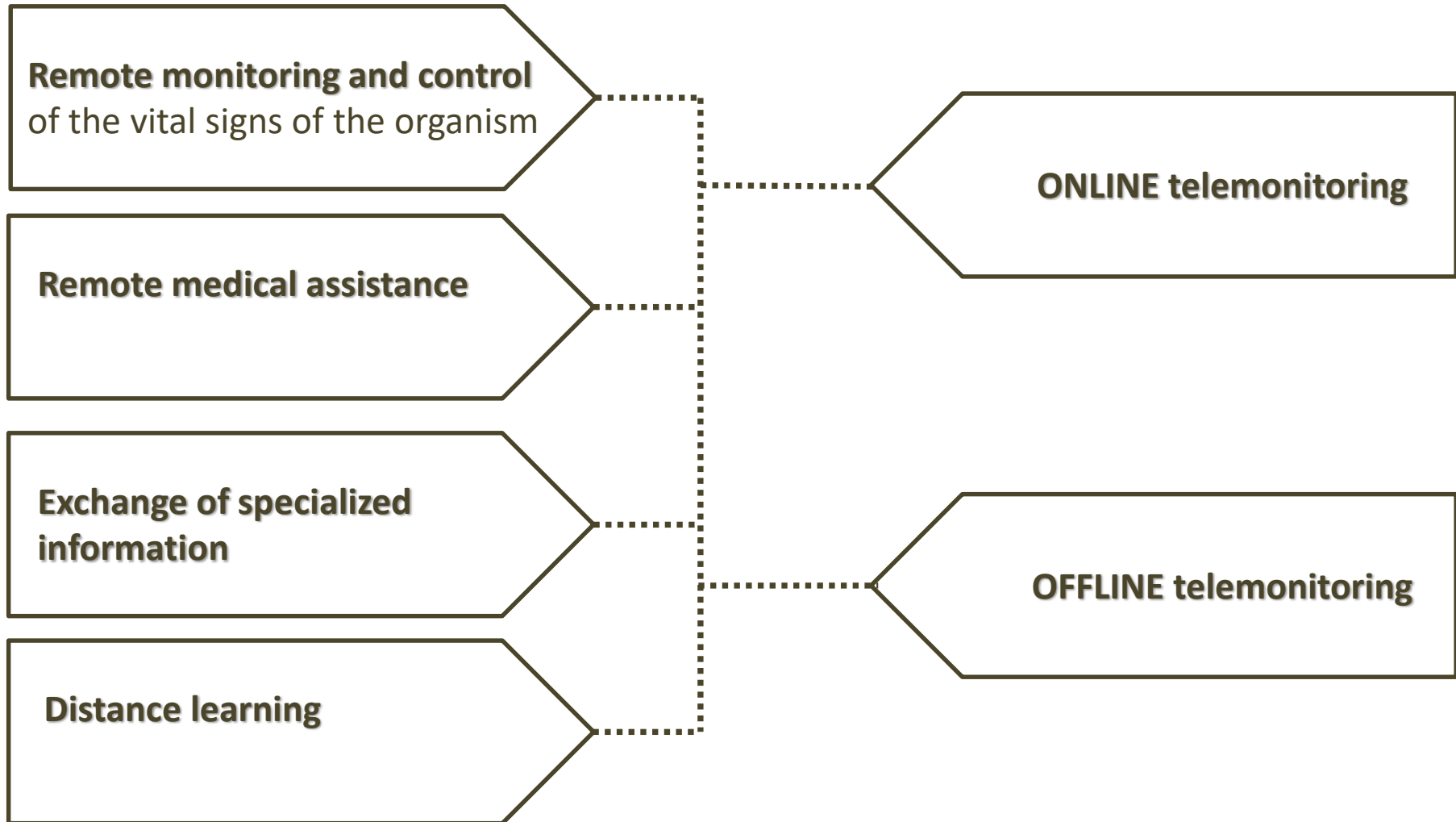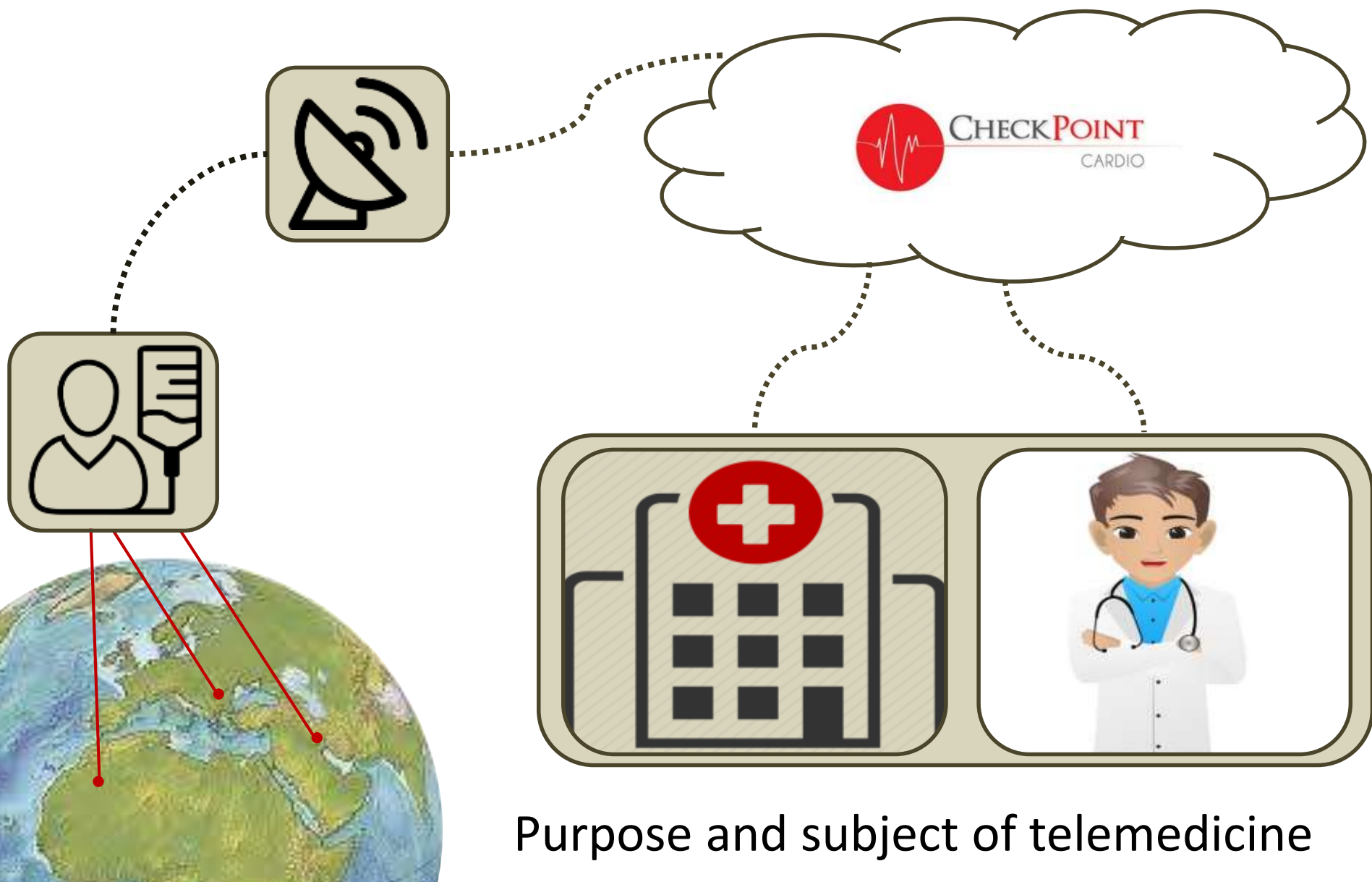# HIGH DEFINITION SYSTEM FOR REMOTE MONITORNIG AND CONTROL OF VITAL SIGNS

Dr. Denislav Boychev

CheckPoint Cardio Team

TELEMEDICINE

Remote monitoring and control of the vital signs of the organism

Remote medical assistance

Exchange of specialized information

Distance learning

ONLINE telemonitoring

OFFLINE telemonitoring

Purpose and subject of telemedicine

ABOUT US

1-12 lead ECG, SPO2, Respiration, Blood pressure, Body temprature, Activity, GPS location

Smart wearable devices

We bring at every hospital and every patients home

Connect them with dedicated medical team 24/7

We provide affordable medical service for all of us everywhere at any time

24 hour medical obesrvation in real time
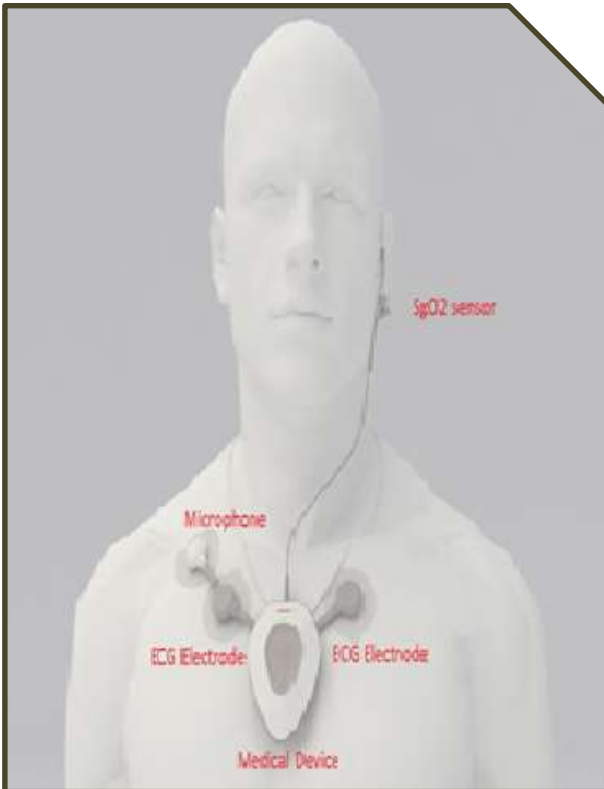
Medical plan menagemnet based on trends of the vital signs

Real time diagnosing

Emergency response

AI on duty – sophisticated decision support team following every heart beat improving the efficiency and productivity even more
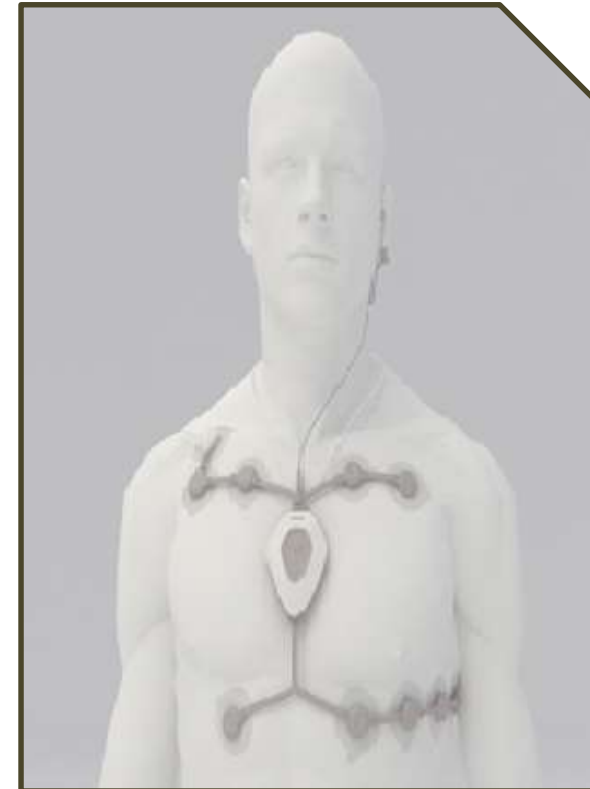
CHECKPOINT CARDIO DEVICES

CPC 1 - 1 channel ECG, Respiration, SPO2, Body temperature, Blood pressure, Accelerometer, GPS location
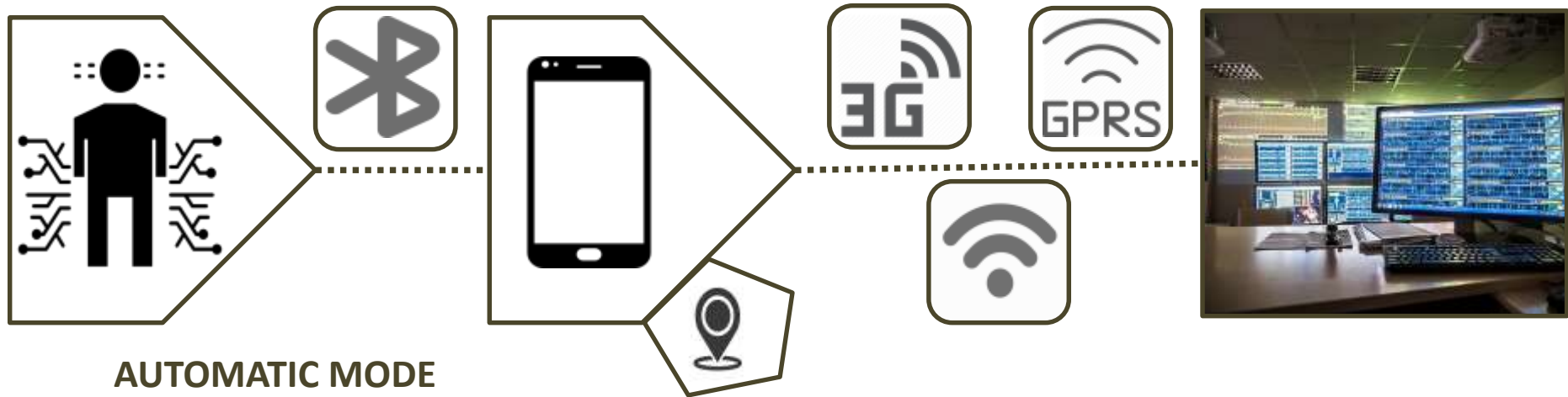
CPC 3 - 3-9 channel ECG, Respiration, SPO2, Body temperature, Blood pressure, Accelerometer, GPS location
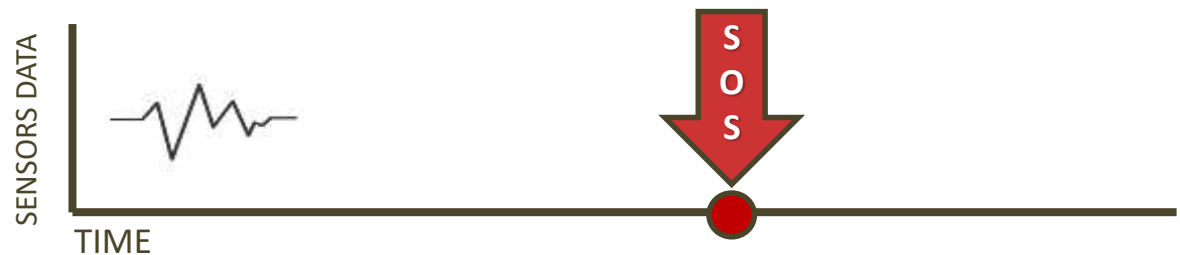
CPC 12 - 12 channel ECG, Respiration, SPO2, Body temperature, Blood pressure, Accelerometer, GPS location

2019

DATA TRANSFER

AUTOMATIC MODE

EVENT MODE - The patient has the ability
to mark a certain period as related to subjective symptoms
by pressing the event button

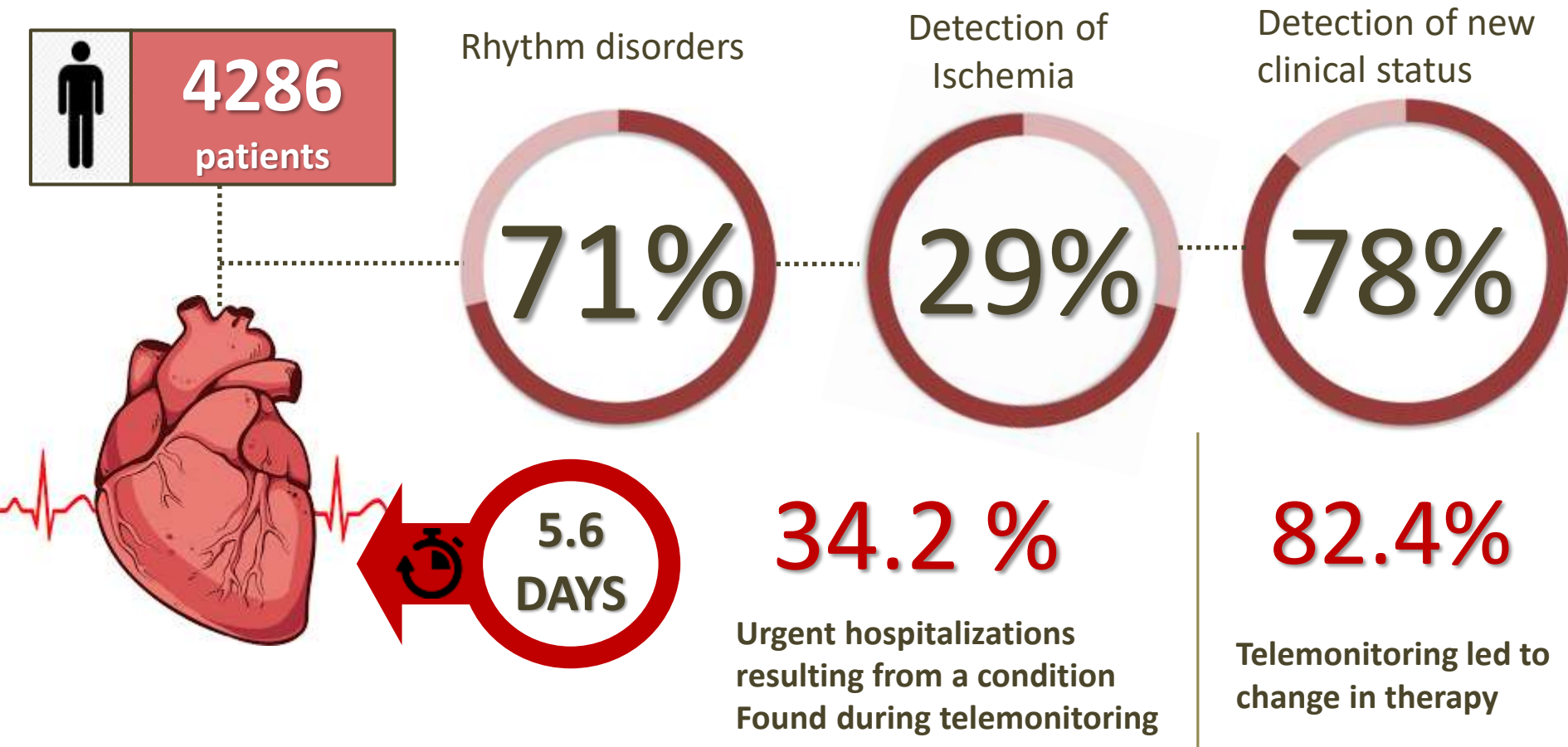# ADVANTAGES OF THE SYSTEMS COMPARED TO THE EXISTING OFFLINE MONITORING:

- **Aflutter/Afib – 1.6 times higher frequency of registration**

- **SVE – 1.4 times higher frequency of registration**

- **SVT – 1.7 times higher frequency of registration**

- **PVC – 2.1 times higher frequency of registration**

- **VT – 2.0 times higher frequency of registration**

- **Conductive disorders – 1.9 times higher frequency of registration**

Source: Joint research paper between our medical center and a leading hospital of Cardio-vascular diseases AciBadem City Clinic:
"Basic rules, indications and importance of using telemtric systems for remote telemonitoring in the diagnose and control of cardiac activity"
B.Boychev, D. Simov, Y. Simova, D. Boychev

ADVANTAGES OF THE SYSTEMS COMPARED TO THE EXISTING OFFLINE MONITORING:

4286 patients

Rhythm disorders

71%

Detection of Ischemia

29%

Detection of new clinical status

78%

5.6 DAYS

34.2 %

Urgent hospitalizations resulting from a condition Found during telemonitoring

82.4%

Telemonitoring led to change in therapy

What data is detected, visualized, analyzed and stored by the system

Estimation of **Heart rate** through ECG and SPO2
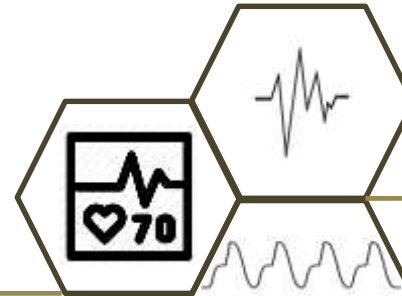
ECG - Live stream 1, 3-9 or 12 channel

Evaluation of **SPO2** and evaluation of **SPO2 graph**

Body Temperature

Blood Pressure systolic, diastolic, avarage and pulse BP

Respiration Rate and wave

24/7

LIVE STREAM

FULL TRENDS

FULL DATA STORAGE Exported in CSV

FUUL HISTORY VISUALISATION

EMERGENCY RESPONCE

Assessment of **Body position** in space

Assessment of **physical activity** in % lying, walking, running…
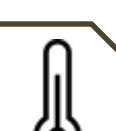
GPS location at any time

HIGH DEFINITION DAILY REPORTS

EVENTS LIST

ANALYSIS

Heart Rate
daily trend

BP daily trend
Systolic, diastolic,
Avarrage, Pulse BP

Respiration
Daily trend

SpO2
Daily trend

Physical activity
Daily trend

Body Position
Daily trend

FULL DAILY TRENDS

Emergency response
Count for the last 24h

BP episodes
SBP <90/>145, PBP <65

Respiration episodes
Rate <8/>25 per min.

SpO2 episodes
SpO2 <90%

Body temperature
Episodes <36/>37 deg.

HRV analysis

Common patient's risk

Cardio-vascular risk

esCCO by PWTT

A.I. TOOLBOX

Data annotation sector - where through a special software the data collected from the physiological signals is being annotated. The annotated date is delivered to the IT sector and data science sector where along with the medical center algorithms and special medical software are being created

Reality check for the work of the algorithms

Testing screen
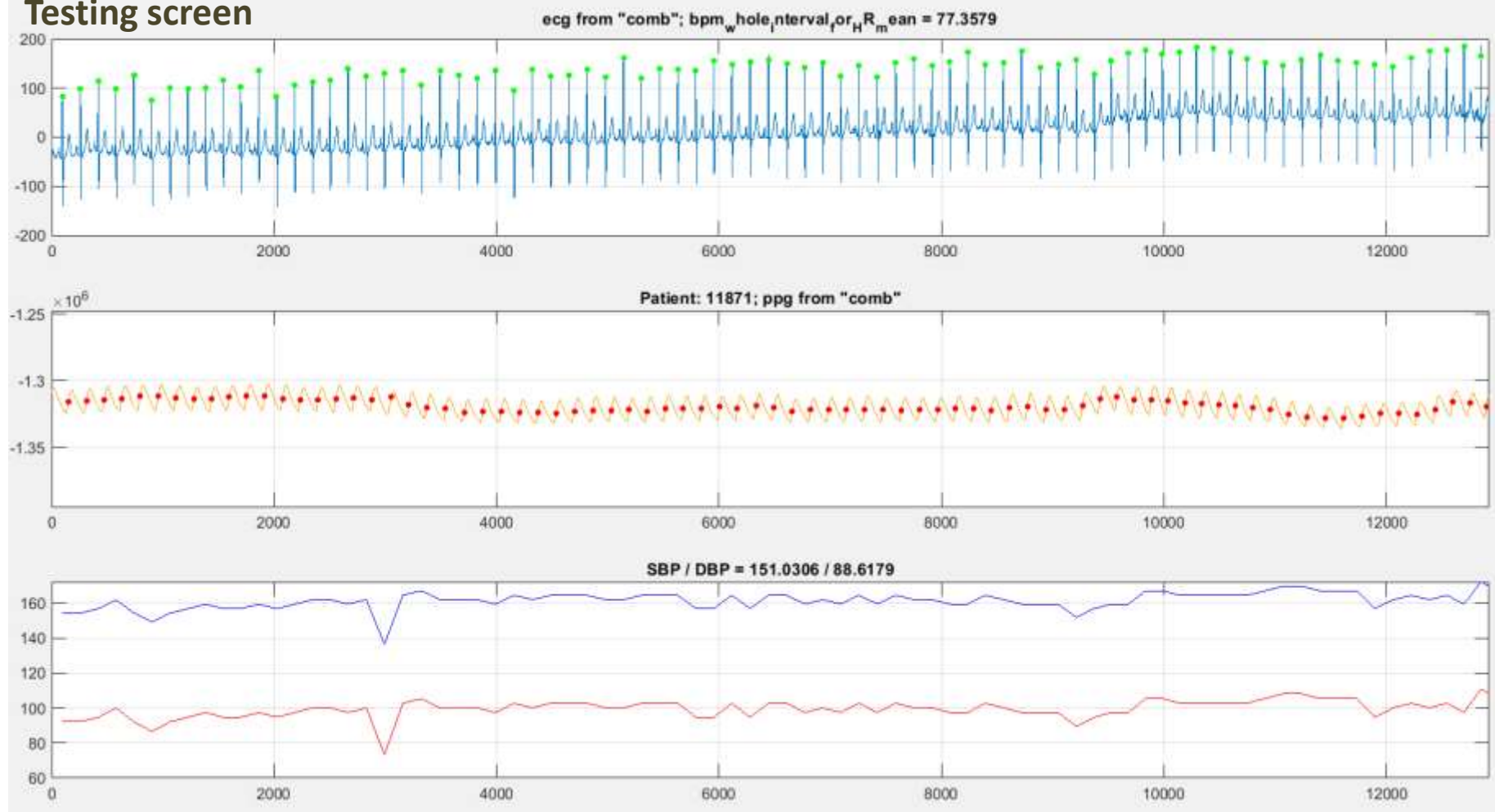
The models, developed from the annotated data, are deployed in
testing environment in real time

CHECKPOINT CARDIO

HEALTHCARE CLINIC

HOME

12:29h

12:29-13:10h

The patient is with idiopathic dilated cardiomiopathy. Heart failure – III functional class (NYHA). Complains from sudden episodes of presincopathic symptomatic, heart oppression and dyspnea.

Multiple cardiological consultations. Multiple ECG – registrations. No evidence of rhythm and conduction disorders.

At 12:29 an episode of sustained, wide complex tachycardia , together with presincopathic symptomatic and dyspnea would be registered.

12:29-12:50h – cardiogenic shock.

12:50-13:10h – possible death or acute left ventricular failure.

CPC BENEFIT

1. Symptomatic pathologies may be hard to detect in conventional diagnostic and observational methods. Real-time continuous monitoring offers valuable data.

2. Patients can be given actionable recommendations in real-time in case an emergency situation occurs.
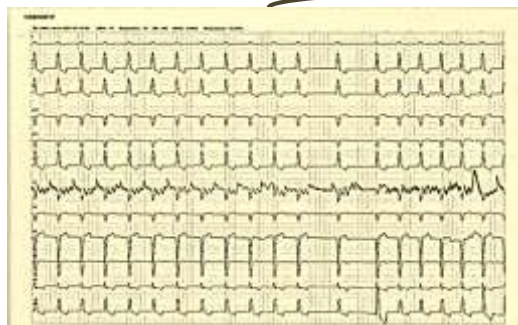
Connected to real time remote telemonitoring (05/12/2017; 11:34h). Initial record – sinus rhythm.
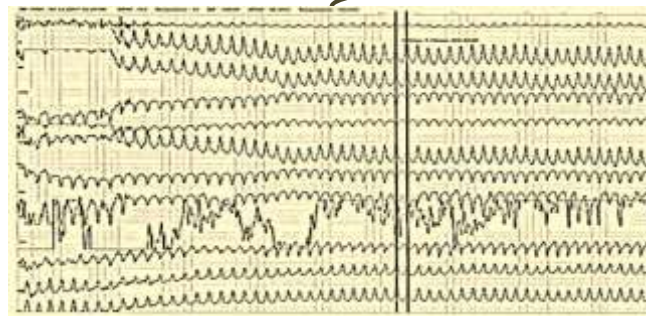
On 06/12/2017 at 12:29h – an episode of sustained, wide complex tachycardia, together with presincopathic symptomatic, dyspnea and chest pain. The patient was localised on the GPS system 9 at the airport, At 12:35h an ambulance was sent t the patient. He was hospitalised. The episode of wide complex tachycardia was overcame. On 17.12.2017 the patient was implanted with CRT-D.

*The described patient and case is real and is registered through the telemonitoring system "ChecPoint Cardio – Kazalak"

THANK YOU FOR YOUR ATTENTION!