

e-Health supported home-based geriatric rehabilitation on improving daily performance

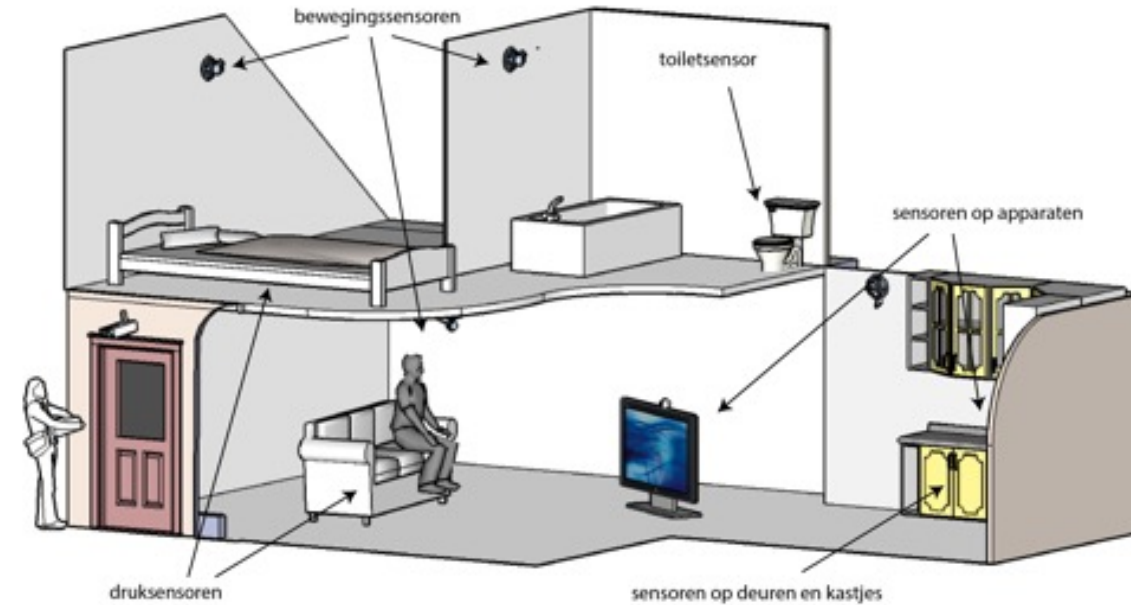




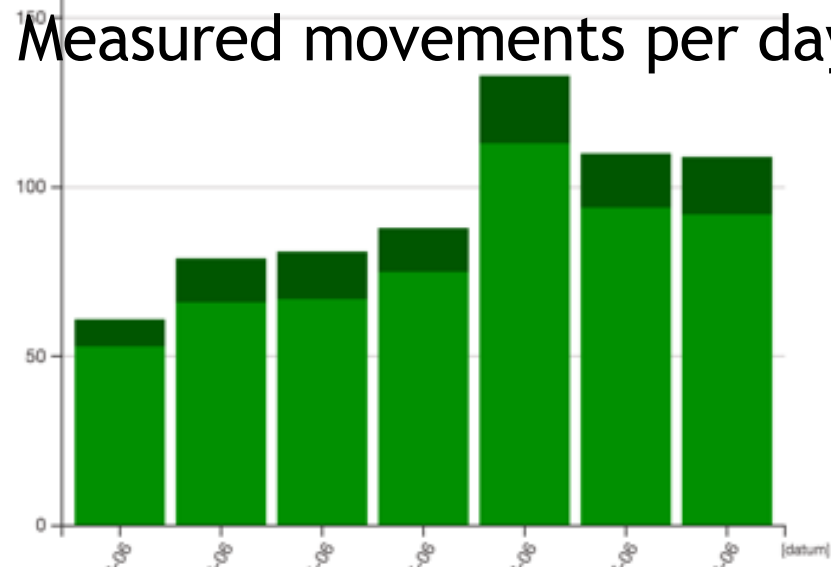
Two types of sensors

Sensor worn on the hip

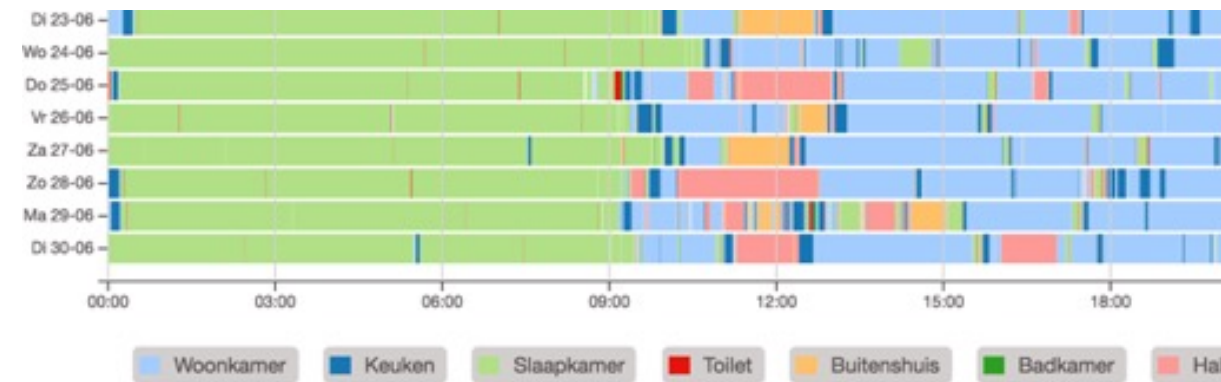
Sensors placed in the home



Measured movements per day



Activity pattern per day

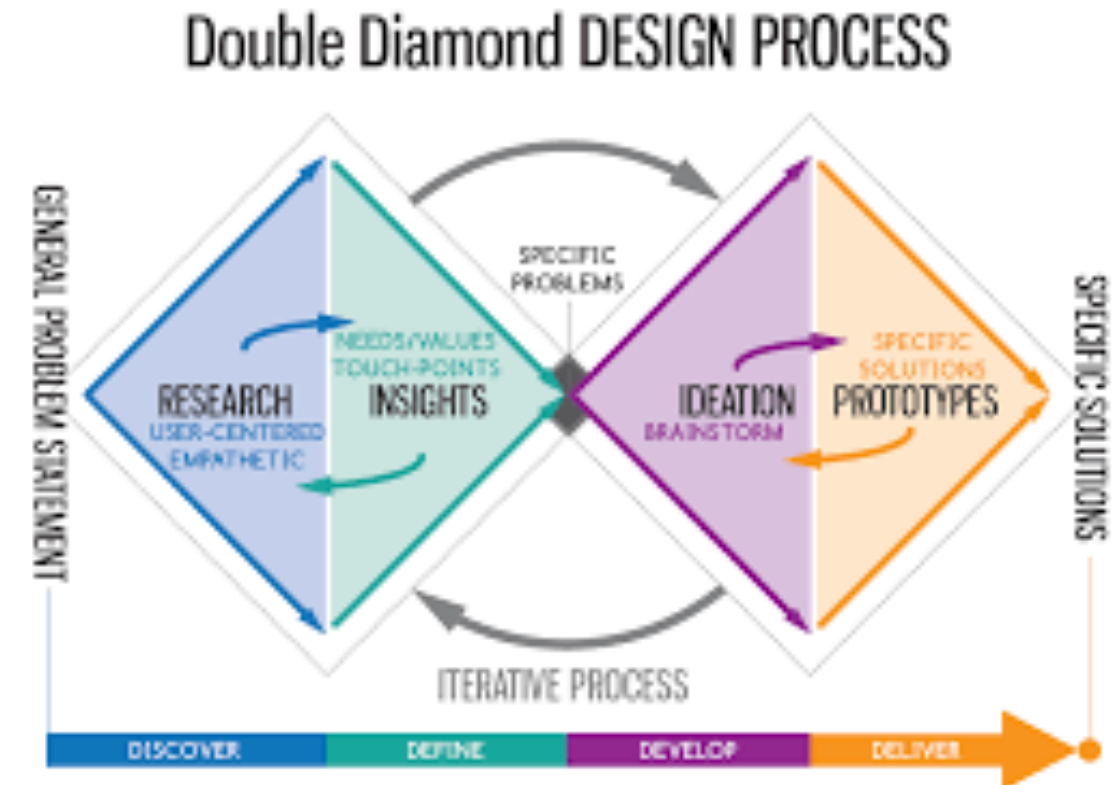
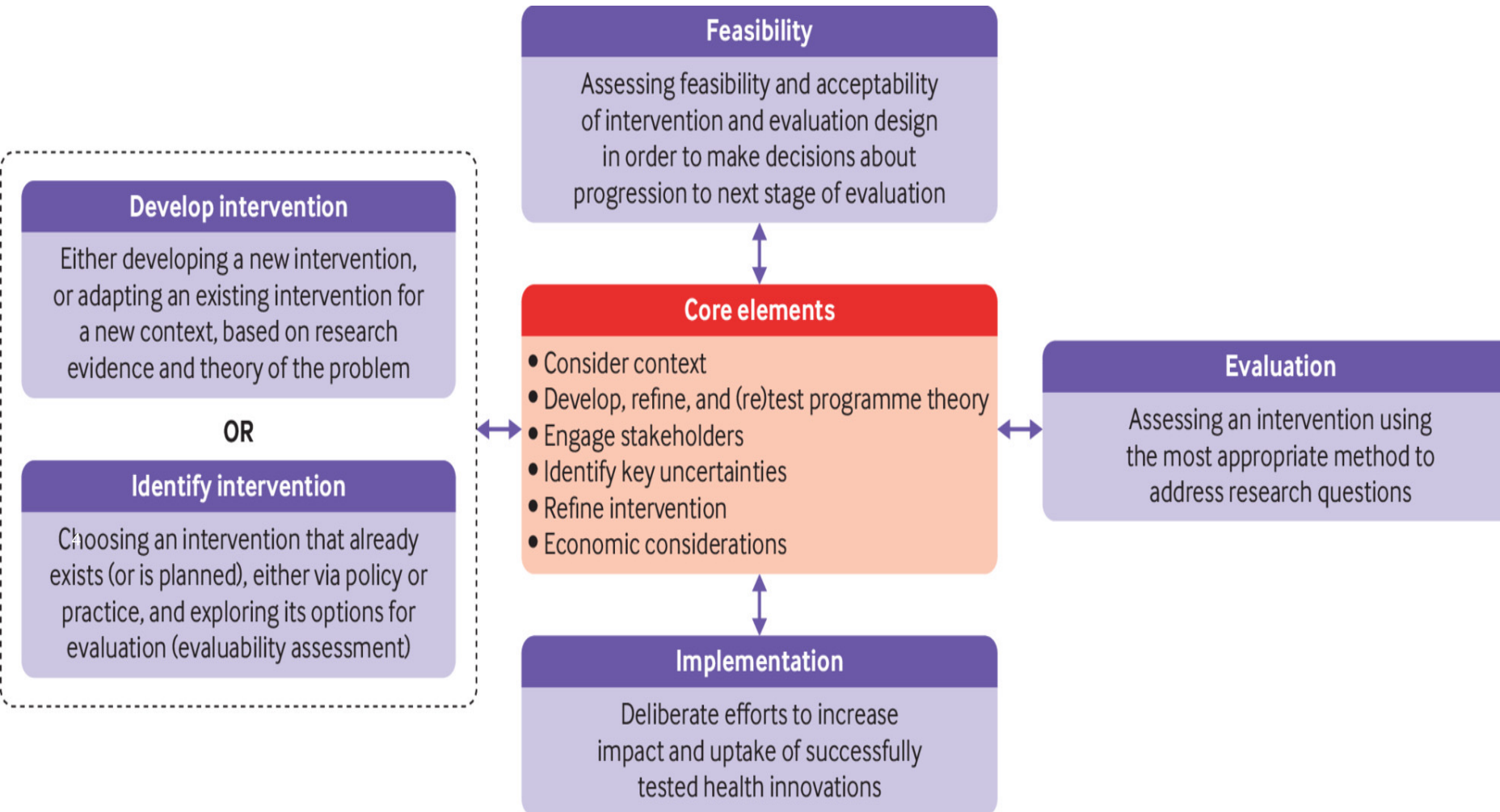




Aim of the research

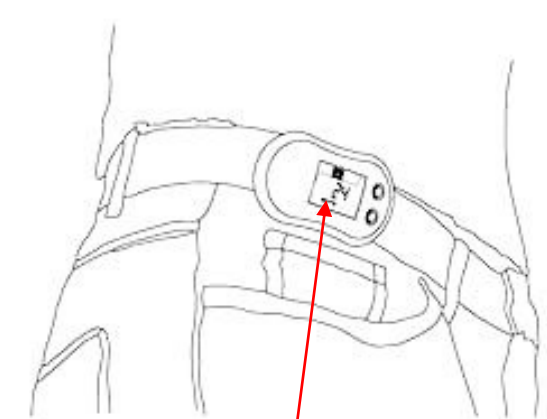
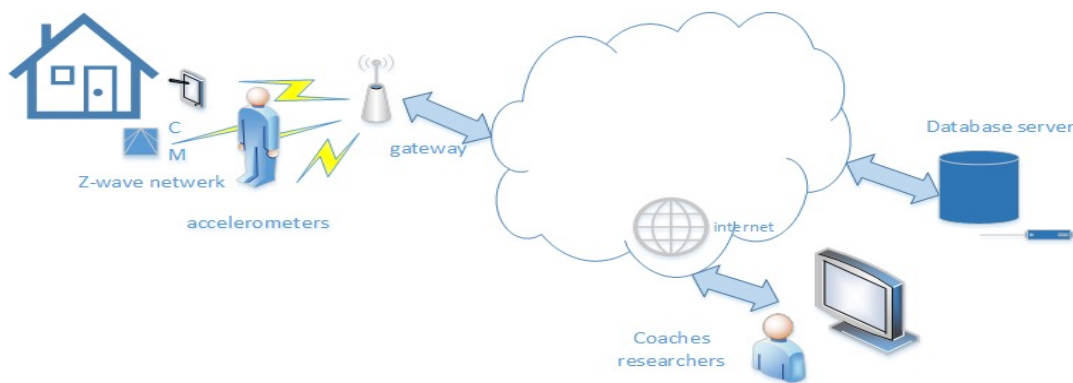
To develop, evaluate and implement eHome-based geriatric rehabilitation to support the everyday functioning of older persons who live independently at home.

Methods

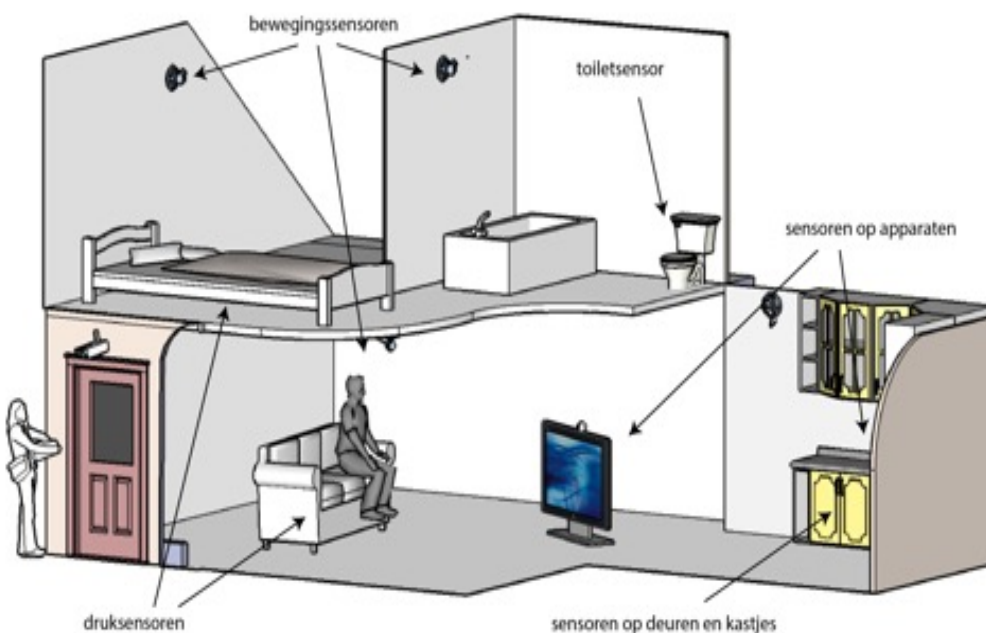


Design thinking

Medical Research Council Framework (MRC-framework) (Skivington et al, 2021)



The intervention: coaching and sensor monitoring



Coaching:

- Provide information about the importance of physical activity and daily exercise
- Ascertain the amount of movement and everyday activities during the day
- Define realistic rehabilitation goals
- make an activity plan
- Evaluate progress



SO-HIP Study

Sensortechnologie bij de revalidatie van ouderen na een heupfractuur

 English  Nederlands

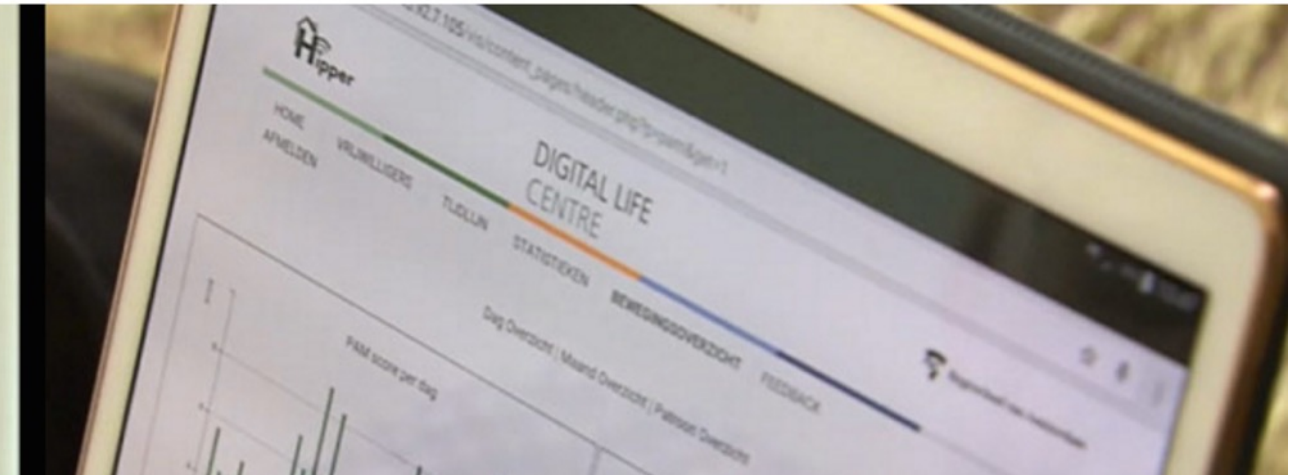
 **Amsterdam UMC**
Universitair Medische Centra



Hogeschool van Amsterdam

 **fondsNutsOhra**
ZORG SUBSIDIES

[Home](#) / [Nieuws](#) / [Onderzoek ▼](#) / [Onderzoeksteam](#) / [Training](#) / [Zorginstellingen](#) / [Contact](#) / [Login voor professionals](#)



Effectiveness of sensor monitoring in a rehabilitation programme for older patients after hip fracture: a three-arm stepped wedge randomised trial

[Margriet C Pol](#) , [Gerben ter Riet](#), [Margo van Hartingsveldt](#), [Ben Kröse](#), [Bianca M Buurman](#)

Age and Ageing, Volume 48, Issue 5, September 2019, Pages 650–657,



Volume 48, Issue 5
September 2019



Volume 48, Issue 3
May 2019

Everyday life after a hip fracture: what community-living older adults perceive as most beneficial for their recovery

[Margriet Pol](#) , [Sebastiaan Peek](#), [Fenna van Nes](#), [Margo van Hartingsveldt](#), [Bianca Buurman](#), [Ben Kröse](#)

Age and Ageing, Volume 48, Issue 3, May 2019, Pages 440–447,
<https://doi.org/10.1093/ageing/afz012>

Published: 26 February 2019 **Article history ▼**



Three groups (N=240)

Stepped wedge cluster randomised trial

Care as usual
monitoring
N=77



Coaching
N=87



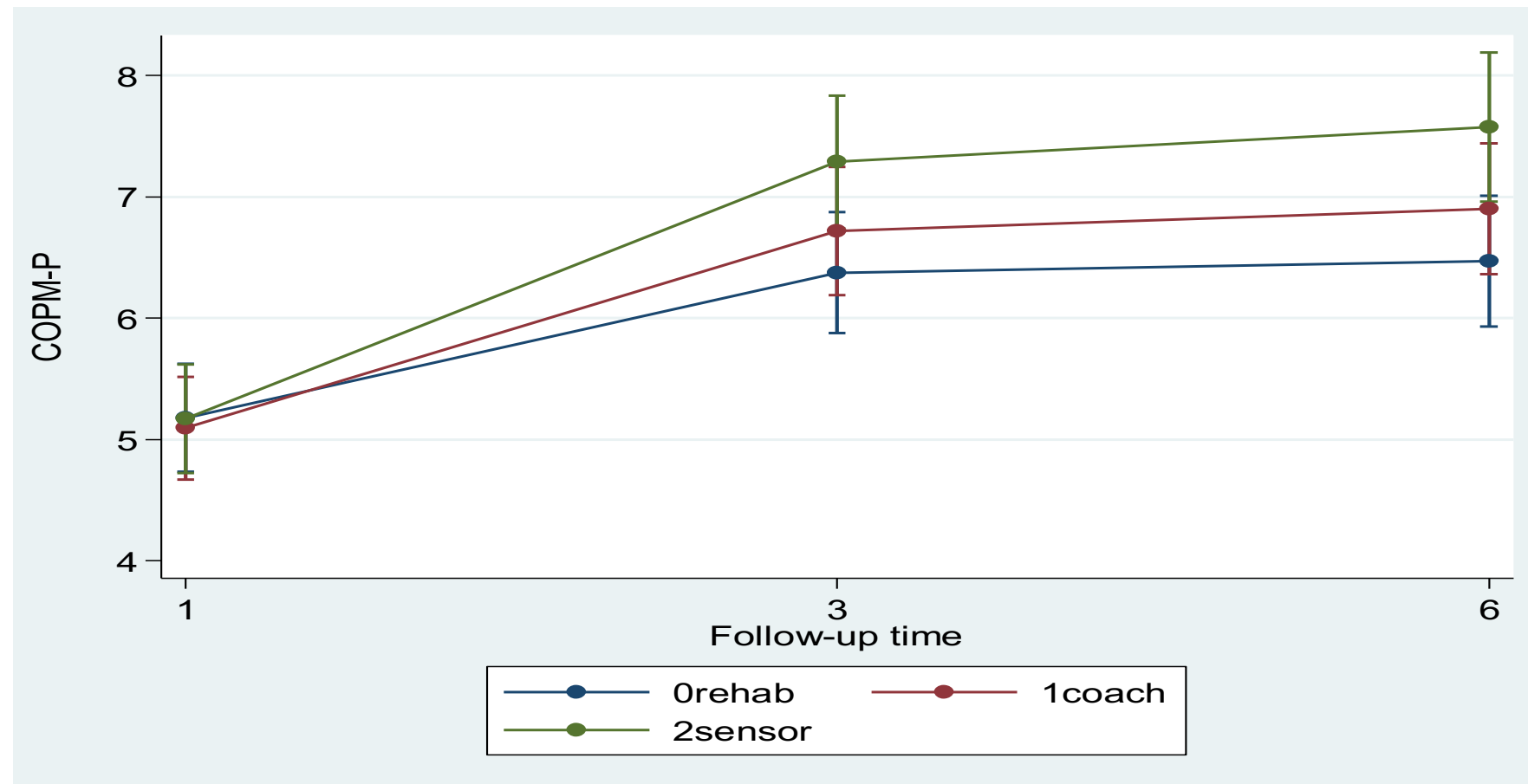
coaching and Sensor
N=76





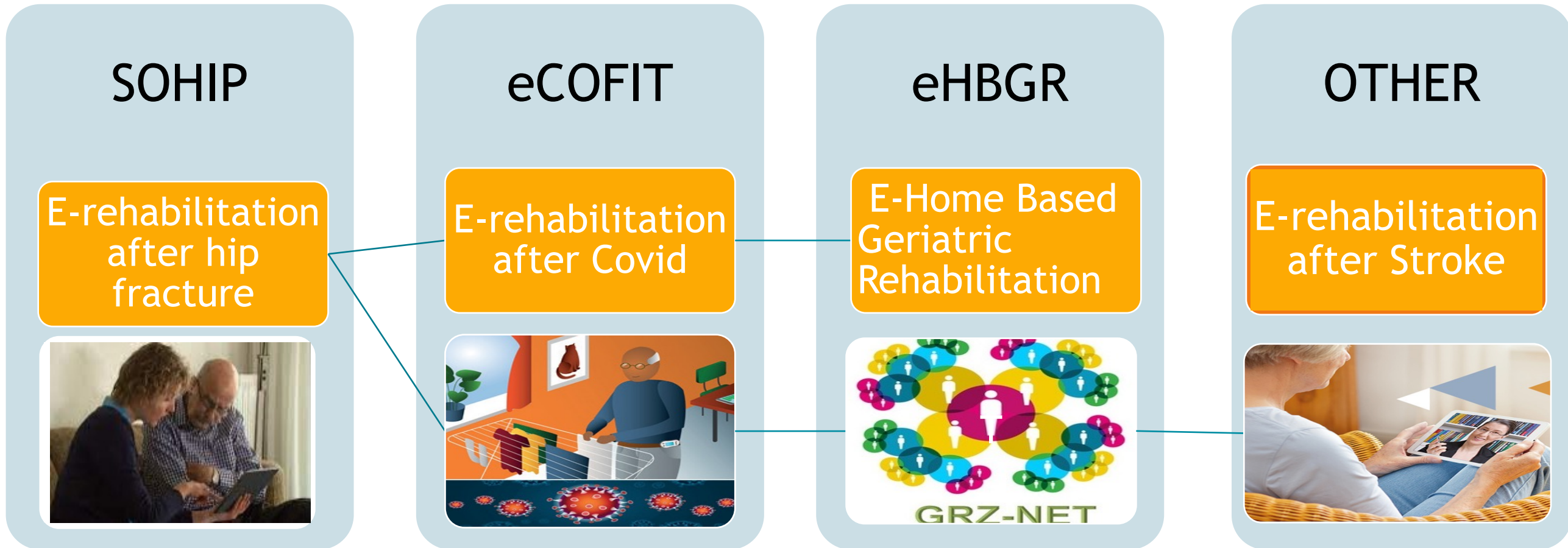
RESULTS

Significant difference in perceived performance of daily functioning at six months for OT-coaching and sensors- of 1.17 [95% CI (0.47-1.87) $P=0.001$]





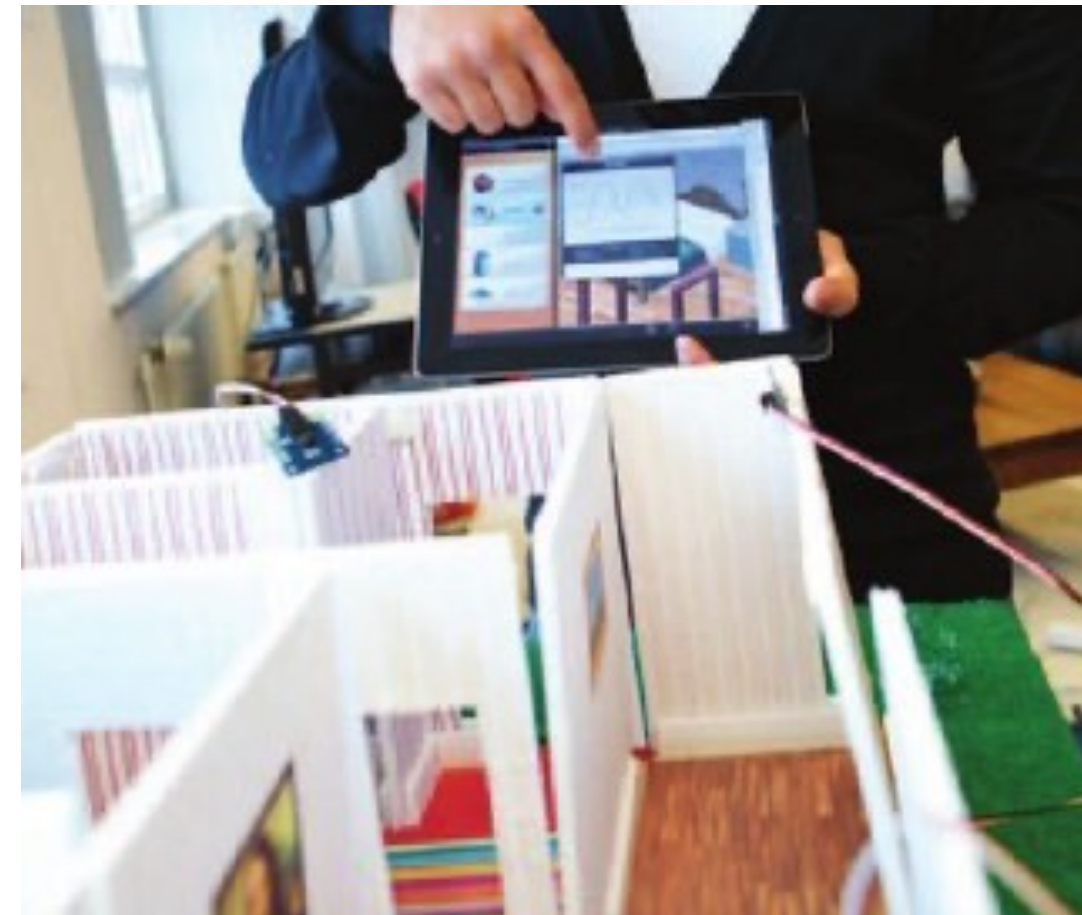
Research projects sensor monitoring and coaching



How to design the intervention



Ahmed Nait Aicha Smart technology for Ageing in Place





The choice for our wearable

- Consumer wearables; no access to the raw data; therefore it is difficult to determine the accuracy and usability for older adults.
- Research wearables; PAM, Actigraph, Active pal; provide detailed information and are well validated in literature (although tested in small samples and younger individuals).

We asked a panel of older adults to test different wearables for a few weeks (Actigraph, ActivePal, Fitbit, Samsung, Polar, PAM, Withings).



The older adult panel chose PAM

- The most user friendly
- Easy to wear
- No battery charging
- Robust
- Contains a long-life cell button battery (one year)
- Access to the PAM data via own server





Wearable Physical activity monitor (PAM)

3- dimensional acceloreometer

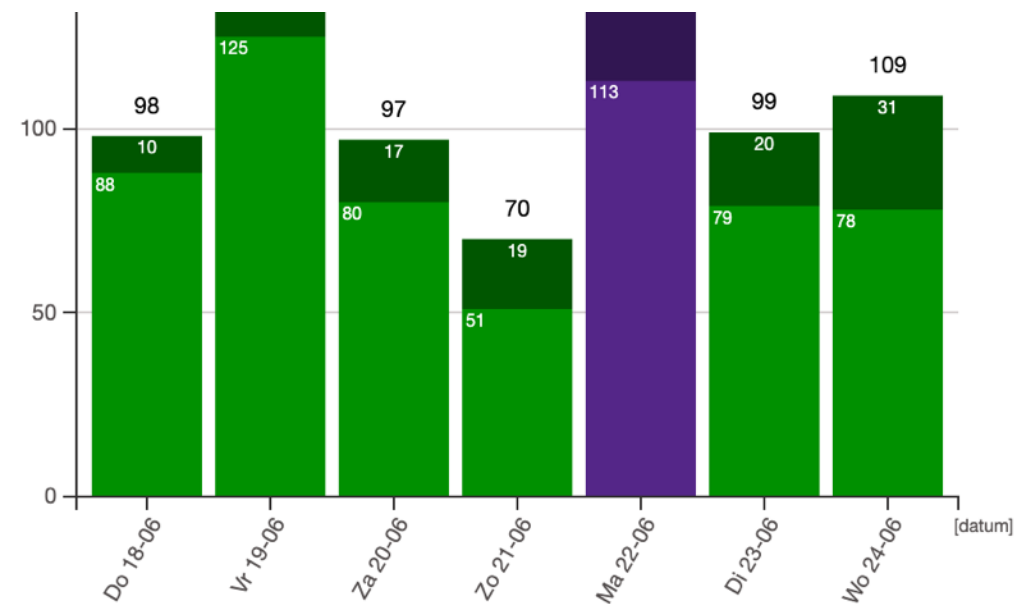
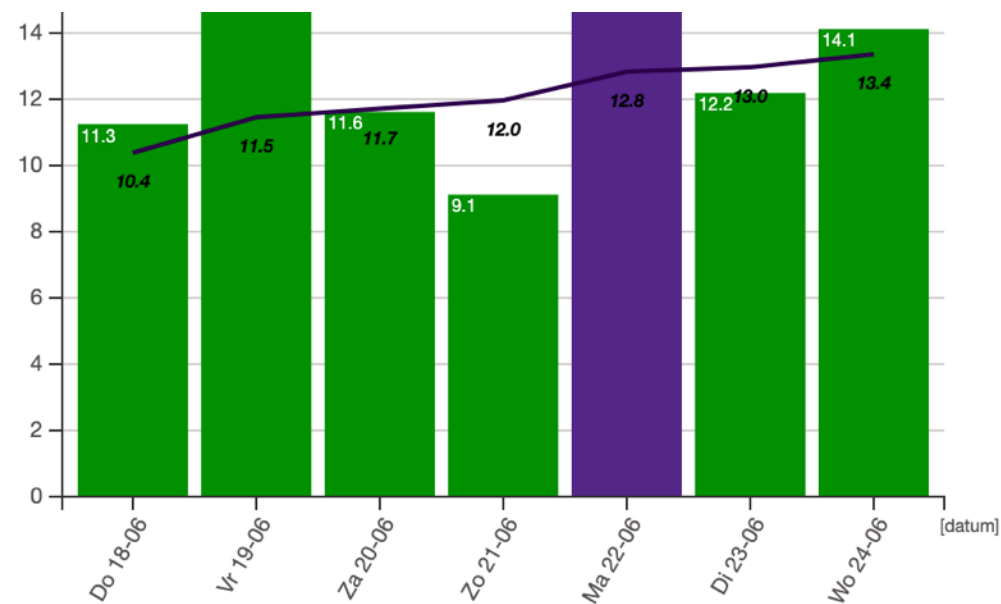
- Movement score
- Time of all activities in minutes per day

PAM score represents ratio of energy to resting metabolism

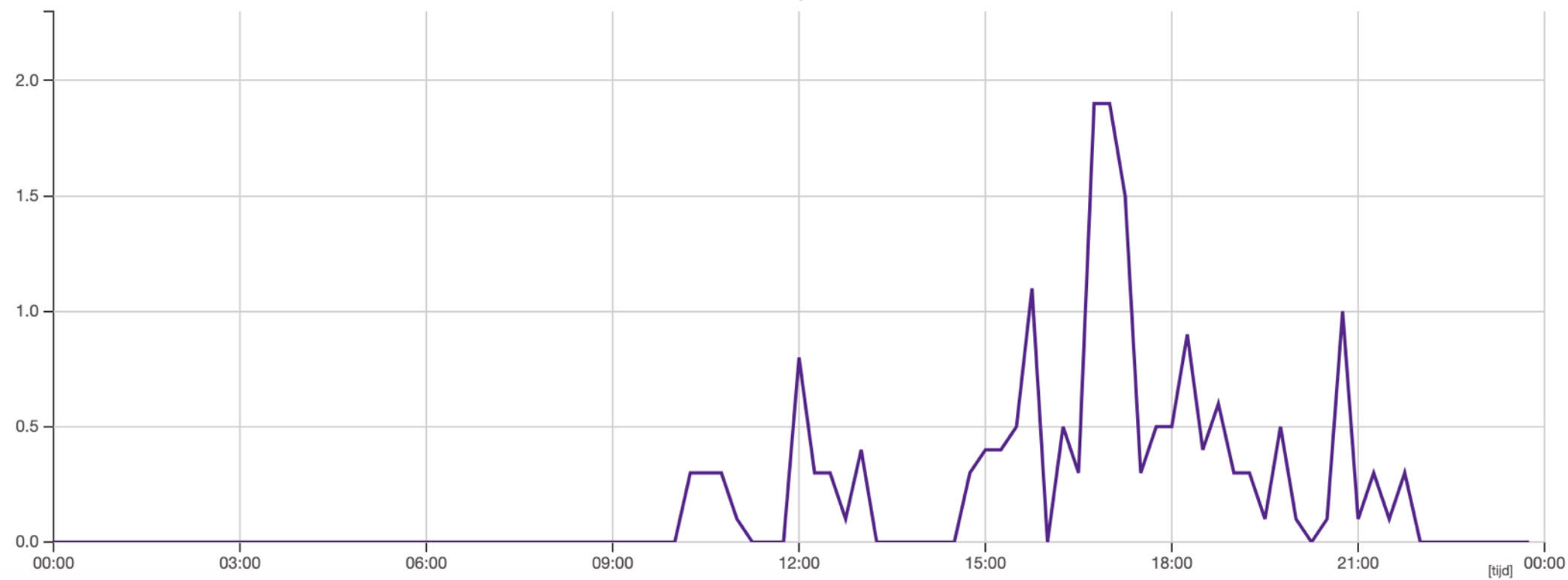
Wireless connected to a base unit

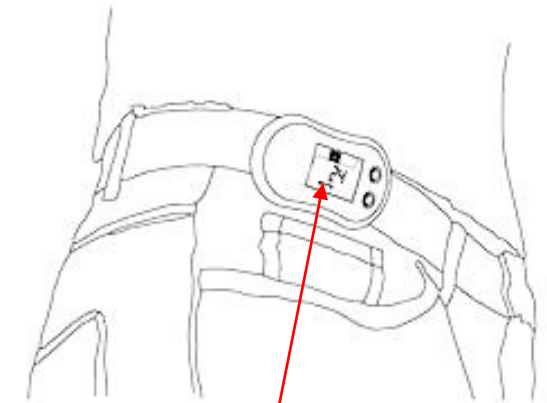
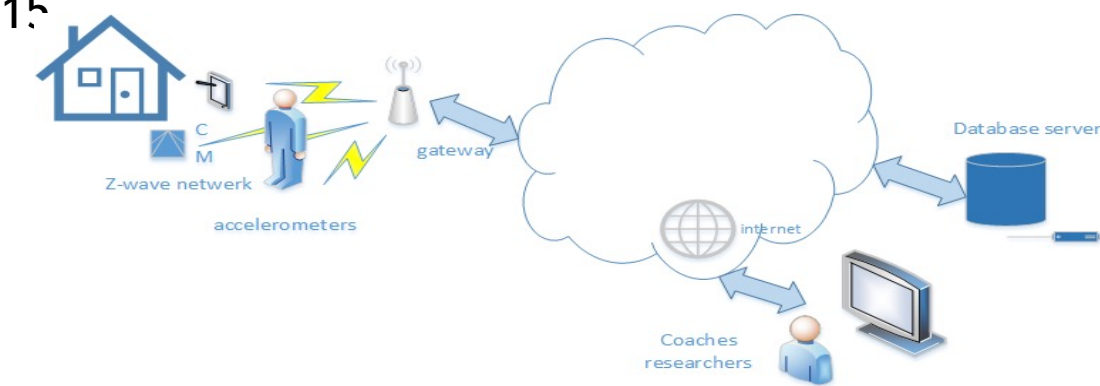
Baseunit consists of a raspberry PI, bluetooth adapter. 4 g dongle





PAM-score per kwartier





The intervention: Blended coaching and activity monitoring



Coaching:

- Provide information about the importance of physical activity and daily exercise
- Ascertain the amount of movement and everyday activities during the day
- Define realistic rehabilitation goals and make an activity plan
- Evaluate progress





Lessons learned

- Coaching and feedback tool vs. tool for assessment or outcome measure
- Wireless sensors only for use long time monitoring
- Implementation needs time; continuing the involvement of the professionals in all implementation stages
- Commitment of the organization (management and professionals)
- Investigate and educate how sensors could be suitable for clients with cognitive limitations



References

- Craig P, Petticrew M. Developing and evaluating complex interventions: reflections on the 2008 MRC guidance. *Int J Nurs Stud*. 2013;50(5):585-7.
- Pol MC, ter Riet G, van Hartingsveldt M, Kröse B, Buurman BM. Effectiveness of sensor monitoring in a rehabilitation programme for older patients after hip fracture: a three-arm stepped-wedge randomised trial. *Age Ageing*. 2019.
- Pol M, Peek S, van Nes F, van Hartingsveldt M, Buurman B, Kröse B. Everyday life after a hip fracture: what community-living older adults perceive as most beneficial for their recovery. *Age Ageing*. 2019;48(3):440-7.
- Skivington K, Matthews L, Simpson SA, Craig P, Baird J, Blazeby JM, Boyd KA, Craig N, French DP, McIntosh E, Petticrew M, Rycroft-Malone J, White M, Moore L. A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *BMJ*. 2021 Sep 30;374:n2061. doi: 10.1136/bmj.n2061. PMID: 34593508; PMCID: PMC8482308.
- Wondergem R, Veenhof C, Wouters EM, de Bie RA, Visser-Meily JM, Pisters MF. Movement behavior patterns in people with first-ever stroke. *Stroke*. 2019;50(12):3553-60