

# TYPE 1 DIABETES EXPERIENCE SIMULATOR APP

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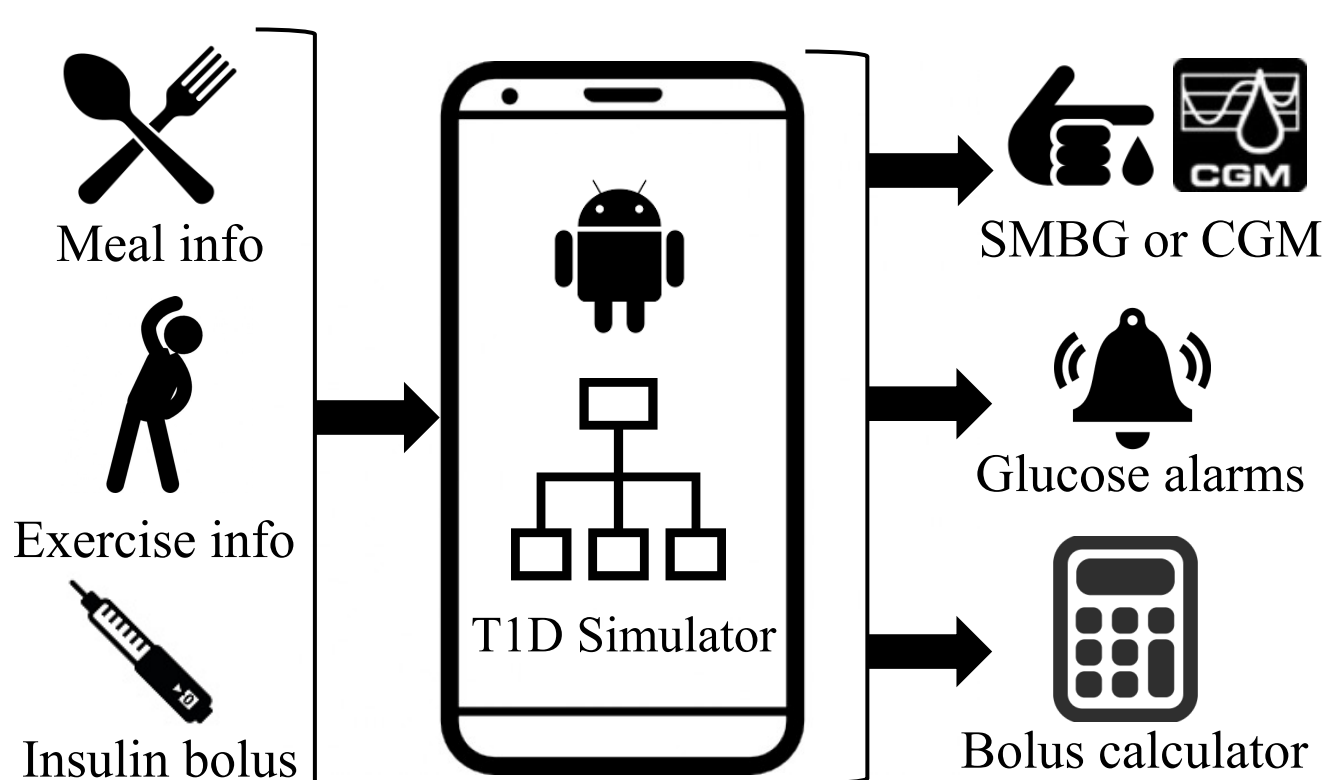
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## Objective

- One challenge clinicians face when treating people living with type 1 diabetes (T1D) is the difficulty to understand the burden associated with self-management.
- The aim of the Type 1 Diabetes Experience Simulator (T1DES) is to simulate the experience of living with T1D for people with normal glucose tolerance and, in particular, for healthcare professionals.
- We hope that simulating the experience of having T1D will encourage greater access to helpful medical devices and therapies.
- The application has been developed in collaboration with INPUT Patient Advocacy (London, UK) the UK diabetes technology advocacy charity.

## Method

- The Type 1 Diabetes Experience Simulator (T1DES) consists of a smartphone application developed in Android which includes a validated T1D simulator incorporating a glucose-insulin model [1], sensor noise, realistic intra-day variability on insulin pharmacokinetic, insulin sensitivity and uncertainty on meal estimation [2].
- T1DES provides a set of graphical user interfaces (GUI) that allow the user to visualize glucose levels emulating continuous glucose monitoring (CGM) or self-monitoring blood glucose (SMBG).
- In CGM mode, the T1DES app alerts the user about low and high glucose events. The GUI also allows the user to manually input information about meals consumed and exercise taken.
- The user has to estimate the insulin doses needed to control glucose levels and cover meal intakes.
- T1DES incorporates an optional bolus calculator to assist to the calculation of insulin doses.



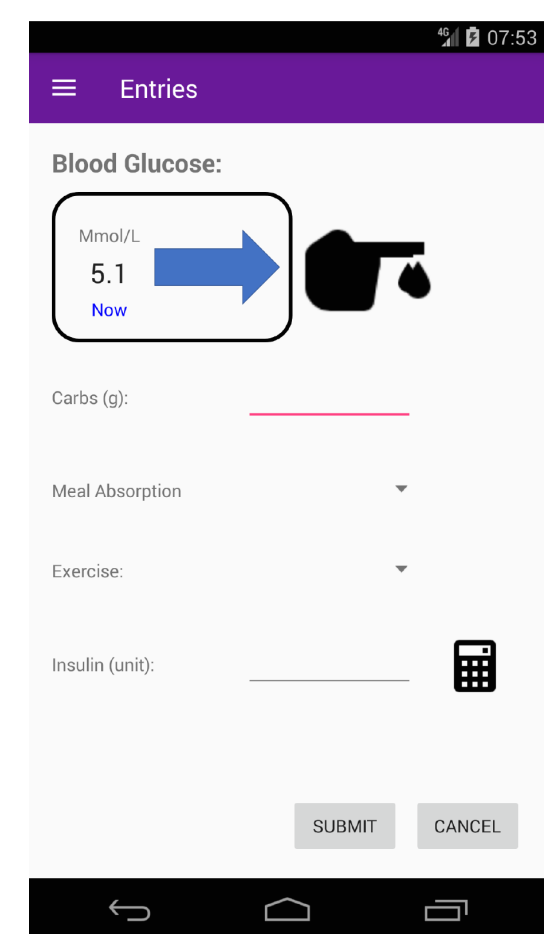
**Fig. 1 – Inputs and Outputs of the T1DES app**

## Results

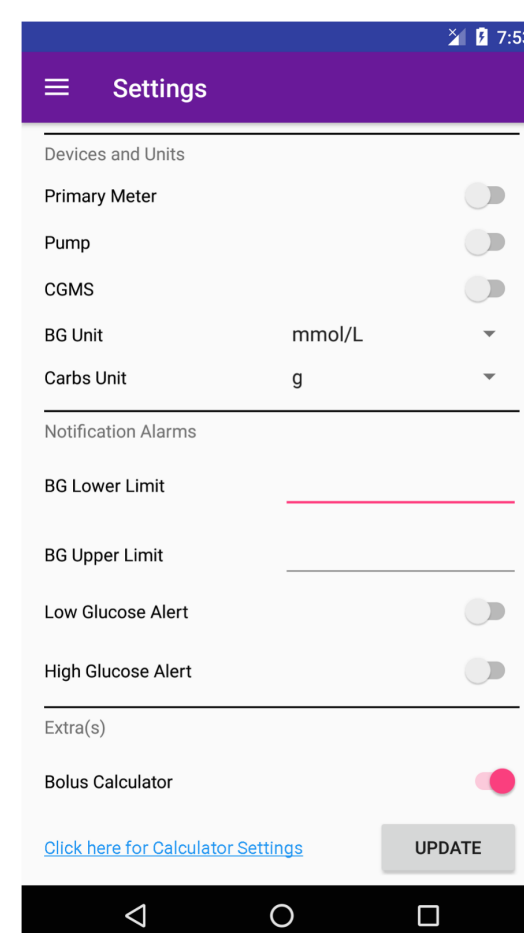
- Software specifications were gathered through focus groups organized by INPUT with people with T1D.
- The T1DES app went through several iterations before achieving a satisfactory result.



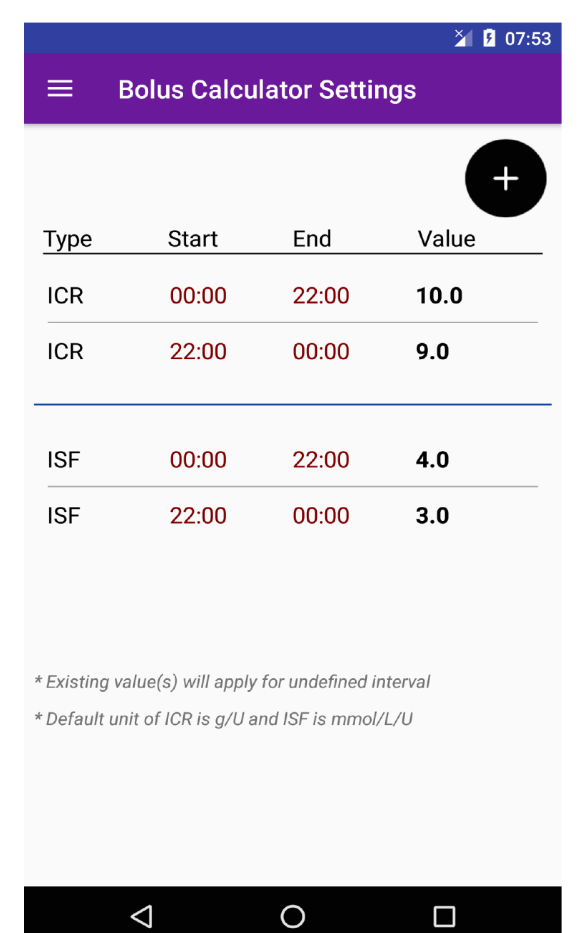
**Fig. 2 – Home screen**



**Fig. 3 – Entries screen**



**Fig. 4 – Settings screen**



**Fig. 5 – Calculator settings**

## Conclusion & Future Work

- A functional user-friendly smartphone application aiming to partially emulate the experience of living with type 1 diabetes has been developed.
- T1DES will be evaluated by a group of people with normal glucose tolerance over a prolonged period of time (e.g. 1 month).
- A semi-structured usability and quality of life questionnaire will be employed for this purpose.

## References

- [1] Hovorka R *Physiol Meas.* 2004 Aug;25(4):905-20.  
[2] Herrero et al. *Comput Methods Programs Biomed.* 2017 Jul; 146:125-131.