



# retention

**SMART HEART FAILURE MANAGEMENT**



**HEART FAILURE  
PATIENT MANAGEMENT AND  
INTERVENTIONS USING  
CONTINUOUS PATIENT  
MONITORING OUTSIDE HOSPITALS  
AND REAL WORLD DATA**



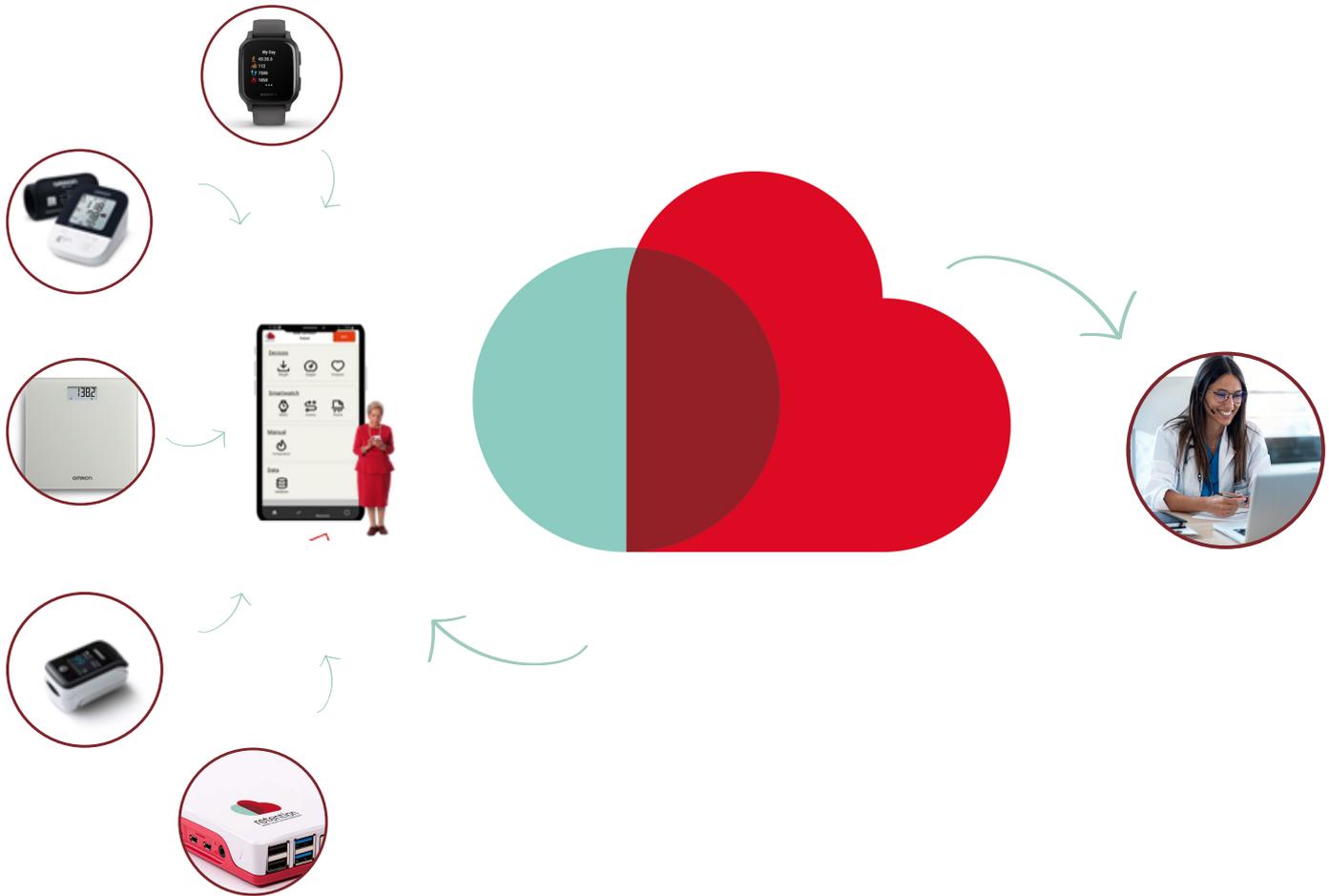
# WHAT IS RETENTION PLATFORM?

**RETENTION Platform** is an **integrated healthcare platform** designed to **monitor patients with chronic Heart Failure (HF), Heart Transplantation, or LVAD** and provide potential interventions to improve their clinical management.



HF is a heavy burden on health systems due to the multiple, prolonged hospitalisations and the related management costs.

# RETENTION PLATFORM



Allows chronic HF patients to stay at home and avoid frequent visits to medical facilities, which can be time-consuming and troublesome.

Provides patients with more comfort, independence, and peace of mind, as they can receive regular health check-ups and medical consultations without leaving home.

Prevents or reduces the risk of complications, as it enables early detection and intervention in any critical situation.

Patients can have direct and immediate contact with medical staff who can monitor their vital signs and provide guidance and support.

Helps the Healthcare system save money and time, as it can reduce the number of emergency room (ER) visits and hospital stays. Patients can also avoid the travel costs and inconveniences associated with going to a medical facility.

# WHO ARE THE RETENTION PLATFORM USERS



**HF patients**



**Carers**



**Hospitals and health professionals**



**Medical Researchers**



**Data Scientists**



**Policy Makers**

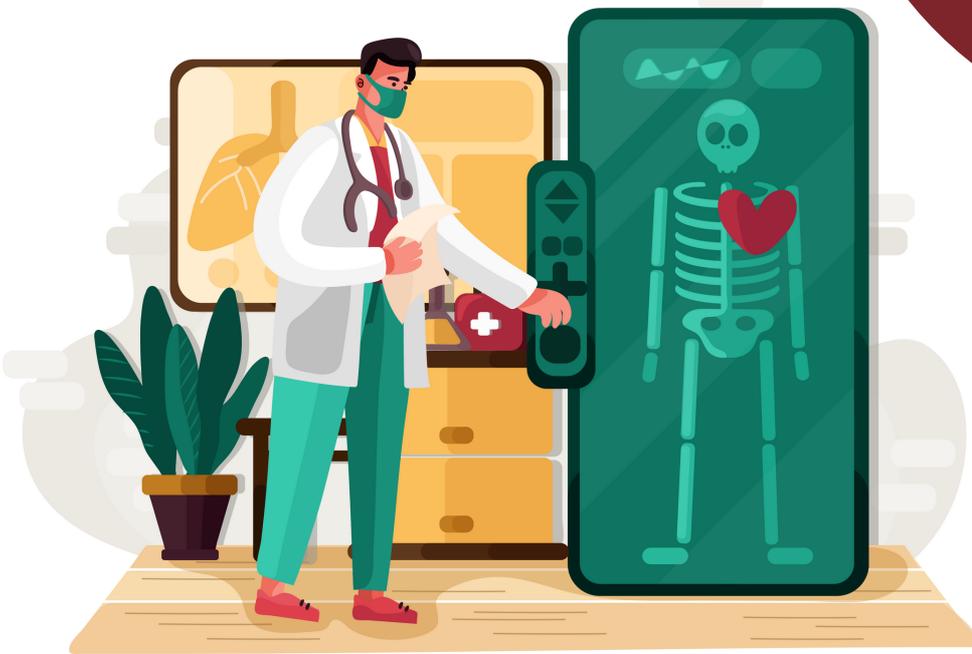
The RETENTION platform primarily targets HF patients, who often have multiple co-morbidities. These patients need regular monitoring, but frequent visits to medical facilities can be inconvenient and difficult.

The use of the RETENTION platform can save them time and enhance their comfort, independence, and health by avoiding unnecessary appointments and complications. The platform can detect emergencies early by remotely observing and analysing physiological parameters.

It can also enable quick responses by connecting patients with medical staff directly, reducing ER visits and hospitalisations.

Remote monitoring can also provide regular health check-ups and medical consultations for those who have limited access to medical care.

# REMOTE PATIENT MONITORING IS THE FUTURE OF TELEMEDICINE



Although cardiac implantable electronic devices like pacemakers, cardiac resynchronisation therapies, and implantable cardiac defibrillators provide tele-monitoring functionalities, additional data for HF remote patient monitoring can provide useful insight.

The most **important parameters** for **remote monitoring** are:

- Body weight
- Systolic and diastolic blood pressure
- Heart rate
- Analysis of the heart rhythm
- Peripheral capillary oxygen saturation (SpO<sub>2</sub>)
- Self-rated health status

Additionally, collecting continuous real-world data and integrating Artificial Intelligence (AI) models into patient management enhances the prognostic value of remote monitoring solutions.

# DEVICES AND SYSTEMS INTEGRATED IN RETENTION PLATFORM

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**Garmin Venue SQ:** It measures physical activity, stress, sleep quality and more.



**M4 Intelli IT:** The Omron M4 Intelli IT blood pressure monitor simplifies monitoring your hypertension at home and automatically transfers your results to your smartphone.



**Digital Scale SC-150:** The OMRON Scale with Bluetooth capability provides unlimited storage of weight measurements.



**P300 Intelli IT:** The OMRON P300 Intelli IT accurately monitors blood oxygen saturation levels (SpO2) and detects heart rate.

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**Xiaomi MI:** A temperature & humidity monitor used to collect qualitative indoor information relevant to patient's health.



**Raspberry Pi 4:** A tiny and versatile micro computer acting as a "Home Gateway" to collect Real World Data.



**Open data:** Free and updated external data from various sources and formats through a weather api "Ext. Temperature", "Ext. Humidity" and "Pollution".

# ONE PLATFORM, MORE SOLUTIONS

**The patient edge** is a solution that can be easily incorporated into HF patients' daily routine, thus enhancing their home care experience. The Patient Edge consists of a Mobile App and a Local Home Gateway that collect and pre-process real-world data from sensors and clinical data from medical devices at home.

The solution allows patients and carers to:

Keep track of heart rate, calorie burn, steps, distance, and sleep quality with the Garmin smartwatch. The smartwatch syncs with the app and provides real-time feedback and insights.

Measure the oxygen saturation, blood pressure, and weight with the OMRON devices, a set of easy-to-use and reliable devices that connect with the app via Bluetooth. The OMRON devices allow for daily measurements of these vital signs to be analysed and monitored by the app.

Record temperature measurements manually within the app — a simple and convenient way to keep track of the body temperature. Patients just need to measure their temperature with a thermometer and register the value via a specific screen. The app will store and display the temperature history and trends.

Monitor the VAD device parameters such as speed (RPM), flow (LPM), pulse index, power (W), duration, alarm, and actions — a comprehensive and secure solution for LVAD patients. The app lets patients send VAD device measurements along with photos of the device screens for validation purposes. The app also helps to manage VAD device alerts and actions.

Gather real-time measurements of temperature and humidity values in the patient's living place as well as outdoor temperature, pollution, and humidity. This data can help measure the thermal comfort and risk of heat stress or dehydration, factors that may affect patients' cardiovascular and respiratory functions, as well as their sleep quality and mood.



# ONE PLATFORM, MORE SOLUTIONS



**The clinical site backend** is more than just a clinical dashboard for clinicians. It is a powerful tool that enables them to access, visualise, process, and analyse the data of all remote managed patients.

The clinicians can use it to:

- Explore and compare the data from different sources, such as sensors, devices, surveys, and medical records.
- Apply and customise various data analytics and artificial intelligence techniques, such as trend analysis, anomaly detection, clustering, and classification.
- Load and use pre-trained models that can help predict and prevent adverse outcomes.
- Recognise and interpret the impact of medication and lifestyle on the patients' health and well-being.
- Reach for evidence-based decisions for personalised clinical management and interventions.

# ONE PLATFORM, MORE SOLUTIONS

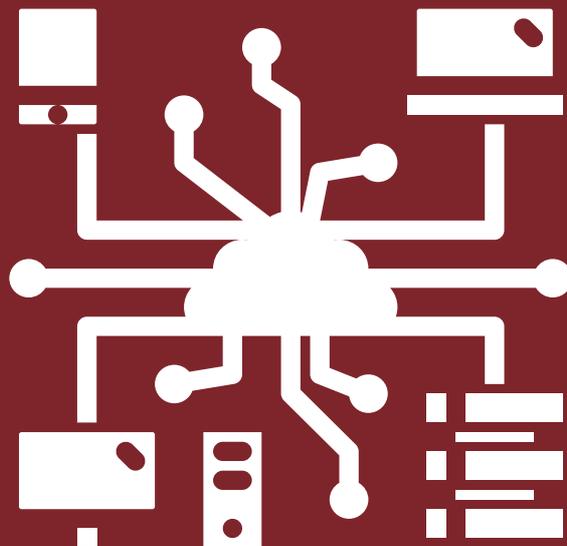
The **global insights cloud** is a versatile tool designed to meet the needs and preferences of different users, such as Data Scientists, Clinical Researchers, and Policy Makers. It allows users to access, analyse, and visualise the anonymised data using different AI and ML models selected by Researchers and Policy Makers.

The tool allows:

**Clinical Researchers** to create and manage their own models using the model view and specification. They can add code that will process the FHIR data and train the models, as well as examine the details of the models, such as when they were created, how long they took to train, and what metrics they achieved.

**Data Scientists** to execute and monitor the federated big data analytics using the analytics execution and monitoring view, where users can run their models on the distributed data sources and see the results and progress of the analytics tasks. Users can also control and adjust the parameters and settings of analytics tasks.

**Policy Makers** to discover and report disease and policy insights using the disease and policy insights view, where they can explore and compare the data from different perspectives and dimensions. Policy Makers can also generate reports and visualisations that can help communicate and share findings and recommendations.



The **Global Insights Cloud** is a solution that enables *data enthusiasts* to create added value from the data collected by the RETENTION platform. It is a solution that leverages the power of machine learning and data analysis to improve clinical management and interventions for HF patients.

# THE SCALE OF HEART FAILURE PATIENTS MONITORING

One of the most common and serious condition affecting older people is heart failure (HF), which is a syndrome characterised by the inability of the heart to pump enough blood to meet the body's needs. HF affects more than 60 million people worldwide (WHO), 25% of whom are in Europe. The burden of HF is expected to increase in the future due to the ageing population, the improved survivability of patients with cardiovascular diseases, and the rising prevalence of risk factors such as obesity and diabetes. Therefore, there is a need for effective prevention, diagnosis, treatment, and management of HF in Europe.

The guidelines of the European Society of Cardiology highlight the role of new technologies such as remote patient monitoring, telemedicine, mobile health applications, and artificial intelligence in improving HF care and mitigating differences in health systems, policies, resources, standards, and practices.

The RETENTION project is honoured to be part of the concerted effort to improve HF care in Europe and improve the health outcomes and quality of life of people living with this condition.



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SMART HEART FAILURE MANAGEMENT



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