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Attention:
Stayce Beck, CDRH
Courtney Lias, CDRH
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FDA Pre-Submission Cover Letter

Q-Sub Type: Pre-Submission
Tidepool will share current product development plans.
We look forward to feedback from the FDA.

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(Howard Look signature redacted from public web copy)

Name of Devices (software applications):
Blip, TIdepool Uploader, Nutshell, Tidepool Platform

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Overview of Tidepool

Tidepool is an open source, non-profit entity with 501(c)(3) status. Our mission is to reduce the burden of managing diabetes through software technology, and our initial focus is on type 1 diabetes (T1D).

Tidepool is a small startup. We have nine employees located around the world. Six of our employees have T1D and two have family members with T1D.

Product Descriptions

Blip is a web application that displays consolidated, retrospective data from diabetes devices. These devices may include insulin pumps, continuous glucose monitors (CGM) and blood glucose meters (BGM). Notes can also be entered using the Blip web interface or an accompanying mobile web application.

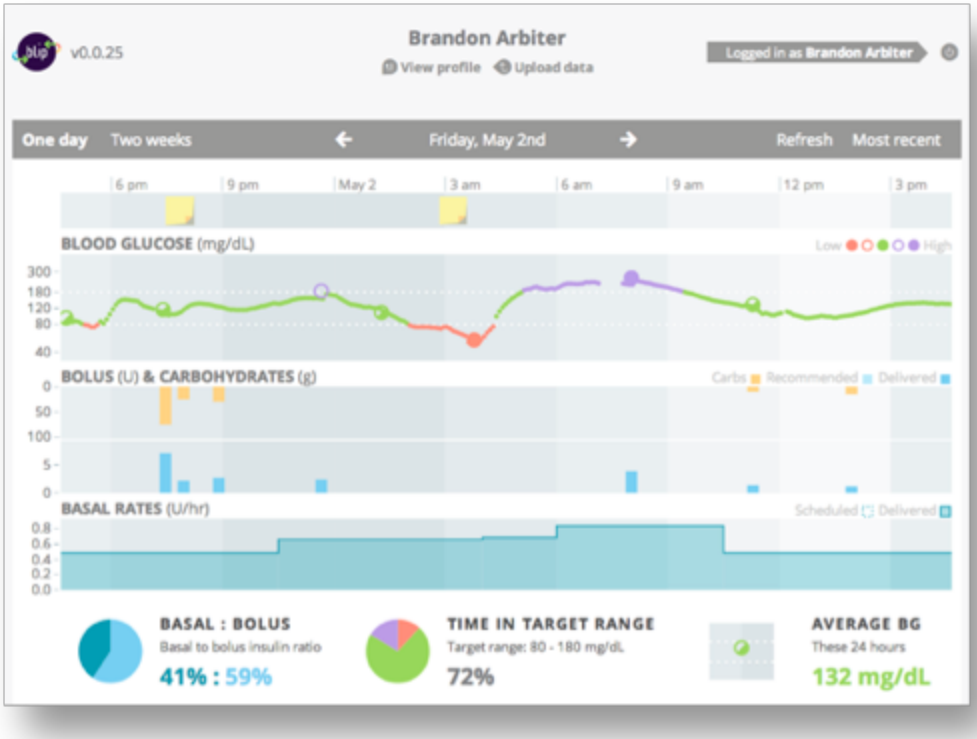

Figure 1: Blip

The **Tidepool Uploader** is a software application that connects to diabetes devices through a computer, reads the device data, and uploads that data to the secure, cloud-hosted Tidepool Platform back-end.

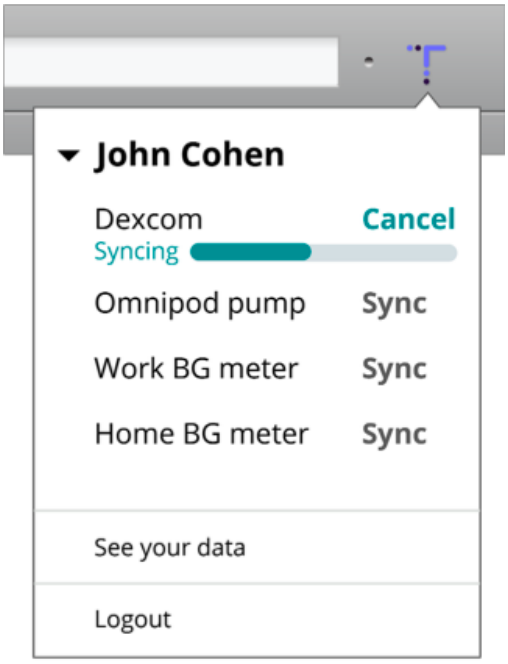

Figure 2: Tidepool Uploader concept wireframe

Nutshell is a mobile application that makes it easy to keep track of meals eaten. Retrospective data from diabetes devices is displayed along with contextual information about the meal (meal name, location and time eaten).

Figure 3: Nutshell

The **Tidepool Platform** is a secure, HIPAA-compliant, cloud back-end for hosting diabetes device data and related contextual information. Software applications use RESTful API endpoints to transfer, store and retrieve data. The Tidepool Platform is designed to allow an ecosystem of applications that can share the same data if the user authorizes them to do so. The platform is also architected to keep device data separate from personal identifying information (PII), enabling an anonymized research database.

The Tidepool Platform mitigates risk around the provenance and validity of data. Specifically, all data that passes through the platform is versioned and given a cryptographic digital signature.

This enables data validation checks and establishes a audit trail for changes to the data. For more technical detail, please see this document.

Of other potential interest to the FDA: The Tidepool Platform will be a excellent mechanism to store and analyze closed-loop artificial pancreas system data, enabling ongoing research including pre- and post-market safety and efficacy studies.

Proposed Intended Use

Tidepool's current products, **Blip**, the **Tidepool Uploader** and **Nutshell**, are intended to be used by people with insulin-dependent diabetes to assist in accessing and reviewing their therapy data. Tidepool's products collect and display information gathered from diabetes devices such as insulin pumps, CGMs and BGMs. The products also collect and display contextual information entered through the software or gathered from other sources like fitness monitors and other mobile and web applications.

Tidepool's products are also intended to be used by caregivers (e.g., doctors, nurses, certified diabetes educators, clinic staff) as well as by other people to whom the people with diabetes would like to share their device and contextual data (e.g., a parent, friend, teacher or school nurse).

Tidepool intends to distribute its applications freely to consumers over web and mobile channels.

Overview of Product Development

Timeline

Tidepool began its development efforts in earnest in July, 2013 with the development of Blip and the Tidepool Platform. Tidepool has also developed prototypes of Nutshell as well as other applications based on the Tidepool Platform.

In May, 2014, UCSF began an IRB-approved pilot study of Blip. This study is primarily a usability and feasibility study, looking at patient and provider use of Blip. As of September 11, 2014, the study has enrolled 30 out of 48 patients.

Tidepool is in discussions with other clinical centers that desire to test Tidepool's software, notably:

- Joslin Diabetes Center, which hopes to study the use of Nutshell.
- Stanford Children's Health, which hopes to study the use of the Tidepool Uploader and Blip.
- UCSF, which hopes to conduct a follow-on study on provider use of Blip and the Tidepool Uploader.

Pending further discussions with the FDA about our regulatory pathway and filing requirements,

Tidepool's goal is to have Blip available for distribution by the end of calendar year 2014.

Development Practices Highlights

Here is a brief overview of Tidepool's software development practices. Tidepool is actively engaged with multiple FDA consultants and others experienced in the implementation of 21 CFR 820. We are guided by the principles outlined in AAMI TIR45.

Open source code: Tidepool's product development is conducted as a series of open source, open development projects. Our source code, development practices and architecture documentation are all available for inspection and contribution at github.com/tidepool-org and developer.tidepool.io. Tidepool reviews and maintains governance over all contributed code.

Agile: Tidepool uses an agile development methodology based on Scrum. We follow Scrum best practices by maintaining backlogs and burndown charts and by engaging in sprints, daily standups, and regular retrospectives that engender continuous improvement and accountability.

Requirements Traceability: Tidepool uses Trello as our mechanism for tracing requirements from concept through to implementation, testing and delivery.

Verification and Validation: Tidepool uses a combination of manual ("black box") and automated ("white box") testing to perform verification and validation.

Human Factors: Tidepool makes extensive use of formative evaluation for human factors and usability. We perform in-person visits with pilot test users and actively respond to ongoing feedback through our support channel.

Data validity, authenticity, and provenance: The Tidepool Platform is architected to mitigate risk around the provenance and validity of data. All data that passes through the platform is versioned and given a cryptographically secure identifier. This enables data validation checks and an audit trail to be established. For more technical detail, please see this document.

Specific Questions

Blip

In reading MMA and the Draft MDDS guidance in detail, it would seem that Blip falls under **enforcement discretion**:

- Blip does not make treatment recommendations or perform patient-specific analysis or alter previously prescribed therapy. Blip is not used for diagnosis.
- Blip is intended to be used retrospectively, not for real-time or active patient monitoring.
- Blip is not intended to replace or discourage seeking medical treatment; in fact, Blip makes it easier for patients to engage with their health care providers to retrospectively review their diabetes data.

This MMA enforcement discretion example also seems to describe Blip well:

> Mobile apps that allow a user to **collect, log, track and trend data such as blood glucose**, blood pressure, heart rate, weight or other data from a device to eventually **share with a health care provider**, or upload it to an online (cloud) database, personal or electronic health record. [Added June 11, 2014].

The Tidepool Uploader reads **retrospective data** from insulin pumps, continuous glucose monitors, and blood glucose meters. With regard to MDDS, it would appear that we would also fall under enforcement discretion under the new draft guidance:

- The platform does not modify the data, and it does not control the functions nor parameters of any of the devices from which it reads.
- The new guidance removes the diabetes carve-out.

Specific questions:

- Will Blip fall under MMA and MDDS enforcement discretion?
- Will Nutshell fall under MMA and MDDS enforcement discretion?
- Will the Tidepool Uploader fall under MMA and MDDS enforcement discretion?
- Assuming the only near-term applications to make use of it are Blip and Nutshell, will the Tidepool Platform fall under MMA and MDDS enforcement discretion?

Tidepool Platform Master File

We expect that there will be future applications built upon the Tidepool Platform that will not fall under enforcement discretion. In the past, we've been given verbal guidance that the best mechanism to enable that will be for Tidepool to establish a Master File with the FDA.

Specific questions:

- Is establishing a Master File for the Tidepool Platform still the best course of action?
- Given the iterative nature of Tidepool's software development process, what is the best

mechanism for keeping that Master File up to date?
- At its core, the Tidepool Platform is simply a cloud-based database storage mechanism that exposes application programming interfaces (APIs) for storing and retrieving diabetes-related data. Assuming that the Tidepool Platform is established via Master File, does Tidepool bear additional responsibility to ensure that other third-party application developers or device makers are using it in a way consistent with FDA regulations? Or is that the responsibility of the third-party?

Device Protocols

Wherever possible, Tidepool is taking the approach of getting official protocol specifications from device manufacturers. For example, we have done this with Dexcom, Insulet and Asante Solutions. In other cases, the Tidepool application imports data that was exported from existing software management solutions like Medtronic CareLink and Diasend, consistent with these services' intended use to enable further evaluation of the data by the patient.

Specific questions:

- To date, not all device makers have been willing to publish their device data protocols. In some cases, we are able to use reverse engineering of the device protocol that enables the Tidepool Uploader to read the device data. We find that this can provide a more accurate representation of the protocol since it characterizes actual operation of the device. If we are able to show through empirical testing that the data we retrieve from the device is accurate, are their any other concerns or risks that we should be aware of from the FDA's perspective?

Engaging with Volunteer Contributors and Testers

As a non-profit organization and an open source project, we have both paid employees and volunteer contributors. Although Tidepool currently has nine full-time employees, we also engage the services of outside volunteer contributors in many areas:

- Software development
- User interface design
- Usability and human factors design and testing
- Quality assurance (verification and validation)

Tidepool has begun having all volunteers agree to a "Volunteer/Contributor License Agreement" (VCLA, attached, and also found here). Since our software is still under development, we've made it very clear to all volunteers that software under test is not to be used for therapy changes or medical decision making.

Specifically, the VCLA says:

8. No use of unregulated products for therapy adjustment or medical decision making. I acknowledge that through this relationship, I may perform testing of and/or provide feedback for diabetes management software that is not currently approved for use by any regulatory agency. As such, I agree that I will not use pre-release Tidepool software to inform, influence, or direct any therapy adjustments or medical decision making in any way.

Specific question:

- Does the FDA have any feedback about this approach?

APPENDIX A:

TIDEPOOL PROJECT, A CALIFORNIA NON-PROFIT CORPORATION

VOLUNTEER/CONTRIBUTOR LICENSE AGREEMENT

Introduction

Thank you for your interest in the projects being administered by Tidepool Project ("Tidepool"). The form of license below is a document that clarifies the terms under which You, the person listed below, may contribute software source code, documentation, project management, product management, testing, graphic design, user interface design or other software-related services (the "Contributions") to the project.

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This agreement also makes it clear that you may be contributing, using, or testing software that may be regulated by the FDA or other regulatory agency. **With this agreement, you agree that you will not use pre-release Tidepool software to inform, influence, or direct any therapy adjustments or medical decision making in any way.**

Please complete the following information about you and the Contributions, and either:

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b) sign and mail a hard copy to Tidepool Project, 555 Bryant St. #429, Palo Alto, CA 94301, or

c) if you are an an individual, and your employer is not in the business of developing software or medical technology, or otherwise may not claim rights in the Contributions, you may send the following text as an email to legal@tidepool.org, or as a comment with your GitHub pull request: "I agree to the terms of Tidepool Project's Volunteer/Contributor License Agreement v1.0 as it exists at http://tidepool-org.github.io/TidepoolVCLA.pdf on <TODAY'S DATE>."

If you have questions about these terms, please contact us at legal@tidepool.org.

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8. **No use of unregulated products for therapy adjustment or medical decision making.** I acknowledge that through this relationship, I may perform testing of and/or provide feedback for diabetes management software that is not currently approved for use by any regulatory agency. As such, I agree that I will not use pre-release Tidepool software to inform, influence, or direct any therapy adjustments or medical decision making in any way.

Please sign: _____ Date: _____

Full name: _____ E-Mail:_____

Mailing Address: _____ Telephone: _____

_____ Fax: _____

_____ Country:_____

If you are employed as a software engineer, or if your employer is in the business of developing software or medical technology, or otherwise may claim rights in the Contributions, please provide information about your employer's policy on contributing to open source projects, including the name of the supervisor to contact in connection with such contributions:

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