



# Made for me: Personalizing Digital Health Technologies for Individuals with Type 1 Diabetes

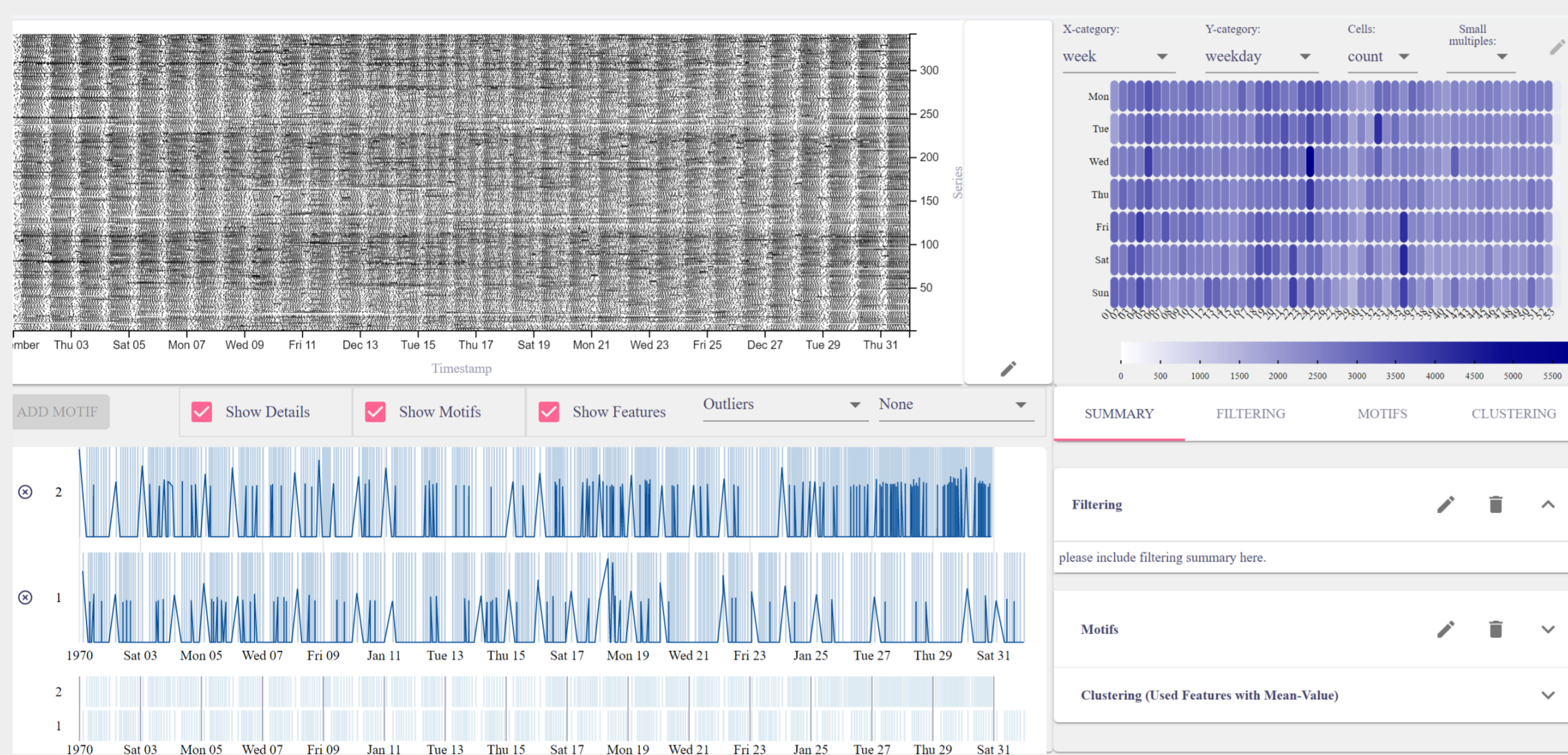
Clara-Maria Barth, Jürgen Bernard, Elaine M. Huang

Contact: cbarth@ifi.uzh.ch

## Our Research:

Our research revolves around the design and development of digital health technologies tailored to the individual needs of people with chronic conditions, with a focus on type 1 diabetes (T1D). Drawing upon approaches from Human-Computer Interaction and Visual Analytics, we aim to understand:

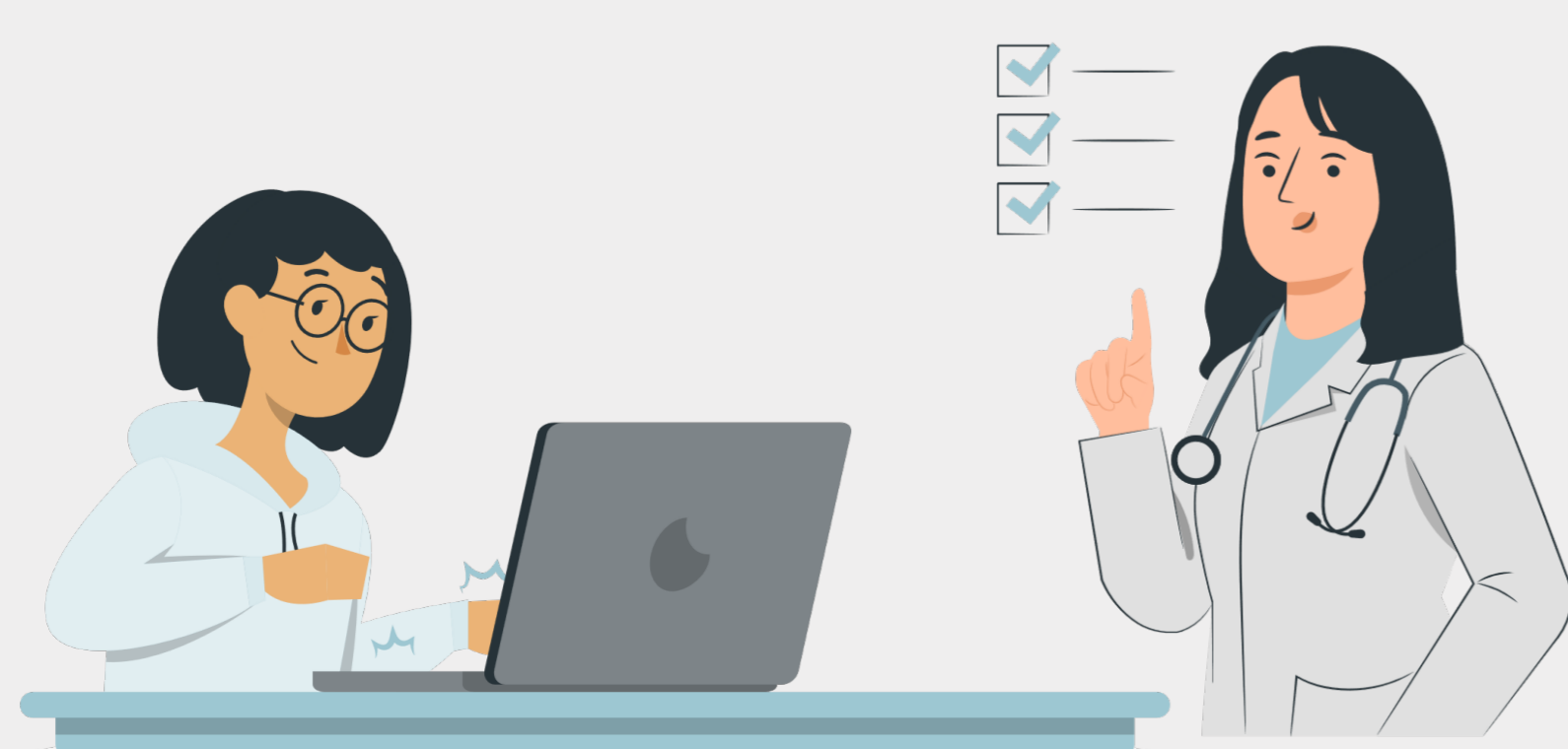
1. What kind of personalization do individuals with chronic conditions desire in regard to how they view and use their health data or interact with health support technologies?
2. What is the space of opportunities for personalized digital health solutions to improve the lives of people living with chronic conditions?
3. How can we design and develop personalized solutions that meet the individual needs of people living with chronic conditions?
4. What is the efficacy of personalized disease management technology, and how does it affect the lives of people with chronic conditions?



## Avenues for Collaboration:

Due to the interdisciplinary nature of our projects, establishing a relationship with medical experts who see and treat individuals with chronic conditions on a regular basis would be mutually beneficial. By collaborating with our research group, healthcare professionals and USZ researchers will gain an understanding of the role technology may play in T1D self-management. Particularly, we would see the following avenues for collaboration:

1. Looking at the lived experience of people with chronic conditions may help medical professionals and researchers to understand patients' self-management challenges outside the clinic. As a result, professionals may discover avenues to support patients in adhering to clinical guidelines using technology.
2. Professionals could gain in-depth insights into the personal experience of their patients through our interviews and co-design sessions.
3. Researchers would gain access and help shape experimental technologies for the self-management of chronic conditions.
4. The medical expertise and long term experience in treating patients of USZ professionals and researchers could provide valuable insights helping shape our interdisciplinary projects.
5. By collaborating with medical experts, we hope to improve our understanding of the clinical and epidemiological challenges of chronic conditions and gain access to state-of-the-art knowledge on T1D care and treatment from the medical community.



## Our Projects

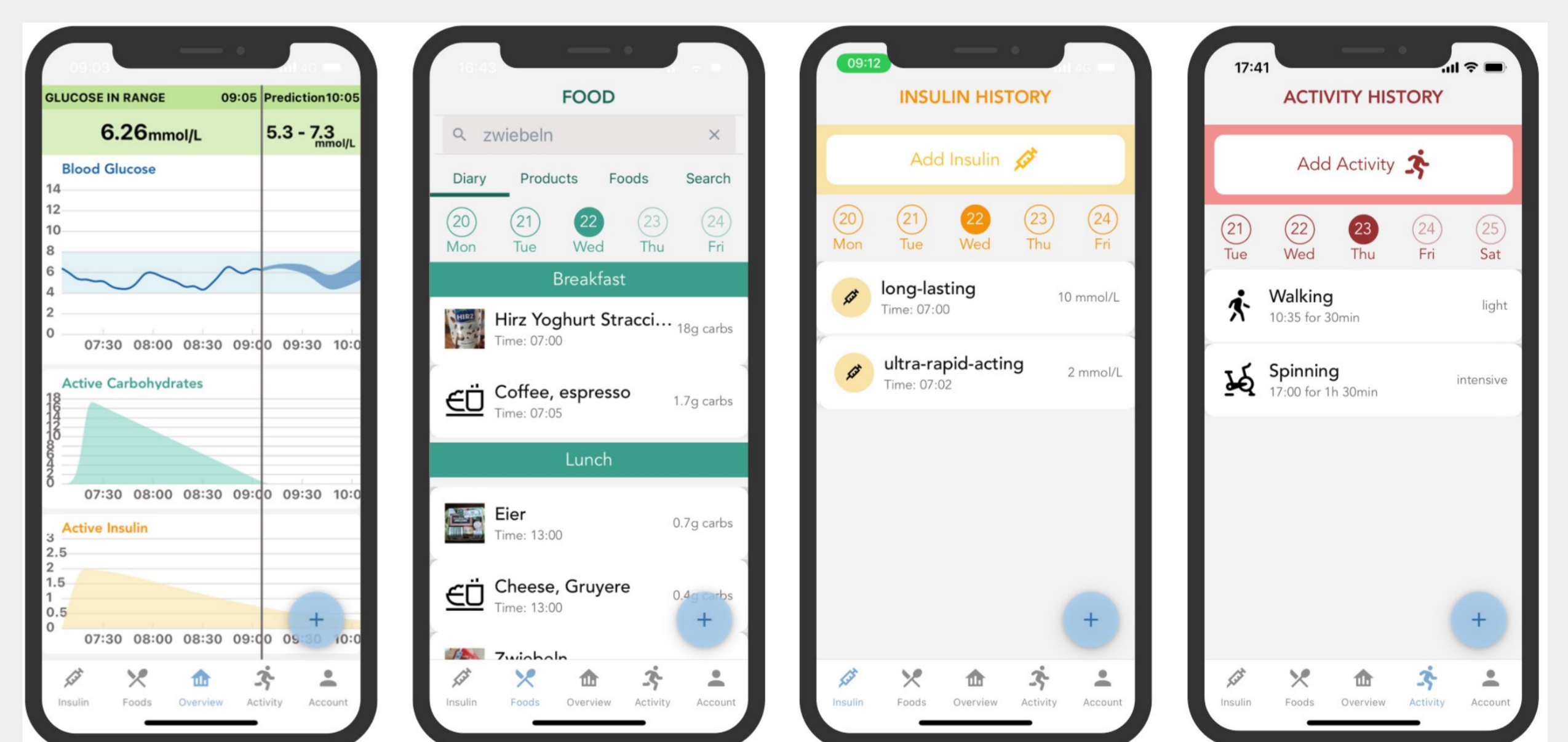
### 1: Blood Glucose Predictions in Everyday Life

In this project, we focused on understanding the lived experience of individuals with type 1 diabetes (T1D) using personalized blood glucose predictions in their everyday lives.

- **Motivation:** Blood Glucose Predictions could help patients manage T1D proactively. In the example below, injecting more insulin now would prevent high blood glucose values in an hour.



- **Problem:** Integrating blood glucose predictions into the everyday lives of individuals with T1D may prove difficult. This difficulty stems from the highly individualized self-management practices needed to meet clinical guidelines.
- **Goal:** With this project we wanted to understand individuals' unique preferences, the importance of social context, and interaction preferences in regard to blood glucose prediction technologies.
- **Approach:** We designed, developed, and deployed a mobile application, called MOON-T1D, that simulated blood glucose level predictions, as depicted below. We conducted a deployment study framed by two qualitative interviews with 15 individuals with T1D.
- **Results:** Our research revealed participant's perceived benefits of blood glucose predictions, how they foster or inhibit trust and the importance of considering participants emotions. Our findings showed that participants wanted those predictions for self-management, that they would take action in response to them and the substantial effect they would have on their management practices.



### 2. Using the Past to Inform the Future

In this ongoing project, we explore the benefit of seeing analogous past situations for informed chronic disease management decision-making. Decision-making based on an assessment of one's current situation and experience is essential in chronic disease self-management, such as T1D self-management.

- **Motivation:** By showing individuals with T1D similar past situations including their future progression, technologies could support patients in making informed decisions, ultimately improving their health outcomes.
- **Problem:** T1D self-management decision-making is particularly difficult as effective management depends on a multitude of interdependent factors, including food intake, stress, and insulin use. While most individuals with T1D rely on their experiences to determine what to do in their current situation, human memory is often limited and biased. This may lead to misinformed decision-making and poor health outcomes.
- **Goal:** Create a digital health technology that allows an interactive and personalized search for the similar past situations to support patients' in situ decision-making based on facts rather than memory.
- **Approach:** In this project, we develop an application that finds the most similar past situations based on the multitude of factors involved in a patient's current decision-making process. To account for individual differences regarding the importance and effect of factors affecting a patient's blood glucose levels, we allow patients to adapt the weights given to factors by our algorithm.

RESEARCH

COLLABORATION

PROJECTS