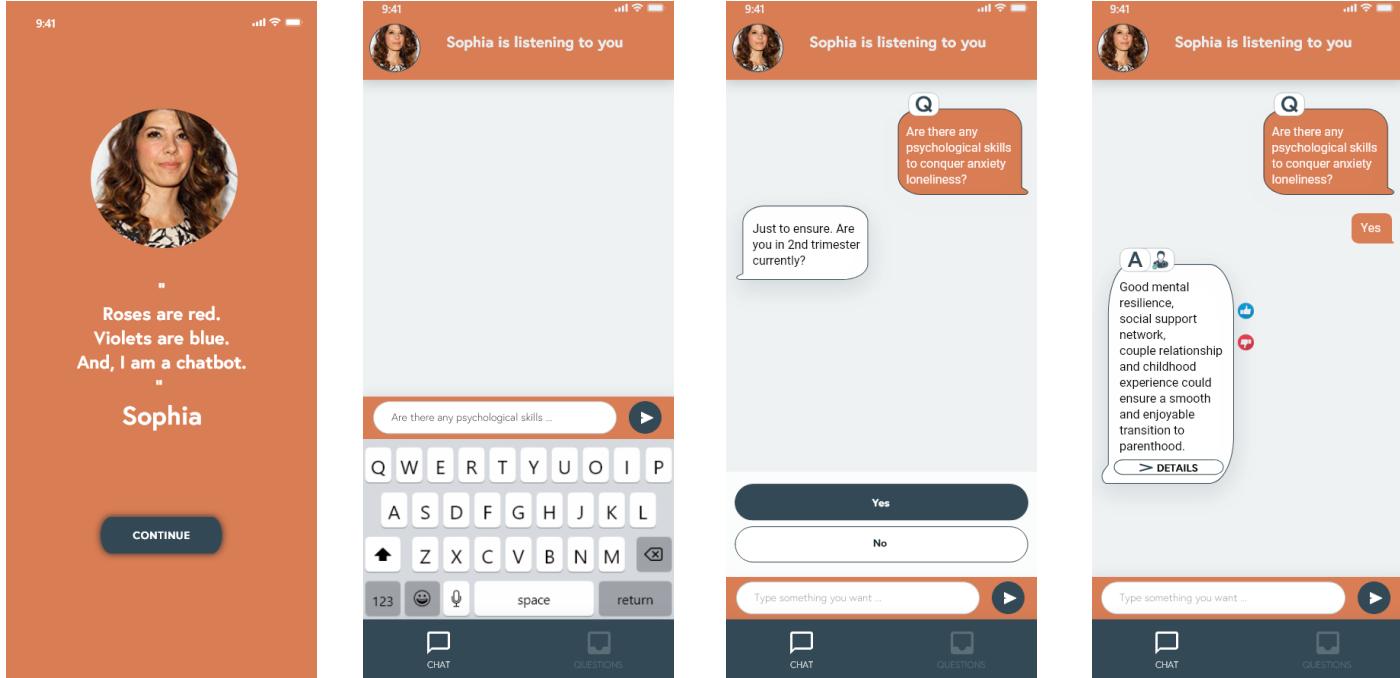
Figure 5: Patient Journey (Second Trimester).

Description - Produced from fig. 5

Sophia is progressing into the second trimester and stay at home alone while Bob working till late. As she starts to feel lonely and anxious, she wants to ask Sophia for recommendations to overcome this feeling [1]. Sophia asks Anne to confirm her pregnancy stage so that it can give suitable information to Anne [2].

Sophia then presents a summarised answer to Anne [3], which she can drill down to the details [4] and explore the knowledge source of the answer [5]. Feeling unsatisfied with the answer from Sophia, Anne gives feedback by down voting the answer [6]. Sophia then offers to save this answer to the question list so Anne can ask her obstetrician later [7].

SCENARIO 3

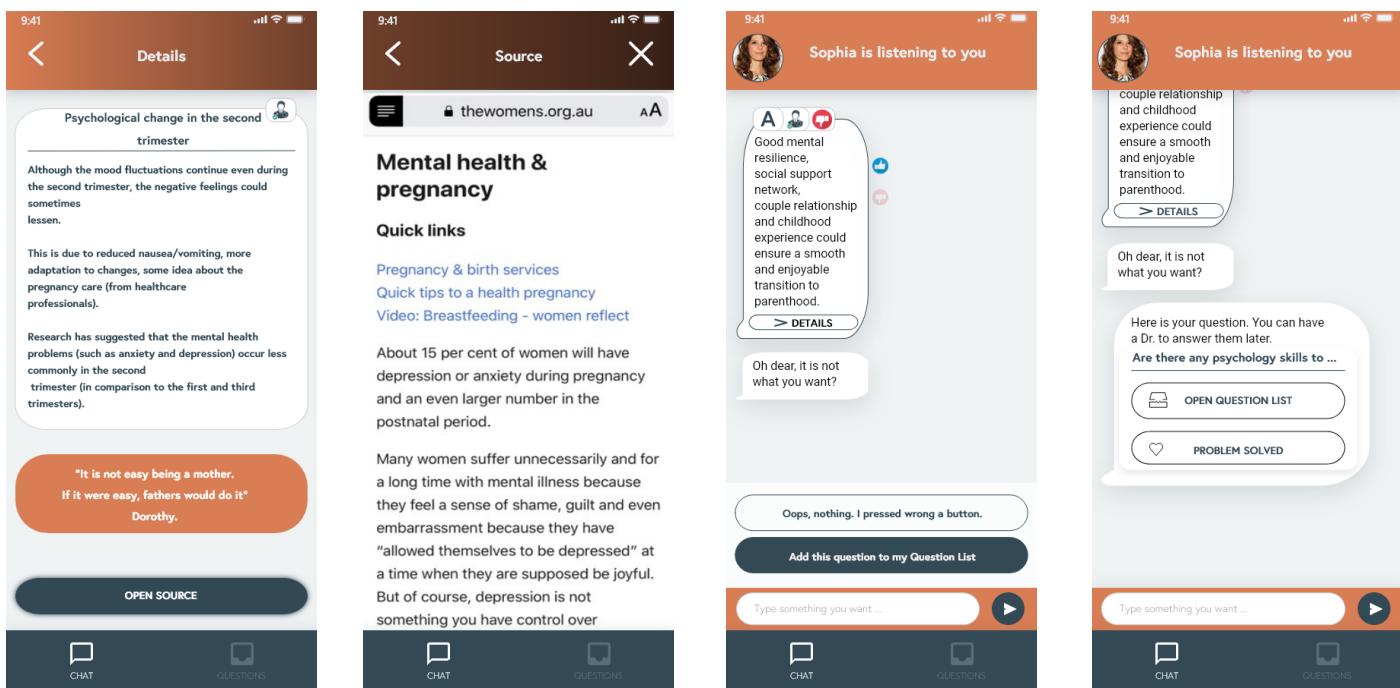


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[1]

[2]

[3]



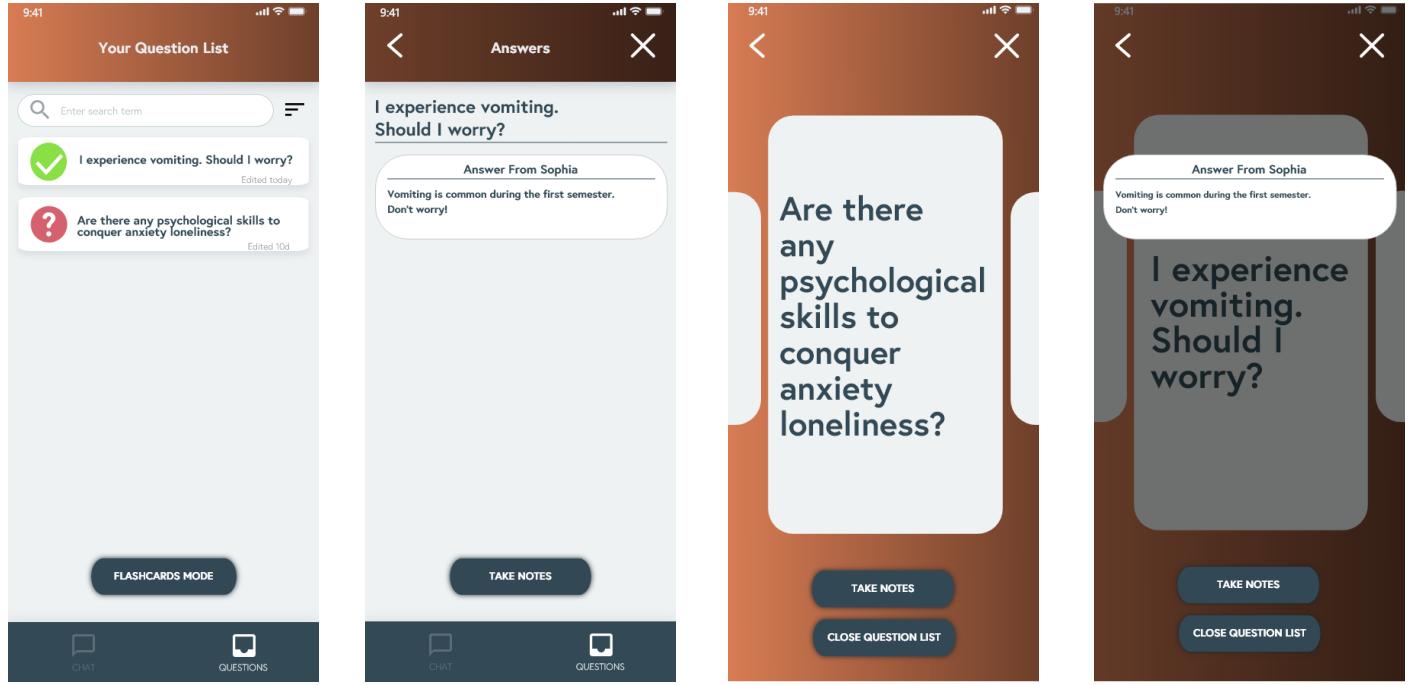
[4]

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[7.1]

SCENARIO 3



[7.2]

[7.3]

[7.4]

[7.5]

SCENARIO 4

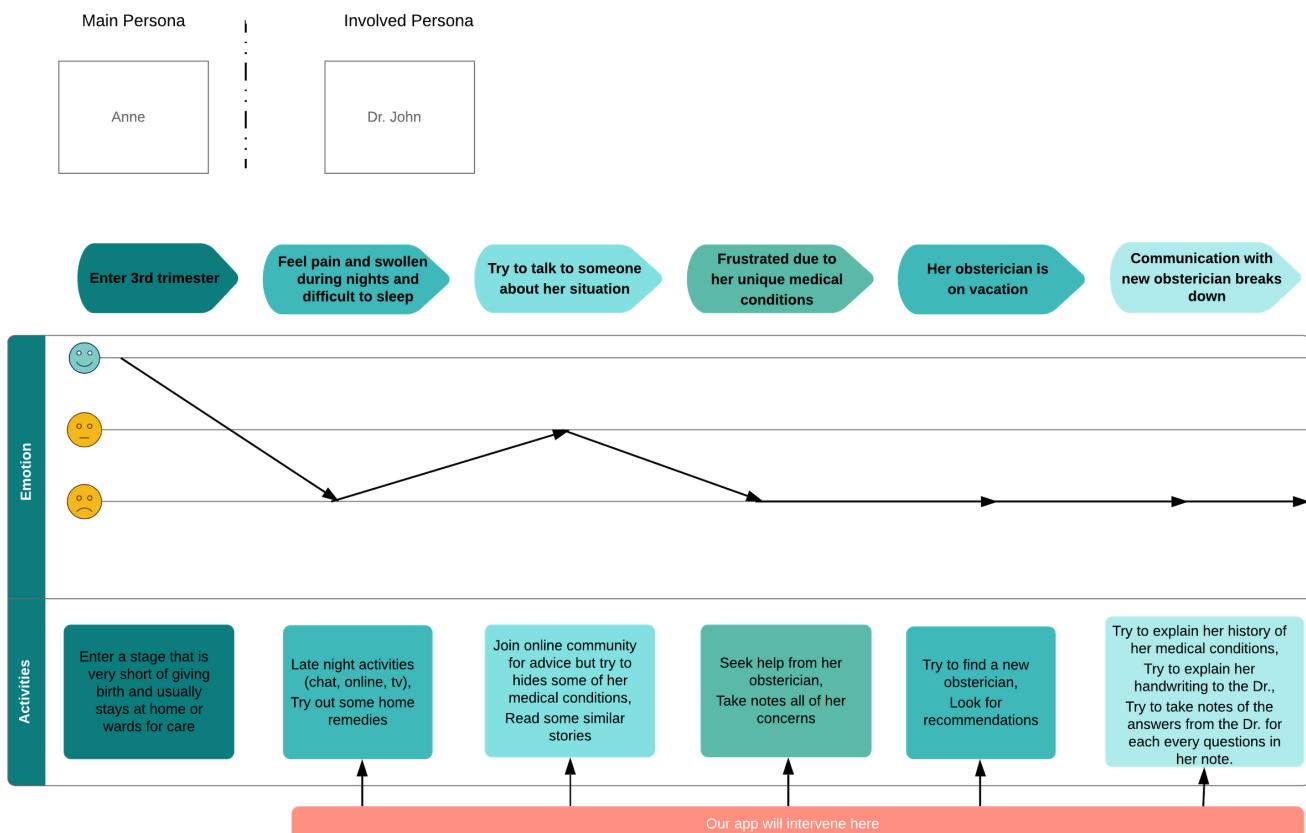


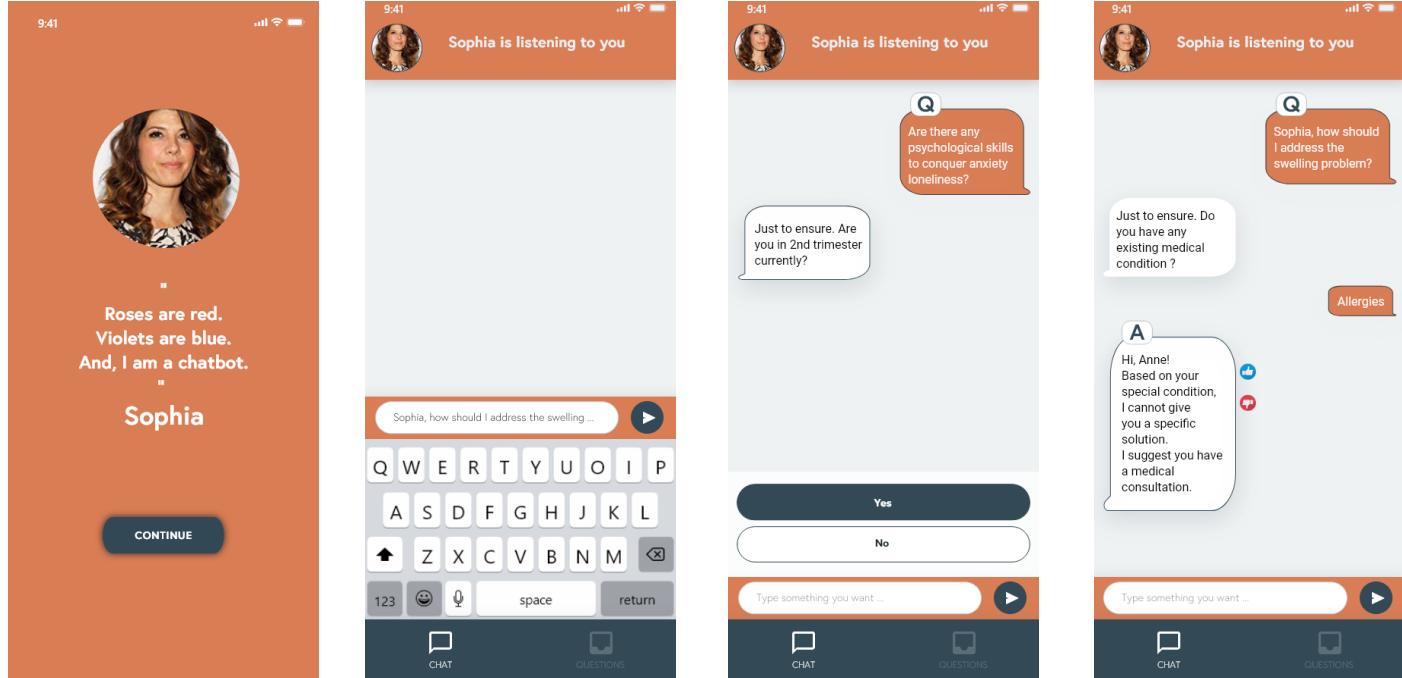
Figure 6: Patient Journey (Third Trimester).

Description - Produced from fig. 6

Anne is progressing into the third trimester and she starts to experience swelling in her feet and ankles. As Anne asks Sophia about this [1], Sophia requires Anne to input her medical history to give a suitable response to Anne' inquiry [2]. Because Anne has history of allergies, Sophia cannot provide an answer for her condition [3] and save the question to question list so Anne can ask her obstetrician later [4]. Feeling her condition can be dangerous, Anne asks for nearby clinics [5].

Sophia presents her with a list of nearby clinics and the earliest consultation times [6]. As these consultation times are not suitable with Anne, Sophia displays advanced booking screen so Anne can select a date, doctor and time slot for her consultation [7]. Sophia then confirms the consultation and add the event to Anne' phone calendar [8]. After arriving at the clinic, Anne presents her questions in the questions list to the obstetrician [9]. Anne then notes down answers from the obstetrician and marks the questions as solved [10].

SCENARIO 4

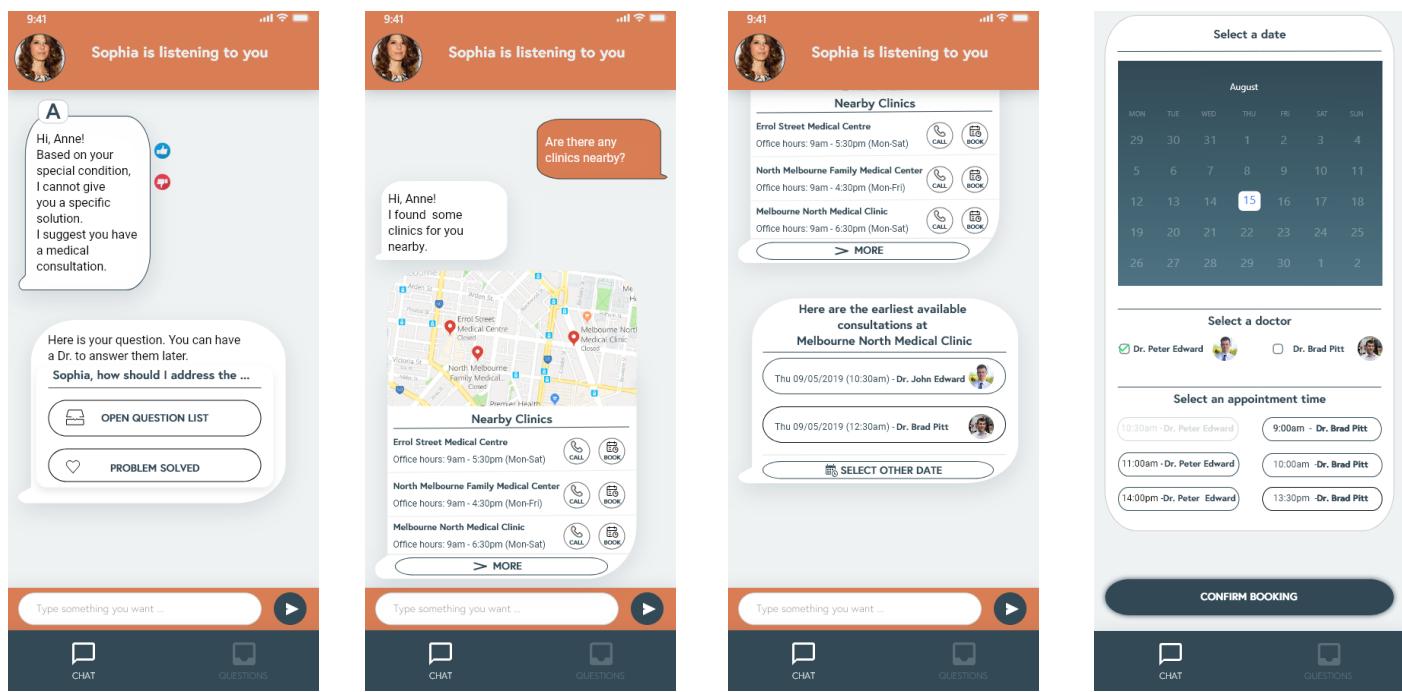


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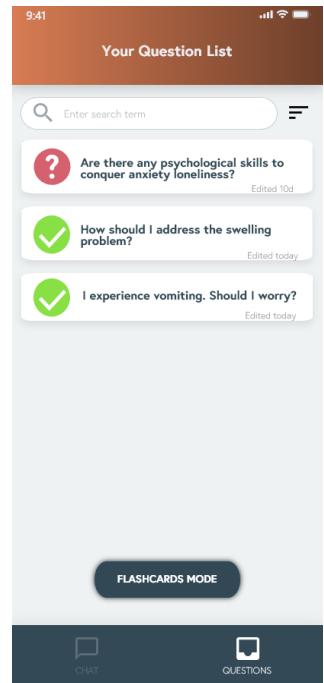
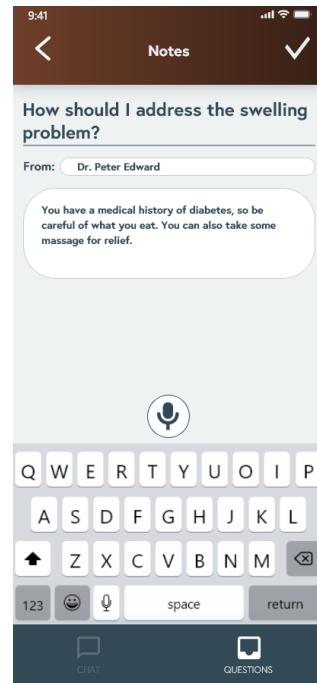
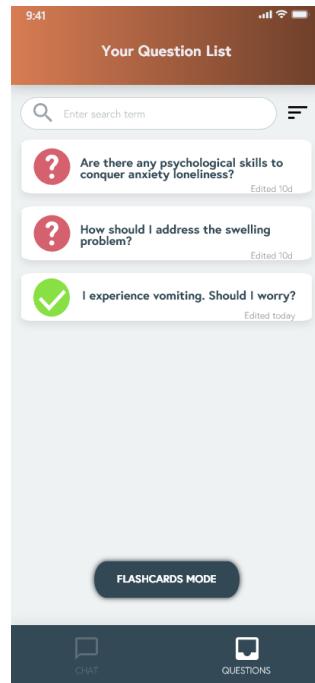
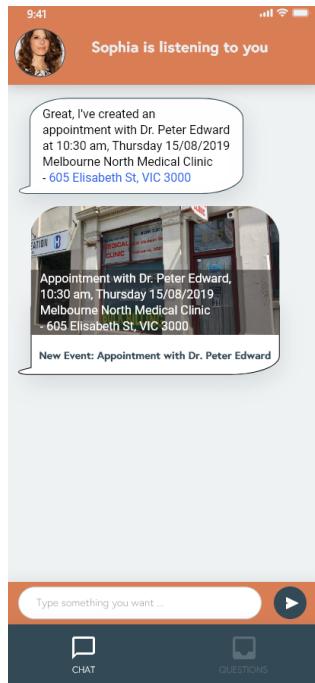
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SCENARIO 4



[8]

[9]

[10.1]

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SCENARIO 5

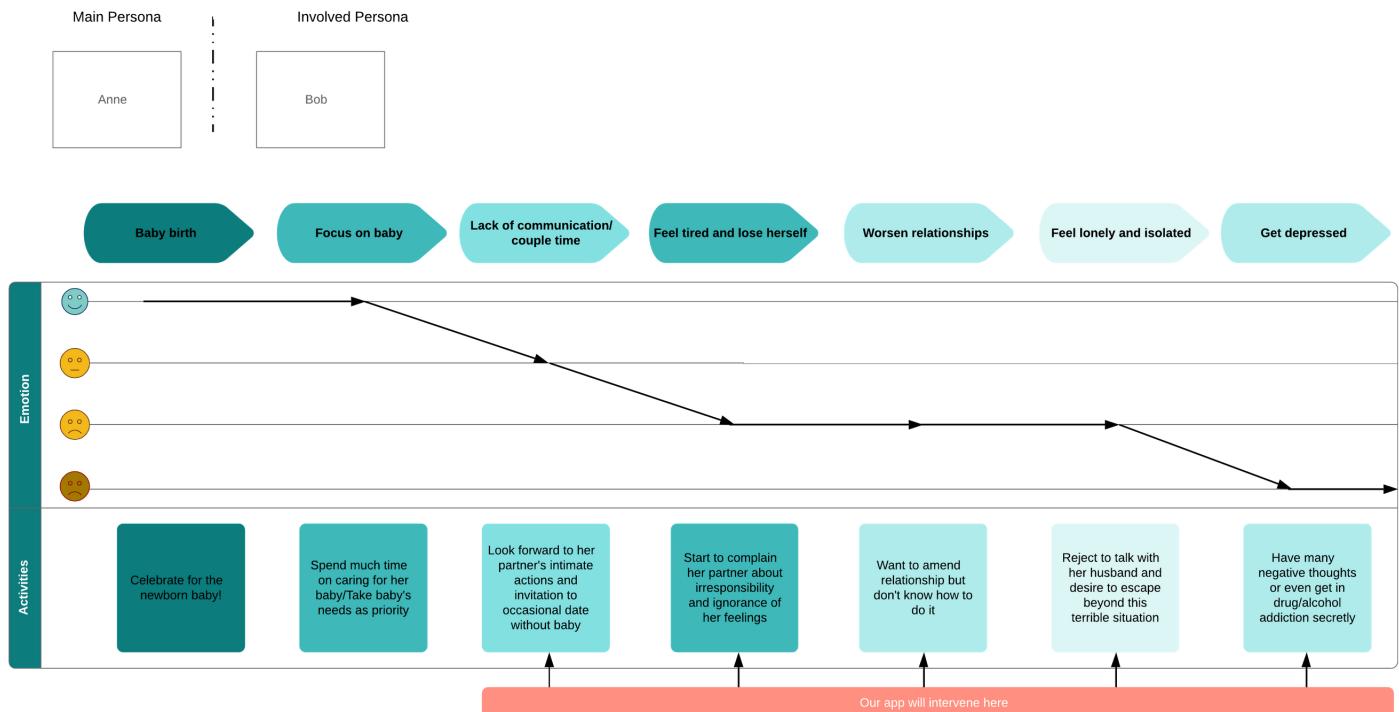


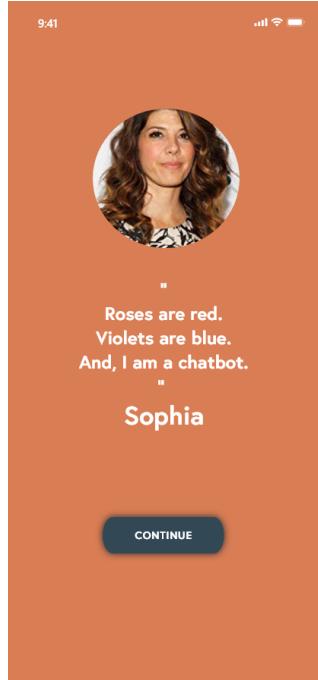
Figure 7: Patient Journey (Postnatal).

Description - Produced from fig. 7

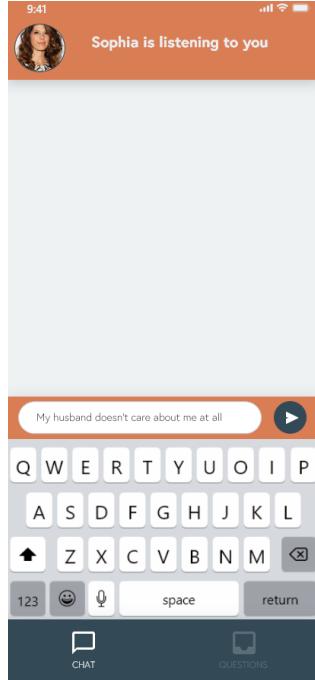
After giving birth, Anne spends most of her time caring for her baby. As Bob working all the time, she starts to have negative thoughts and complain with Sophia about her husband [1]. To understand exactly how Anne is feeling, Sophia asks Anne to classify her feeling using Hungry, Angry, Lonely, Tired (HALT) method [2]. Upon knowing Anne is angry and hungry, Sophia suggests Anne and her husband have a little date night [3].

With Anne's approval, Sophia creates an invitation and notifies Bob [4]. Upon receiving the invitation, Bob feels surprised and wants to understand why his wife wants to go out at night while their baby is still very small [5]. Bob then checks for Anne's mood from the mood tracker [6]. After knowing of her bad mood, Bob accepts the invitation [7], after then Sophia informs back to Anne [8].

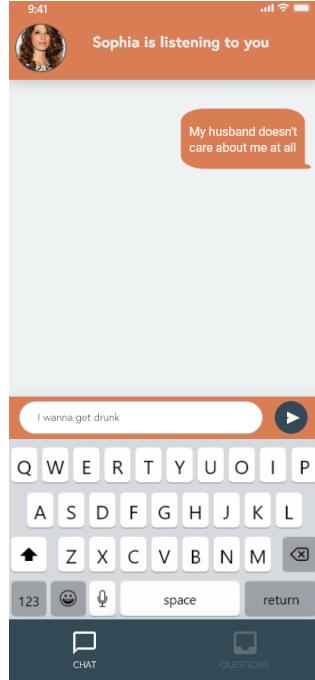
SCENARIO 5



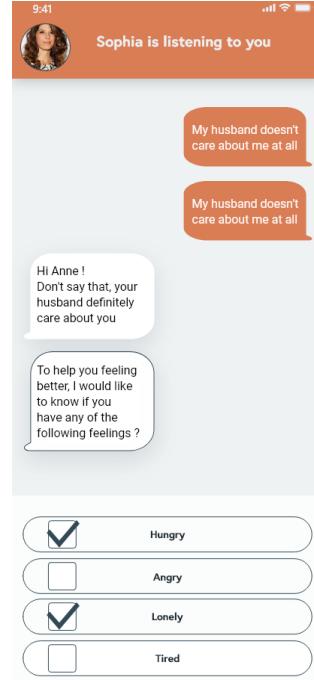
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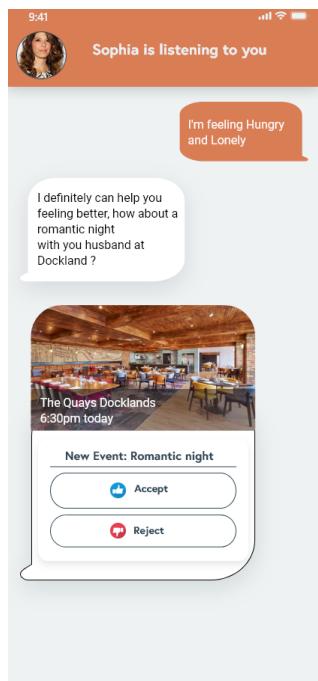
[1.1]



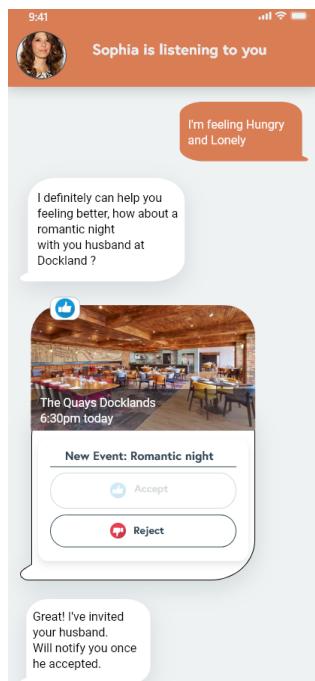
[1.2]



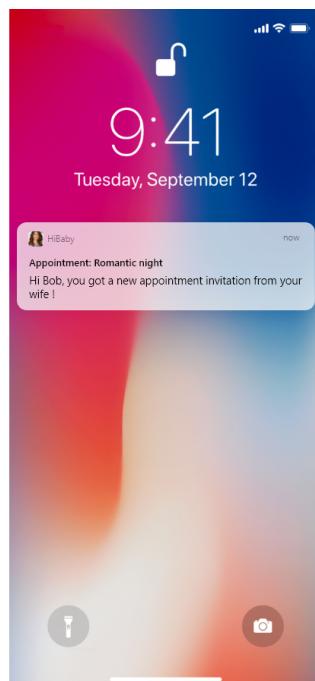
[2]



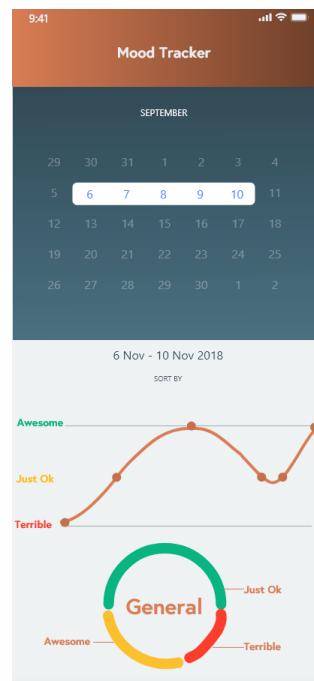
[3]



[4]

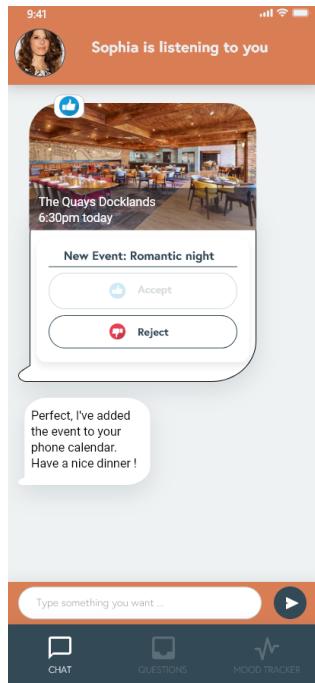


[5]



[6]

SCENARIO 5



[7]



[8]

EVALUATION PLAN

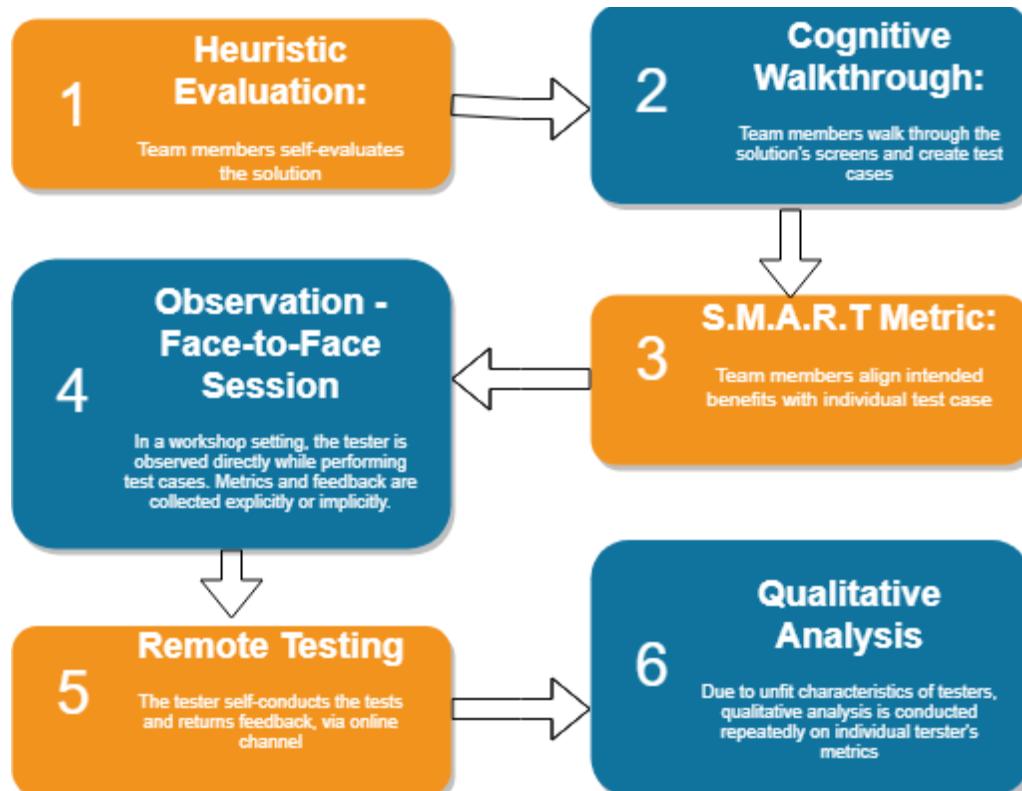


Figure 8: Intended Evaluation Methods
(Adapted from Usability Body of Knowledge, 2012).

EVALUATION PLAN

Due to constraints of the test participant recruitment process, in this study, our group looks for volunteers who are fellow students. The volunteers can choose either to participate in a face-to-face test session which is moderated by our team or a remote testing session where they can test at their own pace.

Notably, the volunteers do not belong to intended user groups and natures of the solution, thus test cases and associated metrics (Figure 8 & Figure 9) are established to only measure key intended benefits of the application. And, in order to collect the measurement metrics, during a test, there will be guiding notes that the test participant needs to follow. Ideally, the recruitment process can be improved in future studies where participants are strictly subject to criteria of the intended user groups.

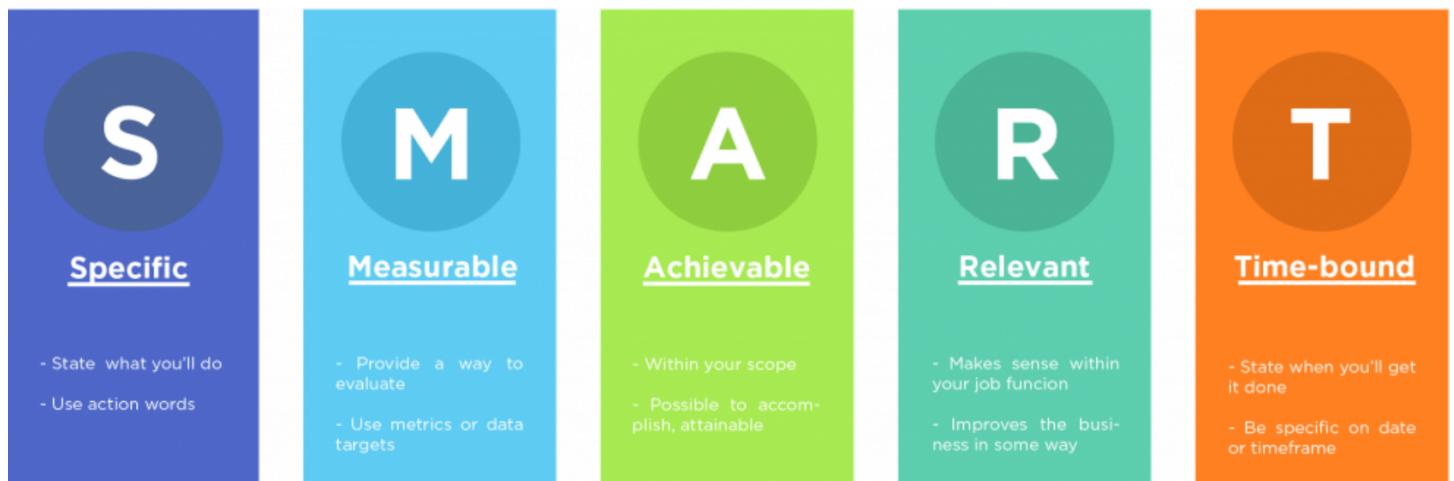


Figure 9: S.M.A.R.T Metrics Creation Method (Reprinted from Laura H., 2018).

EVALUATION PLAN

Test Protocol - Face to Face session

Prior to the Test: The tester will be welcomed and greeted by the team. The tester is briefed about the application and purpose of the test is to evaluate whether the designed application meets the intended benefits, rather than measuring the tester's performances. The tester also be told the whole testing process will be recorded only for evaluation and research purposes of designing this application and the estimated testing time is about 20 minutes.

Additionally, the tester is recommended to speak out loud what the tester is thinking for every actions, decisions, doubts or question. Finally, the tester has to understand all this information and agree that the test can start.

During the Test: The team needs to observe closely the behaviour of the tester to brief the tester the guiding notes and provide just-in-time assistance. Besides, the team needs to keep track of the time as well as the tester's doubts and opinions.

EVALUATION PLAN

Test Protocol - Face to Face session

After the Test: The team spends 2 minutes to hear from the tester about general opinions about the whole application. This information may include but is not limited to:

- What are the tasks that the tester feels easy/difficult to complete, and why?
- Is there any design that makes the tester to feel enjoyable/unpleasant to use, and why?
- What does the tester think about roleplayed persona's potential-emotions if the tester were to be in the persona's situation?
- Do they have other opinions about the designs, such as the design of the background colour and font colours?
- Do they have other overall opinions about this application?

The team thanks the tester for his/her time.

EVALUATION PLAN

Test Protocol - Remote session

In order to collect more feedback and potentially serve future studies, URL to the prototype is produced and circulated to candidates. All the test cases can be accessed via this link: <https://xd.adobe.com/view/lb4dd391-2373-4eb3-7557-053cb6bf2c59-6d7c/?fullscreen>

Furthermore, because the team cannot physically brief the tester, there are black screens (**Figure 10 & Figure 11**) with guiding scripts prior to individual test cases. On the black screen, after reading through the guiding scripts, the tester needs to click “Continue” to begin a test case.

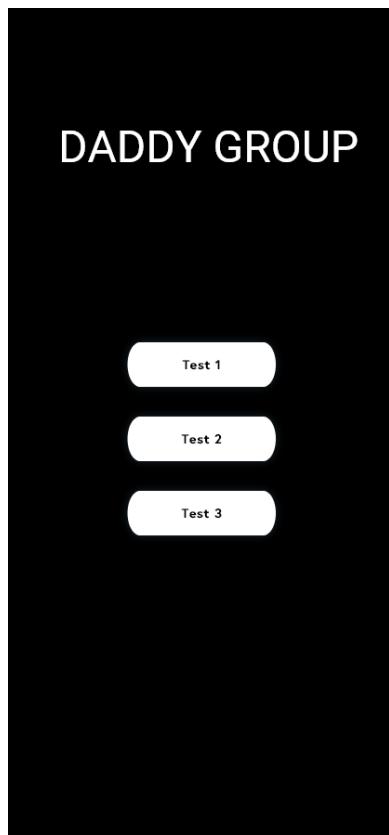


Figure 10: Remote test menu.

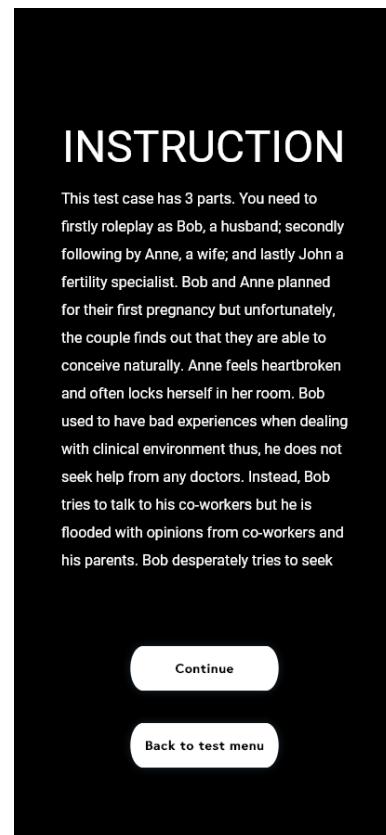


Figure 11: Remote test instruction.

TEST CASES

To maintain effectiveness and minimise testers' efforts, three main test cases are carefully crafted from the five scenarios such that it can cover the key features of the solution while being aligned with the intended benefits.



TEST CASES 1

Purpose

The test case targets new users. It aims at measuring the effectiveness of registration and on-boarding processes; readability and clarity of chatbot interface; understandability and usability of presented clinical information; safety and emotions after the test is completed.

Description

A tester role-plays as Anne who is going to be a mother for the first time. She is in the first trimester and experiences strange symptoms such as vomiting. She also experiences lonely as her husband usually works till late in the night. She has to go online and searches for information and advice to comfort herself.

However, she often finds herself confused and lost in the vast pool of answers online. A friend recommends downloading the HiBaby mobile app. At the moment, she only has two questions in her mind about vomiting and overcome loneliness.

- **Testing Features:** registration, onboarding, information hierarchy via chatbot interface.
- **Test Difficulty Level:** Easy
- **Expected Test Completion Time (heuristic estimation):** 5 minutes
- **Maximum Time:** 10 minutes
- **Completion Criteria:**
 - Complete registration and onboarding processes.
 - Understand questions and answers with/without verifying details/source of answers.
 - Add the unsatisfied question to the “Question List”.
 - Complete above criteria within the maximum time frame.

TEST CASES 1

Test Metrics

- Time taken to complete the test.
- Number of questions asked.
- Able to recognise Sophia is the name of the chatbot.
- Able to recognise Sophia's status.
- Be able to differentiate Anne's messages from Sophia's messages.
- Able to navigate to "Details" and "Source" without asking for help.
- The registration should not take more than 2 minutes to complete and 3 minutes for on-boarding process.
- Hypothetically-perceived emotions after the test completed.
- Hypothetically-perceived confusion if any.
- Other feedback on the colour, font and overall interfaces.

Guiding Note

Anne is happy about the answer for her question about vomiting. On the second question, she is not quite certain and has a recommendation from Sophia (Chatbot) that she can add the question to a question list which can be answered by a Dr. After the test completed, the tester should think about/speak out loud any hypothetically-perceived emotions that Anne may feel.

TEST CASES 2

Purpose

The test case targets experienced users. It aims at measuring effectiveness, learnability of interactive supports (messages) delivered by the chatbot; safety and emotions after the test is completed.

Description

A tester role-plays as Anne who is going to be a mother for the first time. She is in the third trimester. Anne and her husband (Bob) have used the HiBaby to enquire the clinical information since the first trimester.

Lately, Bob is very busy with works and Anne is often feeling lonely. Sometimes, she has negative thoughts of getting drunk as she thinks that her husband is avoiding her on purpose. With mood swing and bad temper due to her physical conditions, she has no-one to talk to as she may unintentionally upset the other party. Eventually, she decides to chat with Sophia.

- **Testing Features:** interactive supports by chatbot.
- **Test Difficulty Level:** Medium
- **Expected Test Completion Time (heuristic estimation):** 8 minutes
- **Maximum Time:** 12 minutes
- **Completion Criteria:**
 - Complete interactions with Sophia.
 - Understand the suggestions from Sophia and take appropriate actions.
 - Successfully book an appointment with psychiatrist.
 - Complete above criteria within the maximum time frame.

TEST CASES 2

Test Metrics

- Time taken to complete the test.
- Number of questions asked.
- Number of errors made when respond to Sophia's suggestions/supports.
- Hypothetically-perceived emotions after the test completed.
- Other feedback.

Guiding Note

After the appointment is booked and Anne's calendar is updated. Anne takes the recommendation from Sophia that Bob should join the appointment too. And, Anne lets Sophia forwards the appointment to Bob. After the test completed, the tester should think about/speak out loud any hypothetically-perceived emotions that Anne may feel.

TEST CASES 3

Purpose

The test case targets experienced users. It aims at measuring effectiveness, learnability of interactive supports (messages) delivered by the chatbot; effectiveness of the Smart Q&A feature prior to appointments as well as during a consultation time; safety and emotions after the test is completed.

Description

This test case has 3 parts. A tester needs to firstly role-play as Bob, a husband; secondly following by Anne, a wife; and lastly John a fertility specialist. Bob and Anne planned for their first pregnancy but unfortunately, the couple finds out that they are able to conceive naturally.

Anne feels heartbroken and often locks herself in her room. Bob used to have bad experiences when dealing with clinical environment thus, he does not seek help from any doctors. Instead, Bob tries to talk to his co-workers but he is flooded with opinions from co-workers and his parents. Bob desperately tries to seek help from the HiBaby.

- **Testing Features:** interactive supports by chatbot (to the husband), interactive supports via chatbot (between husband and wife), Smart Q&A.
- **Test Difficulty Level:** Difficult
- **Expected Test Completion Time (heuristic estimation):** 15 minutes
- **Maximum Time:** 20 minutes
- **Completion Criteria:**
 - Complete interactions (all personas) with Sophia.
 - Understand the suggestions from Sophia and take appropriate actions.
 - Successfully book an appointment with a fertility specialist.
 - Complete above criteria within the maximum time frame.

TEST CASES 3

Test Metrics

- Time taken to complete the test.
- Number of questions asked.
- Number of errors made when responding to Sophia's suggestions/supports.
- Number of errors made when recording an answer to individual questions.
- Hypothetically-perceived emotions after each part of the test.
- Other feedback.

Guiding Note

Part 1 - Bob: Bob questions Sophia about how to increase the success chance of conceiving naturally. He explores the details of the information. Sophia suggests that she can help to book an appointment with a fertility specialist who is an expert and can effectively help him in this situation.

So, Bob decides to make a booking with the specialist through Sophia. After the booking is made, Sophia also suggests sending an invitation to Anne with a lovely note to Anne. Bob accepts the suggestions from Sophia and adds a lovely message.

Part 2 - Anne: Anne receives a notification on her phone from Sophia, saying there is an invitation to an appointment from Bob. Curiously, Anne checks out the information. She accepts the invitation from Bob. Sophia suggests a list of questions that are often being asked for Anne's preparation. Anne adds the questions to her question list. Prior to the appointment, Anne receives a reminder from Sophia about the appointment and her question list.

TEST CASES 3

Guiding Note

Part 3 - John: During the consultation hours, the specialist receives Anne' phone with her question list. He records answers to the question that he thinks the couple may need to remember.

After the test completed, the tester should think about/speak out loud any hypothetically-perceived emotions that Anne may feel.



EVALUATION RESULTS

All the test metrics and feedback are collected and qualitatively analysed. Since the test is on a small-scale setting and the aforementioned limitation of the recruitment process, the qualitative analysis is the best suitable approach where the team can selectively and collaboratively analyse the metrics and feedback.

EXPERT BASED SESSION

During the expert based session, a team member who is considered as an expert, self-walks through the applications. The expert used Nielsen's heuristic principles in conjunction with material design principles to evaluate the screens of the application (Google, 2019; Nielsen J., 1994a). Major feedback was mainly around layout strategy, colour, effectiveness of navigation and privacy concerns.

USABILITY TEST RESULTS

EXPERT BASED SESSION RESULTS

Overall, key results of the analysis from the expert based session are as follows:

1. The layout should be cognitive fit and consistent. For instance, content from the left is more important than the right hand side. Top is more important than bottom.

Solution: Arrange in the suggested order. Especially, chatbot's messages should be on the left side of the screen to shift a user's attention to the chatbot message.

2. Shapes should be presented in the same meaning or common real world phenomena.

Solution: Dialogue shape is adapted as the common shapes across various instant messenger applications.

3. Colour should be used in harmonise, imply action and transition. For instance, too many colours can cause distraction or persistent state of colour does not indicate transition between different levels of a hierarchy.

Solution: Colour theming approach (with primary and secondary colours - Figure 12) is used in conjunction with triangular approach of colour wheel. The colour in primary colon now reflect the level of information hierarchy or details (Figure 13).

USABILITY TEST RESULTS

EXPERT BASED SESSION RESULTS

4. Used colours must be in alignment with intended benefits (mental health) and key target user (pregnant women with depression). For instance, blue colour is often associated with depression (Bill B., 2012).

Solution: With the intention of promoting happiness and positive energy, warm colours is used as the primary colour (Figure 12) instead of cool colours (Allison, S G., 2019).

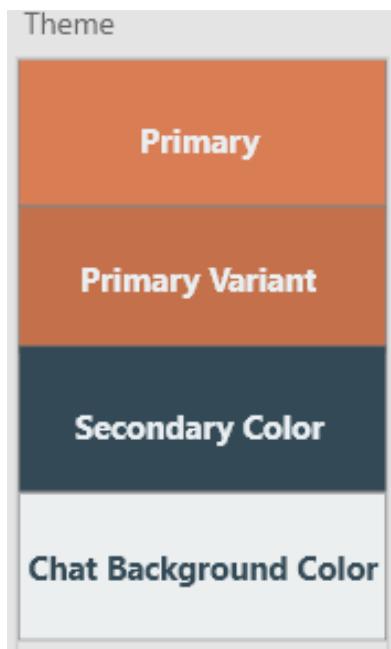


Figure 12: Colours used in the app.

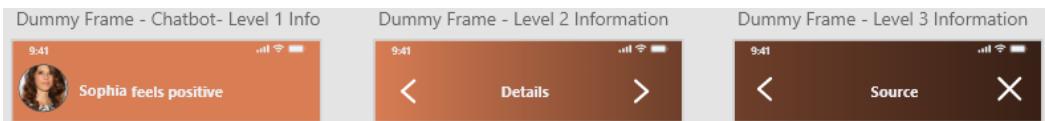


Figure 13: Colour and Information Level Hierarchy.

USABILITY TEST RESULTS

EXPERT BASED SESSION RESULTS

5. Visual cues should be provided. For instance, how does a user know if a piece of information is clinically verified without opening a source?

6. Safe to use and error prevention. For instance, during recording an answer for a question, the solution should stop unintended navigation which may results in lost of recording text.

Solution: Visual indicators are added to assist understanding of information (Figure 14)

Solution: Reorganise layout such that Save note and navigation action are separated (Figure 15) to minimise the error rate. And, a confirmation dialogue is added to prevent unintended action (Figure 16).

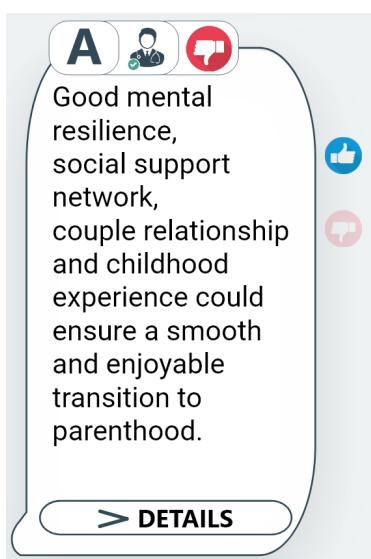


Figure 14: Visual Cues.

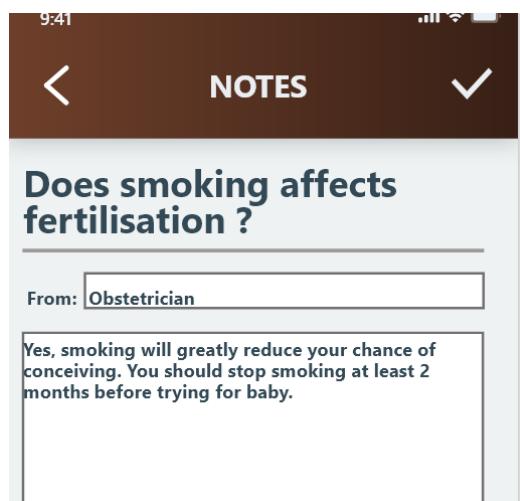


Figure 15: Navigation and Save Notes buttons.

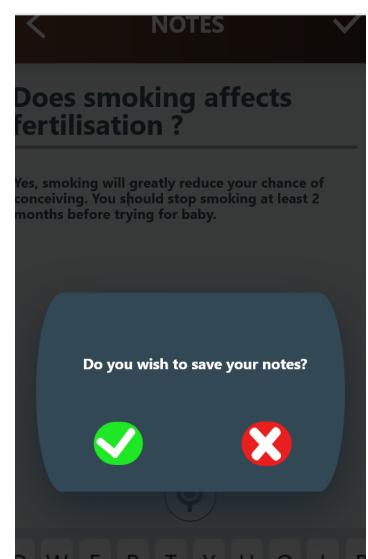


Figure 16: Confirmation Dialogue.

USABILITY TEST RESULTS

EXPERT BASED SESSION RESULTS

7. Misconception issues. For instance, a user may misunderstand the chatbot as a real person.

Solution: Ensure to state the fact that Sophia is a chatbot via the loading screen and on-boarding scenario.

8. For instance, when a woman is in bad mood, she does not want to let her husband know. Thus, the chatbot should not inform the husband without her consent.

Solution: The chatbot should ask for the consent from a user before convey the message to another user. However, arguably, one of key responsibilities of the solution is keep checking on the pregnant woman's mood state and provide just-in-time alert to family member whenever the pregnant woman is in the danger zone of depression.

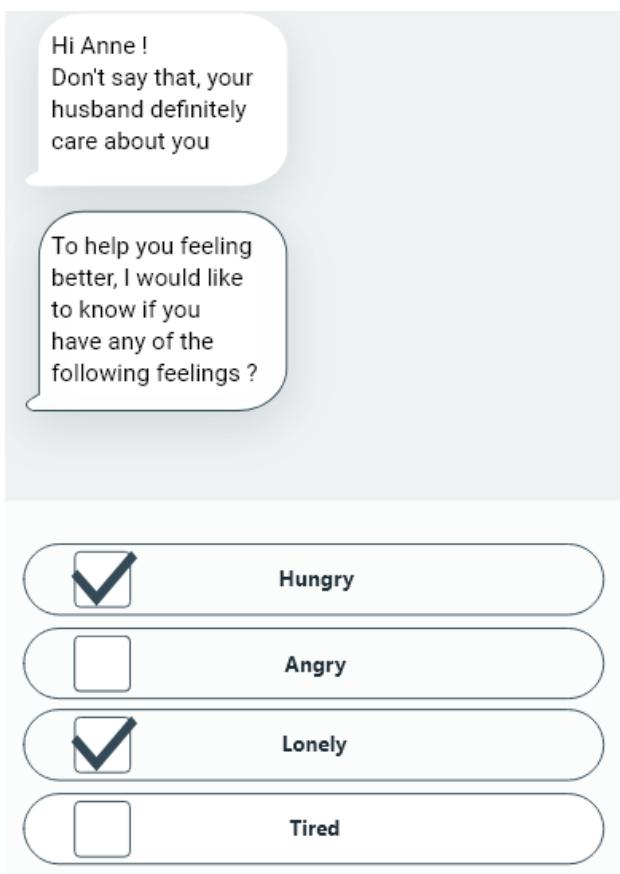


Figure 17. HALT validation method.

USABILITY TEST RESULTS

EXPERT BASED SESSION RESULTS

9. The user should have flexibility of skipping on-boarding process. An existing user may install the application on a brand new phone.

Solution: Add the “Skip” button for skipping on-boarding process (Figure 18).

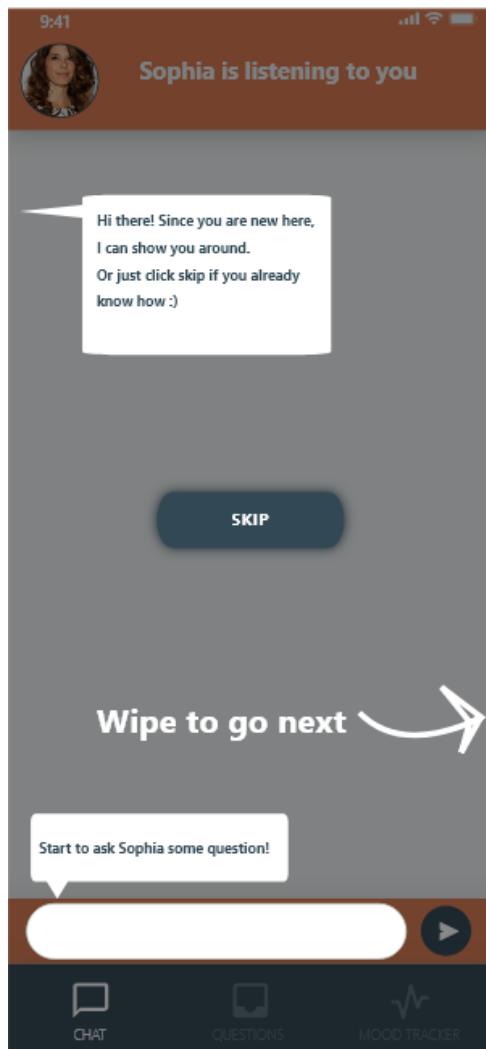


Figure 18: On-boarding welcome screen.

USABILITY TEST RESULTS

USER BASED SESSIONS RESULTS

An improved prototype version revised from expert inputs was used in the user based sessions. Most of the feedback from volunteers are positive. The testers recognise the potential subjugation effects of loneliness symptoms, ease of access to clinical information, convenience of pregnant women in tracking questions and answers as well as communicating with their family members in a context of clinical events and information.

However, one third of testers are sceptical about the necessity of communication with partners via a chatbot instead of directly confronting or resolving with their partners. Even though their concerns are subjectively reasonable, more test data are needed for accurate findings. By and large, common results are discussed and agreed by our team, as shown below:

1. The navigation menu should not be hidden within the “Send” button. During the test, for those without on-boarding experiences, the testers could not find out the navigation menu which only appears by holding or dragging the “Send” message button.

Solution: Introduce a separate navigation bar (Figure 19) instead of a hamburger menu which is suitable for containing more than 4 menu items (Kara, P., & Raluca, B., 2016). The bar is located at the bottom for convenience, with effortless navigation.

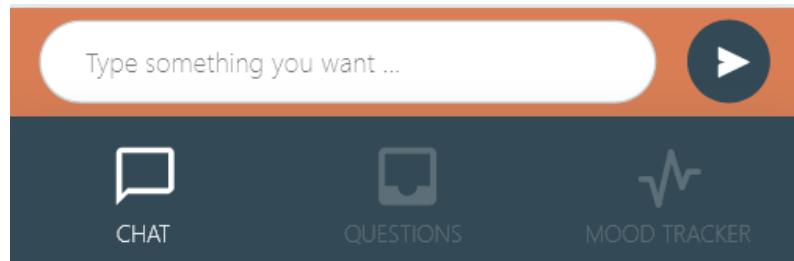


Figure 19: Global navigation bar.

USABILITY TEST RESULTS

USER BASED SESSIONS RESULTS

2. Questions in the question list should be in chronological order or alphabetical order.

Solution: Questions is by default in chronological order, from the latest to the oldest. This speeds up cognitive process because users are often more concern about the most recent questions (Nielsen J., 1994b). Additionally, the user can flexibly sort the question list by questions' statuses, "Unresolved" and "Resolved"; date and alphabetical orders (Figure 20).

3. As the questions list growing, it is harder to find a question or two.

Solution: A search capability (Figure 20) is introduced as a backup when sorting fail and ensures the user always find information that they want (Nielsen J., 1994b).

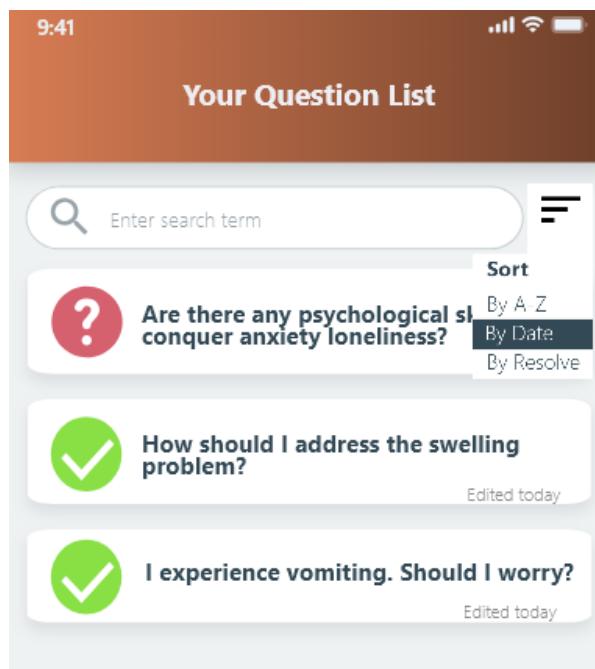


Figure 20: Smart Q&A with Sort and Search capabilities

CONCLUSION

Improvements of the HiBaby lesser the mental load for the users. Hence, it moves the solution one step closer to the intended benefits. More importantly, the latest prototype version can be used in remote testing sessions if required by future studies.

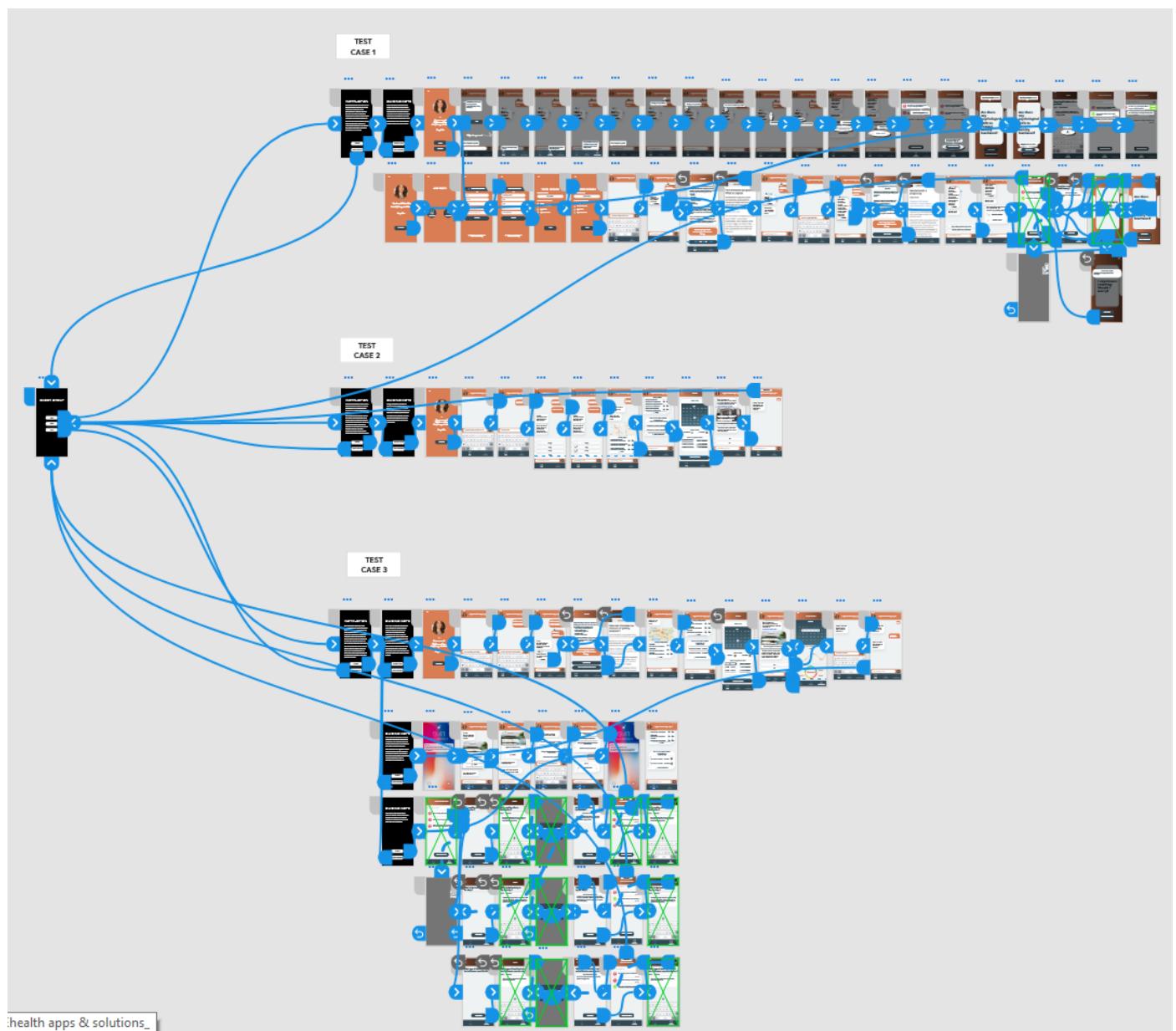


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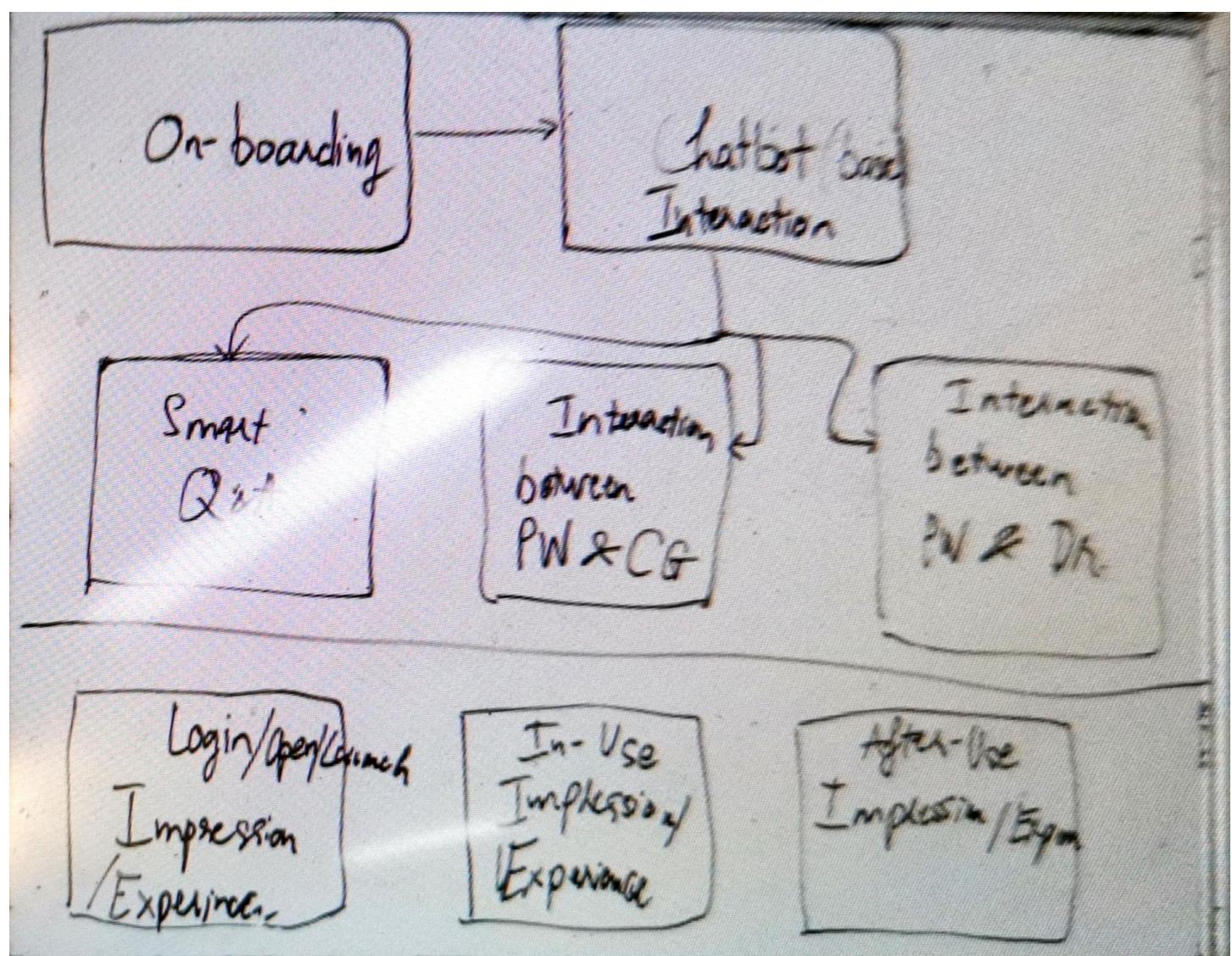
APPENDIX

APPENDIX 1. ART BOARD BY TEST CASE



APPENDIX

APPENDIX 2. DESIGN CONCEPTUALISATION



APPENDIX

APPENDIX 3. DESIGN WIREFRAME

