

# Development of a Multidisciplinary and Telemedicine Focused System Database

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# Home-based Rehabilitation

- Complex processes of rehabilitation often cannot be limited to the sessions conducted in a specialized facility
- Home-based rehabilitation programs supports reintegration into everyday life
- Exercises are currently explained to the patient within the healthcare institution and in most cases documented by a paper based explanatory description. At this state the patient has no further possibility to inform him or herself about the exercises than asking the therapist.

# REHABitation Database

- Available databases are:
  - mostly based on the principle of memberships
  - provide information about specific exercises. Usually without combinational option of available systems and exercises
- REHABitation project combines novel developments (mobile devices, sensors, etc.) and applies them to clinical and home based rehabilitation processes

# Requirements for Database Development

- Allow insertion of new entries (exercises, assessment, equipment) by authenticated users
- Capture internal connections between entries
- Store entries so they are accessible worldwide
- Provide easy usage and user-friendly interface on web
- Present entered data in concise and intuitive way
- Minimize costs
- Consider further expandability and usability

# Used Technology – Open Source

- LAMP stack – open source development platform
  - Linux – operating system
  - Apache – web server
  - MySQL – relational database management system
  - PHP – object-oriented scripting language
  
- Bootstrap - HTML, CSS and JS development framework for dynamic and responsive projects on web
  
- DataTables - table plug-in for jQuery
  - advanced interaction control for HTML tables

# Architecture of the REHABitation Database

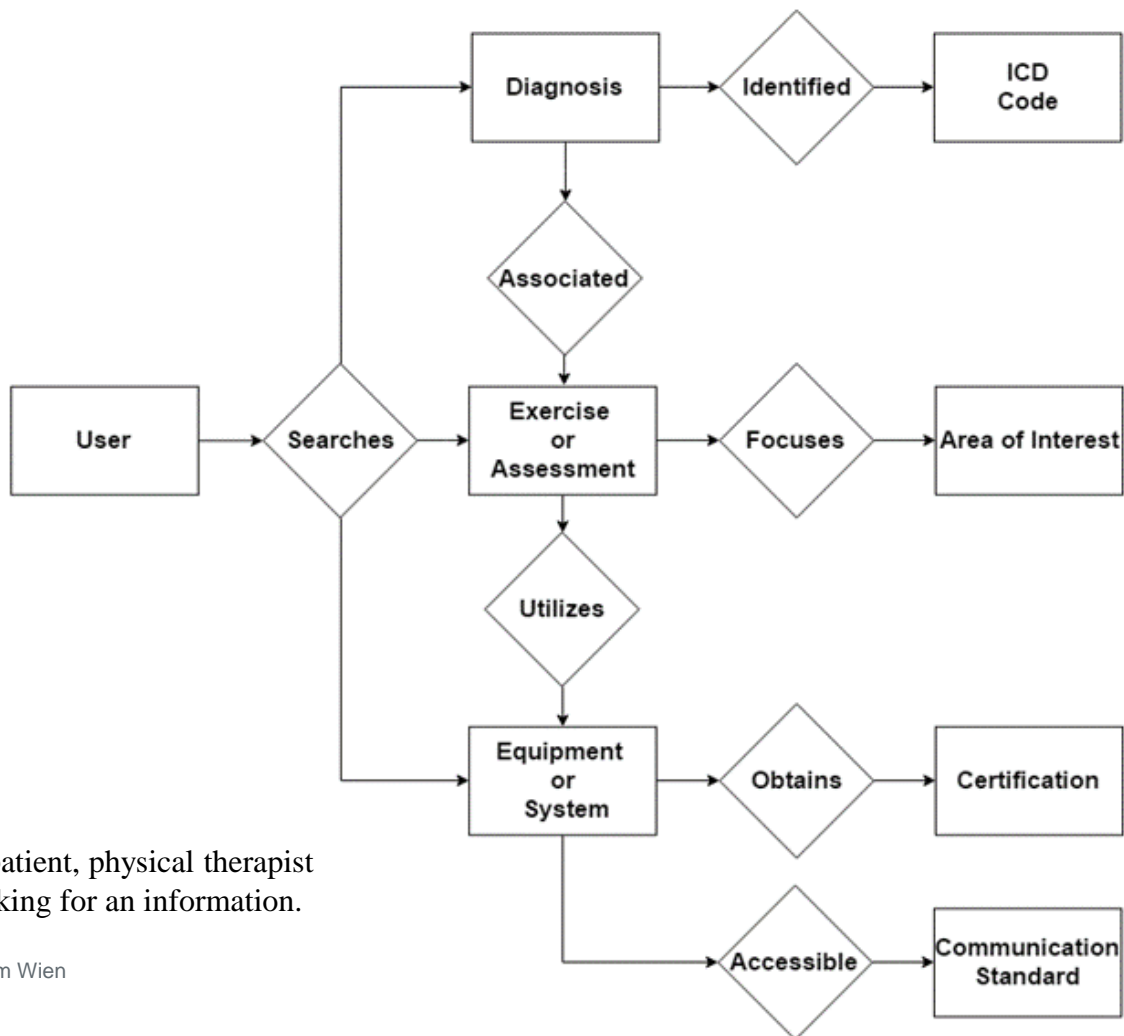
- Data Access Layer (back end)
  - Provides access to the database
  - Validates, stores or deletes entered data
  - Informs user about result of performed actions
  
- Data Presentation Layer (front end)
  - Web based application, user interacts directly with it
  - Responsive web design – tablet, desktop, smart phone
  - Presents data from REHABitation database
  - Allows searching, sorting, paging and filtering of entries

# Roles of the User – Authentication

User can in general:

- Search for Entry
  - No restrictions
  - Web address: <https://rehabdb.healthy-interopability.at/>
  - No registration is required
  
- Adds/Modifies/Deletes Entry
  - Registration and authentication required
  - Designed for physical therapists, technicians or other professional personnel

# Overview of Presentation Layer



User represents patient, physical therapist or technician looking for an information.



## Adding a New Entry

### Add new Equipment Entry ✕

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**Equipment**

**Description**

**Information**

**Mobility**

**State**

**Type**

Click to Establish connection with Exercises

Click to Establish Equipment Connectivity Opti

Click to Enlist equipment as a part of System

Hover over the field label in order to obtain detailed information

Close Save changes

# Use Case Developed for Testing

- Use cases represent **three major areas** of interest in rehabilitation: **neurological** defects, **trauma** focused rehabilitation and **preventive** measures
- The **testers**, representing **medical** professionals, had the task to **search** for available **exercises**, **assessments** and the connected **tools** for the therapy of the given patient
- **Testing** group, representing a **patient** as user, had the task to **search** for their **tasks** defined by the therapists and the **equipment** needed for that purpose

# Use Cases Definition Example

## Use Case: **Stroke Patient**

Appropriate rehabilitation exercises for:

- Female patient, 67 years old
- Stroke diagnosis, suffering from a rightward hemiparesis
- Exercise focus - improving the posture and mobility
- Exercise performable at home
- Previous knowledge - patient's family owns a Kinect system

# Result – Stroke Patient



Stroke

Visible columns

Show 25 entries

Showing 1 to 1 of 1 entries (filtered from 110 total entries)

Previous 1 Next

Name Of Exercise	Description	Diagnosis	Area Of Assessment	Home	Equipment
<input type="text" value="Search Name"/>	<input type="text" value="Search Descri"/>	<input type="text" value="Search Diagnoc"/>	<input type="text" value="posture"/>	<input type="text" value="YES"/>	<input type="text" value="Kinect"/>
Book Shelf	Pushing falling books back into a bookshelf	Lower Back Pain, Movement Disorders, Stroke, Geriatrics	Range of Motion, Movement, Balance, Posture, Coordination	Yes	Kinect 2

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# Notable Features

- Establishing internal links between entries
- Distinguishes between exercises and assessments
- Search in Live-time
- Responsive and dynamically adjusted web page content in accordance to the device used (desktop, tablet, mobile phone)
- Advanced filtering options (all entries, individual columns, etc. )
- Build on open source software
- Free to use

# Conclusion – REHABitation database

- Connecting novel and available devices and tools for rehabilitative home and clinical exercises
- Tested using real-life inspired patient use cases
- Display exactly the information the individual user is looking for in minimal time and effort
- Future development:
  - Expanding the database with new entries also outside of rehabilitation field
  - Interactive collaboration platform to allow device manufacturers, as well as medical professionals to publish their available devices

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