Interview Guide

Notes for the interviewer:

● The first input to give to the interviewees is always an open question. In this guide, open questions are designated with numbers. The NR (No Reaction) notes are meant to help the interviewer to guide the counterpart in the process to start to or further elaborate her ideas.

● Be aware of individual differences and pay attention to the verbal and non-verbal components of the communication in your interaction with the interviewee: sometimes interviewees might need time to think about a question and organize their ideas, and sometimes a question should be reformulated more than once. At times, a question might also be skipped.

● Review this guide before every interview: being familiar with the questions to be presented to the participants will give you confidence but also leave some attentional resources available to recognize when and how to ask for further details.

Introduction (Estimated time: 3 minutes)

a. Short introduction of the interviewer

b. Short introduction of the project and explanation of the purpose of the interview:

“The Luxembourg Institute of Health (LiH) dedicates an important part of its research to exploring possible new paths for the development of technologies that contribute to the well-being of the population.

The following interview is part of an effort to involve people in the design process of health-management resources to be made available for them. We believe that having into consideration the interests, needs, and wishes of intended users of the technology we try to develop, might add to it a tremendous value in terms of usability and improve the chances to be incorporated into their everyday lives and so, to serve its final purpose: to help people maintaining or improving their quality of life”.

c. Verbal consent for recording the interview and confidentiality statement:

- Remind participants about the “Information Sheet” and the fact that the sessions will be recorded for research purposes. Re-confirm their agreement with the terms of the research and ask once again for their verbal consent. If necessary, clarify doubts concerning how their data would be processed and stored.

- Make a confidentiality statement: I herewith agree to keep confidential all potentially sensitive information you could share with me during this interview.
Start recording!
Part 1: Persona-scenario exercises  

(Estimated time: 30 minutes)

To begin, I would like to ask if you have already heard about vocal biomarkers.

Notice: Encourage interviewees to speak their minds and do not rush to give them “the right answer” or correct them”. If they have a partial idea of what it means, then integrate their ideas in the definition you will offer them (e.g. “Exactly. Diabetes distress refers, as you said, to all those emotional reactions that emerge when dealing with diabetes...like the frustration of having to check your blood sugar levels constantly...”). Here, there is a simple definition to use as a basis or to be read to participants referring not to have previous knowledge:

“Vocal biomarkers is a technique to analyse sounds, most of them imperceptible to humans, as people speak. Vocal biomarkers are used as an easy and comfortable method to detect diseases or symptoms. We can say that vocal biomarkers are medical signs coming from the voice. They can serve to alert people about signs of illnesses, to diagnose, as well as for monitoring”.

Can you get an idea about what vocal biomarkers are or would you like me to explain it again or more in detail?

Now, I would like to know if you have some ideas about what diabetes distress is.

“Diabetes distress is defined as a range of emotional responses to living with and managing diabetes. Symptoms can include feeling overwhelmed by the activities related to managing diabetes; fear and worries about complications and/or them progressing or having a severe low; feeling defeated, discouraged, and maybe burned out when you are not meeting your blood sugar goals despite your best efforts to manage them. It is a normal reaction to living with diabetes and it can affect the person with a diabetes diagnosis, but also family members as parents and partners”.

I would suggest you keep these concepts and ideas in mind for the next activity.

Now, I would like to hear your opinion and ideas about some hypothetical situations. For that purpose, I would first share with you the case of an imaginary person. I will provide you with some information about this person and his or her current circumstances and then I will ask for your opinion about the degree of adequacy of several approaches to this person’s situation.
<table>
<thead>
<tr>
<th>Case</th>
<th>Felix</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Persona</strong></td>
<td>Felix is 15 years old. He was diagnosed with type 1 diabetes at the age of 12. He is in the first year of secondary school and his favourite subjects are math and sports. He lives with his parents and his 18 years old half-sister in a cosy house next to the swimming hall of the town. Felix loves playing soccer with friends or going swimming next door with his best friend, schoolmate and neighbour Samuel. Even though, lately, he has started enjoying eating pizza while watching a good action movie on Netflix.</td>
</tr>
<tr>
<td><strong>Scenario</strong></td>
<td>Recently, Felix has been feeling different about having to deal with diabetes. Since he started going to parties, his parents seem to be very much concerned about his blood sugar levels and they are constantly reminding him of the risks that imbalances might have for his well-being. They send him regular reminders on WhatsApp when he is away, which is clearly upsetting him. Lately, he has not been able to stop thinking about how much he would like to be like his sister or Samuel and not have to think constantly about controlling his blood glucose level and what he eats. He feels unlucky and frustrated and would like to find a way to live a relatively normal life despite diabetes. During the last visit to his diabetologist, he was telling him how he has been feeling lately. The diabetologist told him that he might be experiencing a moderate degree of diabetes distress, which is quite common and understandable among people living with diabetes but must not be ignored.</td>
</tr>
<tr>
<td><strong>Task</strong></td>
<td>Please select for each option your degree of agreement with the proposition, considering that: 1= totally disagree 2= disagree 3= nor agree, neither disagree 4=agree 5= totally agree</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td>A) He could use a voice-controlled smartwatch. The watch integrates a vocal biomarker analysis function for monitoring diabetes distress that can be controlled through a mobile application. The application runs a diagnosis of the user’s health condition by integrating data about exercise, sleep, and diabetes distress thanks to voice analysis. The results are made available through a report in the application. B) He could use a smart pen or an insulin pump. The smart pen or the insulin pump has an integrated vocal biomarker analysis function that requires just short voice recordings to detect diabetes distress. The device allows the registration of information related to insulin dose (time) to be combined with the voice data for analysis. C) He could use a mobile application for diabetes distress detection and monitoring. The application uses voice recordings for vocal biomarkers analysis and creates alerts and suggestions for managing stress according to the results.</td>
</tr>
<tr>
<td><strong>Choice</strong></td>
<td>Which of all these options do you think is the best option?</td>
</tr>
<tr>
<td><strong>Format</strong></td>
<td><strong>1. How? Input Type:</strong> 1.1. Holding a vocal (AAAAAA sound) 1.2. Counting (1-20) 1.3. Reading a short text (A short paragraph) 1.4. Using a voice message from another connected application (e.g. WhatsApp) 1.5. Breathing deeply in and out 3 times</td>
</tr>
</tbody>
</table>
1.6. Coughing 3 times
1.7. Answering a question (What is your favourite movie/book about?)
1.8. Explaining why he feels good or bad today
1.9. Free speech about any topic he wants

2. When? Frequency:
   2.1. Once a week
   2.2. Twice a week
   2.3. Three times a week
   2.4. Daily
   2.5 When he feels the need to self-check his diabetes distress level

3. Where? Recording conditions: How comfortable do you think he might be to record (answer based on a Likert Scale from unlikely to very likely):
   3.1. In private: recording whenever is possible to be alone.
   3.2. In front of the family: recording at home
   3.3. In front of acquaintances: recording at home or school or recurrent social spaces (club)
   3.4. Anywhere: recording in the street or in front of strangers

Exp. Why X+Y+Z (combination chosen by the participant) is the best combination possible to your perception?

Case Charlotte

Persona Charlotte has also T1D. She lives with her mother and grandmother near her school. She is 17 years old but she cannot wait to reach her age of majority. Getting 18 is not just a reason to organize a party, but also to get a driving license. The idea of being able to go wherever and whenever she likes is the most fascinating part of getting 18 years old. Her father said he might give her a small car if she will make it to write a good final exam to apply for the university. Charlotte’s thing is hanging around with friends. She loves to be surrounded by people and make them laugh. Her friends are always saying that she would be doing great as a comedian. She has been seriously thinking about going for a degree in dramatic arts after school, but she also thinks her family would not like this idea: somehow, they always saw her as an academic, as most of the family members.

Scenario Since she was 13, Charlotte started having problems controlling her body weight. She did not do much about her weight until her doctor warned her about the risk of obesity. After that last control, Charlotte started trying to lose weight, but after ten days of trying diet and sports, she saw absolutely no changes and experienced a lot of frustration, so she decided to quit. She recently met her diabetologist and told her what had happened. Her doctor explained that for people with type 1 diabetes, losing weight could take longer because of the need to adjust their insulin intake to the new eating and training habits. She encouraged her to try again, mainly focusing on her nutrition, and suggested waiting at least three weeks to check for changes. Weight and body shape have always been complicated topics for Charlotte. She would like to find a way to create new healthy habits that could help her to get fit without feeling overwhelmed.

Task Please select for each option your degree of agreement with the proposition,
considering that:
1= totally disagree 2= disagree 3= nor agree, neither disagree 4=agree 5= totally agree

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A)</td>
<td>She could use a digital scale with integrated voice sensors for integrated body weight and diabetes distress control. The scale is connected to a mobile application that alerts and creates customized recommendations according to the results of the analyses.</td>
</tr>
<tr>
<td>B)</td>
<td>She could subscribe herself to a digital workshop for diabetes management. The workshop includes 20 minutes of teleconsultations with a diabetologist for optimizing glycaemic control and diabetes distress management. A computerized program that analyses vocal biomarkers for signs of hypoglycaemia and diabetes distress also processes the teleconsultations.</td>
</tr>
<tr>
<td>C)</td>
<td>She could use a voice-controlled smart mirror. The mirror integrates vocal biomarkers, facial recognition to elaborate a diagnosis of the user’s health condition, including hypoglycaemia, diabetes distress recognition, and monitoring. The mirror analyses voice components and processes visual data while the user is carrying out daily activities (e.g. Tooth brushing). The analyses' results are displayed on the smart mirror directly.</td>
</tr>
<tr>
<td>D)</td>
<td>She could use an interactive virtual assistant (bot), which is an expert in glycaemic control and diabetes distress management. The assistant is analysing vocal biomarkers and uses them for diagnosis and monitoring.</td>
</tr>
</tbody>
</table>

| Choice | Which of all these options do you think is the best option? |

<table>
<thead>
<tr>
<th>Format</th>
<th>1. How? Input Type:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.1. Holding a vocal (AAAAAA sound)</td>
</tr>
<tr>
<td></td>
<td>1.2. Counting (1-20)</td>
</tr>
<tr>
<td></td>
<td>1.3. Reading a short text (A short paragraph)</td>
</tr>
<tr>
<td></td>
<td>1.4. Using a voice message from another connected application (e.g. WhatsApp)</td>
</tr>
<tr>
<td></td>
<td>1.5. Breathing deeply in and out 3 times</td>
</tr>
<tr>
<td></td>
<td>1.6. Coughing 3 times</td>
</tr>
<tr>
<td></td>
<td>1.7. Answering a question (What is your favourite movie/book about?)</td>
</tr>
<tr>
<td></td>
<td>1.8. Explaining why he feels good or bad today</td>
</tr>
<tr>
<td></td>
<td>1.9. Free speech about any topic he wants</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2. When? Frequency:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.1. Once every three months</td>
</tr>
<tr>
<td></td>
<td>2.2. Once a month</td>
</tr>
<tr>
<td></td>
<td>2.3. Once a week</td>
</tr>
<tr>
<td></td>
<td>2.4. Daily</td>
</tr>
<tr>
<td></td>
<td>2.5 Whenever he feels the need to self-check her diabetes distress level</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>3. Where? Recording conditions: How comfortable do you think he might be to record (answer based on a Likert Scale from unlikely to very likely):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.1. In private: recording whenever is possible to be alone.</td>
</tr>
<tr>
<td></td>
<td>3.2. In front of the family: recording at home</td>
</tr>
<tr>
<td></td>
<td>3.3. In front of acquaintances: recording at home or work/school or recurrent social spaces (club)</td>
</tr>
<tr>
<td></td>
<td>3.4. Anywhere: recording in the street or in front of strangers</td>
</tr>
</tbody>
</table>
### Exp.

| Why X+Y+Z (combination chosen by the participant) is the best combination possible to your perception? |

### Case

| Ralph |

### Persona

Ralph is 44 years old. He works as an accountant for a renowned company in Luxembourg. For the last four years, he has been living with his partner Susan, an accountant. They share an interest in fitness activities and spend most of their free time doing open-air activities when the weather allows. Ralph is a well-organized and goal-oriented person. For him, balance and discipline are the keys to success in all areas of life.

### Scenario

Ralph was diagnosed with type 1 diabetes when he was five years old. In general, he thinks he has reasonable control of his blood sugar levels. Still, lately, after hearing about a friend in a critical situation with the same condition as him, Ralph felt scared about the possible consequences that the periods of imbalance along his life might have in the future. Consequently, he has been checking his levels more often. This brought some problems with Susan, who cannot understand these changes. He would like to find out what is going on with himself and find a better way to deal with his concerns.

### Task

Please select for each option your degree of agreement with the following proposition, considering that:

1= totally disagree 2= disagree 3= nor agree, neither disagree  4=agree 5= totally agree

### Options

| A) He could use a smart pen connected via Bluetooth to a smartphone application. The application has an integrated vocal biomarkers analysis function that requires just short voice recordings to detect diabetes distress. The application also allows the register of information related to insulin dose (time) to be combined with the voice data for analysis. |
| B) He could use a digital scale with integrated voice sensors for integrated body weight and diabetes distress control. The scale is connected to a mobile application that alerts and creates customized recommendations according to the results of the analyses. |
| C) He could use a voice-controlled smartwatch. The watch integrates a vocal biomarker analysis function for monitoring diabetes distress that can be controlled through a mobile application. The application runs a diagnosis of the user's health condition by integrating data about exercise, sleep, and diabetes distress. The results are made available through a report in the application. |

### Choice

Which of all these options do you think is the best option?

### Format

1. **How? Input Type:**
   1.1. Holding a vocal (AAAAAA sound)
   1.2. Counting (1-20)
   1.3. Reading a short text (A short paragraph)
   1.4. Using a voice message from another connected application (e.g. WhatsApp)
1.5. Breathing deeply in and out 3 times  
1.6. Coughing 3 times  
1.7. Answering a question (What is your favourite movie/book about?)  
1.8. Explaining why he feels good or bad today  
1.9. Free speech about any topic he wants  

2. When? Frequency:  
2.1. Once a week  
2.2. Twice a week  
2.3. Three times a week  
2.4. Daily  
2.5 Whenever he feels the need to self-check his diabetes distress level  

3. Where? Recording conditions: How comfortable do you think he might be to record (answer based on a Likert Scale from unlikely to very likely):  
3.1. In private: recording whenever is possible to be alone.  
3.2. In front of the family: recording at home  
3.3. In front of acquaintances: recording at home or work or recurrent social spaces (e.g. club)  
3.4. Anywhere: recording in the street or in front of strangers  

Exp. Why X+Y+Z (combination chosen by the participant) is the best combination possible to your perception?  

Part 2: Previous experiences  
(Estimated time: 5 minutes)  

I would like to know about your experiences with technology, particularly,  
1. What kind of technological developments for diabetes monitoring or self-management are you familiar with?  
   * NR: You can ask if he or she knows about or has been using devices (insulin pumps / close loops, CGMs, insulin pens, smartwatches, smartphones, smart scales, smart mirrors, etc.), or platforms -including websites and apps-, like social media and forums.  
2. What are your perceptions about these technologies?  
   * NR: consult him or her about the attributes that he or she likes/dislike or consider useful/useless  

Notice: If the interviewee cannot recall any kind of technology for diabetes monitoring and/or self-management, it might be convenient to ask them about their experiences with technologies for well-being in general. Examples of this last kind of development would be forums, chats, groups for healthy nutrition, physical training, counselling, etc.  

Part 3: Expectations and wishes  
(Estimated time: 15 minutes)
In the following exercise, I would like to invite you to expand your imagination even further than before: Imagine that in the LIH we found a way to recognize when a person feels a high level of “diabetes distress” by analysing signals from his or her voice. In other words, through using vocal biomarkers. First of all:

3. What would be your first thoughts about it?

*NR: here we want to know what is the first thing that crosses the person’s mind when told about voice recognition technology able to identify mood or mental issues. Ask them about their general expectations, fantasies, concerns, hopes, etc.

4. Where would you visualize this technology as successfully integrated? How?

*NR: suggest some of the following examples: application software, platforms, telemedicine consultations, devices (smartphone, tablet, smartwatch, smart mirror, etc.)

5. If voice analysis is something, a device or program can do: Do you think it would be convenient to mix it with other “things” a device can do?

5.1. What would you think about?

5.1.1. An insulin pump (or a smart pen) with or without CGM, with integrated voice sensors for vocal biomarkers analysis?

5.1.2. Telemedicine with voice recordings for vocal biomarkers analysis? Would it be fine for you to have your voice recorded?

5.1.2.1. *(If voice recording during teleconsultations were an option)* would you prefer to have this function integrated into your teleconsultations with your diabetologist, psychologist, GP, or a virtual assistant (bot)?

6. Would you be willing to use this kind of technology? If yes, under which circumstances and how often would you use it.

*NR: Explain active and passive voice recording. Active voice recording is when you record your voice on purpose. In contrast, passive voice recording is when your voice is recorded and sent to a system without your active intervention.

6.1. Would you rather consider using a device or application with a vocal biomarkers analysis function if it does passive voice recording or active voice recording?

6.2. Who should have access to the data from your voice analyses? Your GP? Your diabetologist? How about researchers?
6.3. If vocal biomarkers analysis will be something that a virtual assistant like Alexa, Siri, or Google can do: will it be fine for you if these companies will keep and own your data?

7. What would be the best way to let people know about this kind of technology if we want to make it accessible to every person who could benefit from it?

*NR: give her all the following examples and ask which of them might be in their opinion the best for the aforementioned purpose: health practitioners, institutions where people with diabetes diagnosis come together (as patient’s associations), laboratories, or peer recommendation.

8. Should vocal biomarkers-based technology be available free of charge or should it be for paying?
   Why? Would you pay for it if your physician prescribed it? Or recommended by a peer with diabetes? If yes, would you be willing to pay for it even if it is not reimbursed?

Closure: 

(Estimated time: 7 minutes)

a. Ask for questions and concerns concerning the interview or the research itself

b. Thank the interviewee for his or her participation.