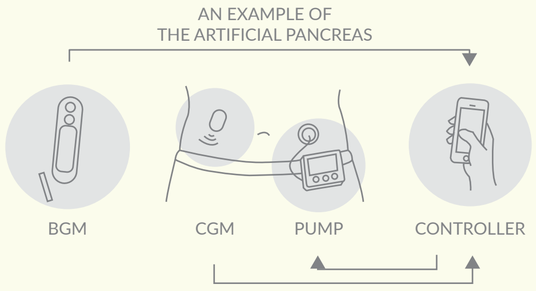
A SHORT INTRODUCTION TO DIABETES

Diabetes is an autoimmune disease where the body's immune system destroys the insulin-producing cells found in the pancreas. In type 1-diabetes, the cells cease eventually completely to produce insulin.The insulin controls the blood sugar level in the body and causes the body to absorb the glucose to produce energy. To treat type 1-diabetes insulin has to be delivered to the body, by injecting insulin using syringes or by using

an insulin pump that continuously pumps insulin into the body. To keep track of how much insulin need so be injected, the blood sugar level needs to be measured several times a day, using a BGM or a CGM. Too low blood sugar levels, hypoglycemia, causes symptoms such as anxiety, trembling and shaking of the body, sweating, palpitations and pallor. It can easy be mistaken for drunkenness. A too low level may lead to unconsciousness and insulin coma that can caus brain damage.

At high blood sugar levels, hypoglycemia, the symptoms are more similar to the initial symptoms of the disease which include thirst, increased urination and fatigue. A high blood glucose level becomes even more critical if it leads to an increased amount of acetone and ketones in the blood, which can lead to acid poisoning in the blood, ketoacidosis. In these cases, blood pH drop so much that the brain is affected and the person ends up in a diabetic coma.



EXISTING DOCUMENTATION

Earlier research indicated that there is a gap between existing technological tools and what diabetics are actually requesting. Diabetics are for instance expressing anxiety, loneliness and daily hassle related to blood sampling and carrying around a lot of different appliances.

By reviewing existing documentation regarding type 1-diabetes, the design team gained an understanding of the problem space.

INTERVIEWS

Through short interviews with type 1-diabetics, covering their feelings about possible problems concerning diabetes, tools and treatment, the design team were able to validate and confirm their findings from the existing documentation.

FURTHER INTERVIEWS

Interviews with potential users, type 1-diabetics, were conducted to collect initial data for the needs analysis phase.

The design team found that, in addition to what was mentioned in the starting phase, the users are, among other, requesting more control, ability to interconnect tools and devices, aesthetically appealing tools and user friendly interfaces.

STARTING PHASE

IDEA GENERATING BRAINSTORMING

With the identified needs established, a brainstorming session with the specific goal to generate three ideas or solution proposals was conducted. The session led to a set of three different concepts, all mainly aiding the feeling-corner and the crisis-corner, but touching upon the tools-corner.

As a complement to the three concepts an overall solution were sketched, based on the currently most advanced and convenient tools. That way also the tools-corner was covered.

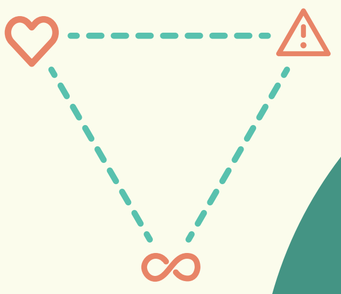
CONCEPTUALIZING THE NEEDS

A triangular model was developed to better grasp the identified needs and to visualize how the different ”types” of needs are dependent on and affected by each other. The model worked as a facilitator for communication around the identified needs in thedesign team throughout the design process.

⚠ = needs related to critical situations
♡ = needs related to feelings, such as anxiety
∞ = needs related to tools and devices

ANALYSIS OF PREVIOUS STUDIES

A more thorough analysis of a previously conducted study exploring diabetics views on tech and life quality, resulted in more useful data. The analysis were made to develop a deeper understanding for user needs and to compare the findings with the participants in this project.



NEEDS ANALYSIS

TEST CONCEPTS THROUGH INTERVIEWS

To make sure which concept to develop further, semistructured interviews with potential users were conducted. The interviewees were presented with the three concepts and were asked what they liked and did not like about them. Trough open discussions about advantages, disadvantages and further input from potential users, the design team was able to establish which concept can meet the user needs the most.

STRUCTURED BRAINSTORMING

A brainstorming method were used to sort and cluster the collected data using post-it notes in different colors. After clustering the collected data, main needs were identified and hierarchically ranked. The identified main needs were:

- less tools, to reduce daily hassle
- increased sense of safety
- reduced sense of loneliness
- reduced anxiety/concern
- increased usability and aesthetic appeal in tools
- raised public awareness

LO-FI PROTOTYPE

THE CONCEPT

The goal is to develop a highly customizable smartphone application for type 1-diabetics that, connected to a CGM, provides aid and help in critical situations by automatically alerting other people on three different levels; people in the direct surrounding, pre programmed contacts and other app-users within a geographical radius.

The application will also log the user’s glucose levels and other data which can be used to facilitate the user’s life.

WORKSHOP

The lo-fi prototype was developed in a workshop setting together with three users. To include the users and to make sure they would all be able to participate and have fun during the workshop, the design team chose to use the tool POP, that enables fast and easy prototyping and that is a mixture of paper and digital prototyping. The lo-fi prototyping workshop were focusing mainly on the ”in-crisis-functions”, which are actually the main functions and the unique part of the concept.

HI-FI PROTOTYPE

USER TESTING

Users were testing the prototype using their actual smartphones continuously during the development phase. Although it was not tested in a real, critical, situation due to ethical and medical issues, the user feedback was highly usable and led to several iterations when designing and developing the prototype.

Examples of important feedback that the user testing contributed to the final design was the user’s ability to customize the alarm intervals, the connection to the user’s Medical ID and the ability to choose to shut down the aid system manually if needed.

DEVELOPMENT

The hi-fi prototype was developed using Adobe Illustrator and InVision, where the design team had shared access to the prototype and were able to collaborate.

The prototype was developed iteratively and was continuously tested by users and redesigned to be tested again and again.

MOODBOARD

The plan for the hi-fi prototype was to initially convert the lo-fi prototype to hi-fi by digitalizing it in Adobe Illustrator. To facilitate the collaboration and communication in the design team a digital mood board was created using InVision, where colors, typefaces, inspiration pics and other related content were shared. This ensured a shared vision of the future work on the hi-fi prototype.

DIAWARE

Stockholm University