Accelerating Development of a Diabetes Management System with Model-Based Design: Q&A with Bigfoot Biomedical

Lane Desborough, Chief Engineer and Co-Founder, Bigfoot Biomedical

Bigfoot Biomedical is a startup medical technology company focused on developing automated insulin delivery systems that will provide people with type 1 diabetes a reliable, cost-effective way to outsource most of the work of managing their disease.

What led you to look for a new way of working?

A physiological sense-decide-act control loop is broken when type 1 diabetes causes the pancreas to stop producing insulin. Our challenge is to design an automated system that works with a variety of individuals whose physiology and behavior is constantly changing. Industry progress has been slow, in part because clinical trials are expensive, risky, and time-consuming. We use modeling and simulation to generate knowledge, and use clinical trials to confirm simulation results.

> Having seen the advantages of Model-Based Design in other industries, we know it will enable us to **generate knowledge faster** than traditional clinical methods and **accelerate** the process of bringing a medical system to market.
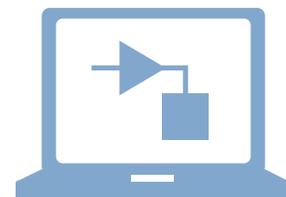
Why Model-Based Design?

Our strategy is to hire the best people and arm them with tools and processes that enable them to generate knowledge faster than our competitors. We view Model-Based Design as complementary to the agile software development approaches we have adopted. Model-Based Design lets us abstract away complexity so we spend our time on modeling and simulating our systems and algorithms, not constructing and debugging huge programs.
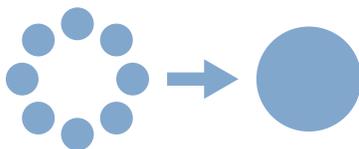
What results have you seen so far?

The models we develop with MATLAB® and Simulink® are among the most valuable corporate assets that Bigfoot possesses. We have set up a simulation factory with MATLAB and Simulink that supports test-driven development, source code management, and automated builds with continuous integration. We are positioned to run millions of simulations in the cloud, generate code for implementation, and use advanced machine learning algorithms to analyze data from our system once it is released.

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