



# MyRehab – An overall system for telemedical assisted rehabilitation system at home and on the go

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GEFÖRDERT VOM



Bundesministerium  
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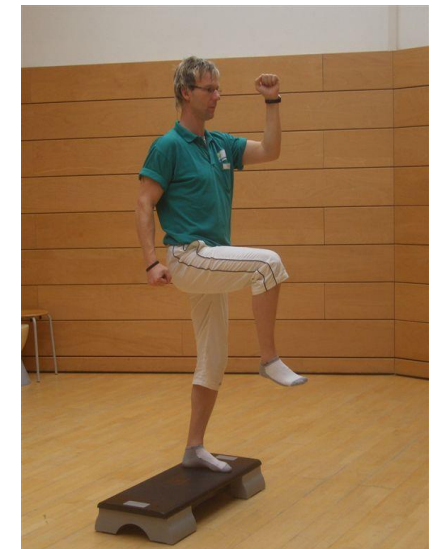
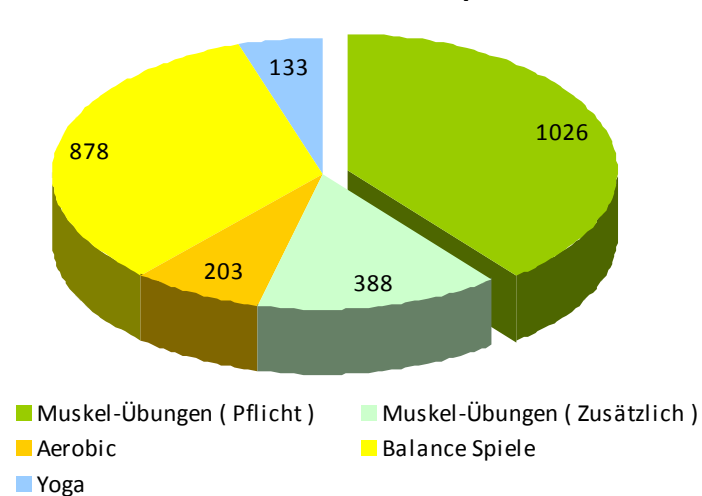
# Outline

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- Previous work (Wii Fit study)
- MyRehab approach
- User requirements
- System Architecture and demonstrator
- User acceptance testing
- Summary and outlook

# Wii Fit-Study 2008

- Comparison of Wii Fit and Footstepper (conventional therapeutic device) in Rehab Center of Lübben (duration: 3 weeks)
- Same set of activating exercises for muscle building and postural stability (Wii Fit and Footstepper)
- Measurement of muscle strength using a Biodex diagnosis device before and after training period
- 2 interview sessions (Audio and Video)



# MyRehab - Approach

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- User-centred design and development process with stakeholders and end users
  - Requirements analysis with patients and physiotherapists
  - Definition of physiological parameters for detection of correct movement
  - Selection of appropriate sensors
  - Design and Development of training material
  - Implementation of Telerehabilitation-Application (Navigation, User feedback, Motion analysis, Communication)



# Telereha – User requirements

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## Patient requirements

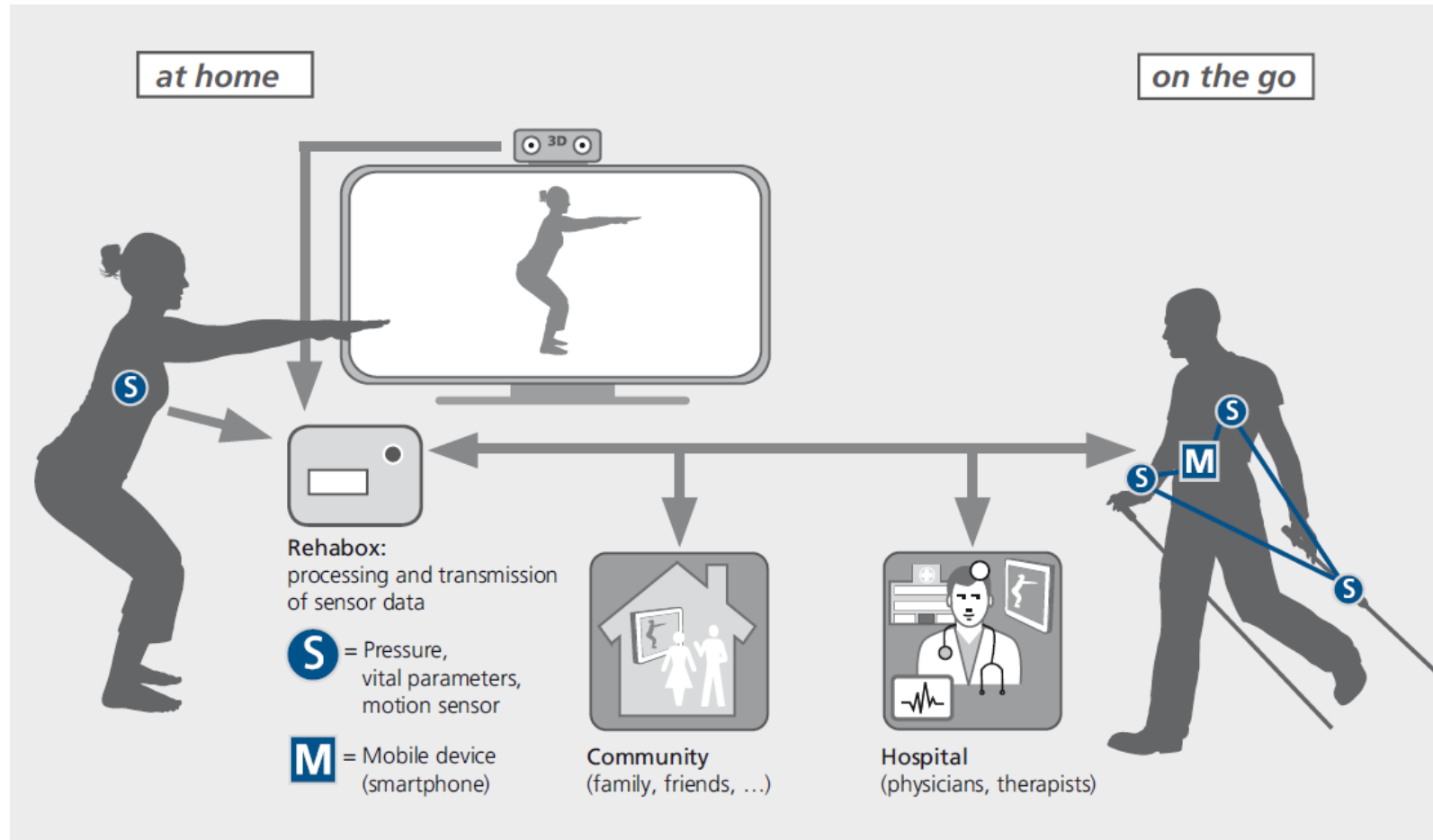
- Easy-to-use and **barrier free design**
- **Configuration and personalization** corresponding to user preferences
- Real and understandable **visualization of motion**
- **Documentation** of training results and **individual communication** with therapists

## Therapist requirements

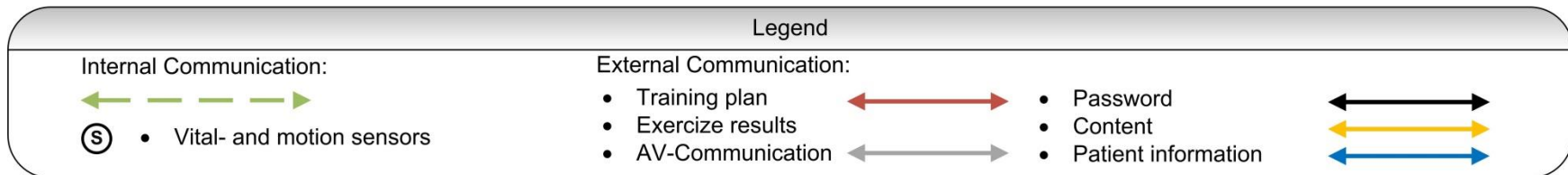
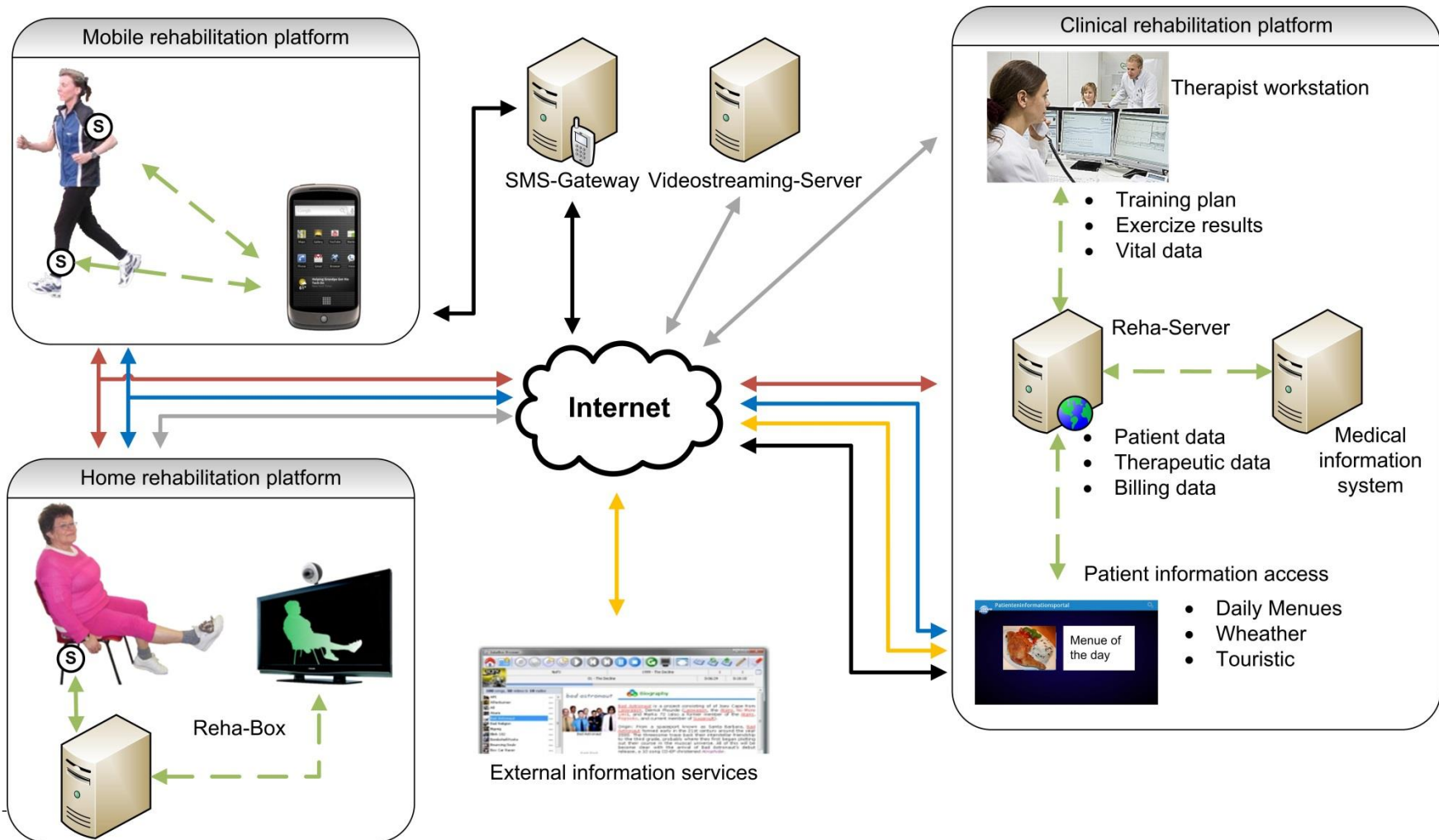
- Coaching of patients and personalization of **therapy plans in clinic**
- Conduction of telemedical assisted assessments for **diagnosis**
- **Control** of movement quality for possible intervention
- Reconfiguration of **therapy plans** in comparison to individual therapy progress



# Overall system architecture MyRehab



# Communication Infrastructure behind





# MyRehab / Reception



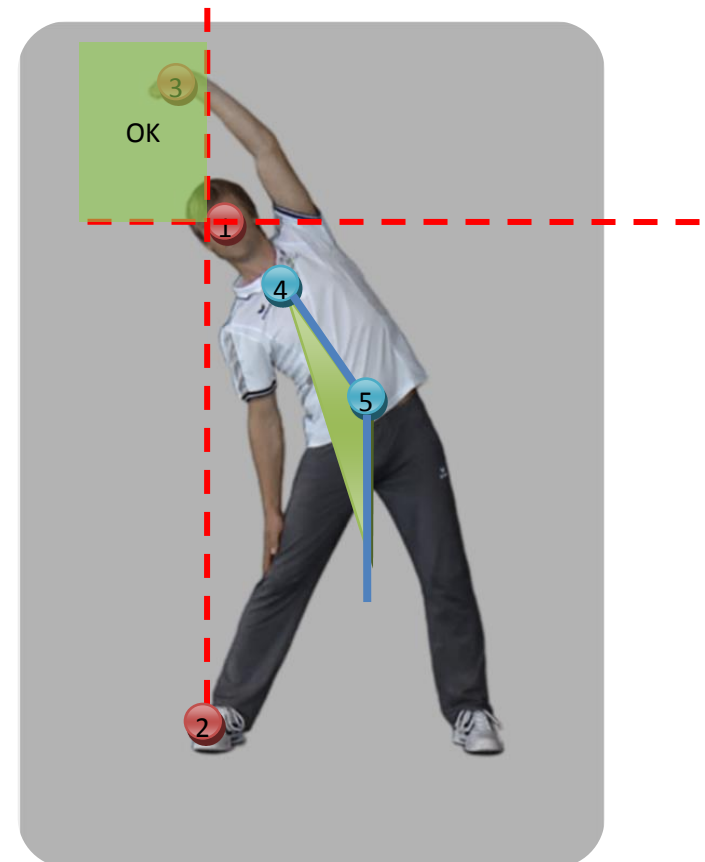


# MyRehab / Gym



# Realtime motion analysis – Correction during exercise

- Motion amplitude
- Movement of arms on body axis
- Initial pose (position of hip joints)
- Postural stability (hollow back or humpback)
- Stability of arms
- Symmetry of arms
- Execution time

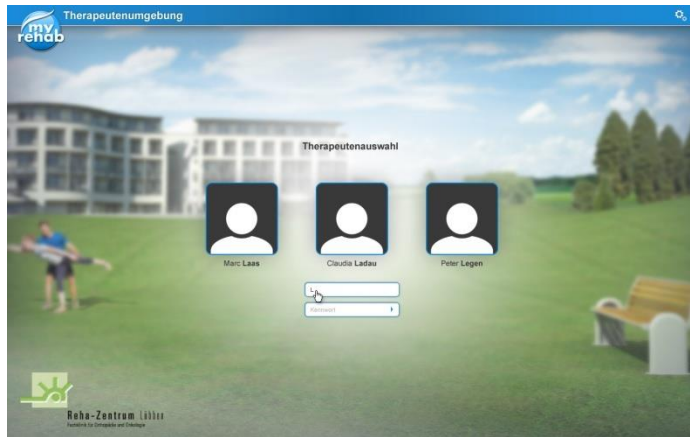


Control of motion amplitude  
(Flankendehnung)

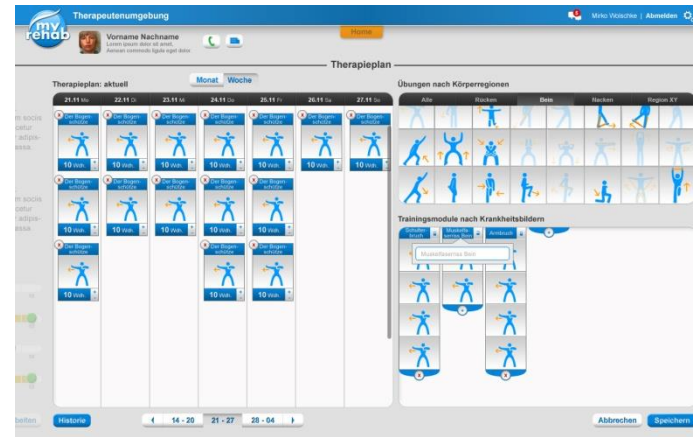
# MyRehab / Classroom



# Therapist work station



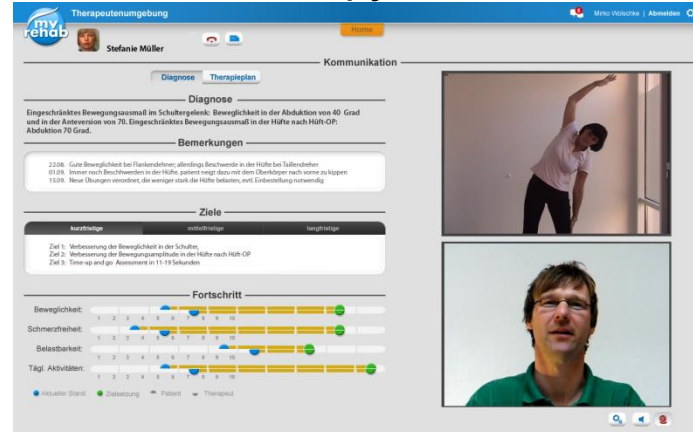
Log in-Screen



Therapy editor



Patient health record



communication window



# Demonstrator Mobile Rehab-System

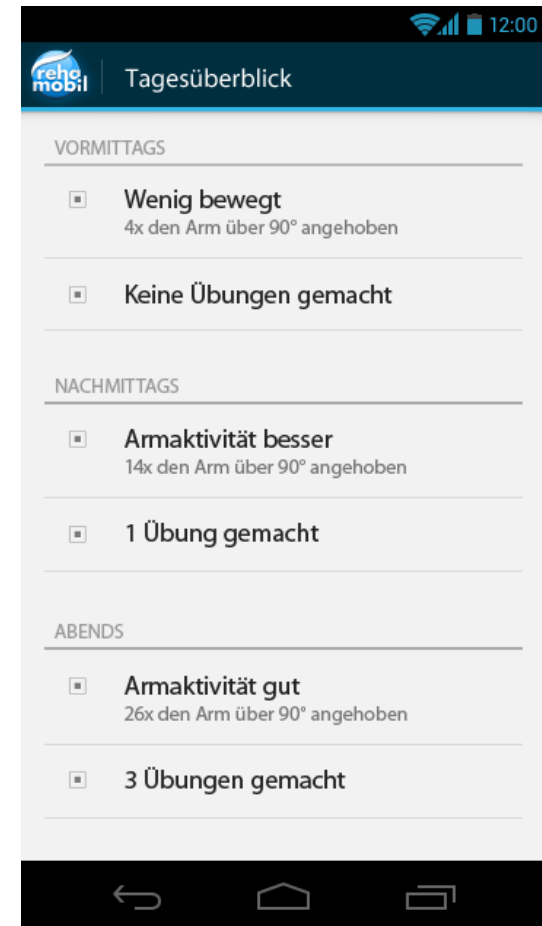
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Animation on  
Android-  
SmartPhone

BT-Module and  
Razor-Board

# Demonstrator: task list, memory and daily overview



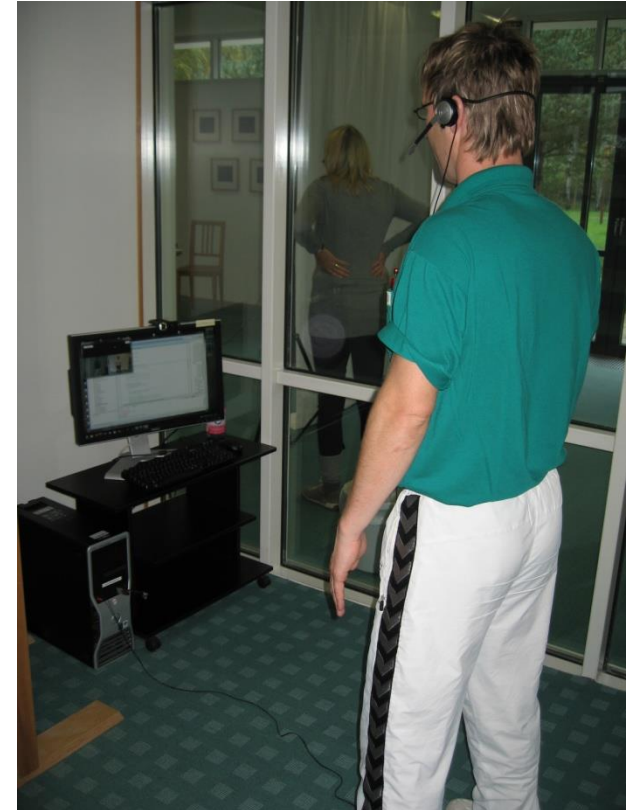


# User acceptance testing

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## Questions regarding:

- Installation and configuration of individual user preferences
- Navigation through programm and menue structure
- Program control (voice and gesture)
- Acceptance of Videoconference with therapist
- Acceptance of motion visualization during exercize
- Acceptance of exercize instruction (real therapist or avatar)
- Motivation for longterm therapy process



# Summary and outlook

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- Patients positively think about prolonging poststationary therapy process at home
- The usage of assistive, multimedia and telemedical connected programs is accepted
- Exercises have to be individual, they should enhance the therapeutic activities already started in the clinic (should match to the individual therapy goals)
- Next steps are
  - Optimization of multimodal feedback (auditiv, visual)
  - Visualization of therapy progress for patients
  - Field tests starting now in cooperation with Reha-Zentrum Lübben and Charité
  - Evaluation report to be ready in September 2014.
- Open platform ready for other indications to be build on

# Literature

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- Innovative Rehabilitation Technologies for Home Environments – An Overview, Michael John, Stefan Klose, Beate Seewald, Handbook of Ambient Assisted Living, J.C. Augusto et al. (Eds.), IOS Press, 2012, doi:10.3233/978-1-60750-837-3
- Evaluation von Vital- und Bewegungssensorik für die Konzeption eines mobilen Rehabilitationssystems, Shanshan Yang, Dr. Michael John, Anett Bölke, Tim Michaelis, AAL-Kongress 2012

# Kontakt:

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