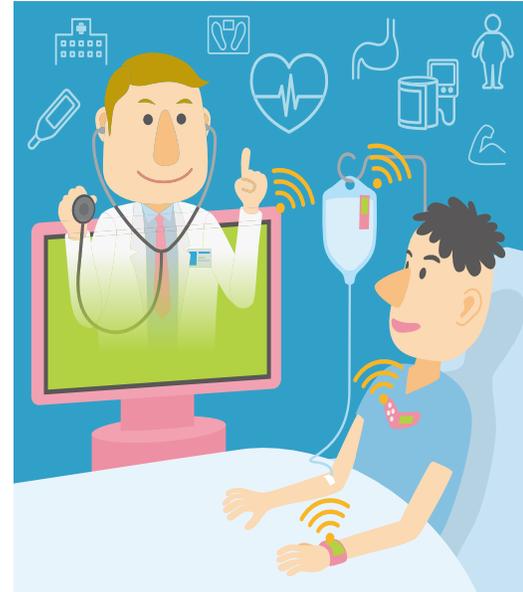


Vitabits is a platform for **monitoring patients at a distance**. It helps medical specialists to communicate with patients and continuously observe their vital signs measured in the patients' home environment.

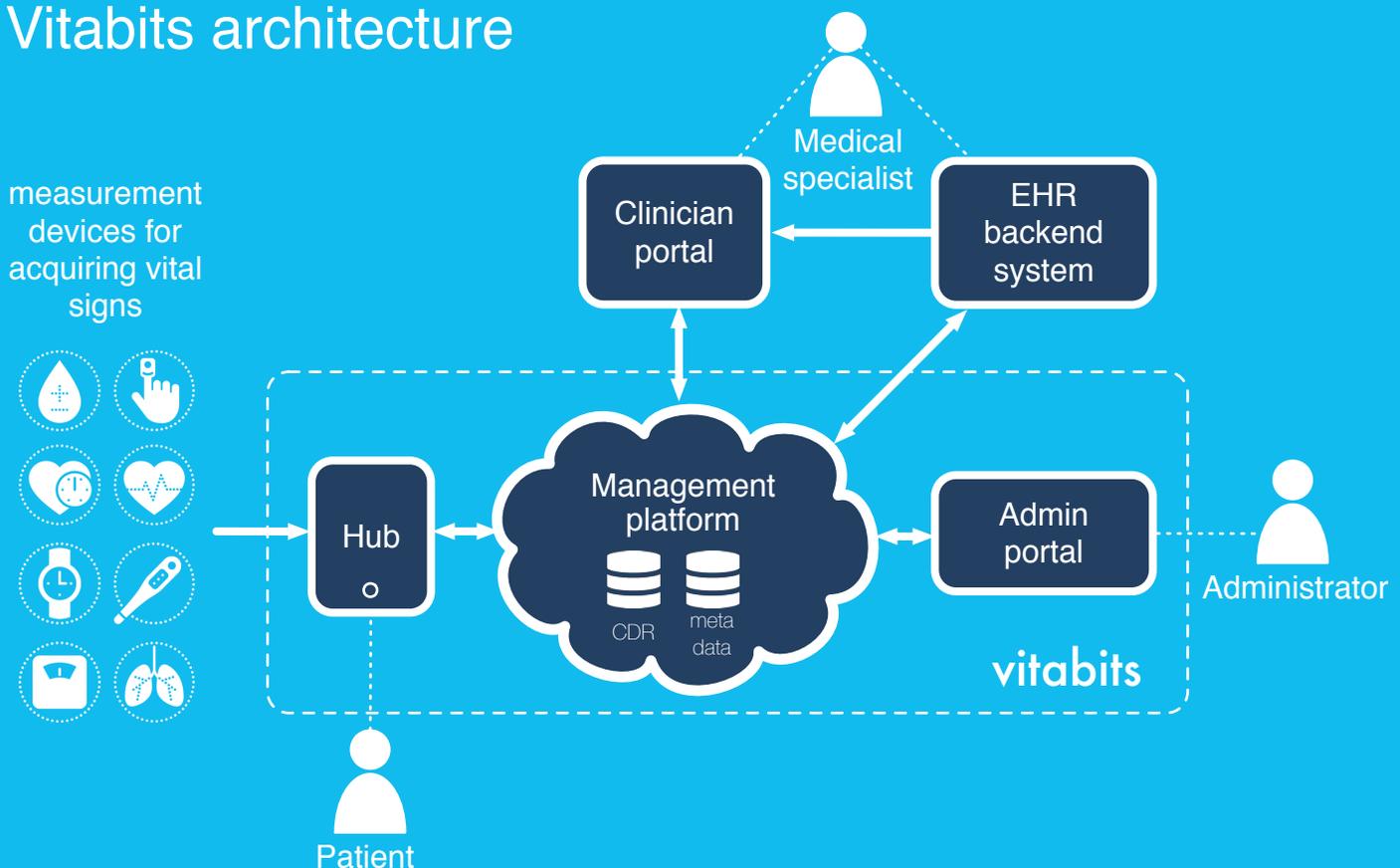
The platform is especially appropriate for remote monitoring of patients with **chronic diseases**, such as diabetes, asthma, congestive heart failure, arterial hypertension, COPD, etc.

Using the platform, the doctor can prescribe a **home care therapy** for a patient, including self-measurement of various vital signs and other activities to acquire data for efficient treatment. The platform allows the doctor to communicate with the patient over a video call and instant messaging and to call the patient for a physical visit if required.



Based on regular observation of patients' health conditions, medical specialists can provide **more accurate diagnosis** and **adjust treatments** as needed. This contributes to higher efficiency of health care and consequently lowers the associated costs.

## Vitabits architecture

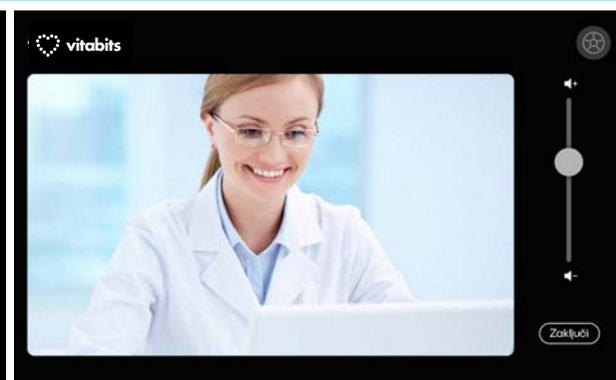
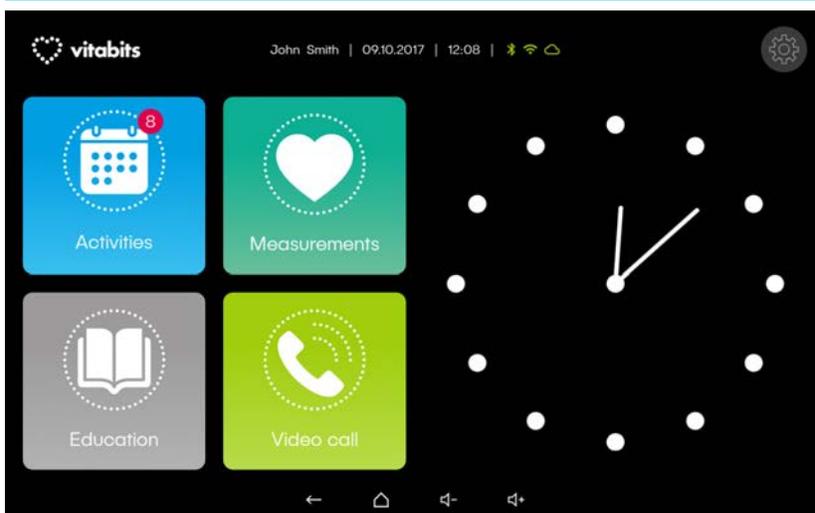


# Hub

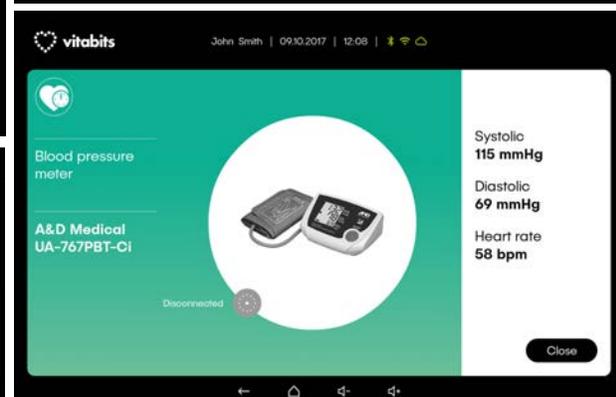
Hub or gateway is a software that supports an easy and efficient self-measurement of patient's vital signs and safe data transfer to the cloud. The software is generic, i.e. it runs on a **smart phone**, **tablet**, **TV-box** or on a **dedicated standalone device**. Thanks to the hub, the whole measurement process is simple and transparent – patients don't need to care of anything - the measurement devices are **auto-detected** and measurements automatically sent to the backend system. At the same time, the hub acts as the main **communication channel** between patients and their treating physicians.

## Basic functionality

- Easy integration with various measurement devices and sensors,
- Device auto-detection,
- Multi-user support,
- Voice commands and messaging,
- Secure transfer of data to selected backend systems,
- Support for chronic diseases, such as diabetes, asthma, CHF, COPD, arterial hypertension...
- Support for daily activities, reminders, and warnings,
- Representation of measurement data in a table or on a graph, with a reference intervals and trend lines,
- Support for video communication / instant messaging,
- Support for remote management of hub and connected devices.



Date	Systolic (mmHg)	Diastolic (mmHg)
13.04.2017, 14:10	126	69
13.04.2017, 09:50	145	69
13.04.2017, 04:44	114	60
12.04.2017, 22:13	163	60
12.04.2017, 14:54	150	60
12.04.2017, 01:23	133	90
11.04.2017, 10:14	140	58



# Management platform & Admin portal

Management platform is a **cloud enabled server** that implements all required functions for remote management of vitabits hubs and connected devices. The management services are available through GUI of **Admin Portal** or over dedicated API. At the same time, the platform serves as a **safe and secure data storage**.

## Basic functionality

- Remote management and control of active hubs and connected devices,
- Administrative support for the entire life cycle of remote patient monitoring, including technical support for service activation and deactivation, troubleshooting, system update, QoS assurance, notifications, remote device management etc.,
- Application program interface (API) implementing Push&Pull services for remote platform management and data retrieval,
- Safe and secure repository for data, captured within the remote patient monitoring. The data in the repository is encrypted and only available to patients (owners) and authorized medical personnel.

## Admin portal



**Vitabits platform status**  
72% Active hubs, 28% Nonactive hubs

**My last interventions:**

Date and Time	Type	Details
1.3.2017, 11:30:55	Hardware failure	The blood pressure device remotely the hub and by giving the user remote support, it turned out the device is in ...
1.3.2017, 09:35:45	New device added	User needed new device for measuring glucose level. I helped him to bind it.
27.2.2016, 07:20:39	Connection problems	WiFi connection didn't work. We didn't solve the problem yet as he needs the password for his local ...

**My profile:** John Doe, john.doe@vitabits.org, User, Distributor, Admin

**Measurements**

Date and Time	Measurement	Result	Unit
1 2.3.2017, 12:33	Blood pressure	130/90	mmHg
2 2.3.2017, 12:35	Pulse	88	bpm
3 2.3.2016, 12:40	Weight	77	kg
4 3.3.2017, 19:30	Blood pressure	166/120	mmHg
5 4.3.2017, 21:44	Blood pressure	180/112	mmHg

**Blood pressure graph:** Shows diastolic and systolic pressure over time (2.3 to 7.3).

**Hub info:** Type: VitaBB v0.9, Firmware version: dataHubOS Core, build 6E2X84, Last upgrade: 15.10.2016 @ 10:44:12, Current status: Active

**Device name:** JohnT2, S/N: SI2016-22ACF1G21, Last status check: 5.5.2017 @ 15:06:41

**Hub state at last heartbeat signal:** CPU 69%, Memory 28%, Disk Space 8.4GB

**Connected devices:**

Last used	Connection	Type	Details
1.3.2017, 11:35:55	BTLE	Weight	OneTouch Continua 22b, FW id: 3efa16bd
1.3.2017, 09:35:45	ZigBee	Blood pressure	Contour 33, Model X, HW: AEF292845CKW
27..2016, 07:20:39	ZWave	Blood glucose level	BloodStart Advanced v2, S/N: 02X245AEF45

**Interventions:**

Date and time	Agent	Type	Details
1.3.2017, 11:35:55	BlazS	Hardware failure	The blood pressure device wasn't working. After checking remotely the hub and by giving the user remote support, it turned out the device is in ...
1.3.2017, 09:35:45	JureK	New devices added	User needed new device for measuring glucose level. I helped him to bind it.
27..2016, 07:20:39	JokiC	Connection problems	WiFi connection didn't work. We didn't solve the problem yet as he needs the password for his local ...

**New intervention:** Date and Time: 7.6.2017, 6:45, Intervention Type: Hardware failure, Description: Problem description, details of troubleshooting, findings, actions, ...

# Clinician portal

The Clinician portal allows remote monitoring of chronic patients. The medical staff can use the portal to **plan patient's therapy**, remotely monitor patient's measurements of vital signs, and **access** and **analyze data** obtained by questionnaires and recording of patient's eating habits. Medical staff can communicate with them using **video communication** or **messaging**.

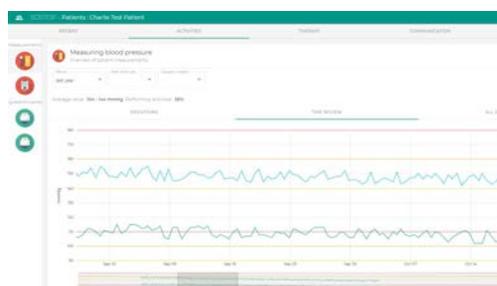
## Basic functionality

- Planning of patient's remote therapy (frequency and limits for vital signs measurements, questionnaires),
- Overview of patients' data from the backend medical information system (basic data, chronic diseases, medical therapy),
- Overview of measurements (deviations, graphic representation, detailed overview), patient's nutrition information, and patients' chronic disease management levels,
- Remote communication with the patient (video communication, messaging),
- Creating and distributing reports on the patient's remote monitoring of the chronic disease,
- Publishing educational content for patients.

Clinician portal



Patient Name	Activity	The share of deviations	Average value	Target	Performing activities
Emily Test Patient (74 years)	Measuring blood pressure	0%	64 - 70 mmHg	---	2%
Emily Test Patient (74 years)	Measuring blood sugar	100%	3 mmol/l	---	0%
Jack Test Patient (31 years)	Measuring blood pressure	0%	42 - 108 mmHg	---	0%
Charlie Test Patient (61 - 67 years)	Measuring blood pressure	66%	154 - 154 mmHg	---	66%
Charlie Test Patient (61 - 67 years)	Measuring blood sugar	68%	6 mmol/l	---	68%



**SOSTOP - Patients: Charlie Test Patient** John (Test health center)

PATIENT ACTIVITIES THERAPY COMMUNICATION FOOD

Telemedicine therapy of the patient  
Therapy beginning: 7. junij 2018  
Last changes: 9. 4. 2019 12:49 [DISCARD CHANGES] [CONFIRM CHANGES]

**Measurements**

**Measuring blood pressure**  
Enter the limit values of the deviations and the instructions for carrying out the activity

Stage	Systolic (mmHg)	Diastolic (mmHg)
Stage 1:	From: 140 To: 159	From: 90 To: 99
Stage 2:	From: 160 To: 179	From: 100 To: 109
Stage 3:	From: 180	From: 110

Instructions for carrying out the activity:  
Before you check your blood pressure, you should:  
Wait 30 minutes after eating or using caffeine, alcohol, or tobacco products.  
- Go to the bathroom and empty your bladder.  
- Rest for 3 to 5 minutes and do not talk.  
- Sit in a comfortable position, with your legs and ankles uncrossed and your back supported.  
- Elevate your left arm to the level of your heart. Place it on a table or desk and sit still.  
- Wrap the cuff around the upper part of your bare arm. The cuff should be smooth and snug. There should be enough room for you to slip one fingertip under the cuff.  
- Check the placement of the cuff. The bottom edge of it should be 1 inch above the crease of your elbow.

Note: [Text area]  
[REMOVE ACTIVITY]

**Schedule**  
Set a schedule of activity

Frequency	Start	To
1 (past)		
1 (current)	22. junij 2018	
Frequency	Daily	
During the day	2 - times	

[CHANGE SCHEDULE]

# Connectivity

Vitabits enables remote acquisition of all important [vital signs](#) and other data that can contribute to understanding of patient conditions and can help doctors to give [efficient treatment](#).

## Vital signs



blood glucose level



heart rate and oxygen saturation



blood pressure



ECG signal



daily activity



body temperature



body weight



respiratory rate

## Measurement devices

Vital signs can be measured by any measurement device that communicates over [Bluetooth](#) protocol (BT or BTLE) and is [Continua](#) certified or uses standard [GATT](#) services.



At the moment, vitabits hub integrates over 50 measurement devices selected by independent medical specialists. The device manufacturers include: Rossmax, Nonin, A&D Medical, ChoiceMMed, Roche, Philips, ForaCare, Contour, Fitbit,... All devices have acquired certificate of "European Conformity" 



Measurement devices can be easily [added](#) or [removed](#) using graphical interface (over hub or management portal) or programmatically over API.

## Supported backend systems

Vitabits offers an API with push&pull services for the communication with any available backend system. By design, it supports and promotes the communication with [FHIR](#) or [OpenEHR](#) compliant systems.

