
Indoor and outdoor NITICSplus solution for dementia challenges (IONIS)

IONIS: Validation of Technical Solution through Pilots with End-Users

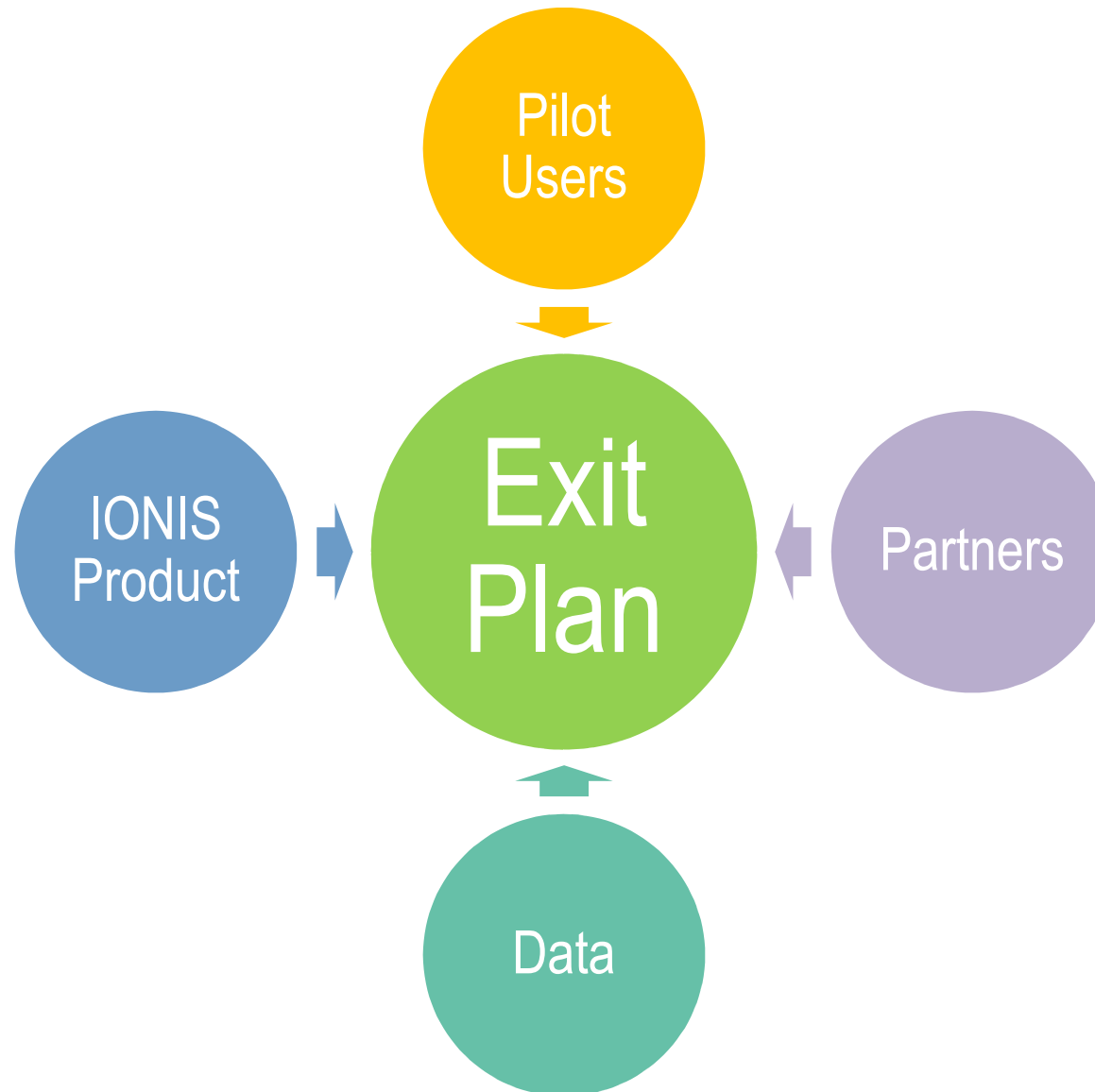
**AAL Forum, 23-25 September 2019,
Aarhus, Denmark.**

Oana CRAMARIUC, CITST

Presentation overview

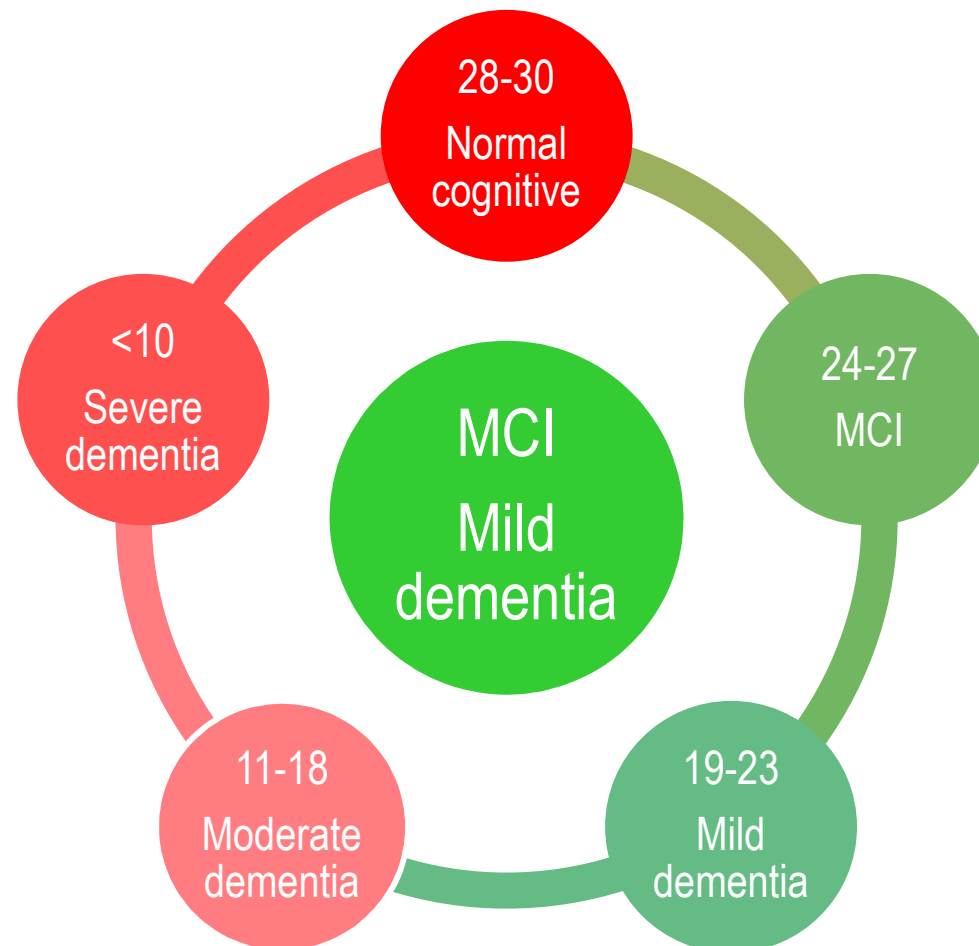
- ❖ Pilots: IONIS exit strategy
- ❖ End-user classification and differentiation
- ❖ Pilots with individual platform modules
 - ❖ Pilots materials and methods
 - ❖ Pilots countries
 - ❖ Slovenia
 - ❖ Poland
 - ❖ Hungary
 - ❖ Romania
- ❖ Conclusions

Exit strategy for all involved parties



End-user classification and differentiation

- ❖ Dementia specific criteria: Mini-Mental State Examination (MMSE) - primary tool for cognitive assessment and user selection



Green – included
Red – excluded

End-user classification and differentiation

- ❖ Technology specific criteria - category of users would need specific functionalities of the IONIS system. The input given by the end-users in WP1 was taken as the basis of the categorization.
- ❖ Demographics:

Internet usage in the 65+ population



Pilots with individual platform modules

- ❖ Overview for all countries (33 out of 80 primary and secondary users)
 - Pilots started in Slovenia already in August (Withings Sleep Tracking Mat, FitBit Alta HR). Pilots complemented with living lab demos and tests.
 - Romania followed. Pilots include sleep (Emfit) and activity monitoring (FitBit Charge 2 – larger display, GPS)
 - Pilots in Poland and Hungary include various sleep sensor (Ballistogardiography, UWB), health monitoring (BZN solution), indoor localization.

Pilots materials and methods

Device Code	Device Name	Functionality
XMB2	XIAOMI MI Band 2	Smart Watch
XMB3	XIAOMI MI Band 3	Smart Watch
ADWS352	A&D Precision Health Scale(UC-352BLE and UC-351PBT)	Body Weight Scale with BLE or Bluetooth
ADBP651	A&D Blood Pressure Monitor(UA-651BLE and UA-767)	Blood Pressure Monitor with BLE or Bluetooth
Z-PP102	Z-Wave Fibaro Wall Plug (FGWPF-102)	Smart power plug
Z-DT02	Z-Wave Philio Tech PST02-1C Z-Wave 3 in 1 Sensor	Enviromental multisensor (PIR, door/window, temperature and illumination)
Z-PPMIC	Z-Wave NodOn Micro Smart Plug	Smart power plug
Z-MS001	Z-Wave Fibaro Motion Sensor (FGMS-001)	Motion Sensor
EFSM	EMFIT Sleep Tracking & Monitoring with Heart-Rate-Variability	Sleepmonitoring device
KWSMK88	King Wear K88 Heart Rate Smartwatch	Smartwatch GPS
FBFTCH2	Fitbit Charger 2	Fitness tracker
WUIL01	WUT indoor localization infrastructure 01	WUT indoor localization infrastructure 01
NOKSB	Nokia Withings sleep pad	Sleepmonitoring device
EXYX-GW	IONIS gateway	Data collection

Pilots in Slovenia (ASLO)

- ❖ Male, age 68, graphic and art editor, retired; 2016 diagnosis of Alzheimer's disease.
- ❖ Living alone in an apartment; caregiver – daughter;
- ❖ Very active and social, using computer and smartphone;
- ❖ Member of European Working Group of People with Dementia [LINK](#);
- ❖ Interview on the use of IONIS in Spominčica magazine;
- ❖ Involved in IONIS pilot since august 2018.



Pilots in Slovenia

❖ Withings Sleep Tracking Mat

- Sleep tracking: sleep cycles (deep, light & REM), HR and snoring, sleep score;
- Home Automation: control lights, and other smart home-enabled devices by getting into and out of bed.



❖ Fitbit Alta HR

- Smart wristband;
- Tracks steps, distance, calories, activity & stationary time, HR tracking & analysis, sleep monitoring & analysis, reminders.
- Proprietary



Pilots in Slovenia

- ❖ users involved in the pilots found the devices useful: language (not in Slovenian) was an obstacle



Trials in the IZRIIS living lab

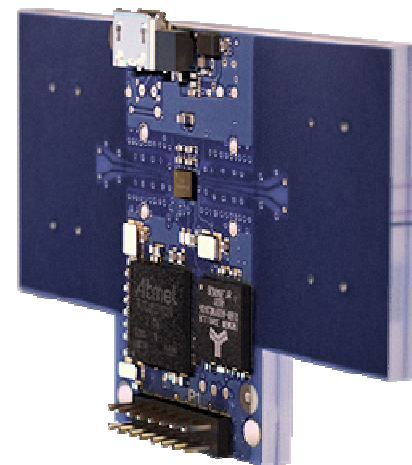
- ❖ Involved 15 end-users (7 elderly 67-82 yrs old, 8 caregivers) in 3-4 testing sessions of 30 minutes;
- ❖ Tried infrastructure: fall detector wearable, 2 options for fall detection installed in the model bathroom and toilet area; SOS button wearable or on the phone; smoke alarm detector; pill dispenser;
- ❖ During the demonstrations and trials in the last month 2 persons ordered the e-care and 1 ordered an SOS button option.



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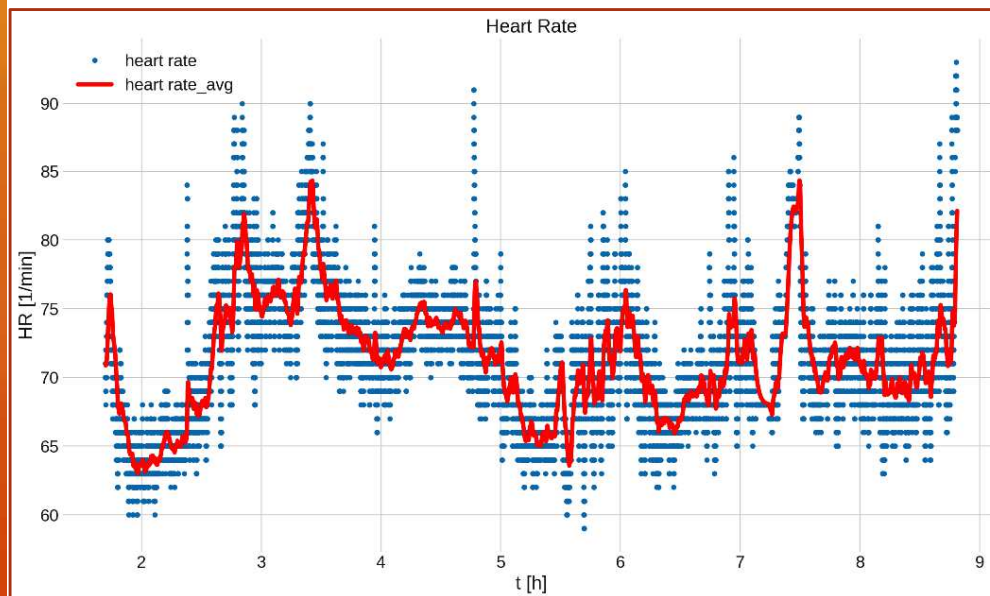
Pilots in Poland (DGW)

- ❖ Testing of two sleep sensors provided by WUT (also data processing):
 - Ballistogardiography – Bed sensor (attached to the bed) with accelerometer for detection of heart rate, respiratory rate and bed occupancy (SCA11H – Murata);
 - Ultra-wide band (UWB) sensor for wireless detection of respiration, body movements and bed occupancy (X4M200 – Xethru).

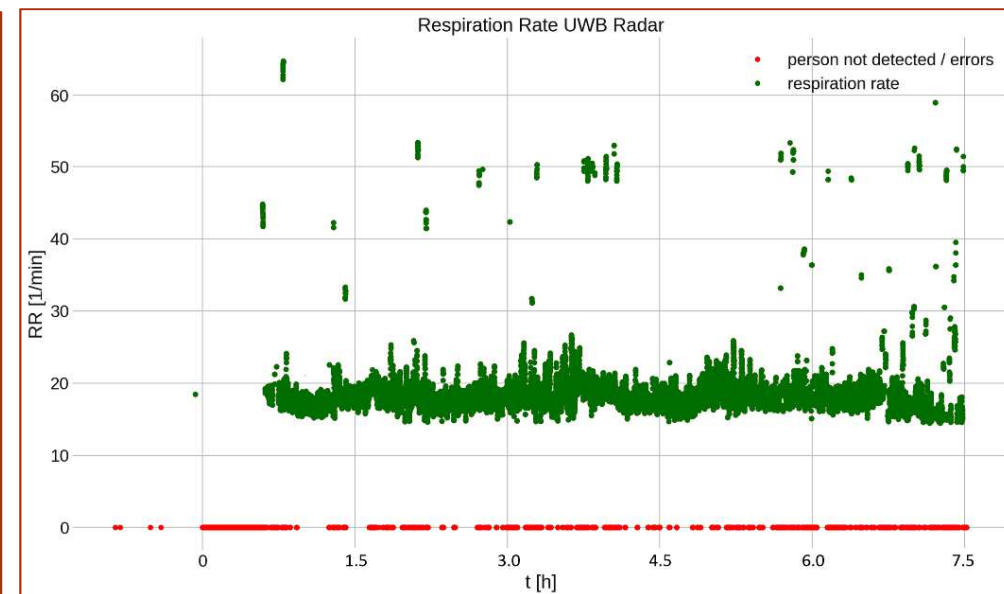


Trials in Poland (DGW)

- ❖ Trials were performed in November and December 2018 with 4 primary users for 1-6 nights.
- ❖ End-user cooperation was satisfactory.



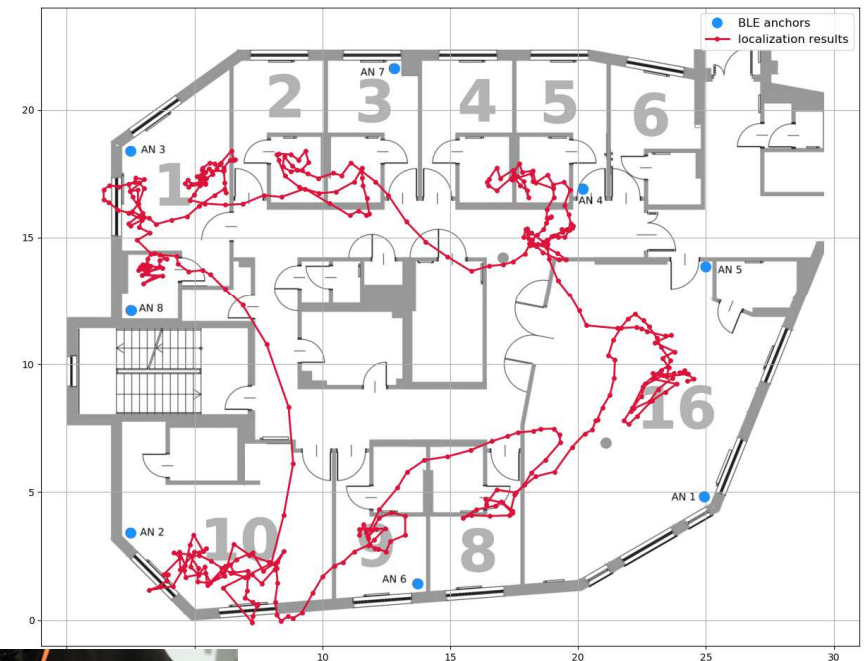
ballistocardiography sensor,
HR and average HR



UWB radar sensor, person
not detected, respiration rate

Indoor localization testing in Poland

- ❖ Preliminary tests performed in a nursing home to investigate the WiFi and BLE propagation conditions.



Trials in Poland

- ❖ The Pilot tests performed in Poland proved very valuable in terms of confirming good tolerance of the devices measuring activity (Mi band, smartwatch) and disclosing limitations of use of such devices as described above in detail.



Pilots in Hungary (MSI)

- ❖ Testing of health monitoring system:
 - Blood pressure meter (A&D UA-651BLE);
 - Samsung Galaxy A3.



2018.01.04. 08:04	124	78	88	Torok	12
2018.01.04. 12:08	122	80	88	Torok	12
2018.01.04. 18:08	118	78	78	Torok	12
2018.01.05. 07:07	120	77	88	Torok	12
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2018.01.05. 08:08	121	78	78	Torok	12
2018.01.05. 18:08	121	80	88	Torok	12

Intervallum:

☐ Vértorok

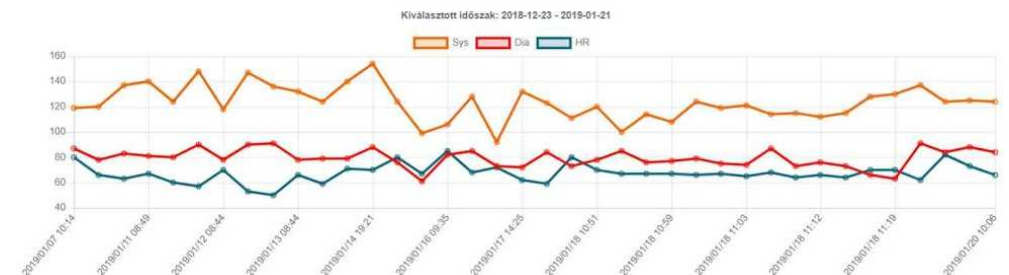
☐ Vértorokszint

☐ Testhőmérséklet

☐ Balance scale

☐ Okosóra

Lekérdezés



Pilots in Hungary (MSI)

❖ Elderly user 1&2

- Male, 79 years old
- Lives independently
- Has mild dementia
- Lives with his partner in his own flat (informal caregiver)



❖ Elderly user 3&4

- Male, 73 years old
- Lives independently
- Has mild dementia
- Lives with his wife in their own house (informal caregiver)



Pilots in Hungary (MSI)

- ❖ The users are very pleased with the measurements, they expect them, come, interested, the measured values are considered to be important for them, and the device is very practical



Pilots in Romania (CITST)

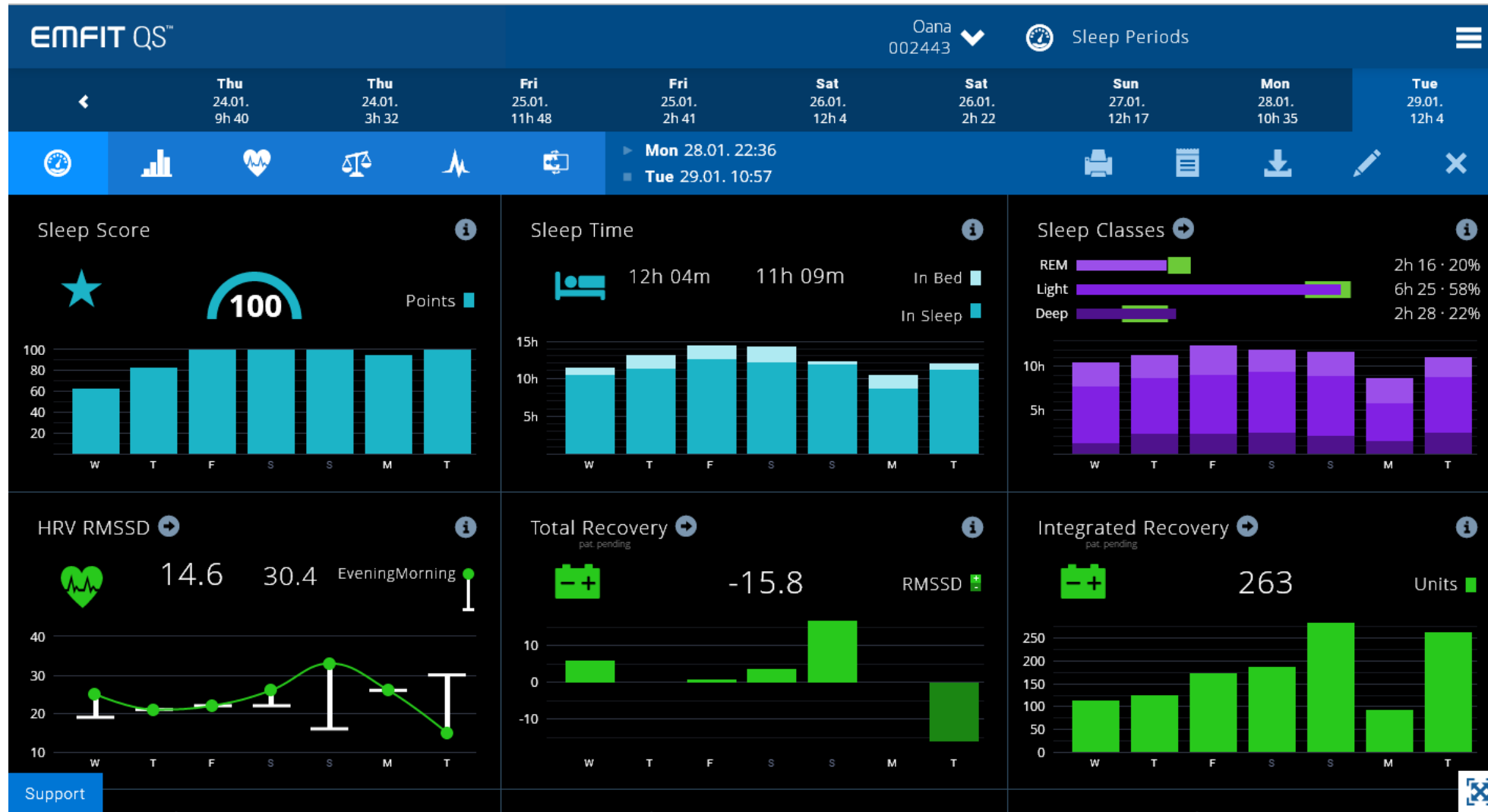
❖ Pilot infrastructure:

- 3 Emfit sleep monitoring sensor (3 primary users with MMSE 22-27 and their caregivers)
- 2 FitBit activity monitoring bracelet (2 users with MMSE 23 – 27 and 1 caregiver).

❖ Pilots started in November.



Pilots in Romania (CITST)



Pilots in Romania (CITST)

- ❖ users involved in the pilots found the devices useful.
- ❖ All users found that they can stay more active with the use of activity bracelets.
- ❖ Health monitoring was appreciated but considered more interested if coupled with an interface and the other devices which they tested (e.g. activity monitoring).
- ❖ Sleep monitoring was found very useful by the caregivers while elderly were more interested in monitoring their heart rate during sleep.



Conclusions

- ❖ Generally, users involved in the pilots found that the devices used in the pilots are helping them to stay more active, monitor their health and improve their wellbeing (e.g. sleep quality).
- ❖ Language issues have been identified as being important for the pilots with the integrated platform (especially, for the IONIS interface).
- ❖ In general, the elderly users living independently were able to use the devices on their own or with occasional help from their family members or friends.
- ❖ GDPR principles were respected.
- ❖ From technical point of view, installation of the devices did not pose any other major problems.
- ❖ From technical point of view, we have identified several issues which will need to be addressed in the integration of the IONIS platform.

