



**Unique eye tracking as biomarker
for monitoring and diagnostics
in dementia therapy**

Maria Fellner, MBA | digitAAL Life GmbH

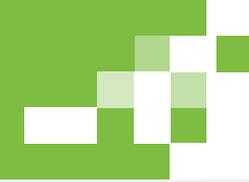


My grandma 35 years ago... (suffering from Alzheimer's disease)

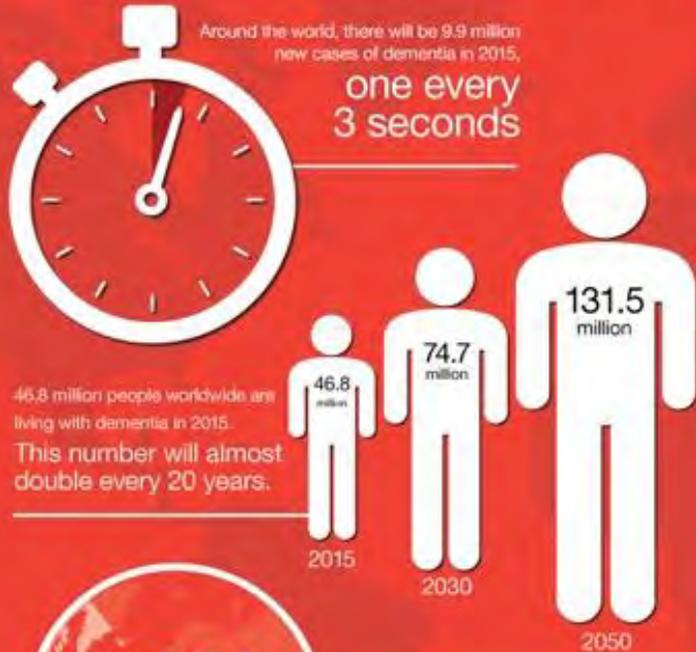




Dementia as a rapidly growing worldwide market



INFOGRAPHIC The global impact of dementia



New markets

Several new market opportunities due to our unique eyetracking as biomarker and multimodal activation:

- People wanting to maintain their cognitive health
- Other neurogenerative diseases, e.g. Parkinsons
- Early detection of dementia



The Challenge: Rapid global Growth of People with Dementia



Alzheimer

- Worldwide 46,8 Mio people (2015)
- By 2035 100 Mio people with dementia worldwide
- Cost to societies € 2 trillion

Research

- No results from drug research (Pfizer, Roche stopped)
- Combined behaviour-oriented approach (cognition, movement, nutrition...) shows results and recommended by WHO and The Lancet Commissions

Care

- Behaviour-oriented offers for mobile and stationary care under development
- Efficient tools for supply sought
- Currently only selective monitoring of the dementia status

Surrounding

- Family members & communities: support for care at home needed
- Slowing onset and progress of dementia for better quality of life and longer independence
- Prevention

Our Solution: Daily Training – supervised or independent



[Watch Video: digitAAL Life App explained](#)

Our Solution: Daily Training – supervised or independent

- Multimodal training model of MAS Alzheimerhilfe (Austria)

- Developed in cooperation with



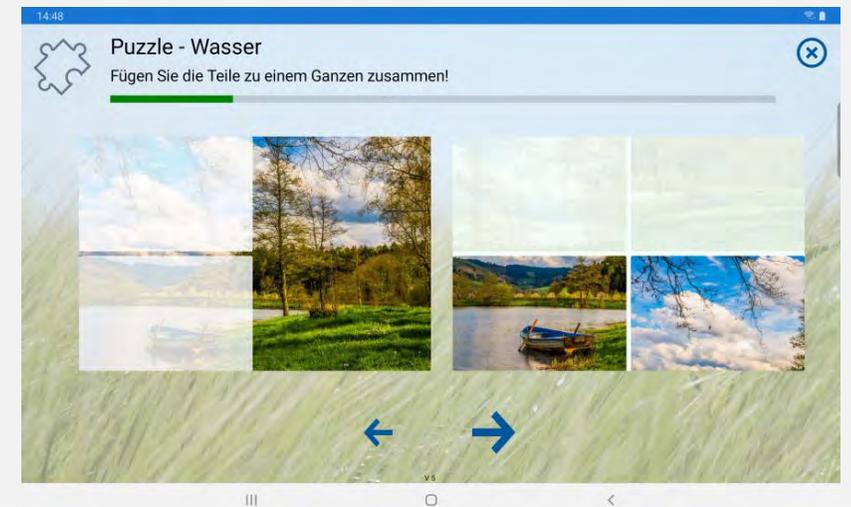
- Training units with a specific theme (e.g. water)

- Sequence of exercises**

 - Movement and perception exercises to warm up

 - Knowledge questions, calculations, cloze words and texts, puzzles, image pairs, trouble shooting images, audio puzzles and more

- Stimulate the different senses





Activating Training with Tablet-App



AT HOME

Stay active - independently or with relatives



MOBILE

Supervised training with experts or trained volunteers



STATIONARY

Use in health and care centers for individuals and in group settings

Advantages of our Training App

- Individual or group sessions, at home and in health, care and social organizations
- Many different topics, each available in 4 levels of difficulty, new content every month
- Thoroughly tested in practice, professionally well-founded, clearly structured
- Can be used immediately without additional effort
- App raises interest and motivation to integrate multimodal training regularly into everyday life



Professionally well-founded methodology – thoroughly tested in practice

Tested in practice in numerous field studies by

[Austrian Red Cross](#)

[LKH-Univ. Klinikum Graz.](#)

Scientific basis from several [research projects](#)

under the lead of JOANNEUM RESEARCH, especially the projects [multimodAAL](#) and [PLAYTIME](#).

Further development of eyetrackings: [Watch video: MIRA from research project PLAYTIME](#)

[Numerous scientific publications](#) have been published



Landeskrankenhaus - Universitätsklinikum Graz
Univ.-Klinik für Neurologie

A-8036 Graz, Auenbruggerplatz 22, Telefon: +43 (316) 385-81031, Fax: +43 (316) 385-14280
Steiermärkische Krankenanstaltsgesellschaft m.b.H. Medizinische Universität Graz



Serious Challenges need serious Solutions

- ❏ Since 2011 Active & Assisted Living @ **JOANNEUM RESEARCH – DIGITAL**
- ❏ Since 2011 mobile dementia (M.A.S.) trainings @ **Sozialverein Deutschlandsberg**
- ❏ Successful cooperation since 2015
- ❏ Digital, tablet-based solution for multimodal training as result of joint **research projects**
- ❏ Convincing field tests and pilot projects
- ❏ Research (JR-DIGITAL): ICT based indicators for dementia investigated for the first time worldwide
- ❏ **digitAAL Life** is a **spin-off** of JOANNEUM RESEARCH and the Sozialverein Deutschlandsberg (founded in 02/2020)





Multidisciplinary Team



Maria Fellner, MBA

Co-Founder and CEO



Dr. Heinz Mayer

Co-Founder,
[CEO of JOANNEUM RESEARCH](#)



Josef Steiner

Co-Founder, Former Chairman of
Sozialverein Deutschlandsberg



Robert Hartmann

Business Development



Elke Zweytik

Dementia & Care



Thomas Fruhmann

CIO



Stephan Spat

CTO



R&D Partners



DI Dr. Lucas Paletta

Scientific head of research team at [JOANNEUM RESEARCH DIGITAL](#) & scientific lead of EU project PLAYTIME



Dr. in Sandra Schüssler

1st Deputy Head of [Institute of Nursing Science at MedicAL University Graz](#), Austria



Silvia Russegger, MSc

Head of platform development at [JOANNEUM RESEARCH DIGITAL](#) 20+ years in managing positions in product management

Prof. Dr. Reinhold Schmidt

Head of [Department of Neurology, Medical University Graz](#), Austria

Petra Schmidt

[Austrian Red Cross](#)

Dr. Stefanie Auer

Head of [Center for Dementia Studies at Danube University Krems](#), Austria
Scientific head of [MAS Alzheimerhilfe Austria](#)

Dr. Liselore Snaphaan

[Mental Health Care Center Eindhoven](#), NL

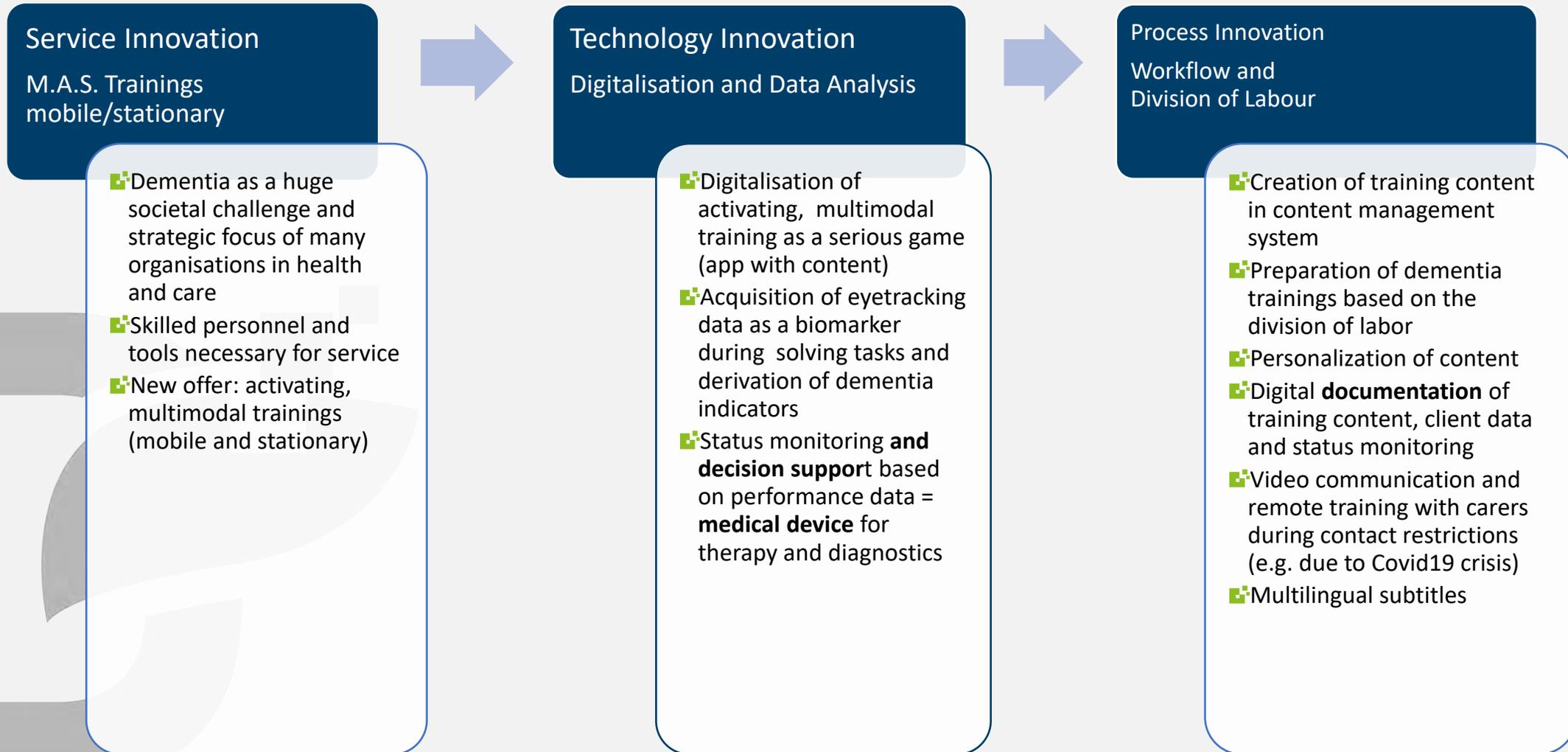
Prof. Dr. Inge Bongers

[Tilburg University](#), NL





Innovation in Service – Technology - Process





Product Development Stages



USP: *only* certified medical device for therapy *and* diagnostics with a scientific basis by clinical studies

	Therapy I	Therapy II	Diagnostics	Therapy III
Medical Device Certification	none	Therapy of dementia	Diagnostics of dementia	<i>Personalised</i> therapy of dementia
USP	Thematic, structured, stadium-specific training units in 4 levels	Unique certified training tool Progress monitoring, remote care cockpit and target group specific dashboards	Diagnostics <i>and</i> therapy Eyetracking as a biomarker Decision support	Therapy with diagnostics and progress monitoring -> personalised therapy
Licence types	Home Professional Lite	Home Professional Lite Professional Premium	Home Professional Lite Professional Premium Decision Support	Home Home Premium Professional Lite Professional Premium+ Decision Support+



Roadmap for Scaling-Up and Growth



February 2020

Foundation of company as spin-off from JOANNEUM RESEARCH and Sozialverein Deutschlandsberg

200 kEUR
Pre-Seed Financing



600 kEUR
Seed Financing



385 kEUR
Crowd investing by



588 kEUR
research funding by



Future Financing Round



until Q1/2021

- First product version in German finalized (without certification as a medical product)
- First licences sold
- Dutch content

until Q2/2023

- Development of decision support and remote care features
- Reference study on efficacy and clinical study
- Certification as a medical device for therapy and (in future) diagnostics (CE & FDA)
- Markets: Europe (DACH, CEE, BENELUX)

> 2024

- Internationalisation of product and sales (US, ...)
- Extension of product and service portfolio
- Reaching profitability
- 2024: 29,000 licenses installation basis



B2B2C-Model:

■ B2B:

- Inpatient facilities
- Inpatient long-term care (retirement and nursing homes)
- Day care centers
- Assisted and sheltered living
- 24 care
- Mobile care, ...

■ B2C:

- Persons with mild to moderate dementia
- Persons with mild cognitive impairment
- Elderly persons who want to remain active or make provisions for etc.

Licenses

Research projects

Trainings

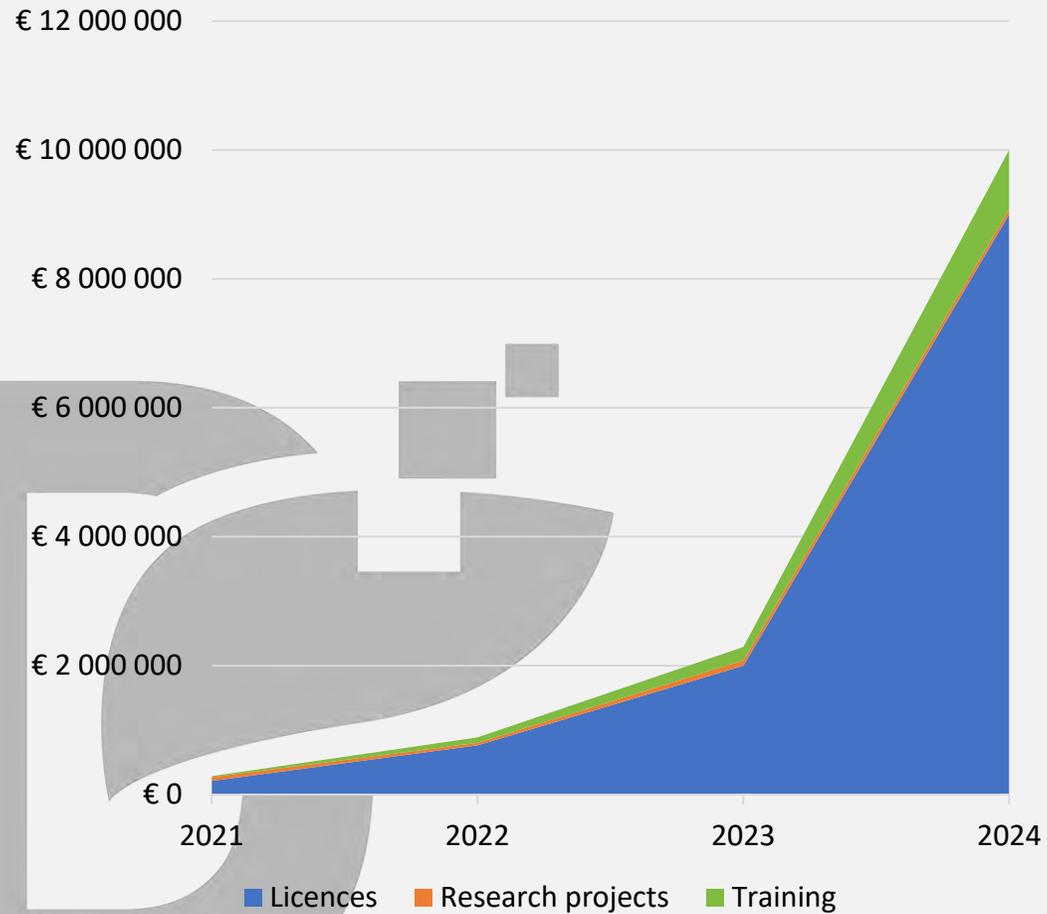
Revenue planning using the example of a typical larger 24-hour care provider in Austria



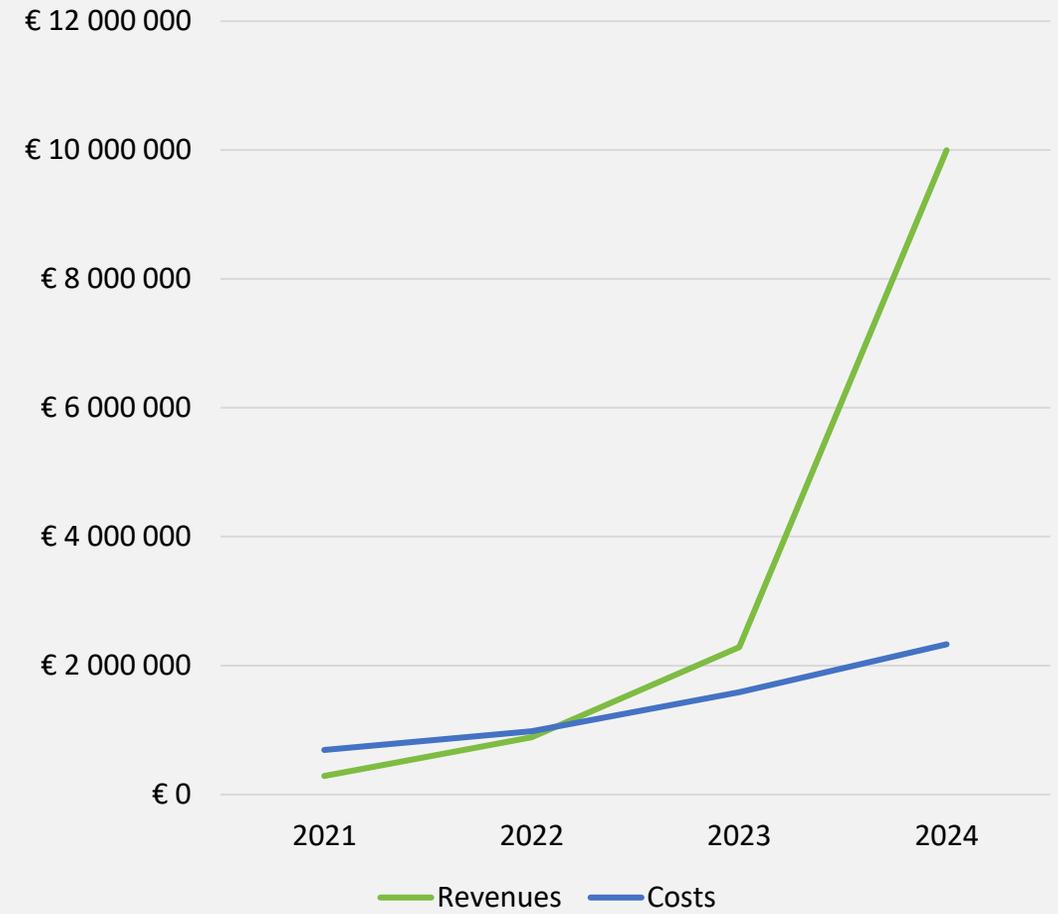
- Approx. 45,000 people in 24h care in Austria.
- One provider has about 400 clients
- Price of an annual license: EUR 450 (incl. discount)
- Turnover per year: EUR 180,000
- Market share of the 24h care market: 0.88%
- Target market share: 5% = EUR 1.023 million turnover in Austria alone



Revenues by category



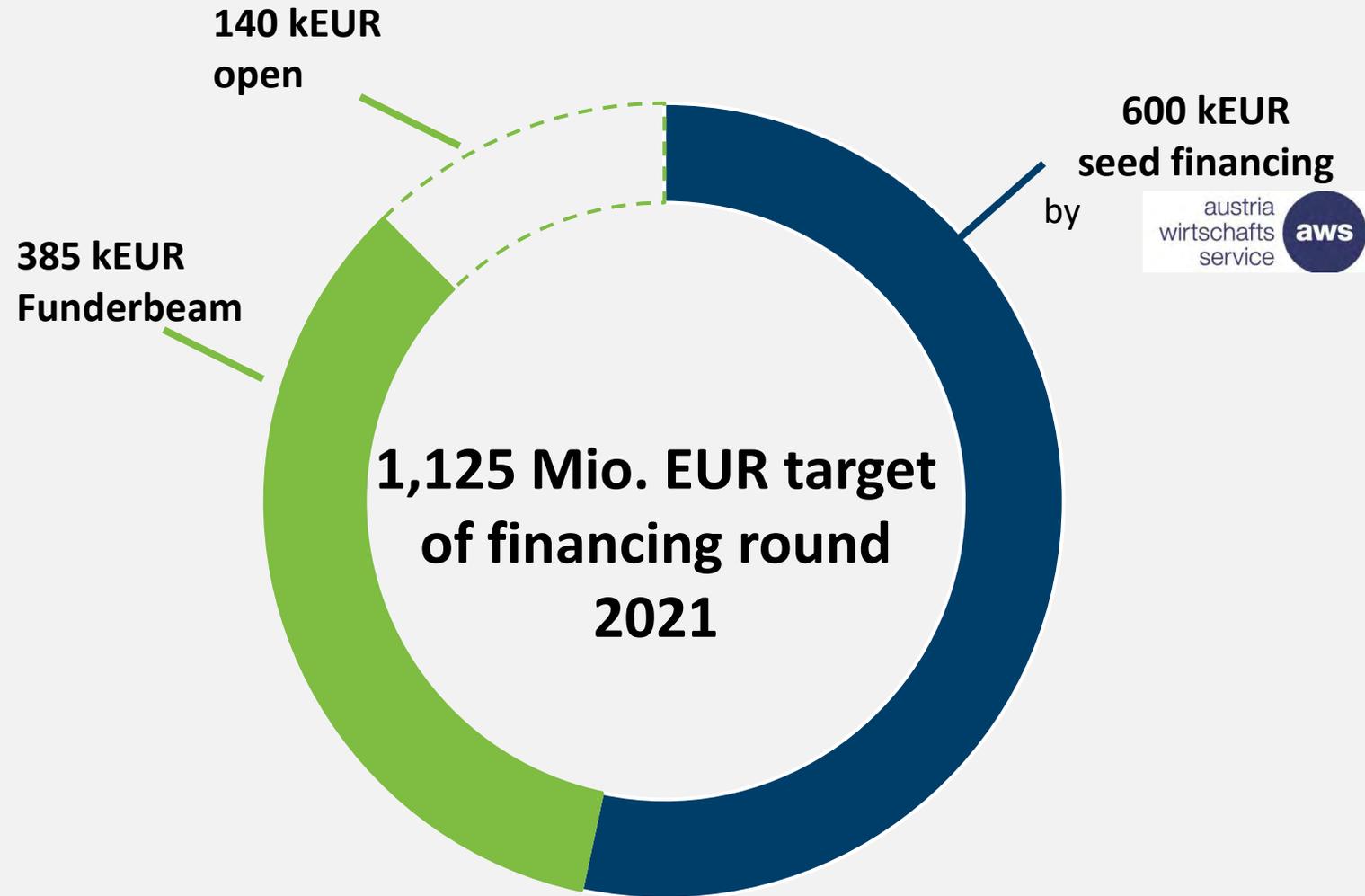
Revenues and Costs





Use of funds:

- Development of new features
- Efficacy reference study and clinical trial
- Medical device certification for therapy and diagnostics
- Personnel for development and sales





Free test version & contact

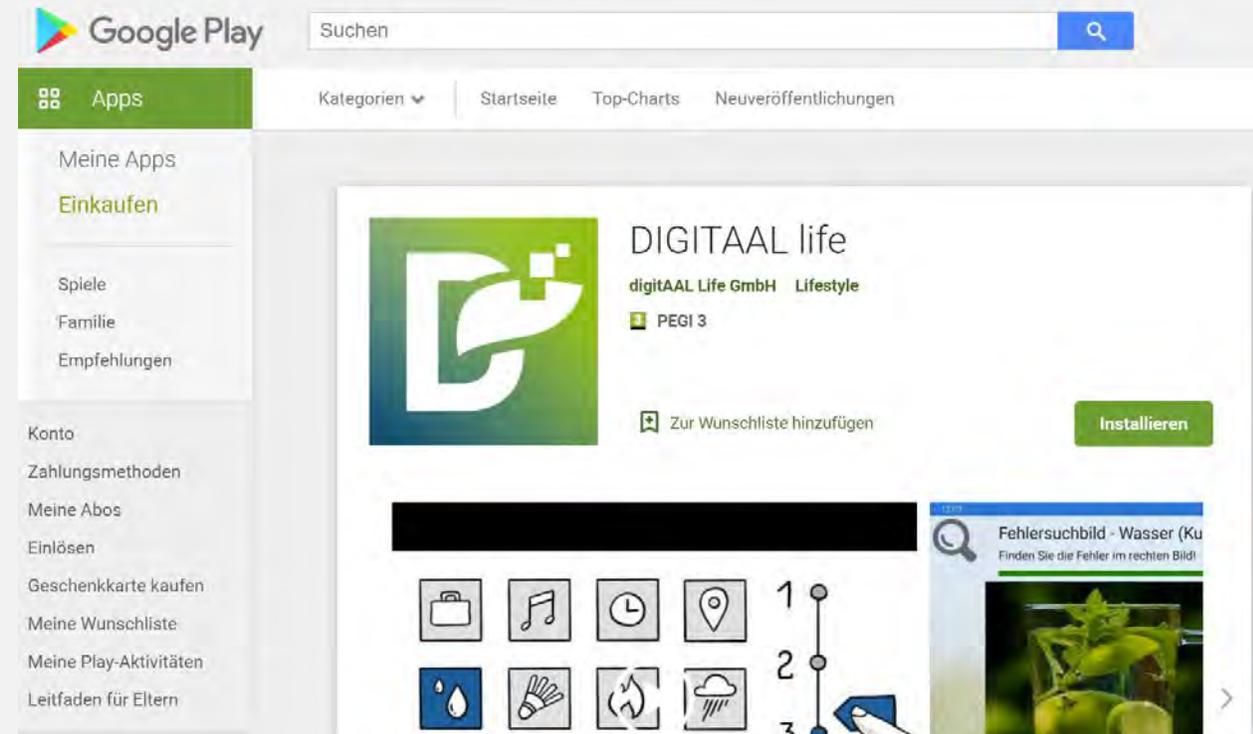
www.DIGITAAL.life/test

[Watch video: Demo @ AIDEM 2021](#)

Email: maria.fellner@DIGITAAL.life

Tel.: +43 676 847 947 101

Web: www.DIGITAAL.life



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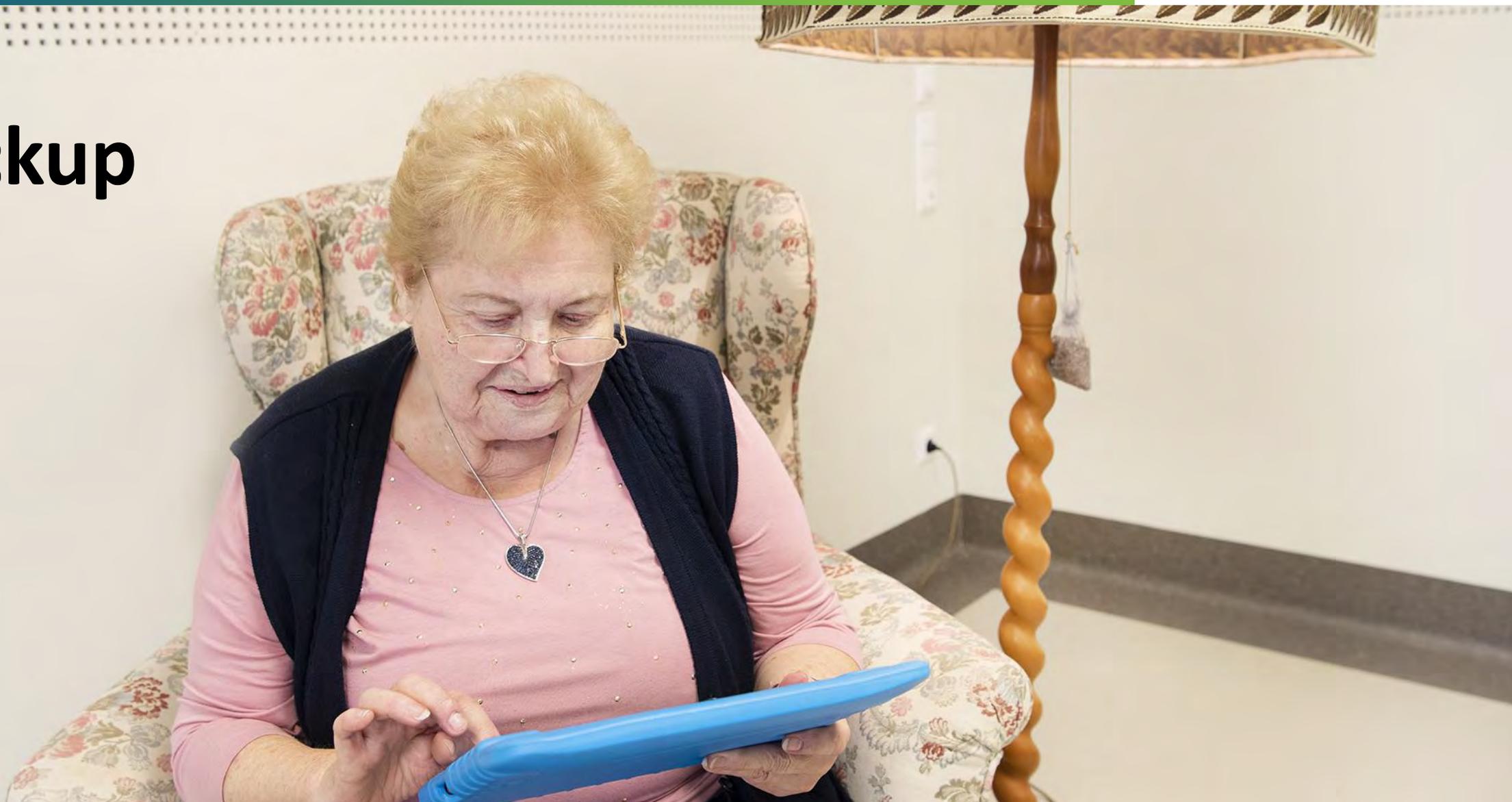


 Bundesministerium Digitalisierung und Wirtschaftsstandort

 Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie

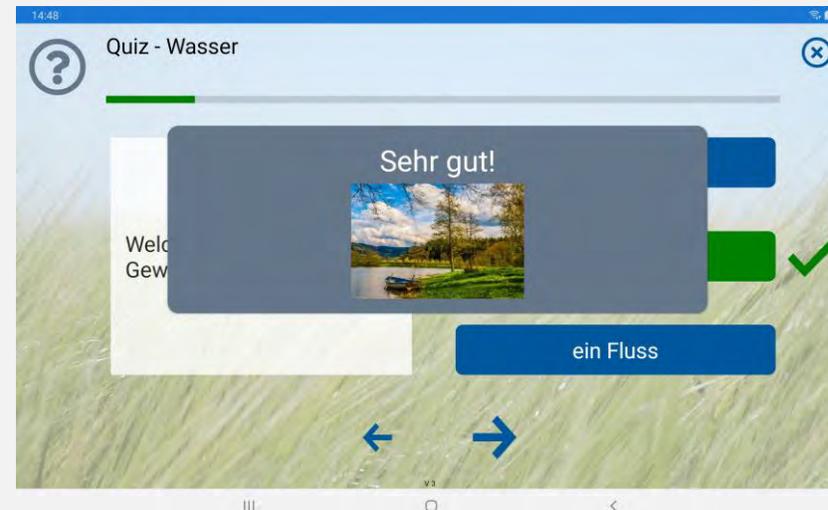
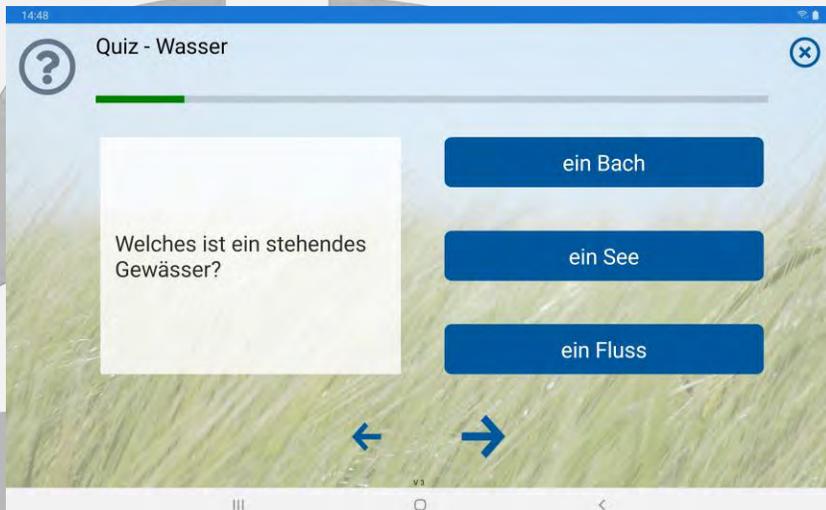
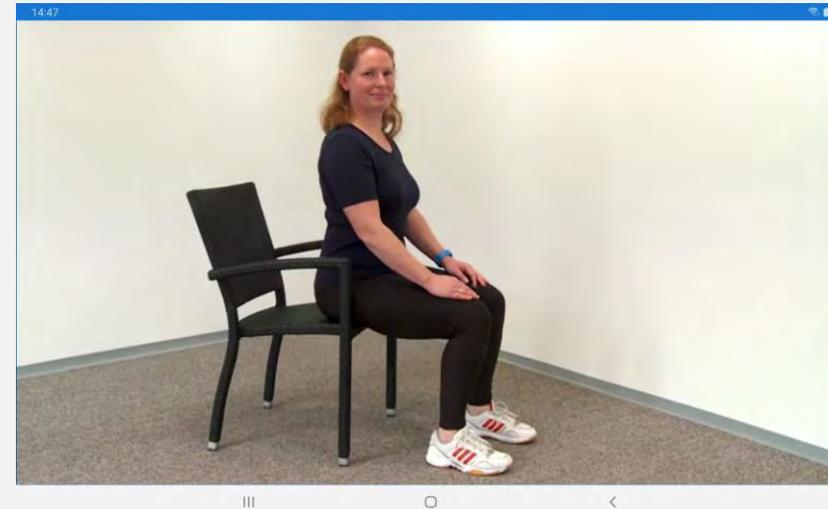
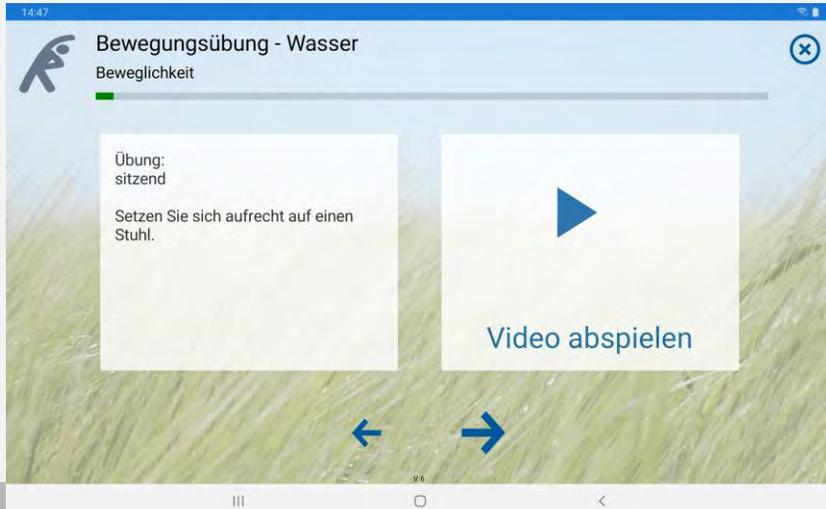


Backup





Examples for Exercises from Theme „Water“





Examples for Exercises from Theme „Water“



14:48

Puzzle - Wasser

Fügen Sie die Teile zu einem Ganzen zusammen!

Navigation: ← →

14:49

Lückentext - Wasser

Bringen Sie durch Tippen die Buchstaben an die richtige Stelle.

f l

W a s s e r _ a l _

Navigation: ← →

14:50

Rechenaufgabe - Wasser

Lösen Sie die Rechnung!

$90 + 9 =$

99

93

96

Navigation: ← →

14:50

Reihenfolge - Wasser

Bringen Sie die Handlungsvorgänge in die richtige Reihenfolge.

Nägel lackieren

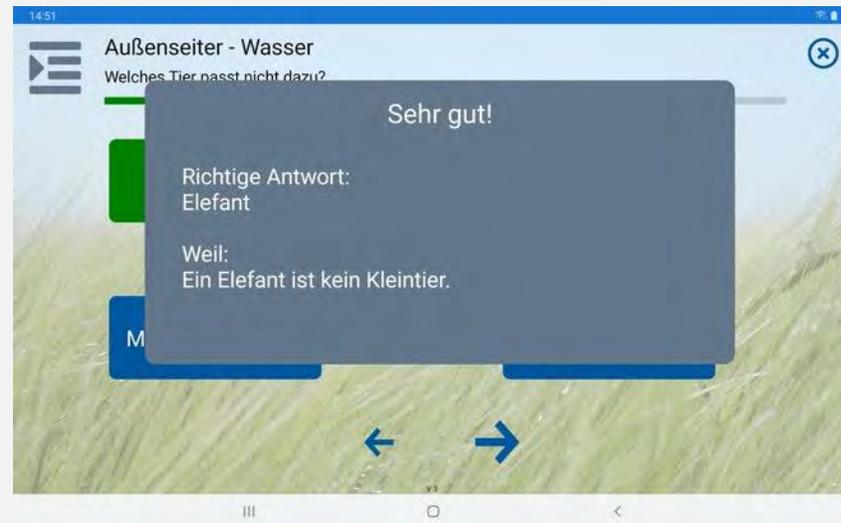
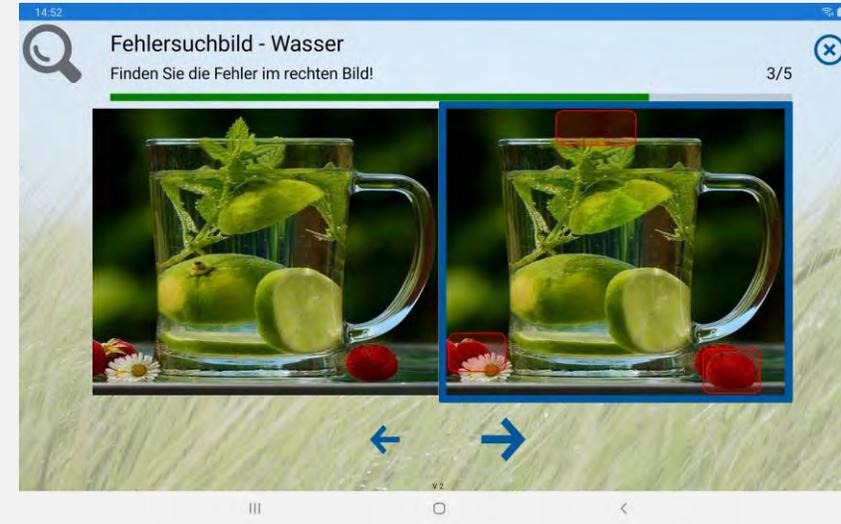
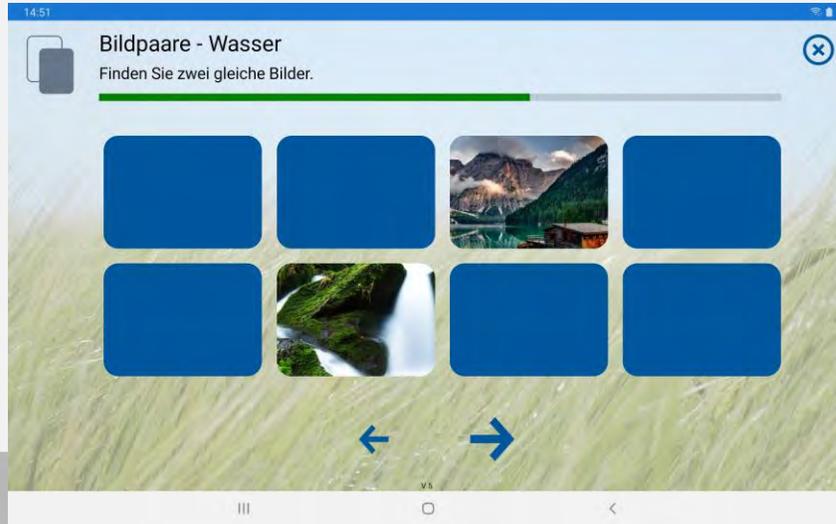
1 2 3 4

Nägel lackieren Nägel trocknen Nägel schneiden Nägel feilen

Navigation: ← →

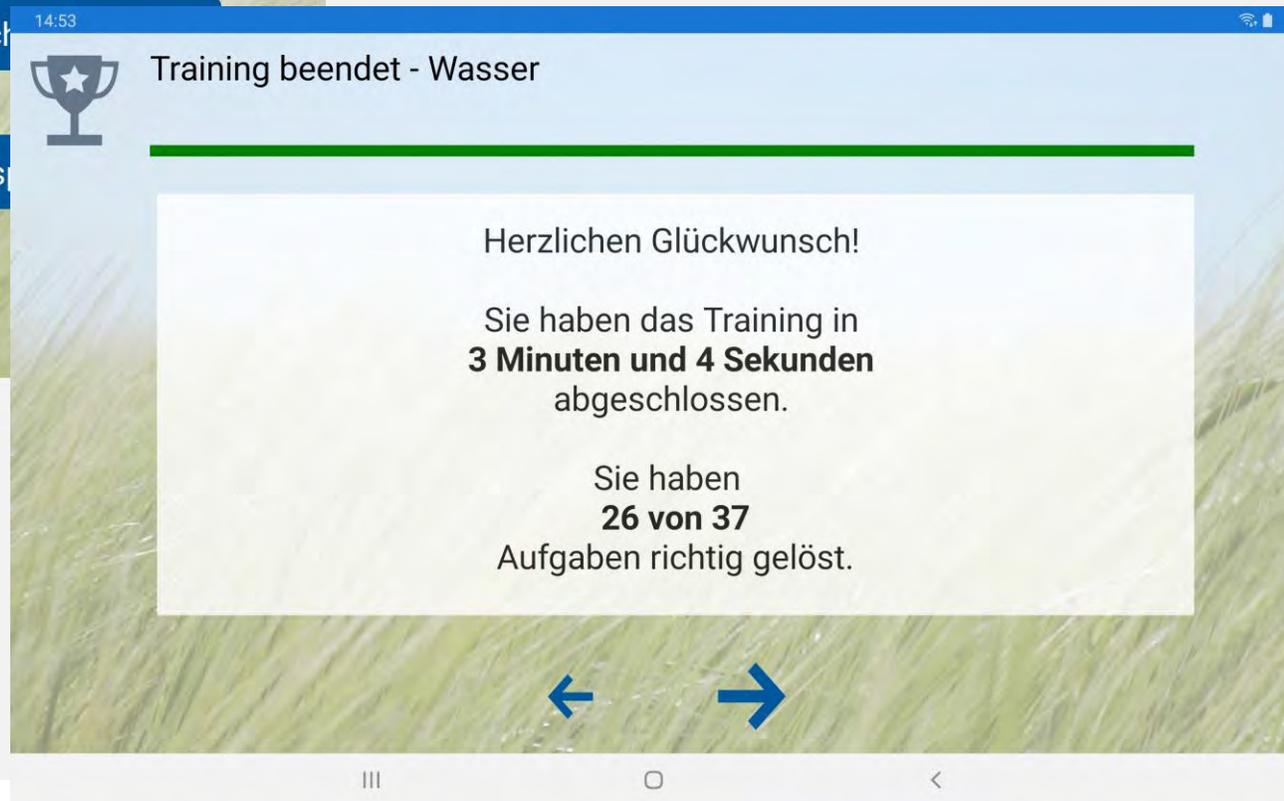


Examples for Exercises from Theme „Water“





Examples for Exercises from Theme „Water“

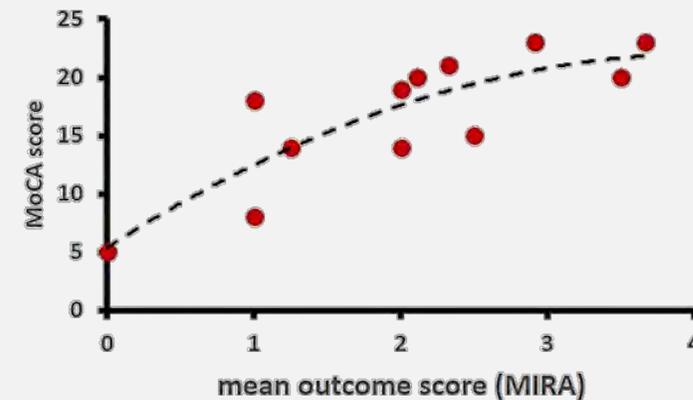
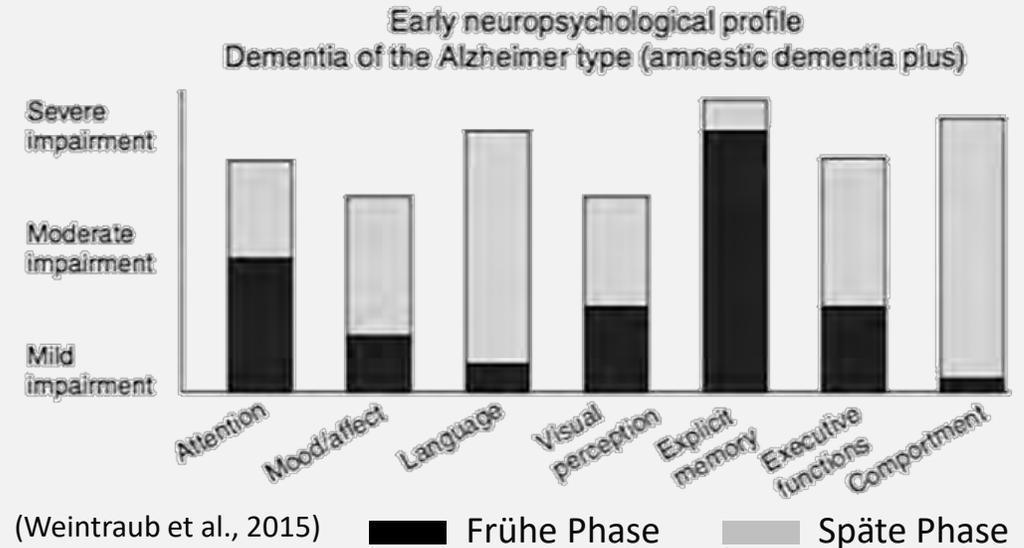




The training content of the tablet app is also offered in the form of a dice game and can thus be used for group trainings.



- **Individual setting** of neuropsychological profile, individual development of functionalities / deficits
- Training with diagnostics module enables estimate for MoCA subscores
- **Game scores as estimates for individual cognitive assessment**
- Personalisation via AI system



Polynomial regression for mental state estimation with a precision 2.60 ± 1.93 points of MoCA score.
(Paletta et al., 2020)



Our Research: Exercises and cognitive Categories



MoCA Subscores							
ExerciseType	Visuospatial Executive (1)	Naming (2)	Attention (3)	Language (4)	Abstraction (5)	Recall (6)	Orientation (7)
KnowledgeText				🌀	🌀	🌀	
Puzzle	🌀		🌀			🌀	🌀
BoxFinder	🌀		🌀			🌀	🌀
GapFill		🌀	🌀	🌀		🌀	
Step Sequence	🌀			🌀		🌀	
Math			🌀		🌀	🌀	
Memory	🌀					🌀	
Outsider				🌀	🌀	🌀	
Knowledge ImageClip	🌀		🌀				🌀
Acoustic Knowledge					🌀	🌀	
Difference Puzzle	🌀		🌀				🌀
Movement	🌀					🌀	
Number Series	🌀		🌀		🌀		



Business Model



- Simple and highly scalable business model (SaaS) used by health and care companies in their purchasing of digital applications
- Strategic network partners transfer training contents into their cultural context and receive commissions (monetary or as licenses)
- Market development via our B2B customers (care and support organizations) and strategic network partners

- Licence types (software as a service):
 - Home (250 € p.a.)
 - Professional Lite (500 € p.a.)
 - Professional Premium (2.000 € p.a.)
 - Authoring Tool (1.000 € p.a.), Sharing Tool (1.000 € p.a.), Decision Support (N/A)
- Free test version (for all users)
- Pilot projects for organisations
- Training (online and in presence)



Professional licenses cover 20, 50 and 100 trainers, limited correspondingly to 100, 250 and 500 patients



Worldwide growing Market



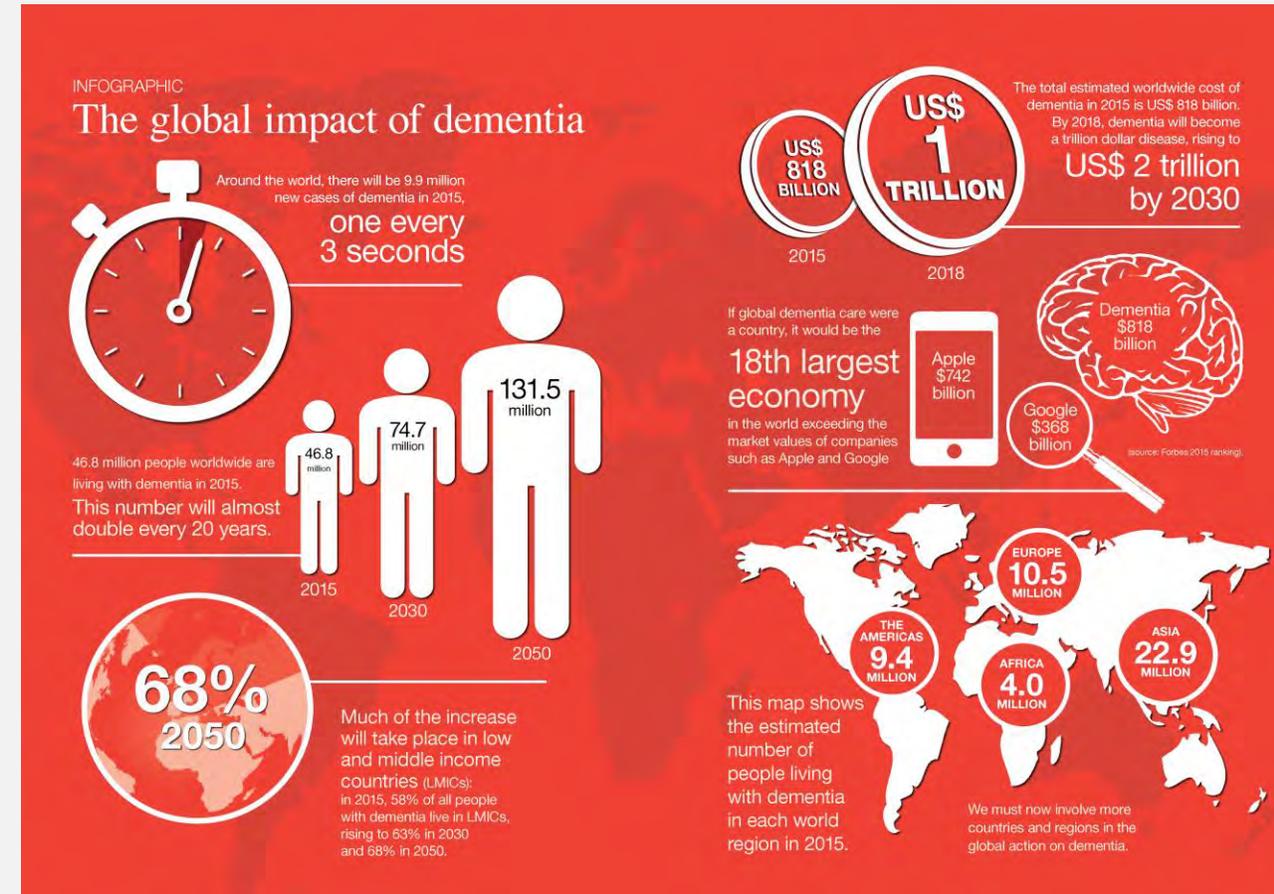
B2B market

- Organizations that provide services for people with dementia
- Mobile dementia training and support
- Stationary care facilities (nursing homes, acute geriatrics)

- Direct sales and distribution partners

B2C market

- Individuals with dementia and their relatives
 - People with mild cognitive impairment and mild to moderate dementia
 - Individuals who want to prevent
 - Sales via network partners (B2B customers)
- Additional target groups
- Other neurodegenerative diseases (parkinson)
 - Post-operative cognitive decline
 - Early detection of dementia



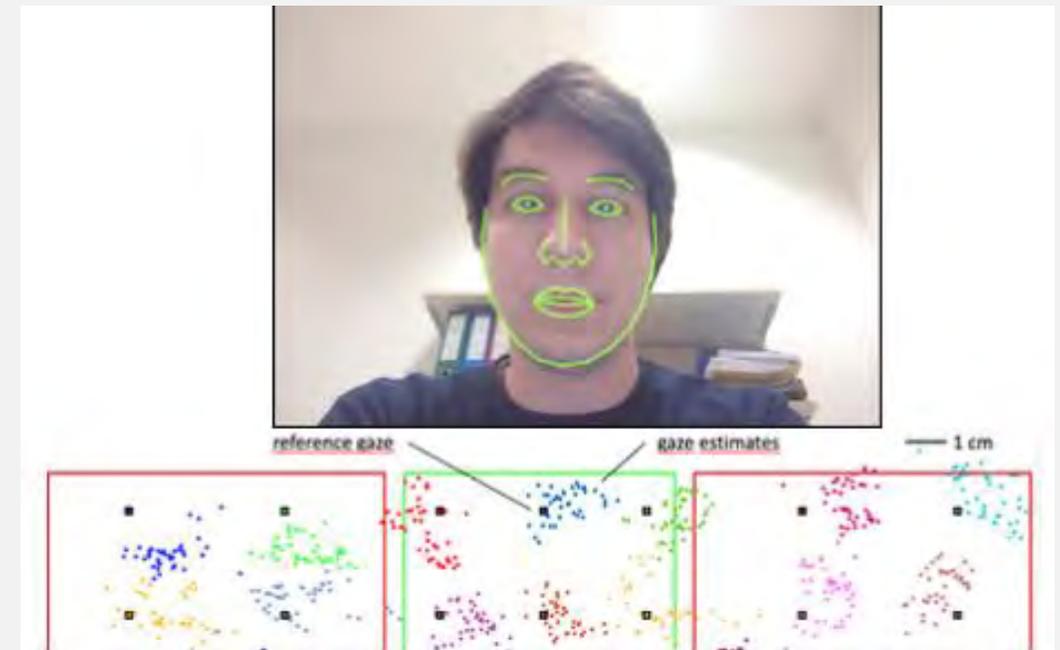


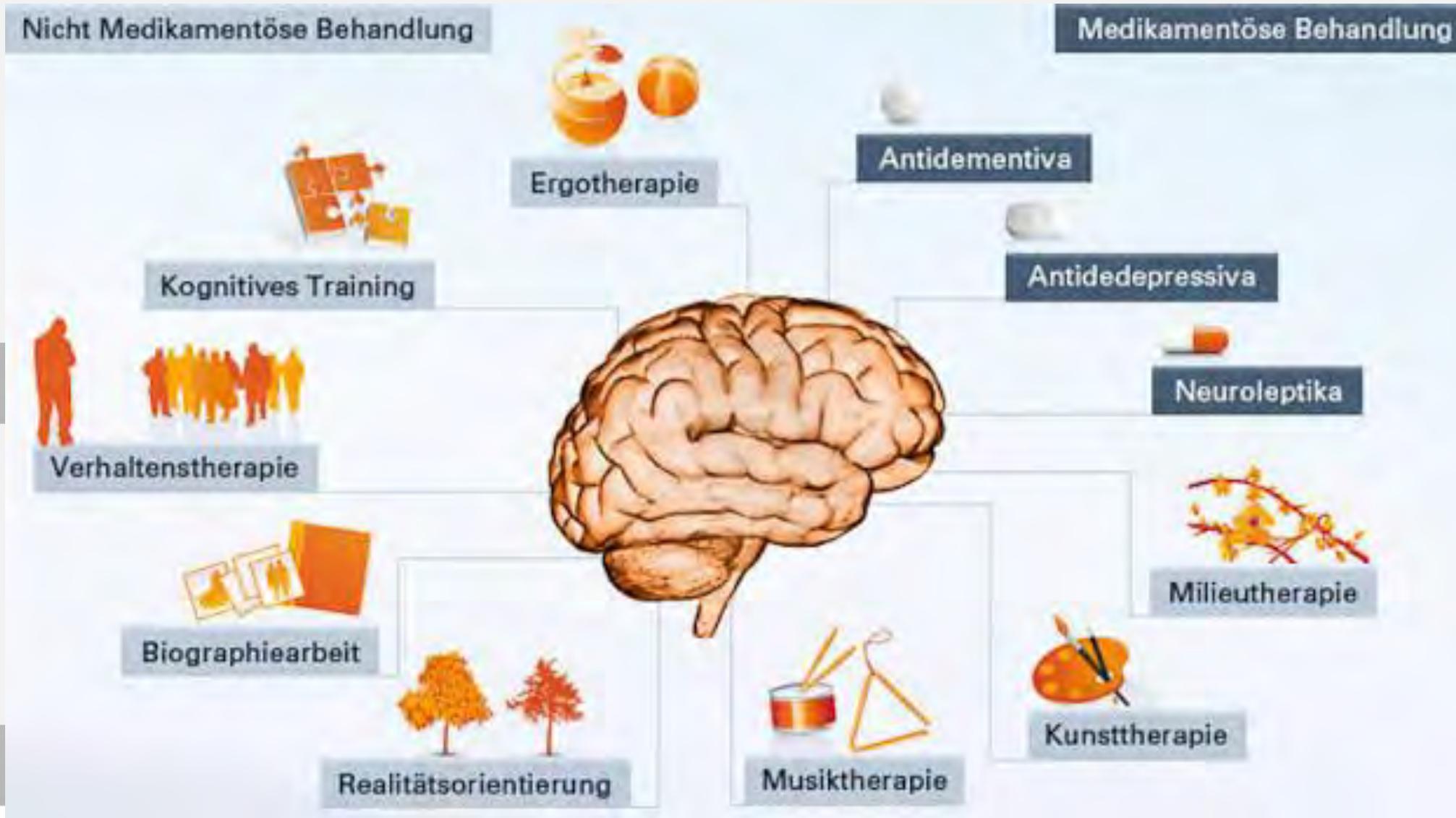
Conventional dementia trainings by skilled personnel:
expensive, no continuous monitoring

Digital applications for cognitive training, monitoring or diagnostics:
limited features, no medical devices

Our unique eyetracking as biomarker makes
digitAAL Life disruptively competitive

Feature	digitAAL Aktiv	Activity trainings			Diagnostic tools		
		memoreBox (RetroBrain.de)	Media4Care.de	Neurotrack.com	Cognifit.com	AcceXible.com	Savonix.com
Multimodal training, combining cognitive and movement exercises, activities of daily living, creativity and games	✓	✓	✓	Partially (only cognitive)	Partially (only cognitive)	✗	✗
Group modus for activity training	✓	✗	✓	✗	✗	✗	✗
Personalisation of content due to biography and interests, e.g. using family photos	✓	✓	✓	✗	✗	✗	✗
Creating and sharing own content	✓	✗	✗	✗	✗	✗	✗
Diagnostics of cognitive status (dementia) by eye tracking and performance data (decision support)	✓	✗	✗	✓	✓	Partially (no scores)	✓
Long-term monitoring of client's cognitive performance	✓	✗	✗	✓	✓	✓	✗
Integration of relevant third-party applications	✓	✗	✗	✗	✗	✗	✗
Certification as a medical device	✓	✗	✗	✗	✗	✗	✗
Mobile device based	✓ (end of project)	Partially (additional hw. needed)	✓	✓	✓	✓	✓







Digitalisation

- App for tablet (Android, iOS)
- Backend
 - Customizing training content
 - Patient data and professional user admin
 - Automated recommendations for next trainings

Data acquisition (sensors)

- Gaze and motion data collection by eyetracking and wearables
- Performance in serious game

Decision Support:

Derivating dementia status indicators for monitoring

- Selected eyetracking features as dementia biomarkers
- Alerts to diagnostics and care

