CASE STUDY

OUTCOMES BASED HEALTHCARE SENSE 360 APP HARVESTS DATA FROM SMARTPHONE SENSORS

Client Background

Outcomes Based Healthcare (OBH) is one of a growing number of companies helping to revolutionize incentive models for healthcare providers. OBH are a team of health outcomes data specialists including clinicians, developers, data scientists, NHS data analysts, economists, and product specialists. They all share a deep commitment to supporting sustainable healthcare by transforming the way healthcare measures and funds success, to those things that matter to people.

softserve

Business Challenge

Patient outcomes can be measured in a number of ways. In some cases, clinical or administrative data from healthcare services and providers can be used. However to capture a patient's voice, current standard practice requires an individual to feed back 'Patient-Reported Outcomes' (PROs), usually in the form of a written survey response. However, there are challenges with this approach:

- Response levels and frequency of data collection are usually very low, and drop off over time
- The data collected measures a point in time (usually in a single healthcare setting or care silo) – we all have good and bad days and infrequent manually collected PRO surveys can't take that into account
- The feedback is entirely subjective and so only really relevant for the individual in question

In short, PRO surveys tend to be time-consuming, have poor completion rates, introduce bias, are episodic, and often very costly.

OBH is using technology to radically disrupt existing approaches to PRO data collection, interpretation and analysis. Specifically, in this instance, the question OBH wanted to answer was; is it possible to continuously and passively measure patient-reported outcomes in people with diabetes without having to resort to long, paper or online questionnaires?

OBH chose to make use of the increasingly ubiquitous smartphone to continuously and passively measure data which could answer this question. The company wanted to create an app, **OBH Sense 360**, that could harvest data from the sensors that are already integrated into smartphones. We know that people use their smartphones differently when they are sick or unhappy, so the OBH team wanted to see if they could capture how people use their phones, and correlate that with their outcomes.

Project Description

SoftServe was selected by OBH for its reputation for having extensive research capacity, as well as experience with complex projects that require both deep technical expertise and creativity.

SoftServe started the build for the front and back end of a native Android application that could both improve the collection of PRO data through a well-designed, usable interface, and also gather large volumes of unstructured sensor data passively in the background. The sensors in a smartphone measure everything from movement, how fast you walk, the way you hold your phone, how often you use your phone and even the air temperature where an individual is located.
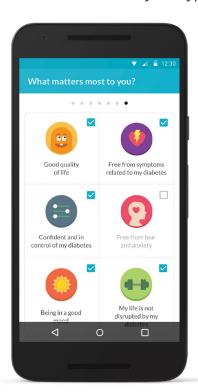
The project was broken down into multiple phases including investigation, application architecture, development & User Interface (UI), integration, and testing. The app itself was built using an iterative 'agile scrum' methodology.

SoftServe elected to use Funf, the open sensing framework for Android to capture data from sensors. The unpredictability and complexity of the Funf framework contained some risks. Chief among these being the sheer volume of unidentifiable and unstructured data recorded. However, due to the iterative approach taken in development, the SoftServe team had enough time to investigate the issues and develop comprehensive solutions.
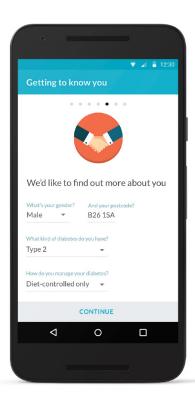
The SoftServe team presented regular status reports, and demonstrated new functionalities using an Android emulator on a bi-weekly basis.

SoftServe also worked to reduce memory and battery consumption for smartphones taking part in the project. This was achieved by carefully tuning the frequency with which sensors reported second-by-second data against the level of detail OBH needed.

SoftServe also helped OBH to specify and implement the databases using cloud services provided by Amazon Web Services in Europe and Parse.com in the US. This helped ensure all data stored was fully encrypted and handled in line with data protection laws.

OBH trialled the Sense360 app early in 2016, and is planning a pilot in the summer of 2016. This will involve researchers analysing data collected to look for a relationship between the survey answers and phone usage patterns. They will apply intelligent machine learning algorithms to understand how diabetes impacts peoples' outcomes.

Value Delivered

Within the first two iterations, SoftServe completed more than 90 percent of the UI scope, and for each following iteration new sensors were added to the application.

"We knew that we needed a very experienced and strong team of technology experts, who are both analytical and innovative. We were happy to find this partnership with SoftServe," explained Dr. Nasrin Hafezparast, CTO and Co-Founder OBH.

"SoftServe's active participation and partnership approach towards this project, whereby OBH supported SoftServe's technical delivery with specifications and research on outcomes measurement, has made the difference between an app which merely 'does the job', and one which is able to be sustainably deployed as a routine health tracking innovation."

The OBH Sense360 project is currently a research project, but the future of outcomes based commissioning depends on finding a scalable, reliable and reproducible method of measuring outcomes that requires minimum user input. On an industry level it could revolutionise and accelerate the transition to value based healthcare, and for OBH it would provide an additional scalable source of revenue and position them as a leader in the industry.

ABOUT US

SoftServe is a global digital authority and consulting company, operating at the cutting edge of technology. We reveal, transform, accelerate, and optimise the way large enterprises and software companies do business. With expertise across healthcare, retail, media, financial services, software, and more, we implement end-to-end solutions to deliver the innovation, quality, and speed that our clients' users expect.

SoftServe delivers open innovation – from generating compelling new ideas, to developing and implementing transformational products and services. Our work and client experience is built on a foundation of empathetic, human-focused experience design that ensures continuity from concept to release.

Ultimately, we empower businesses to re-identify their differentiation, accelerate market position, and vigorously compete in today's digital, global economy.

Visit our **website**, **blog**, **Facebook**, **Twitter**, and **LinkedIn** pages.

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