3.7

Formative evaluation: User interface evaluation conducted with the intent to explore user interface design strengths, weaknesses, and unanticipated use errors.

3.13

Summative evaluation: User interface evaluation conducted at the end of the user interface development with the intent to obtain objective evidence that the user interface can be used safely

3.19

Usability test: method for exploring or evaluating a user interface with intended users within a specified intended use environment.

3.27

User interface evaluation: process by which the manufacturer explores or assess the user interactions with the user interface.

Does it give meaning that you have to register no accident?

# STARTS HERE

Initial user interface evaluation.

This phase was divided into two parts: one where various UI prototypes were presented and evaluated by test subjects who were not necessarily familiar with with the UCon device and another where people who had participated in clinical trials of the UCon device were asked to evaluate various methods of visualizing data.

The purpose of the second part was to act as a formative evaluation with a focus on data visualization through user interviews. The evaluations were conducted to understand what data a UCon user might want to have visualized and how they would like it to be visualized, as well as to identify any difficulties in various data presentation techniques. The evaluation was designed to also include aspects of first click testing and concept testing.

# Part 1: User interview

This part is an extension of the semi-structured interview presented in \ref. After general questions about the user’s experiences with their condition and the use of the UCon device, the following questions were asked to ascertain whether the user had preconceived ideas for possible data visualization methods and uses for such visualization. The following questions were asked, allowing for personalized follow-up questions in response to the interviewee’s answers.

1. What personal data about your condition is most important for you to know?
2. Have you used any forms of tracking your condition before using the UCon device? If yes, which ones?
   1. Have any of these tracking methods influenced your personal understanding of your condition?
   2. Have you used any information from these tracking methods to affect your condition outside of mandates from doctors?
3. When using the UCon device, which information did you track?
   1. Did you personally analyze any of this information? If yes, what information?
   2. Did your perception of the UCon device’s effective on your condition change based on any of this information?
4. If you were to use the UCon device on a daily basis, what data would you like to know about your use of it?
   1. How would you like data to be visualized?

# Part 2: Evaluation of data visualization techniques

After hearing the user’s initial experiences with recording and analyzing data in regards to their condition, the user was presented with a series of graphs and tables to analyze. The purpose of this was to gain insight into how a user reads and understands various types of figures.

The figures were sorted into series by type of figures, ie a series of pie charts, a series of line graphs/scatterplots, etc. For each series, the user was given a general scenario which identified the type of data they would be observing, and then they were presented with one figure at a time. Each series included multiple questions, presented below. These questions were designed to test the user’s understanding of the graphs and the information presented in them. Each graph in a series was asked the same type of questions, though the exact information varied. For example, a user might be asked to interpret the number of stimulations on bar graph 1 at 2 o’clock in the afternoon and 4 o’clock in the morning on bar graph 2.

After each graph or table in a series was presented individually, all graphs or tables in that series were presented at the same time, and the use was asked to compare them with each other.

Finally, the user was asked to evaluate the graph type and the data within from the perspective of their experience using the UCon device, as well as to provide any further comments.

Once all series were completed, the user was asked several questions in regards to the different graphs and the information they presented.

### Series 1:

|  |  |  |
| --- | --- | --- |
| **Graph type:** | **Bar graph** | **User thoughts** |
| **Number of graphs:** | 2 |  |
| **Subject of graphs:** | Average on-demand stimulations per hour of the day |  |
| **Scenario:** | The user wishes to better understand their use of the on-demand stimulation function of the Ucon device. After a week of use, the user is presented with the following graph of their average daily use of the on-demand stimulation. |  |
| **Graph-specific questions:** | 1. What data does the graph show? 2. When did you use the on-demand stimulation the most? 3. How many stimulations did you have at (pick 1 time at random)  |  |  | | --- | --- | | **Time** | **Correct answer** | | 4 | 1 | | 7 | 1 | | 9 | 2 | | 17 | 4 | | 18 | 3 | | 19 | 1 | | 20 | 1 | | 21 | 3 | | 22 | 2 | |  |
| **Series questions:** | 1. When looking at the graphs side-by-side, what are your initial thoughts? 2. Which graph is the easiest for you to read? 3. Which one do you prefer? 4. Do you think that having access to this graph would influence your use of the Ucon device? |  |
| **Notes and observations:** |  |  |

### Series 2:

|  |  |  |
| --- | --- | --- |
| **Graph type:** | **Bar/line graph combination or double bar graph** | **User thoughts** |
| **Number of graphs:** | 2 |  |
| **Subject of graphs:** | Average on-demand stimulations per hour of the day with accidents |  |
| **Scenario:** | The user wishes to better understand their use of the on-demand stimulation function of the UCon device and how it affects the number of accidents they have. After a week of use, the user is presented with the following graph of their average daily use of the on-demand stimulation combined with the noted number of accidents they recorded in the app. |  |
| **Graph-specific questions:** | 1. What data does the graph show? 2. When did you use the on-demand stimulation the most? (15, 6 stims) 3. When did you have the most accidents? (8, 3 accidents) 4. How many accidents did you have on average per day? (15) 5. How many stimulations and accidents did you have on average at (pick 2 randomly)?  |  |  |  | | --- | --- | --- | | Time | Stim | Accident | | 5 | 0 | 1 | | 7 | 1 | 0 | | 8 | 0 | 3 | | 12 | 4 | 1 | | 14 | 3 | 2 | | 17 | 4 | 1 | | 21 | 3 | 0 | | 23 | 0 | 1 | |  |
| **Series questions:** | 1. How important to you is the data presented in this series? 2. What are your initial thoughts looking at this graph? 3. Which graph is the easiest for you to read? 4. Which graph has the best color scheme? 5. Which one do you prefer? 6. Do you think that having access to this graph would influence your use of the UCon device? |  |
| **Notes and observations:** |  |  |

### Series 3:

|  |  |  |
| --- | --- | --- |
| **Graph type:** | **Pie chart** | **User thoughts** |
| **Number of graphs:** | 3 groups of 2 |  |
| **Subject of graphs:** | Number of accidents per week for week 1 and week 4 |  |
| **Scenario:** | You have been keeping a bladder diary for the last four weeks with a focus on how many accidents you had each day. You are now comparing the first week with the current week. |  |
| **Graph-specific questions:** | 1. What data do the charts show? 2. Did you have more accidents in week 1 or in week 4? (week 1) |  |
| **Series questions:** | 1. What are your initial thoughts looking at these graphs? 2. Which graph is the easiest for you to read? 3. Which unit do you prefer? 4. Which one do you prefer? 5. Do you think that having access to these graphs would influence your use of the UCon device? |  |
| **Notes and observations:** |  |  |

### Series 4:

|  |  |  |
| --- | --- | --- |
| **Graph type:** | **Line graph/scatter plot** | **User thoughts** |
| **Number of graphs:** | 3 |  |
| **Subject of graphs:** | Average daily evaluation for each day of the week |  |
| **Scenario:** | You have been making a daily evaluation every night for several weeks. A score of 3 means that you had a good day, a score of 2 means you had a neutral day, and a score of 1 means you had a bad day. You are now looking at your daily score for each day of the week for the first week and the fourth week. |  |
| **Graph-specific questions:** | 1. What data does the graph show? 2. Has your scoring improved, remained the same, or gotten worse? (Improved) 3. What score did you have for week 1 for (pick 1 at random)  |  |  | | --- | --- | | Day | Score | | Monday | 2 | | Tuesday | 1 | | Wednesday | 2 | | Thursday | 3 | | Friday | 1 | | Saturday | 3 | | Sunday | 2 |  1. What score did you have for week 4 for (pick 1 at random)  |  |  | | --- | --- | | Day | Score | | Monday | 3 | | Tuesday | 2 | | Wednesday | 2 | | Thursday | 3 | | Friday | 2 | | Saturday | 3 | | Sunday | 3 | |  |
| **Series questions:** | 1. How important to you is the data presented in this series? 2. What are your initial thoughts looking at these graphs? 3. Which graph is the easiest for you to read? 4. Which graph has the best color scheme? 5. Which one do you prefer? 6. Do you think that having access to these graphs would influence your use of the UCon device? |  |
| **Notes and observations:** |  |  |

### Series 5:

|  |  |  |
| --- | --- | --- |
| **Graph type:** | **Data tables** | **User thoughts** |
| **Number of tables:** | 3 |  |
| **Subject of graphs:** | Total number of accidents and on-demand stimulations for week 1 and week 4, the average daily score for week 1 and week 4, as well as the change in each value from week 1 to week 4. |  |
| **Scenario:** | You have used the UCon and app for the last four weeks, logging any accidents you have as well as a daily evaluation for each day. You are now looking how your use of UCon and your condition have changed from week 1 to week 4. |  |
| **Table-specific questions:** | 1. What table does the table show? 2. What was your (pick 1 at random) for week 1?  |  |  | | --- | --- | | Subject | Value | | Accidents | 7 | | On-demand stimulations | 8 | | Average daily score | 1.9 |  1. What was your (pick 1 at random) for week 4?  |  |  | | --- | --- | | Subject | Value | | Accidents | 3 | | On-demand stimulations | 12 | | Average daily score | 2.4 |  1. Did your (pick 2 at random) rise, remain the same, or fall?  |  |  | | --- | --- | | Subject | Result | | Number of Accidents | Fell | | Number of on-demand stimulations | Rose | | Average daily score | Rose | |  |
| **Series questions:** | 1. How important to you is the data presented in this series? 2. What are your initial thoughts looking at these tables? 3. Which table is the easiest for you to read? 4. Which table has the best color scheme? 5. Which difference demonstration method did you prefer? 6. Which one do you prefer? 7. Do you think that having access to these tables would influence your use of the UCon device? |  |
| **Notes and observations:** |  |  |

On a scale of 1 to 5, with 1 being very unimportant and 5 being very important, how rate each type of data in terms of importance to you in your personal daily use of the UCon device?

|  |  |
| --- | --- |
| **Data** | **Score + user thoughts** |
| Number of on-demand stimulations |  |
| Number of time-limited stimulations |  |
| Number of accidents |  |
| Daily evaluation results |  |
| Stimulation intensity |  |

Any further comments or questions regarding data visualization?

# Part 4: Final thoughts

Here the user was asked if they had any additional thoughts, comments, or questions regarding data evaluation.