

CASE STUDY: QARDIO

A Scalable, IoT-based Health Monitoring Ecosystem

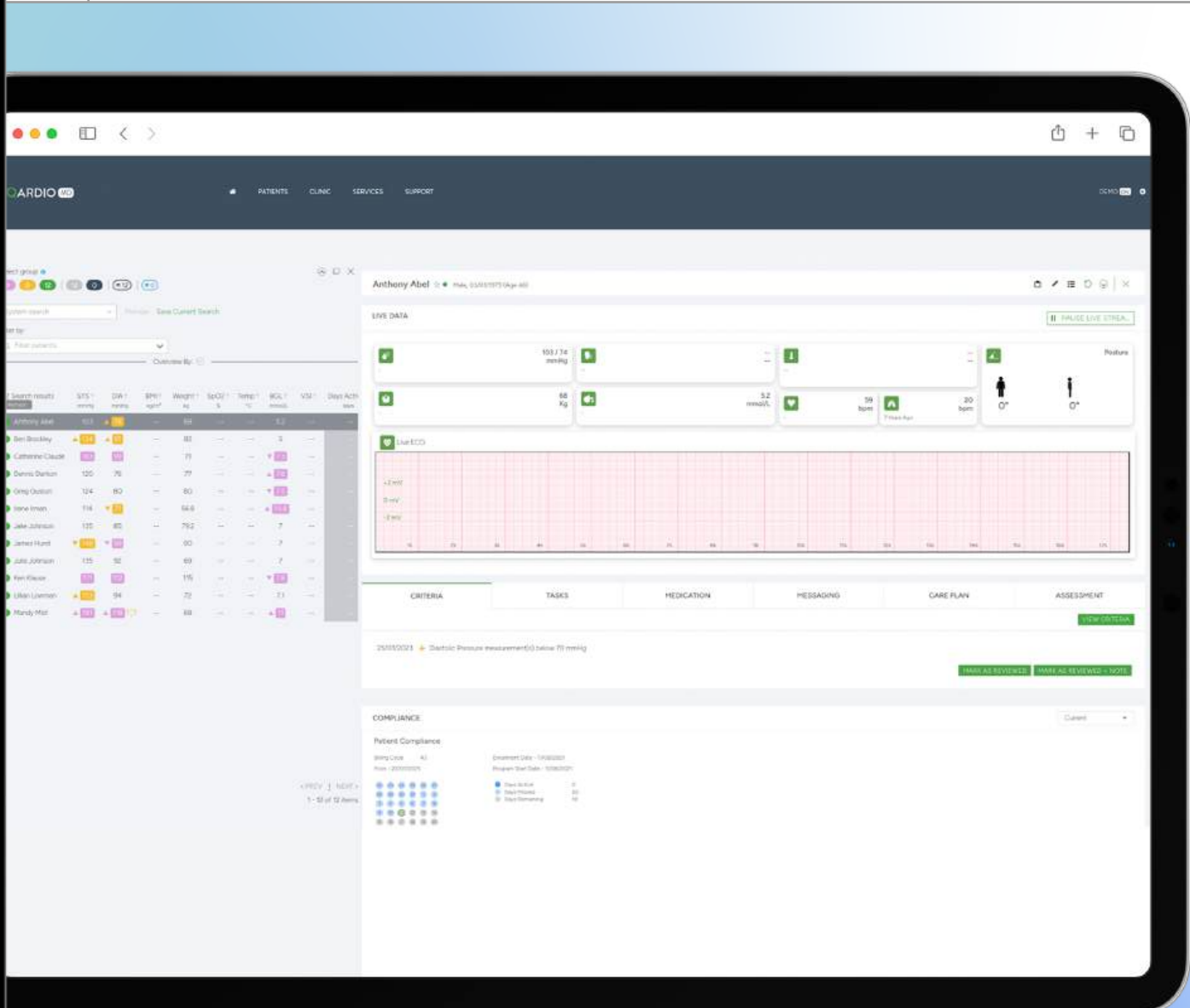
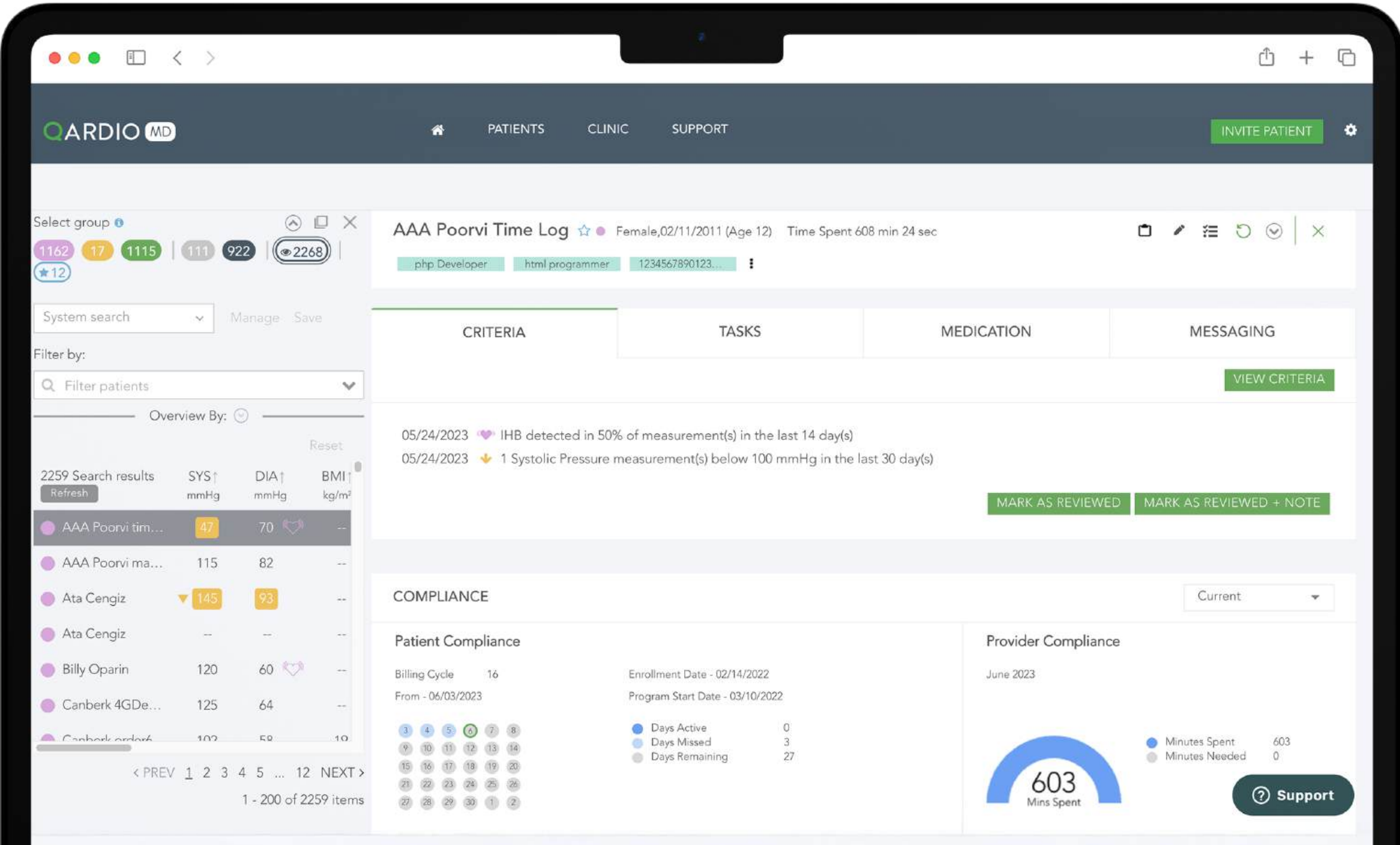
Partner information

Partner: Qardio
Company size: 51-100
Headquarters: USA

Team size:

Backend developers: 5
Frontend developers: 4
Android developer: 1
iOS developers: 1-2

QA engineers: 4
DevOps engineers: 2
Software architect: 1



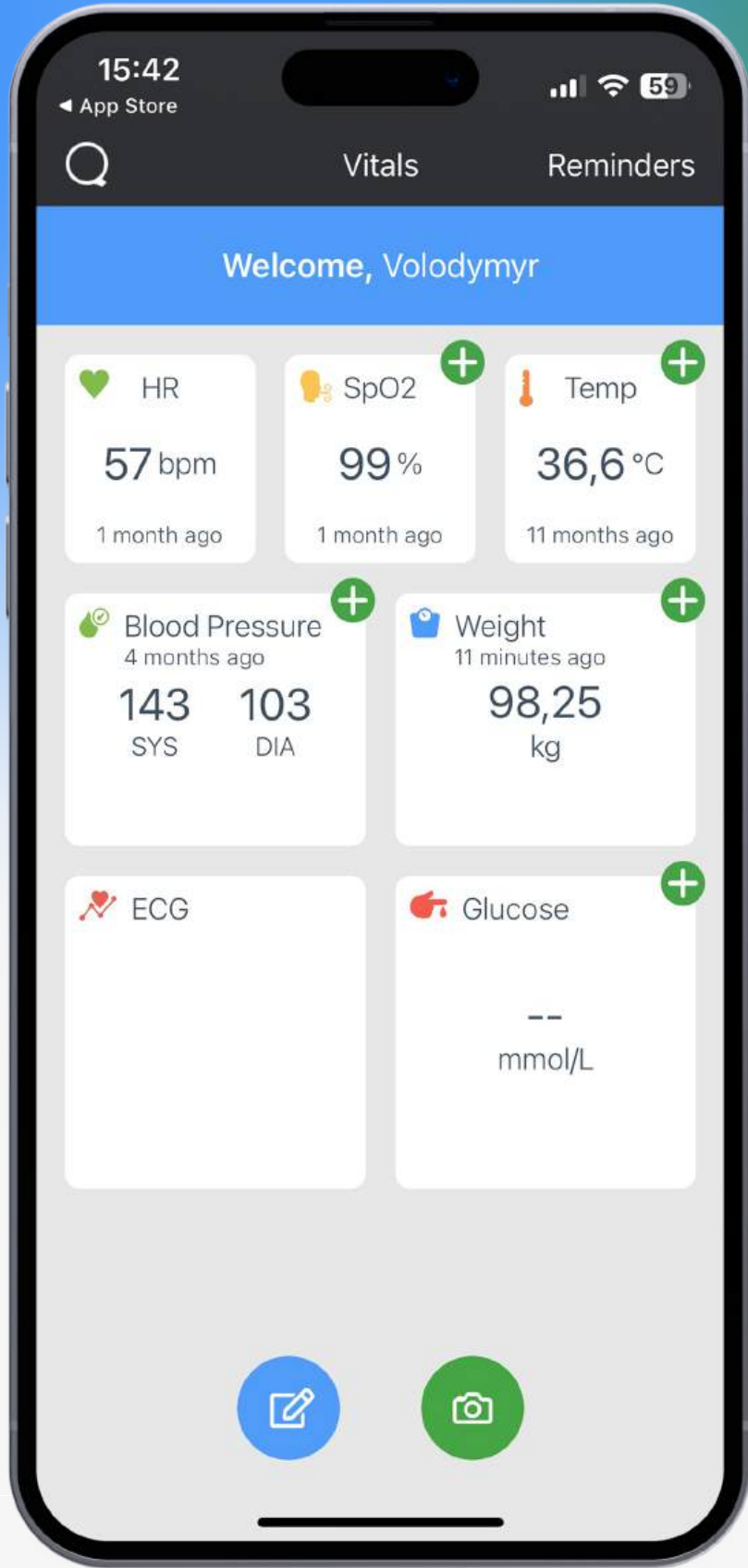
PROJECT OVERVIEW

In 2012, U.S. startup Qardio approached us with an idea: an IoT-based app that connects to wearable devices to track users' health data, including blood pressure, heart rate, and blood oxygen saturation levels, in real-time.

Initially, they wanted a standalone app for general users, but later extended our work over the course of 12 years to build a suite of interconnected apps and services for hospitals and medical professionals to use alongside their devices, amassing a total of over 3 million active users.

As we worked together, Qardio gave us more autonomy to take on new tasks independently, while making the ecosystem scalable. With each iteration phase, we added and improved features, such as health metrics collection and secure data management, as well as various integrations with 3rd-party systems, including Google Fitness, Chargebee, and others.

From startup to full-fledged healthcare platform, we built a solution to fit and then stretch Qardio’s vision, becoming a critical part of their journey.



Provided services

- Web development
- QA & software testing
- Mobile development
- DevOps services

Technologies & tools

- **Platform:** Liferay, Android, iOS
- **Frontend:** Angular.js, jQuery, React.js, React hooks, Pug, Material-UI, D3.js
- **Backend:** Java, Spring stack, MySQL, Feign, Gradle
- **QA tools:** Charles, Android Studio, Postman, JUnit, Mockito
- **Mobile:** Android SDK, Android Wear, Android Support Library, Swift, Xcode
- **DevOps:** Jenkins, AWS CodeDeploy, AWS ECR, Kubernetes EKS, AWS EC2, Kafka, AWS CloudWatch, Prometheus, Grafana
- **Third-party tools:** Google Fitness, Google Cloud Messaging, Google Analytics, Crashlytics, Samsung Digital Health SDK, ChargeBee, Sendbird, RedoxEngine

REQUIREMENTS & CHALLENGES

As Qardio grew, our team moved from building one mobile app from scratch that connected to a few devices, to developing a complex ecosystem that covers a growing range of devices, including pulse oximeters, smart blood pressure monitors, and others.

At the outset, we faced a business challenge: coordinating logistics with their device manufacturing partner. We had to build a system that manages the flow of products from the manufacturer, integrating it with our partner’s platform to automate order processing and shipment tracking.

Another challenge was defining Qardio’s system architecture and mapping out exactly how the mobile app would function, as well as the web platform for healthcare professionals. The larger challenge was making their entire ecosystem scalable so it would support Qardio’s fast-growing user base, an urgent need for microservices architecture became obvious.

We also had to include subscription models to position Qardio’s system for new revenue streams, and build with future device integrations in mind, crucial to Qardio’s long-term success. Our mission-critical tasks included:

Matching business growth with ecosystem expansion

Working closely with Qardio’s team to adapt and match their long-term business goals to efficient custom integrations, services, and features.

Continuous development and technical complexity

Evolving projects required continuous updates and feature releases; we carefully balanced developing new functionality and maintaining and expanding their existing platform.

Integration with healthcare devices

Connections between Qardio’s platform and various healthcare devices, including blood pressure monitors, smart scales, and ECG devices, had to run uninterrupted for real-time tracking, and secure data transmission and synching.

Building scalable infrastructure

Developing a modern, microservices-based architecture to handle an influx of users, integrate with various diverse devices, and support ambitious growth without compromising performance.

Data security

Maintaining compliance with United States health data standards while protecting system vulnerabilities.

Performance monitoring

Integrating a comprehensive set of DevOps monitoring tools and performance metrics to spot potential bottlenecks and avoid downtime, while efficiently allocating resources to maintain high performance under varying loads.

HOW WE WORK

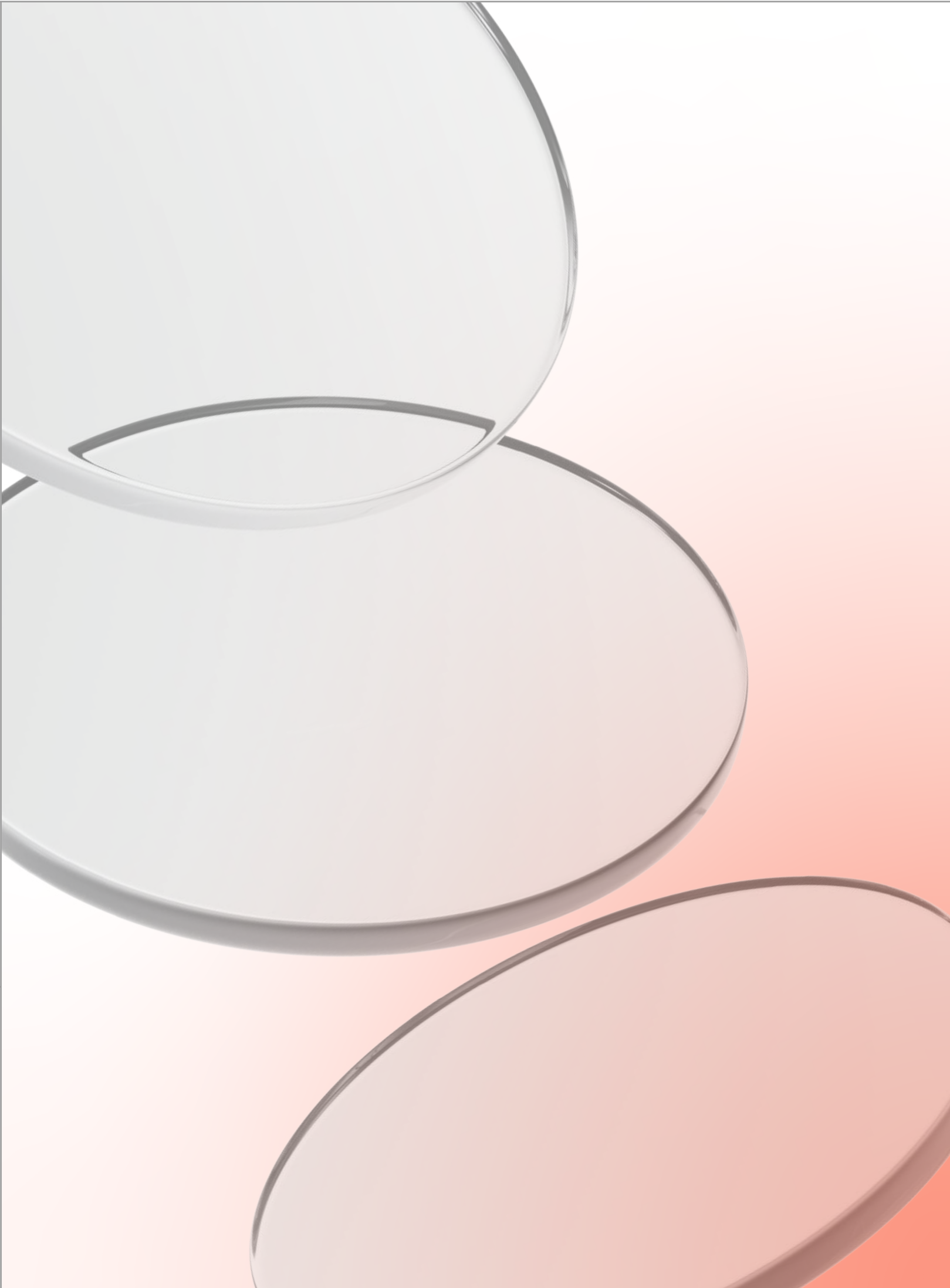
Collaboration approach & process

For 12 years, our work with Qardio was based on **continuous collaboration, trust, and shared growth.**

Our team worked closely with theirs and stayed **highly engaged** and **proactive** to meet expectations as they grew and adapted. We were quick to respond to urgent issues and often went beyond the standard scope to cover needs. It was this ambitious level of involvement that aligned us with Qardio’s goals as their ecosystem evolved.

And with hard work and strong results came **mutual trust.** Over the years, Qardio granted us increased autonomy to address complex technical challenges and choose the best-fit tools and development approaches.

By prioritizing their goals and working closely with their team, we were the collaborative **partner** Qardio leaned on to move efficiently toward their vision to build a future-proof healthtech ecosystem.



STEP-BY-STEP PROJECT FLOW



Stage 1: Core MVP development and device integration

To start, we worked with Qardio’s stakeholders to clearly define their vision and product requirements, then began building an MVP based on their concept for the initial mobile app.

Key deliverables included core architecture and a prototype of the mobile app, along with integrations for healthcare devices within the app to collect and monitor health data in real time.



Stage 2: Expanded ecosystem for providers and patients

As Qardio’s needs grew, we built web and mobile apps for healthcare professionals and patients to monitor and interact with patient data through an attractive and easy-to-use interface.

With added integrations of medical devices and third-party platforms, we transformed their MVP into a comprehensive healthcare ecosystem used at an individual level and by hospitals and healthcare professionals to manage and analyze health metrics.

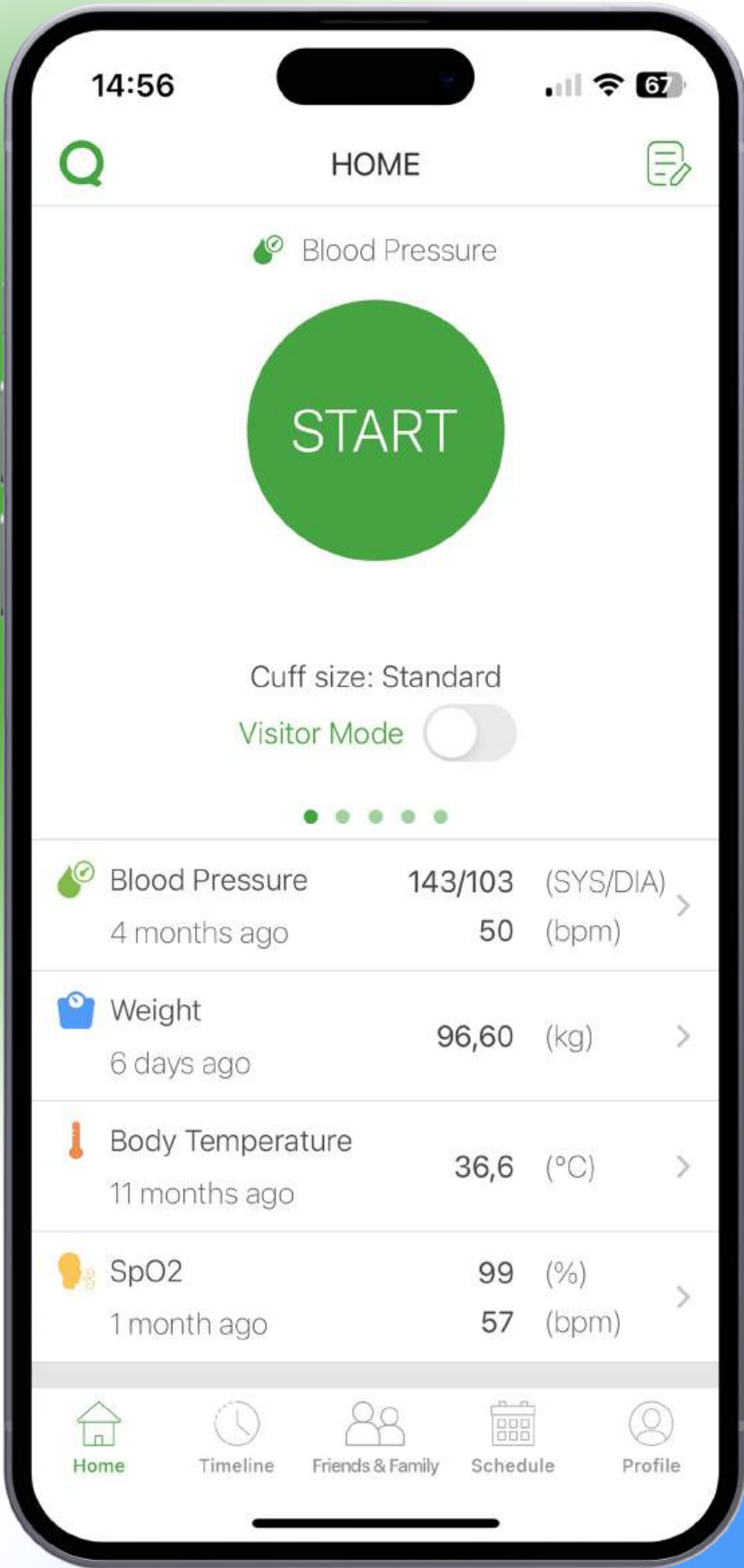


Stage 3: Maintenance, improvements, & more development

To make their ecosystem future-ready, we improved performance and system efficiency, and fine-tuned infrastructure and security measures.

That way, Qardio can continue to add new features and adapt its platform to meet evolving market needs, new devices, and user expectations.

DELIVERED FUNCTIONALITY



- **Mobile apps:** Let users and healthcare professionals track their vital signs and analyze data collected by wearable health monitors, set goals, track progress, and share results with their families and doctors.
- **Doctor portal:** Gives healthcare professionals access to patient data and real-time health updates for more personalized care. They can also generate reports and share them across medical
- **Integration with health monitoring devices and third parties:** Qardio’s platform integrates with a growing range of healthcare devices and third-party systems, like Google Fitness and Samsung Digital Health, for real-time synchronization, accurate tracking, data management, and monitoring in a single ecosystem.strict browser security standards.
- **Admin panel for management:** Built with Liferay, the admin panel provides customizable reports and monitoring, and lets Qardio’s internal team manage site content, as well as manage users and track their activity and payments with ease.
- **Ecommerce store:** Users can purchase medical devices and accessories directly from Qardio’s ecommerce store that’s integrated into their full ecosystem, for simple order management and tracking, while management monitors traffic and user engagement.
- **Company website:** Their website, built with WordPress, serves as an informational hub linking directly to their ecommerce site, to educate users about their products and then redirect them to a location-specific online store to make purchases and browse related information.

THE PRODUCT IN NUMBERS

As Qardio's project developed, we kept improving processes to make their ecosystem efficient and capable of handling billions of user data points.

80%
unit test coverage for product reliability and resilience



BILLIONS
of health datapoints tracked worldwide

3M
active users

12 YEARS
of partnership

30%
improvement in system efficiency

PROJECT OUTCOMES

<div>From concept to turnkey solution</div> <div>From initial idea to entire ecosystem, we collaborated closely with Qardio every step of the way to build a scalable health solution for end users and healthcare professionals.</div> <div>Revenue growth</div> <div>With various subscription models for hospitals and patients, and integrations with other platforms and devices, our team positioned Qardio’s platform to bring in fresh revenue streams and surge to over 3 million active users with a 97% positive rating, solidifying their position and future in the market.</div> <div>Strategic expansion for long-term market reach</div> <div>Over our 12-year partnership, we positioned Qardio’s long-term growth, from idea to a complete platform that can support ongoing business growth indefinitely and adapt to new devices and user needs. We helped them open up to opportunities, diversify their offerings, and create new revenue streams.</div>	<div>Scalable infrastructure for growth</div> <div>With a microservices architecture that can easily handle Qardio’s growing user base and integrate with an expanding range of devices, without compromising system performance..</div> <div>Better performance and stability</div> <div>After spotting and fixing performance bottlenecks like duplicate requests, we dramatically improved app speed and reliability. A more stable system means a better user experience, too.</div> <div>24/7 support and cost optimization with DevOps</div> <div>With active monitoring and security Qardio’s platform has 24/7 infrastructure support to allocate resources for improved performance and efficiency, proactively avoid downtime, and cut unnecessary costs.</div>
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