



SUCCESS STORY MEDICAL DEVICES

# MEDICAL DEVICE MAKER CONNECTS CLINICAL INTEL TO PATIENT CARE

Apexon provides digital expertise to put product vision into action



**This startup, which provides medical-grade sensors and data services for continuous health monitoring, needed Apexon's digital expertise to help build out the full promise of its data-as-a-service offering.**

At inception, the company developed a Data-as-a-Service (DaaS) platform for remote patient care providing ongoing monitoring, predictive analytics, and algorithmic clinical insights. The offering combines wearable sensors, a mobile application and cloud service to collect and report real-time patient data such as skin temperature, heart rate, respiratory rate, fall detection, coughing, sneezing, vomiting, etc. for early detection of adverse trends.



**FOUNDED IN 2018**



**MEDICAL GRADE MONITORING AND MANAGEMENT FOR SCALABLE REMOTE CARE AT HOME**



**SINGLE-USE WEARABLE DEVICES WITH 30 & 90 DAY BATTERY LIFE**



**ADVANCED DATA-AS-A-SERVICE OFFERING FOR EARLY DETECTION OF ADVERSE TRENDS**



As the company looked at getting its offering market-ready, it needed help on the development of the companion mobile application and the connectivity and interaction between the different solution elements. The company was familiar with related work Apexon had done supporting other digital healthcare innovators such as Proteus and LifeScan.

The company started working with Apexon in 2020 where they embarked on a phased approach to quickly develop an MVP that included a companion mobile application on Android and iOS which would communicate with the sensor device using BLE protocol and transmit the information to the cloud where it could be securely accessed by healthcare providers. The roadmap from there included SDK creation, UI enhancements to the mobile application, creation of a scalable cloud architecture, data ingestion framework and analytics around sensor performance.

THE RESULTS

# KEY OUTCOMES



## DRAMATICALLY FASTER PRODUCT CYCLE TIME

Through fail fast approach



## ABILITY TO MONITOR KEY DEVICE PARAMETERS

And take proactive steps for improved user satisfaction



## SCALABLE, HIGH-PERFORMANCE CLOUD ARCHITECTURE

Through strong GCP cloud engineering and DevOps practices

OUR METHODOLOGY

# THE DIGITAL LIFECYCLE

Apexon works with companies across the digital lifecycle.

## GO DIGITAL

Accelerating the delivery of new digital initiatives with confidence

## BE DIGITAL

Creating the infrastructure and foundation to scale digital initiatives

## EVOLVE DIGITAL

Leveraging data and analytics to continuously improve digital delivery processes

## LAUNCH & EXPERIMENT



## AUTOMATE & ACCELERATE



## BE INTELLIGENT & AUTONOMOUS

Enable digital adoption in a quick, and agile manner

The Apexon team developed android and iOS mobile app.

They developed a BLE protocol framework for communication between the sensor, the cloud, and the mobile app.

Build digital infrastructure and foundation for enterprises to scale

Apexon deployed automated cloud monitoring using terraforms and infrastructure deployment using Bitbucket pipelines.

Leverage data engineering to make strategic decisions and get digital right every time

Apexon developed a partner SDK which enables the company's Pharma partners to brand certain UI aspects of the solution and build branded applications around it for data presentation, alerts.

Apexon also developed a data ingestion framework to work effectively on all unstructured data sources creating a unified data model.



## THE CHALLENGE

# TO BUILD REMOTE MONITORING FOR PATIENT VITAL STATISTICS

Personalized, predictive remote care is imperative to the future of healthcare. So, the promise of 24x7 remote monitoring of patient vital statistics was incredibly compelling to healthcare providers and others in the health ecosystem.

But it also presented critical technology challenges for the company to ensure efficacy and performance. Some of these included:



### Developing a mobile application

Building an engaging and intuitive companion mobile application to support both the patient and the care provider. The company did not have expertise in this area, but it was a critical aspect of the overall solution.



### De-identification of patient data

Handling the de-identification of patient data as it is transmitted and stored to ensure compliance with privacy regulations such as HIPAA and GDPR.



### Transmitting real-time data

Doing this reliably on an ongoing basis between the sensors worn by the patients, the companion mobile application, and the cloud where the data was stored and accessed. This had to happen in the background so that it did not adversely impact the performance and battery usage of the sensors.



### Data framework

Creating a framework for collecting patient and device data points to be used by the company's data science team.



### Developing telemetry

For monitoring sensor devices to ensure high performance over long periods of time.

## THE SOLUTION

# FOCUSING ON 5 CORE AREAS

As part of this engagement, Apexon focused on five core areas:



## A COMPANION MOBILE APP

Apexon started with a small mobile application team developing the app on Android and iOS for use by both patients and care providers to view the patient's health information. The team leveraged a low-energy BLE protocol for communicating data between the sensor worn by the patient and the mobile application which then was transmitted to the cloud. The Apexon team also integrated a health chat bot to monitor the health of patients. This enabled it to be used for the monitoring and contact tracing patients in Covid-19 quarantine scenarios.



## V&V AND PRODUCTION SUPPORT

With a focus on quality at the core, Apexon started working on the development of an end-to-end QA strategy, system verification and validation, load testing and cloud performance testing. Apexon used its Quality Automation Framework (QAF) for automating API and performance testing to identify threshold factors and scalability of the company's backend systems. The team is also identifying opportunities for optimization in support of Live customers and setting up early monitoring alerts to flag any potential issues with devices in use.



## DATA ANALYTICS, DATA SCIENCE

Apexon incorporated millions of patients' data collected by the company to form the data foundation and expand the use of data science internally at the company. This involved developing a data ingestion framework which could work effectively on all unstructured data sources; creating a unified data model; de-identifying patient data; creating microservices API endpoints; and collecting performance data from all sensors and mobile devices including all alerts, crashes, hardware faults, watchdog resets, etc.



## CLOUD & DEVOPS

Apexon aligned the right resources and skills to develop Python API's which were used to serve data to front-end mobile apps, device analytics, and device telemetry front ends. The team also used GCP Cloud Services such as DataFlow, PubSub, and Cloud Functions. Apexon also automated cloud monitoring using terraforms in the company's staging and production environments. Bitbucket pipelines were used for infrastructure deployment.



## PHARMA PARTNER SDK

Apexon has also developed a partner SDK which enables the company's Pharma partners to brand certain UI aspects of the solution and build branded applications around it for data presentation, alerts and more.



Apexon is a pure-play digital engineering services firm focused on helping companies accelerate their digital initiatives from strategy and planning through execution. We leverage deep technical expertise, Agile methodologies and data-driven intelligence to modernize systems of engagement and simplify human/tech interaction.

We deliver custom solutions that meet customers' technology needs wherever they are in their digital lifecycle. Backed by Goldman Sachs and Everstone Capital, Apexon works with both large enterprises and emerging innovators – putting digital to work to enable new products and business models, engage with customers in new ways, and create sustainable competitive differentiation.

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