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Playful motivation for daily multimodal training and diagnostics: the AktivDaheim/PLAYTIME solution for people with dementia

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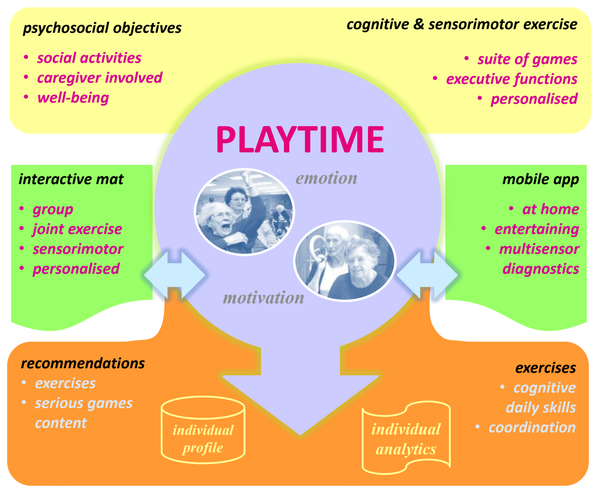
Serious Game Framework

Living at home with adequate care is a key objective for persons with dementia. Most therapies exclusively stimulate cognitive processes but studies clarified that locomotion and social activity positively impacts dementia, challenging is daily motivation to exercise.

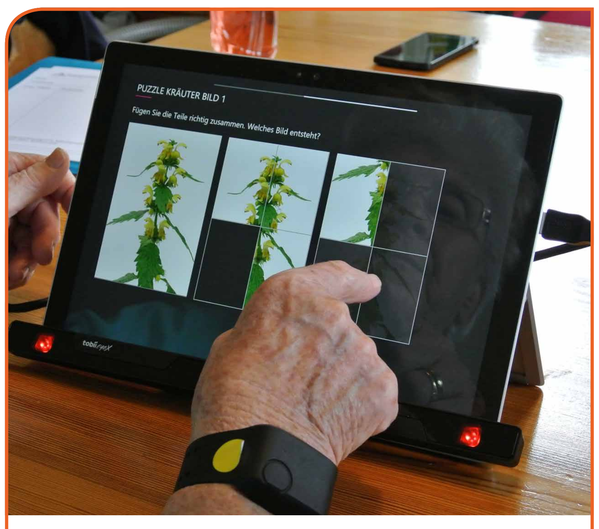
In the projects AktivDaheim and PLAYTIME, a serious game is developed for multimodal training performed by caregivers and clients. Key element is interactive mat sensing about board game type interaction at social events of people with dementia. Sensed data provide indications for tuning of weekly playful training sessions at home facilitated by informal carer using easily configurable services on a Tablet PC.

The AktivDaheim/PLAYTIME game and its sensing diagnostic toolbox offer affordances for entertaining, measuring and analysis of behavioral parameters, to enable people with dementia to stay longer at home and slowing down the progress of disease.



Serious game framework

Tablet PC and Interactive Mat



Single user training with tablet

Tablet PC

- Functions as **control unit** for caregiver
- Touch screen for interaction
- Control parameters for game tuning

Interactive mat and cones

- Cone: **RFID field** identification
- Uni-directional communication from cone to tablet

Profile log

- Individual **performance is recorded**

Assistance for **carer** & **dementia client**

- **Back-end simple interface** with high usability, planning weekly training & games
- Guideline for daily multimodal training

Playful motivation

- Word and picture puzzle, picture memory, math…
- Videos for mobility training
- Personalisation: **biographic data** as input for training (own pictures, videos)

Suite of training units

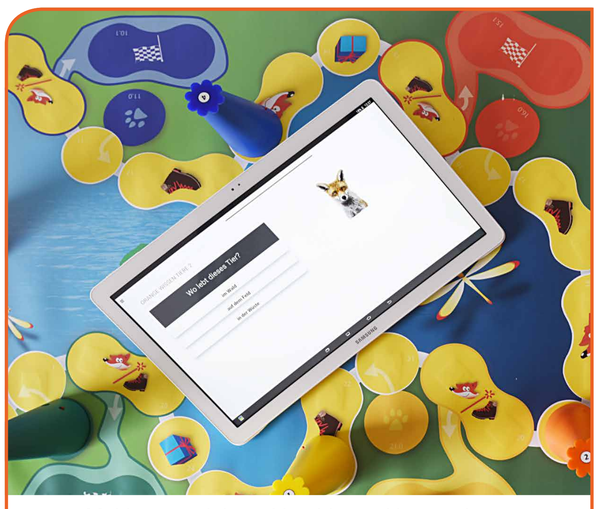
- 25 thematic sessions

Communication with **mobile sensing**

- Eye tracking data about Tablet usage
- Bio-sensor data from wristband, motion data from miniaturised sensor

Profile editor

- Performance statistics, diagnostic features; data only accessible by trainer

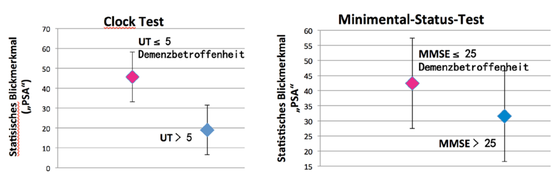


Multi user training with tablet and interactive mat

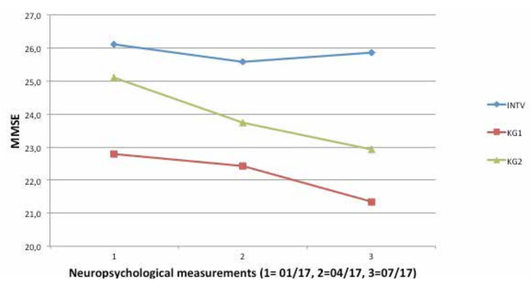
5-Pillar-Methodology for MAS training by Sozialverein Deutschlandsberg

Field Test Results

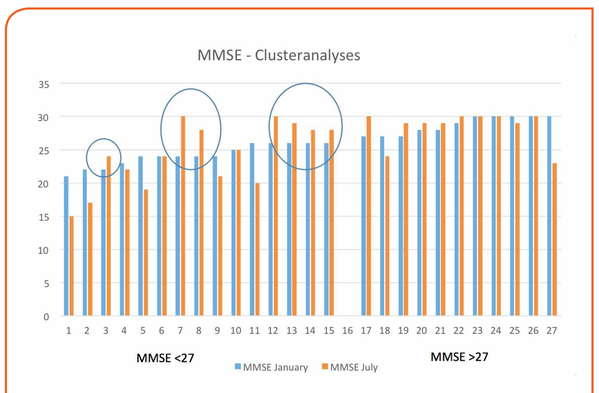
In a 6 month study 3 groups with each 25 participants living with dementia (cut-off: >MMSE 21) were compared. The intervention group had training with a tablet, one control group received conventional MAS training once a week and the second control group didn't receive any intervention. A neuropsychological test battery examined the cognitive status of the participants (MMSE, clocktest compared with the control groups, trail making test, go/no go task for inhibition). The results show that the intervention group scored significantly better than both control groups regarding to the short term memory and the time-based orientation.



Discrimination of Alzheimer mental state using eye movement features



Stages of mental state evaluation in intervention and control groups (12 persons, 422 sessions, data filtering)



MMSE Cluster analysis

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