



# BEAT2PHONE

## ECG

Innovative ECG solution for fast, cost-effective screening of heart problems.



VITAL  
SIGNUM



## 1. WHERE WE COME FROM

# Finland has one of the most efficient healthcare systems in the world

The Finnish healthcare sector is built on world-class research and technology know-how. That is why Finland has one of the most efficient healthcare systems in the world, offering high value for money spent.

In Finland we create, combine, and enhance technologies and practices to improve the health of our citizens and people around the world. Finland remains a world leader in digitalization and one of the leading EU countries in this domain.

(Digital Economy and Society Index 2018, Country Report Finland, European Commission)

Finland has more R&D professionals and healthcare startups per capita than any other country. Finnish universities, research institutes, and university hospitals employ more than 25,000 researchers in the fields of science, technology, and medicine.

### FINLAND IS #1 IN



#### HEALTH TECH

Now the largest and one of the fastest growing export segments in high-tech Finnish industry.

(Healthtech Finland, 2019)



#### AVAILABILITY OF SCIENTISTS AND ENGINEERS

(World Economic Forum Global Competitiveness Report, 2017-18)



#### AVAILABILITY OF LATEST TECHNOLOGIES

(World Economic Forum Global Competitiveness Report, 2017-18)



**88%**  
of Finns are satisfied with their healthcare services.

"Health and long-term care in the European Union" European Commission, 2007.

<https://www.businessfinland.fi/en/do-business-with-finland/explore-key-industries/health-wellbeing/in-brief/>





Upper row from left: Veli-Heikki Saari, Kari Kiviniemi, Risto Soila, Matti Suominen, Pasi Keski-Nisula  
Lower row from left: Eero Punkka, Henrik Resman

## 2. THIS IS US

# Our company story

Helsinki-based VitalSignum Oy was founded in 2015 by a team of top Finnish medical and health tech experts.

**VITALSIGNUM OY DEVELOPS** and provides simple, reliable, and easy-to-use mobile health monitoring solutions and services. The company focuses on ECG remote monitoring solutions for identifying heart problems.



**Developer of Beat2Phone ECG,  
Timo Varpula, CTO, PhD Technology:**

"In 2011, my endurance sports hobby got out of hand. I ended up with a condition called overtraining, which caused, among other things, irregular heartbeat episodes. They were not present at the doctor's office nor during a Holter examination.

I was looking for a suitable device which I could use to record my ECG myself whenever I had the sensation of an irregular heartbeat. I didn't find one. I set out to develop a device that measures your ECG and sends it via Bluetooth for viewing on a smartphone. Already with the first trial version of Beat2Phone, I recorded evidence of an arrhythmia and used data to get the right treatment."



### VALUES

We believe in integrity, trust, innovation, and passion and this forms the foundation of our company culture and day-to-day operations.

These values guide how we treat, interact with, and serve our clients, partners, and customers.



### MISSION

Our mission is to save lives by providing everyone with reliable, affordable, and easy-to-use mobile health monitoring solutions.



### VISION

Our vision is to be the world's leading provider of mobile health monitoring solutions.

### 3. THE WORLD WE ARE LIVING IN

# Cardiovascular disease is the leading cause of death in the world<sup>1</sup>

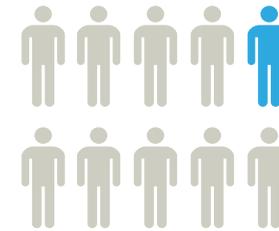
Most countries have rising life expectancy and an ageing population.<sup>2</sup> Around 10 percent of the population suffers from heart symptoms like palpitations, arrhythmias, anxiety, and chest discomfort.<sup>3</sup>

Arrhythmias often remain undetected in medical examinations simply because the condition is not present during the examination.

Beat2Phone ECG helps to screen and treat patients with cardiac symptoms in primary healthcare instead of sending them, often unnecessarily, to costly secondary care or specialized hospitals.

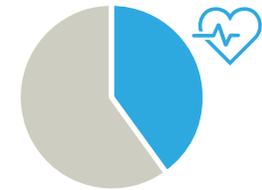


1) <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>  
2) <https://www.ahajournals.org/doi/10.1161/CIR.0000000000000757>  
3) [https://www.who.int/ageing/publications/global\\_health.pdf](https://www.who.int/ageing/publications/global_health.pdf)



**10%**

OF THE GLOBAL POPULATION SUFFER FROM CARDIAC-RELATED SYMPTOMS SUCH AS ATRIAL FIBRILLATION.<sup>3</sup>



**40%**

OF STROKES ARE CAUSED BY ATRIAL FIBRILLATION.<sup>4</sup>



**+250%**

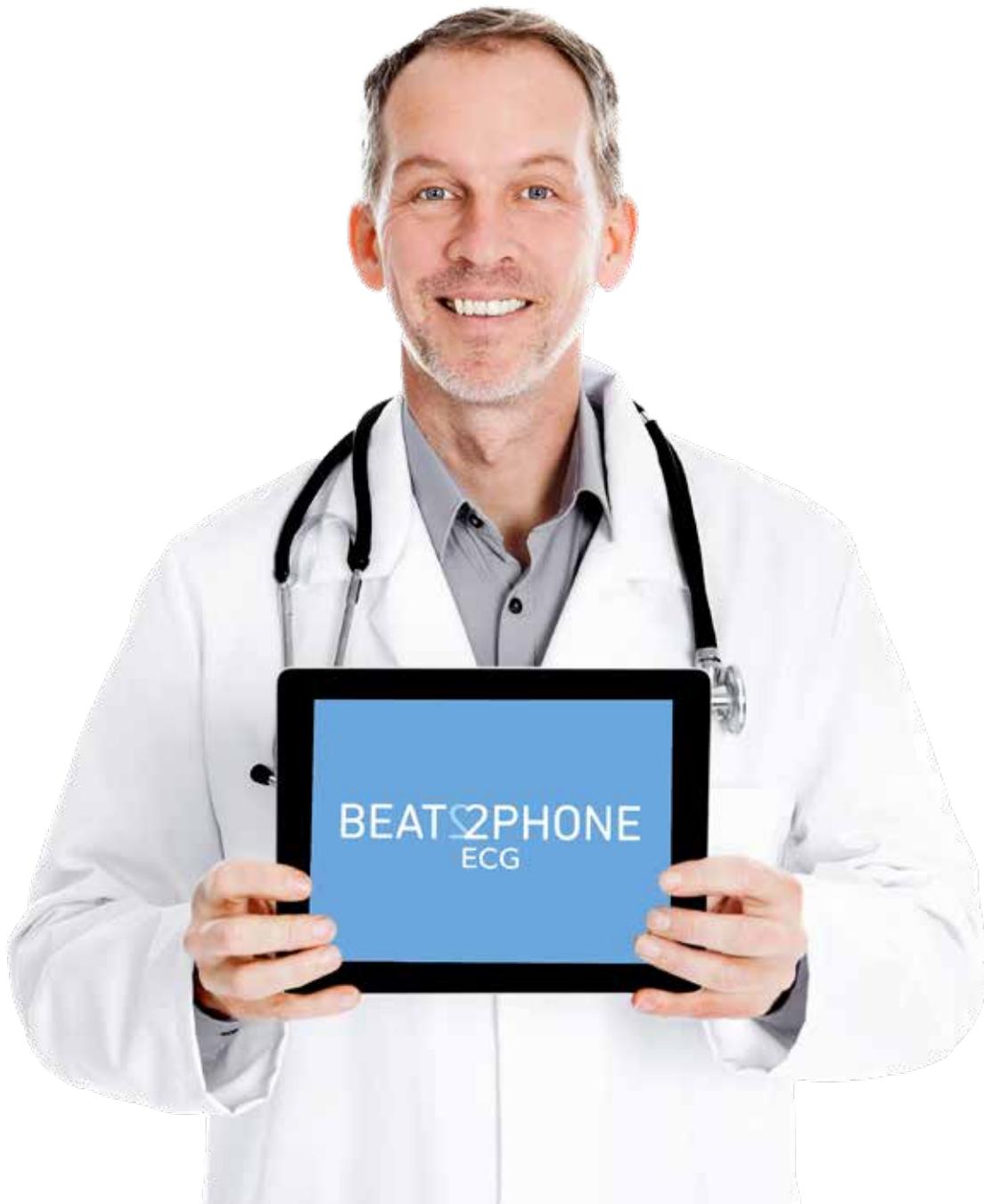
ESTIMATED INCREASE IN NUMBER OF PATIENTS WITH ATRIAL FIBRILLATION IN WESTERN COUNTRIES BY 2050.<sup>5</sup>



**100%**

OF PEOPLE OVER 65 WHO SHOULD BE SCREENED, ACCORDING TO AFNET.<sup>5</sup>

4) <https://www.stopafib.org/stroke.cfm>  
5) AFNET - [afnet.org](http://afnet.org)



#### 4. OUR SOLUTION

# Beat2Phone ECG - an innovative mobile concept

Beat2Phone ECG is a simple, reliable, and easy-to-use medical-grade wearable electrocardiogram (ECG) sensor. It works with a phone application that connects to a cloud analytics service for fast, cost-effective screening of arrhythmias.

**PEOPLE CAN EXPERIENCE** random or regular heart palpitations, but the feeling often passes while queuing for ECG monitoring at health centers and hospitals. The Beat2Phone ECG sensor allows adults experiencing palpitations or other cardiac symptoms to take an ECG anytime and anywhere and then share the results with a medical practitioner.

**BEAT2PHONE ECG CAN BE WORN COMFORTABLY** by the user for as long as needed. The system has been designed to be fully automated to save both patient and health professionals valuable time and effort. Beat2Phone ECG enables better preventive monitoring and observation of cardiac symptoms leading to cost and time savings in healthcare and a healthier life for patients.

### BEAT2PHONE ECG IS A CERTIFIED MEDICAL DEVICE

**BEAT2PHONE ECG IS A CLASS IIA CE<sub>0598</sub> MARKED** and certified medical device, demonstrating it complies with all the requirements of EU legislation. VitalSignum Oy's quality system is certified according to the EN ISO 13485: 2016 standard. The standard defines the requirements for the organization's quality system, by which the company demonstrates its ability to produce medical devices and related services that regularly meet the requirements of both customers and authorities.



Beat2Phone ECG has been created by a team of top medical and health tech experts in Finland.





## 5. WHO NEEDS THE PRODUCT

# Beat2Phone ECG is ideal for healthcare professionals

Beat2Phone ECG is an ideal tool for healthcare professionals, primary care clinicians, cardiologists, home care professionals, the elderly, and, for example, people recovering from heart attack, coronary angioplasty, or open-heart surgery.

### **1. HEALTHCARE ORGANIZATIONS IN BOTH PUBLIC AND PRIVATE PRIMARY CARE**

- Diagnosing and screening of walk-in patients' heart symptoms
- Follow-up of patients after heart procedures and stroke

### **2. ELDERLY CARE PROVIDERS**

- Screening of symptoms at home or in a care home

### **3. INSURANCE COMPANIES**

- Premium private health insurance offering, screening of health condition

### **4. PHARMA COMPANIES**

- Health monitoring during drug testing

### **5. DEVELOPING COUNTRIES**

- Ideal for developing countries with limited healthcare infrastructure to address the needs of primary healthcare

Beat2Phone ECG enables **better preventive monitoring and observation of cardiac symptoms**, leading to cost and time savings in healthcare and a healthier life for patients. Beat2Phone ECG can be used at home before and after surgery; patients do not have to visit a hospital just to get their heart monitored. With Beat2Phone ECG, data can be sent direct to the healthcare professional.



## 6. FUNCTION

# The Beat2Phone ECG sensor lets you monitor your heart function

## 1. In monitoring mode:

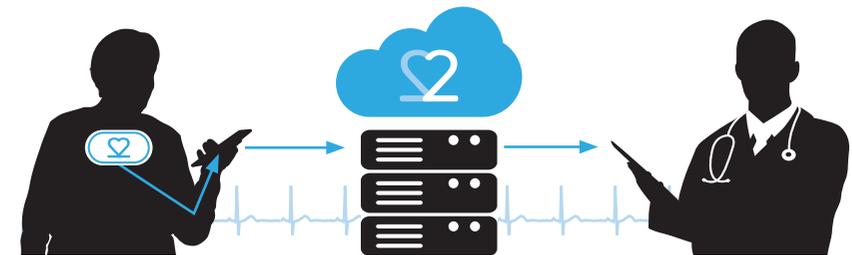
- ECG
- Heart rate (with time graph)
- Heart rate variability (with time graph)
- Posture and activity (from 3D accelerometer)
- Annotation button

## 2. In analysis mode:

- Heart rate histogram for the measurement period
- ECG intervals: P, PR, QRS, and QTc
- Analysis annotation button
- A millimeter paper view of ECG and heart rate, e.g. for sending as an email attachment
- Written report of possible findings generated by the algorithm in pdf



# Beat2Phone ECG is not just a mobile AF detector, it is a complete cloud-based service.



**1. PATIENT**  
with the  
Beat2Phone device  
and the smartphone  
app

**2. DEDICATED  
CLOUD SERVER**  
with medical-grade  
algorithm

**3. PHYSICIAN**  
with the  
Beat2Phone  
smartphone app

**WHENEVER A USER RECORDS** their ECG, the data is uploaded to the cloud service as soon as the measurement session is completed. The user can also make annotations, for example if abnormal palpitations are felt during the recording, and these annotations are also uploaded to the cloud.

**THE CLOUD SERVICE** includes a medical-grade algorithm (Cardiolyse CE0197) that automatically analyzes all the uploaded ECG data. The algorithm reports detected abnormalities, such as extra beats and arrhythmias, by adding an annotation. These annotations tell the medical professional what the algorithm has detected and at what time in the ECG the abnormality occurred, leaving the healthcare professional to confirm the diagnosis.

**THE BEAT2PHONE CLOUD SERVICE** allows healthcare professionals to remotely access their patient's ECG recordings through a browser-based graphical user interface.



## 7. PHYSICIAN'S VIEW

**“Beat2Phone  
accelerates patient  
screening in primary  
care without  
compromising the  
quality of care.”**

**–Dr. Kari Korhonen, MD, PhD**



“The primary healthcare emergency service is used on a daily basis by patients reporting various abnormal sensations in their chest. Arrhythmia is an acute problem and concern, but a more precise diagnosis can often not be made in the emergency room as the actual problem has passed. The uncertainty, however, remains.”

**BEAT2PHONE OFFERS AN OPTION** for longer-term follow-up, where the patient can also mark points on the recording if irregular or abnormal heart rhythms reoccur. Patient monitoring can also be performed at home if there is no need for acute care at that time.

**THE PATIENT'S VARIOUS EXPERIENCES** of arrhythmias often require longer-term cardiac rhythm follow-up studies. Primary care usually refers patients to specialist healthcare for further examinations.

**BEAT2PHONE ECG OFFERS** the opportunity to monitor heart rhythm long term for patients already in primary care, to preliminarily identify those who would benefit the most from specialist healthcare, and at the same time to speed up further examinations.





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