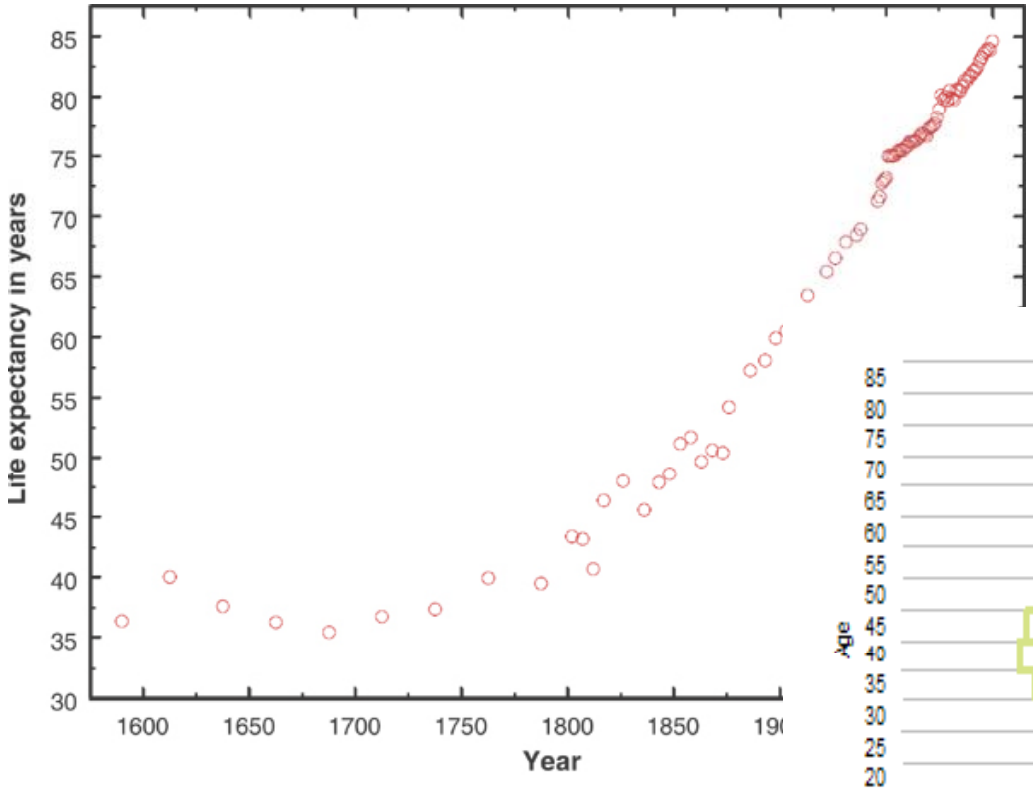
co-funded by the European Commission

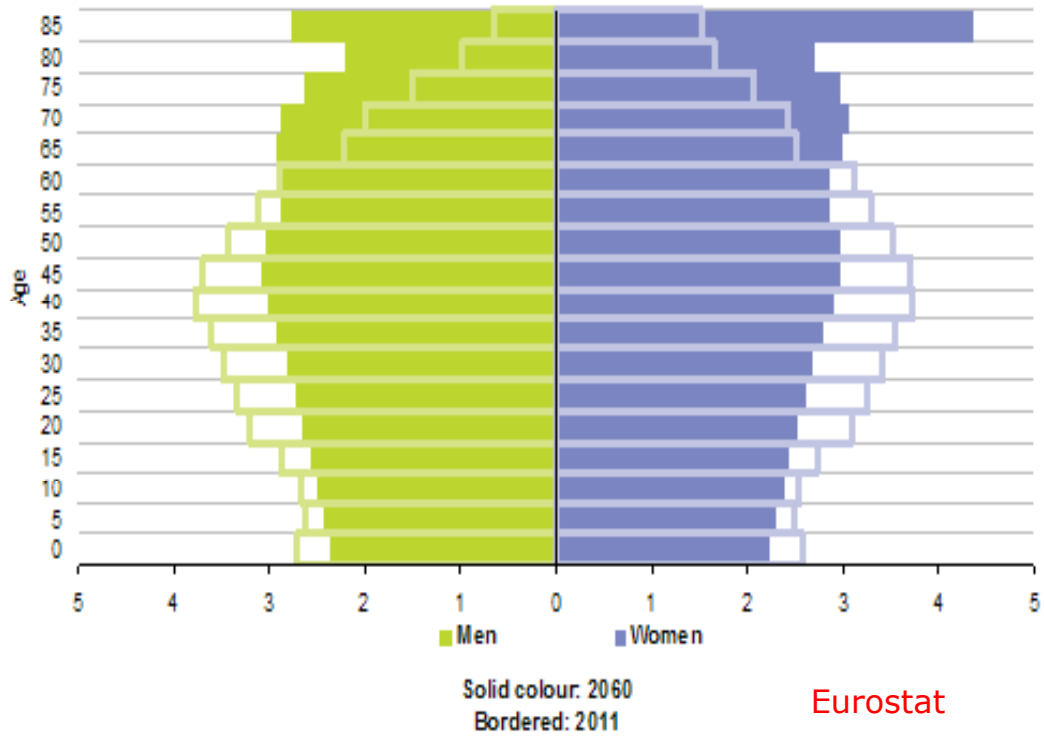
Cognitive and Physical Games for the Elderly: how effective are they?

Panos Bamidis

Dept. of Medicine, School of Health Sciences, Aristotle University of Thessaloniki, Greece

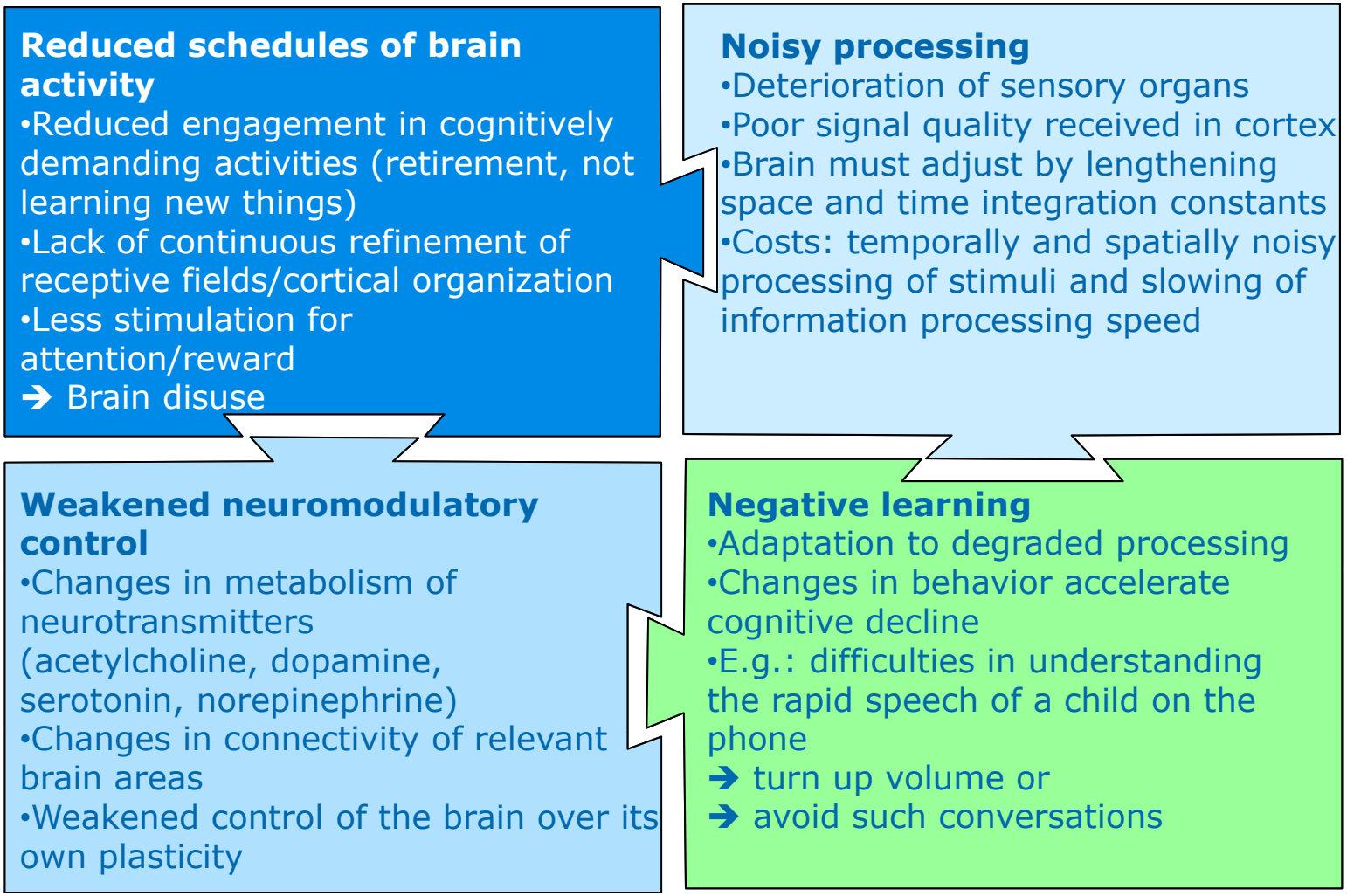
We live longer –
but our society gets older…





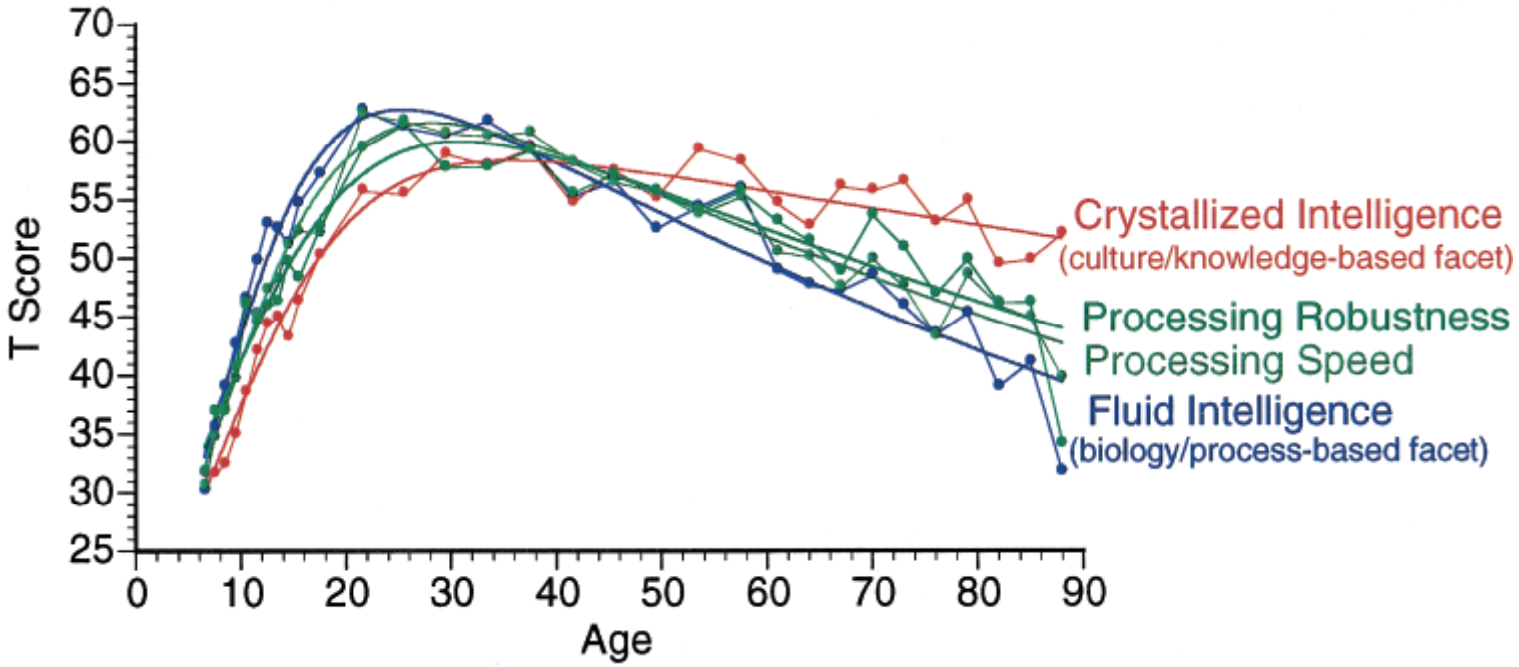
Eurostat

In aging, negative cortical plasticity has four mutually reinforcing components that create a downward spiral of degrading brain function



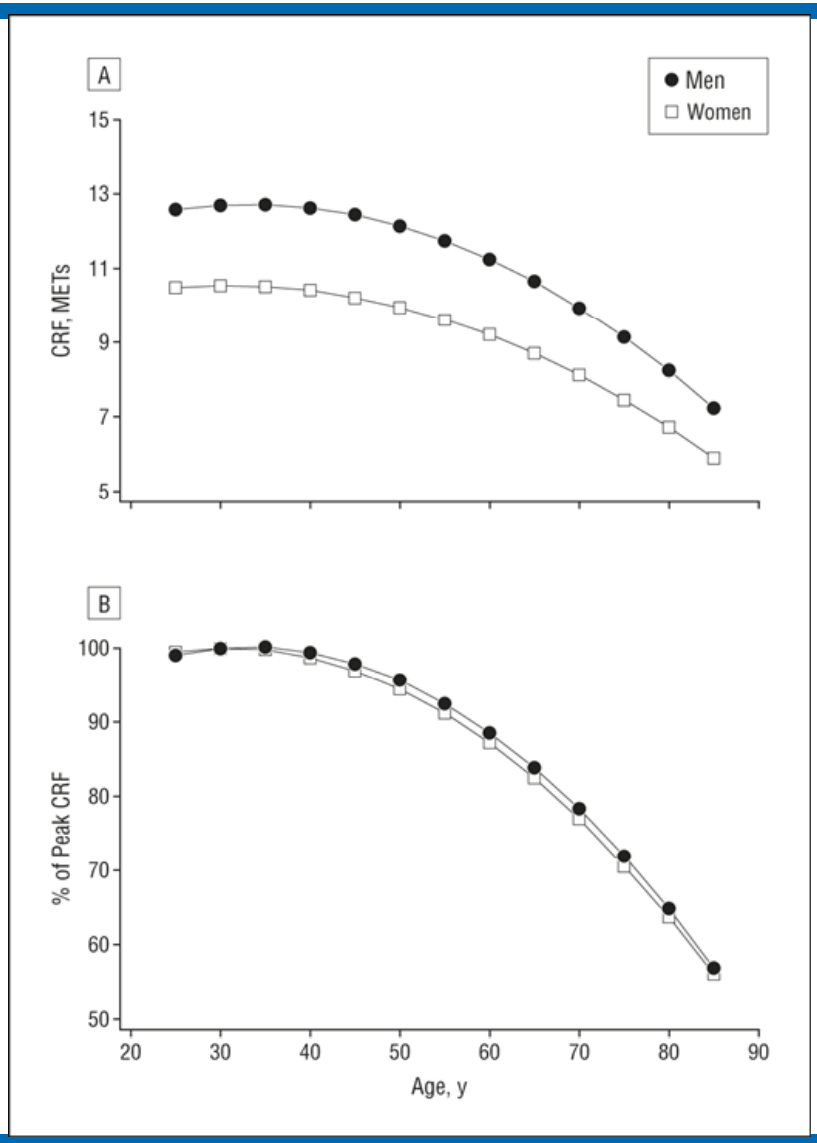
Mahncke, Bronstone, & Merzenich (2006), *Progress in Brain Research*

As we grow we lose functional capacity…



Li et al. (2004), Psychol Sci; Li et al. (2009), Psychol Res

…and also physical capacity…



CRF – Cardiorespiratory fitness (treadmill test until volitional exhaustion)

Peak CRF – Maximal aerobic power (peak VO2)

METs – Metabolic equivalents
(1 MET = oxygen uptake of 3.5 mL/kg per minute = energy expenditure at resting state)

Jackson et al. (2009), Arch Intern Med

The good news…

- Our brain is built in a way that can counteract the decline…

- Brain synapses change / can be regenerated in the time frame of days!

Dementia: 21st century epidemic

Dementia has obtained epidemic dimensions lately, with even worse forecasts for the near future

(World Alzheimer's Association, 2009;World Health Organization; WHO, 2003)

There is no treatment!

Research evidence : **preventing dementia** is the only way of tackling it

(Brookmeyer, Johnson, Ziegler-Graham & Arrighi, 2007; Roberson & Mucke, 2006; Valenzuela & Sachdev, 2005)

Prevention methods

Physical exercise

- Train body…

(Colcombe, et al., 2006; Colcombe & Kramer 2013)

Cognitive exercise

- Train mind

(Ball, et al. 2002; Mahncke, Connor, Appelman, et al., 2006; May, Hajak, Steffens, et al, 2007; Willis, Tennstedt, Marsiske, et al. 2006; Valenzuela, 2008)

Proper training

→ induces neural plasticity changes

→ slows down or inverts cognitive decline

(Smith et al., 2009)

Technology and Active Ageing

- Can technology intervene non-pharmacologically?
- Can we make internet developments fight against cognitive decline and promote active ageing?
- Can elderly people improve their health by playing games over the internet?
- Are there any such "**silvergames**" for "grown up kids"?

What's the difference between different games

- Different attitudes towards elderly and kids…???
- Difference in design between silvergames and kids' games ???
- What is the optimal design strategy ???
- Is there any evidence out there ???
- …Neuroscience …

- come and join us: SAN2014, Utrecht 30/1/2014 - 2/2/2014; www.applied-neuroscience.org/san2014

Game effectiveness: …towards the evidence

- Resting state MEG
  - short term-changes of variability
  - older brains are less dynamic
  - dynamic brains are better
  - neuronal variability relates to cognitive function

(Garret et al, 2013)

Game effectiveness: …towards the evidence (Cont'd)

- Can we improve by behavioural exercises?
  - behavioural variability improves cognitive function in mice...
  - enriched environment and spatial memory
  - long-term training of old mice reduces spatial memory errors...

(Bennet et al, 2005)

Game effectiveness: …towards the evidence (Cont'd)

- Behavioural activity:
  - Kids at school age:
    - v.large (change lesson every 45')
  - Older age: less (e.g. Greek kafenio)
  - Wang et al, (2012) study elderly people:
    - how active they are
    - activity index
    - Doing more types of activities relates to cognitive functions...
    - follow up in 2.5 y: low activity group goes down (cognitively) more quickly

Game effectiveness: …towards the evidence (Cont'd)

- W. Schlee refers to "Learned Rigidity"
  - kinds of activities we do and learn during life time...
  - Games specific heuristics (e.g. chess)
  - Cognitive and attentional demand vs efficiency of the game strategy:
    - Experts: have got low demands and more strategies
    - Novices: big demands & few strategies.

Game design: aiming for effectiveness

- Aim for silver games: aim at novice level !
- To enhance cognitive function:
  - 1) use cognitive demanding games
  - 2) promote behavioural and neuronal variability by preventing game specific strategies
    - switch games or change rules…

Long Lasting Memories (LLM)

- **1st time worldwide** combination of computer based physical and cognitive training
- Exercises properly designed for silver minds
- Auto-adapting levels of difficulty along elder's performance so as to achieve optimal training effects
- Game based activities, for elderly (>60), that are also fun to use and play with (exergaming)

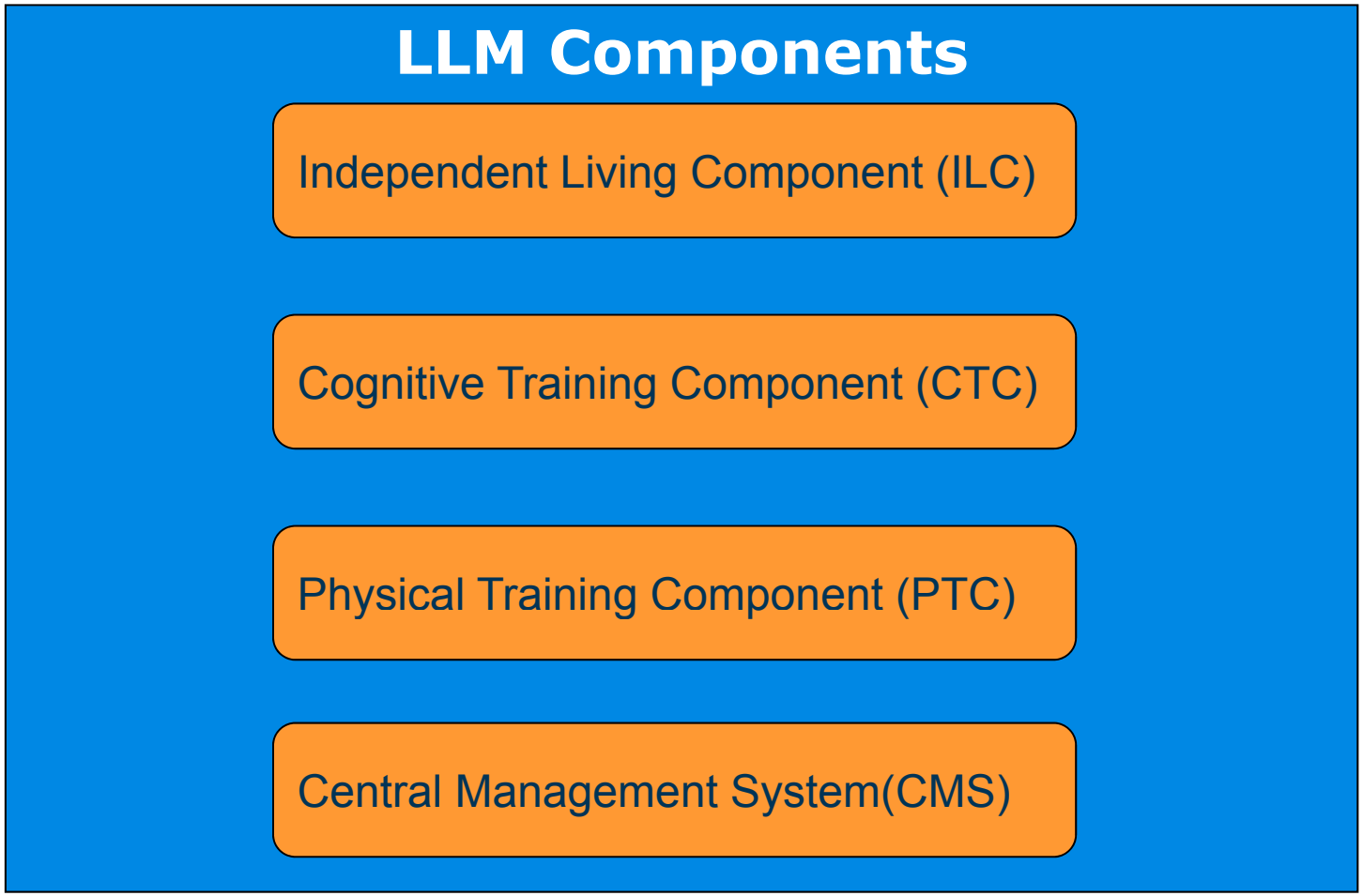
What is LLM ?

- Long Lasting Memories (LLM) is an integrated ICT platform which combines :
  - state-of-the-art cognitive exercises
  - with physical activity (in the form of games)

  in the framework of an
  - advanced ambient assisted living environment (sensor based e-home)

Long Lasting Memories
Mind and body fitness for life

LLM Platform



Long Lasting Memories
Mind and body fitness for life

Component 1:
Effects of Physical Exercise in the Elderly

- Regular physical exercise, significantly improves physical functioning of individuals at any age
- Engagement of elderly individuals in regular physical exercise programs has demonstrated improvement in
  - aerobic capacity, muscular strength, muscular endurance, flexibility, balance,
  - motor control and performance,
  - skill acquisition,
  - coordination,
  - cognition and psychological well being

(www.who.int/hpr/ageing/heidelberg_eng.pdf)

Long Lasting Memories
Mind and body fitness for life

In aging, negative cortical plasticity has four mutually reinforcing components that create a downward spiral of degrading brain function

COMPONENT 2

Reduced schedules of brain activity
•Reduced engagement in cognitively demanding activities (retirement, not learning new things)
•Lack of continuous refinement of receptive fields/cortical organization
•Less stimulation for attention/reward
➔ Brain disuse

Noisy processing
•Deterioration of sensory organs
•Poor signal quality received in cortex
•Brain must adjust by lengthening space and time integration constants
•Costs: temporally and spatially noisy processing of stimuli and slowing of information processing speed

Weakened neuromodulatory control
•Changes in metabolism of neurotransmitters (acetylcholine, dopamine, serotonin, norepinephrine)
•Changes in connectivity of relevant brain areas
•Weakened control of the brain over its own plasticity

Negative learning
•Adaptation to degraded processing
•Changes in behavior accelerate cognitive decline
•E.g.: difficulties in understanding the rapid speech of a child on the phone
➔ turn up volume or
➔ avoid such conversations

Requirements for behavioral training to drive large-scale plasticity

COMPONENT 2

Intense schedules of activity
- Thousands of trials
- Frequent engagement
- Adaptively increase task demands

Refine stimulus processing
- Increase fidelity
- Use complex, dynamic inputs
- Decrease spatial/temporal integration constants
- Support generalization and in-context function

Enhance neuromodulation
- Activation, arousal, reward, novelty
- Increase demands on attentional control

Strengthen critical life skills
- Force engagement in difficult tasks
- Shape new behaviors
- Positively reinforce enhanced function

LLM Service


e-Home
Local Interface
e-Home
e-Home
Cognitive Training
dah
gah
Niagara Falls
e-Home
Physical Data
Cognitive Data
e-Home Data
LLM Service
Physical Training

LLM home example

LLM Objectives & Challenges

Integrate two existing ICT solutions with physical training equipment, thus delivering innovative ageing-well / independent-living support services for elders

Demonstrate the significant impact potential of LLM service in different EU countries

Verify the technical, organisational and legal feasibility of LLM service along the complete value chain of stakeholders

Verify the sustainability, scalability and applicability of LLM services across Europe

Technical Integration

Trial Deployment

Service Marketability

The YouTube Video

- Project Video:

http://www.youtube.com/watch?feature=player_embedded&v=tXnUc4lCi1Y

Or (with English subtitles):

http://www.youtube.com/watch?feature=player_embedded&v=ilABZtm8eGM

Focus on (physical) exergaming

Effects of physical training

- Reduction of chronic disease symptoms. Improvement of fitness, muscle strength and quality of life.

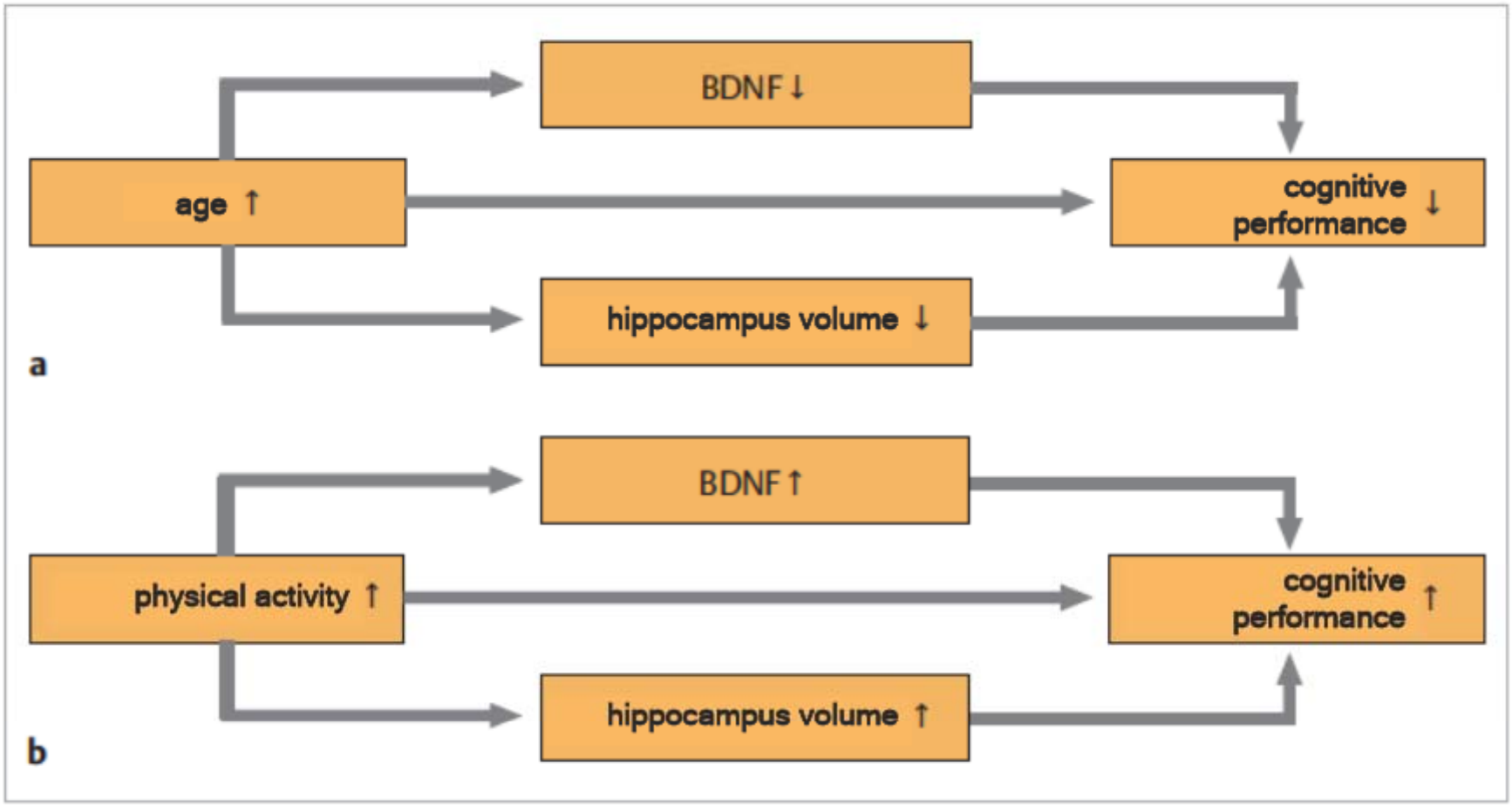
  (Pedersen & Saltin, 2006)

- Quality of life improvement for seniors

  (Hassmen, Koivula & Uutela, 2000)

- Mediating suffering from chronic diseases like
  - cancer (Courneya & Friedenreich, 1999) &
  - diabetes (Chyun, Melkus, Katten et al., 2006. Maddigan, Majumdar & Johnson, 2005. Smith & McFall, 2005)

Theoretical model for body train-based prevention of cognitive decline



Thurm (2012), NeuroReha; Erickson et al. (2012), Neuroscientist

Long Lasting Memories
Mind and body fitness for life

Exergaming & technology

Long Lasting Memories
Mind and body fitness for life

Exergaming

- Attractive and motivating
- Virtual and mixed reality games
- Interactive treatment[1,2] and training in fully- or semi- controlled 2D or 3D environments
  - Haptic interfaces, tabletop interfaces, sensor-enabled game input controllers (Nintendo Wii), motion tracking cameras (Sony EyeToy, Microsoft X-Box) etc.

1. Bonanni L., Vaucelle, C., Lieberman, J., & Zuckerman, O. (2006). TapTap: A Haptic Wearable for Asynchronous Distributed Touch Therapy. Ext. Abstracts CHI 2006, ACM Press (2006), 580-585.

2. Mumford N., Duckworth, J., Eldridge, R., Guglielmetti, M., Thomas, P., Shum, D., Rudolph, H., Williams, G., and Wilson, P.H. A virtual tabletop workspace for upper-limb rehabilitation in Traumatic Brain Injury (TBI): A multiple case study evaluation. In Proc. of Virtual Rehabilitation, (2008), 175-180.

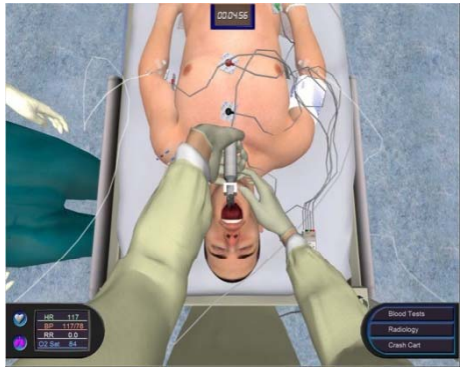
Long Lasting Memories
Mind and body fitness for life

Virtual reality

- VR use computers to create virtual worlds, simulating real worlds and conditions (or even unreal, wishful…), through which the user feels is included, capable of moving and iteracting with sourrounding objects (like in real world).

- Applications:
  - Education
  - entertainment (edutainment)
  - Interventions in special target groups with specific behavioural features (e.g. autistics)

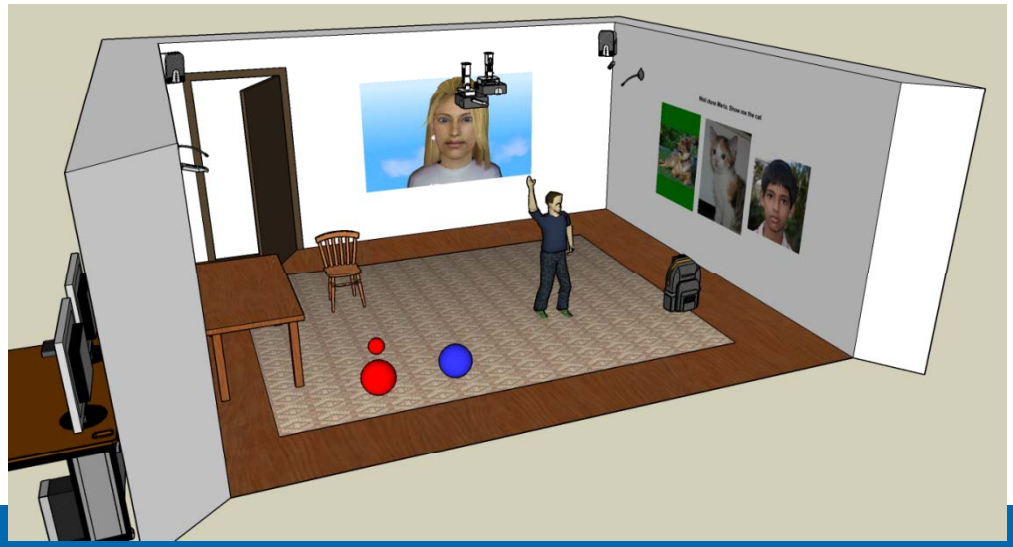
  …….



Long Lasting Memories
Mind and body fitness for life

Semi-virtual environments

- Augmented reality
- Still VR (computer based)
- Objects of the environment take part in the process
- User participation with bodily movements
- Collaborative group games



Our Goal

- Improve physical and cognitive health of seniors and ultimately quality of life

Exercise types/categoriees

- Aerobic
- Muscle flexibility
- Muscle strength
- Balance

FFA user-centered design cycle

- Iterative procedure
- Steps
  1. -Recording of user needs and preferences
  2. -Design of game scenarios based on previous information
  3. -Testing in real world settings / record end-users reactions and beliefs

Solutions to accessibility issues

- Adoption of user-centered design principles
  - Multiple game content format
  - Simple game scenarios, comprehensible instructions
  - Repetition on exercise execution, easy-learning

- "Senior-friendly" HCI system
  - Strengthens mood
  - Motivation
  - Attractive environment and interest maintenance

Using Wii Remote control

- Accelerometer based function:
  - Static acceleration (position/status due to gravity)
  - Mechanical acceleration (motion)
  - 3 – axes
  - Bluetooth technology for PC connection

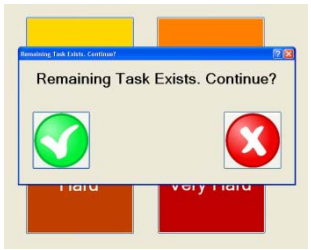
Wii Balance Board

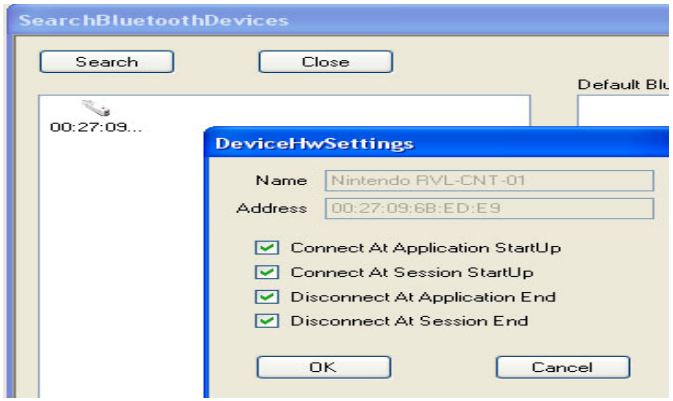
- Pressure sensors
  - 4 sensors for centre of gravity estimation
  - Bluetooth for PC connection

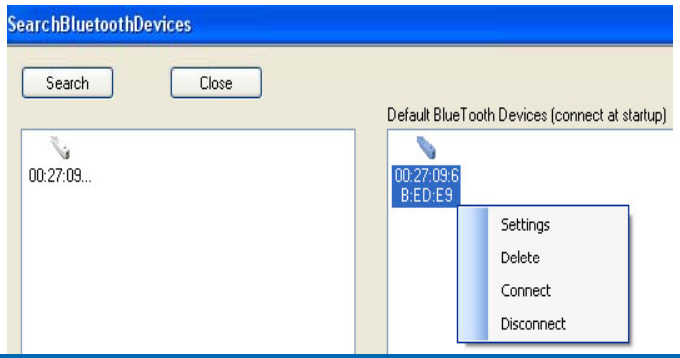
XNA 3d Graphics

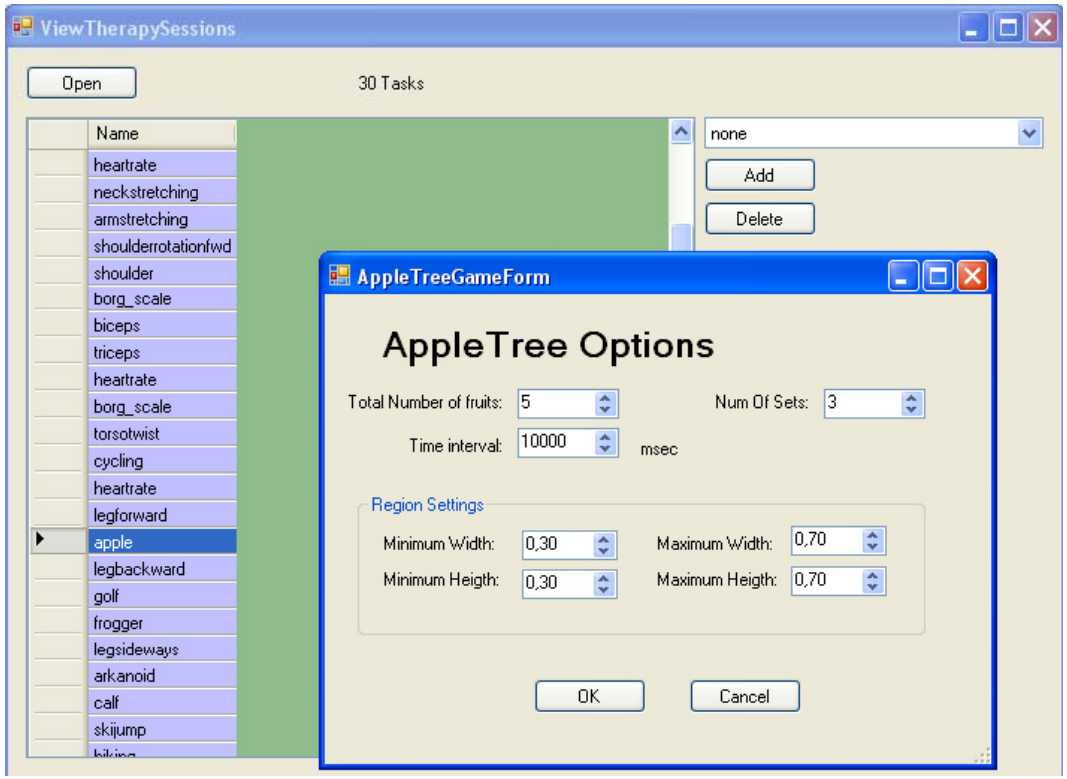
- 3d graphic and game development platform
- Quick and easy development (rapid)
- Numerous applications and games based on XNA available
- Easy integration of existing games in FitForAll

Managing interface examples

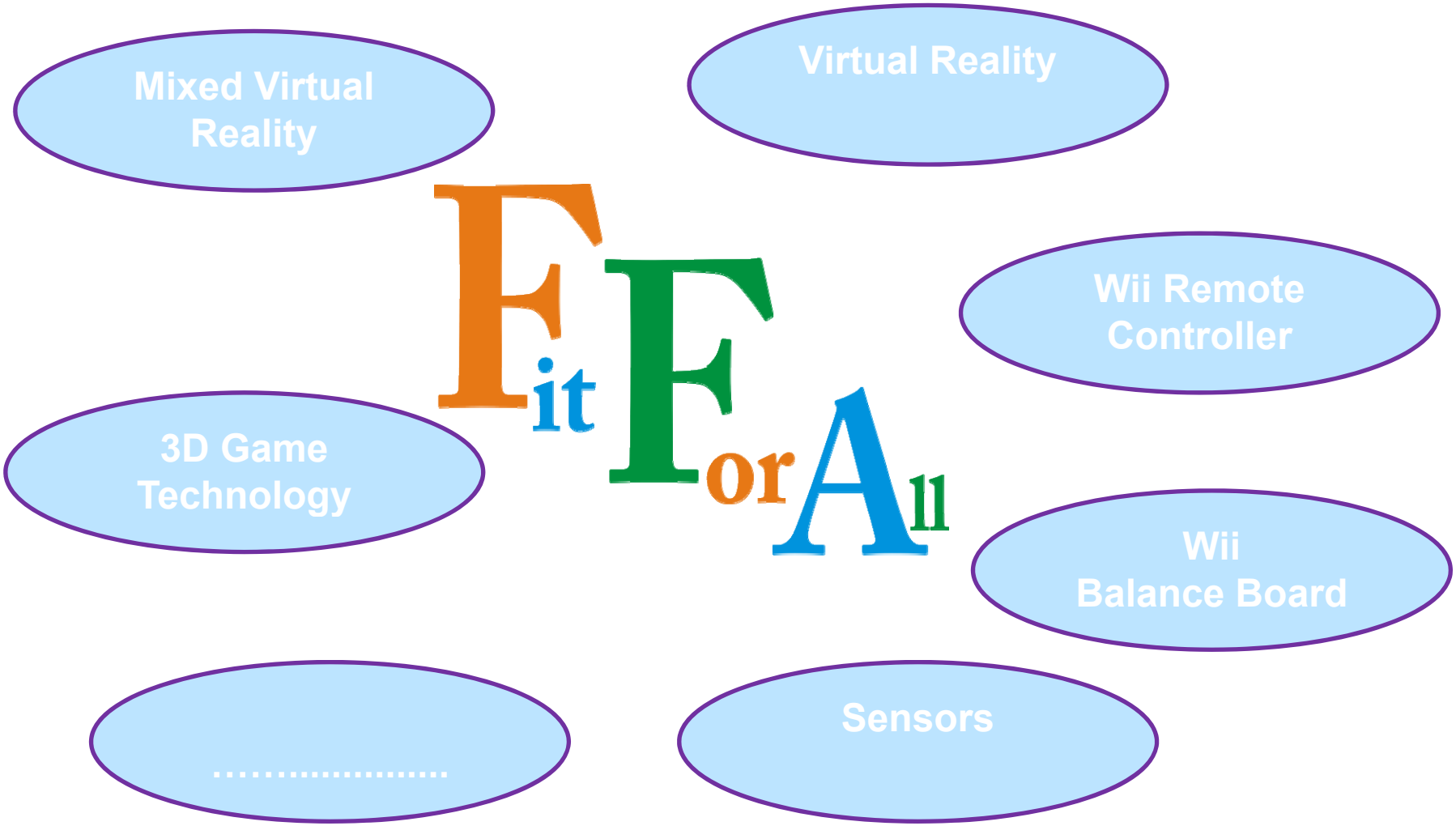




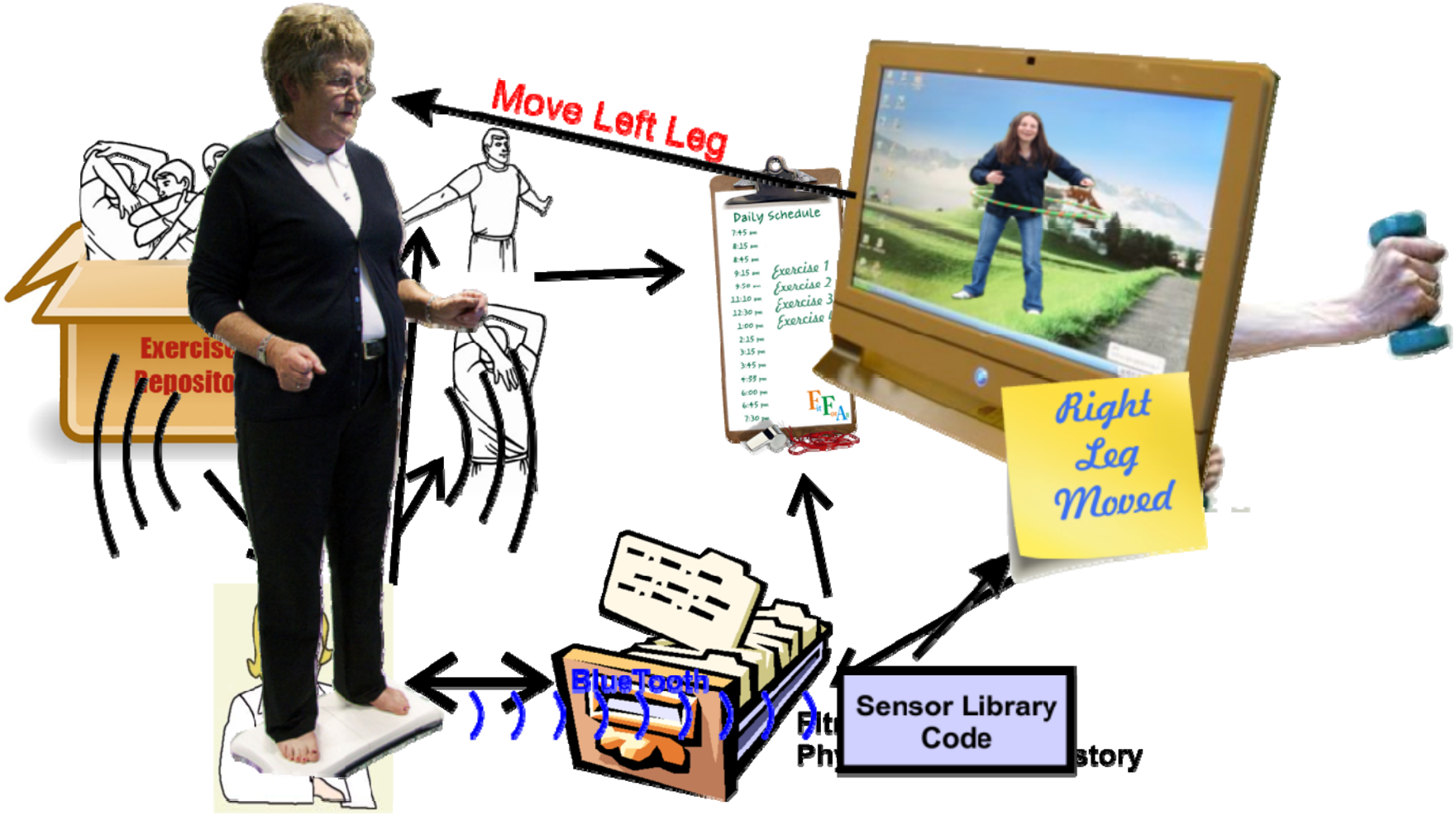




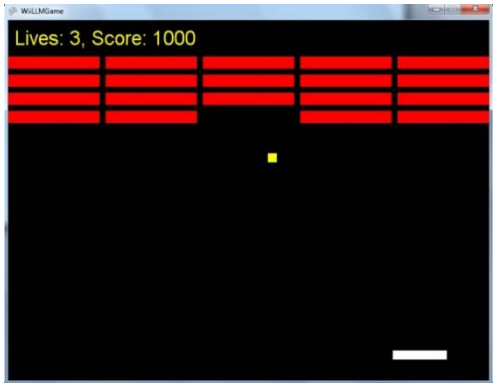
FFA platform description

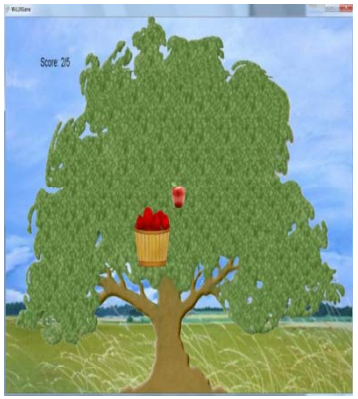


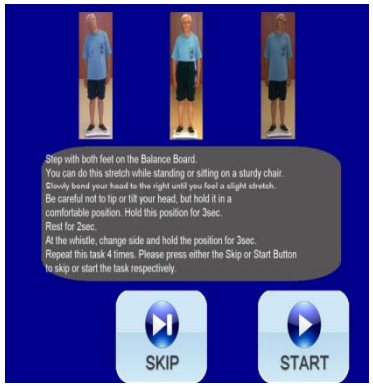
FitForAll Architecture

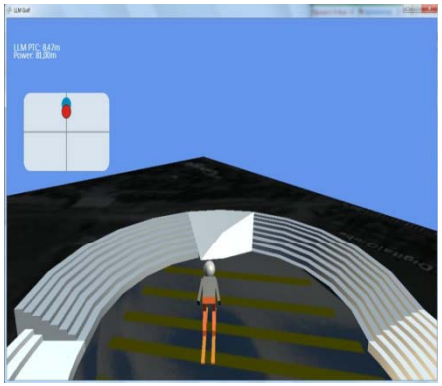


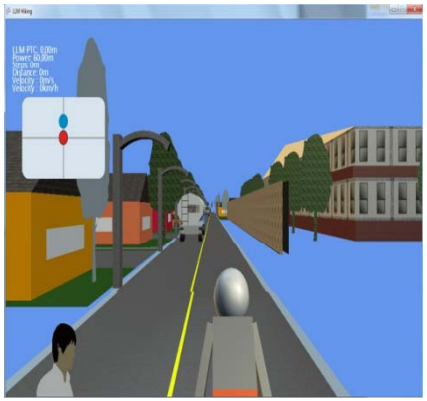
Physical Games









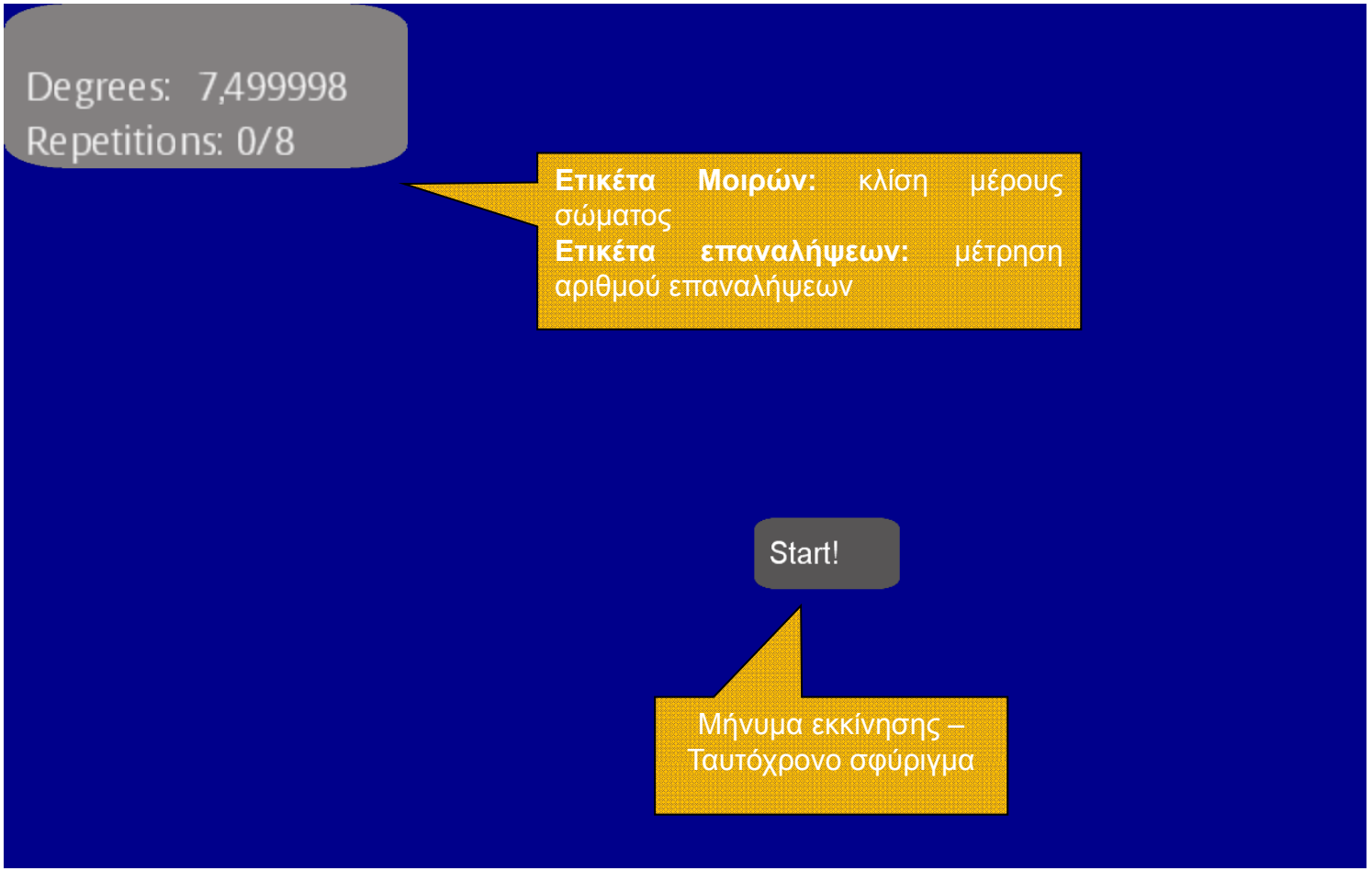


Instructions based on text, images and sound/speech

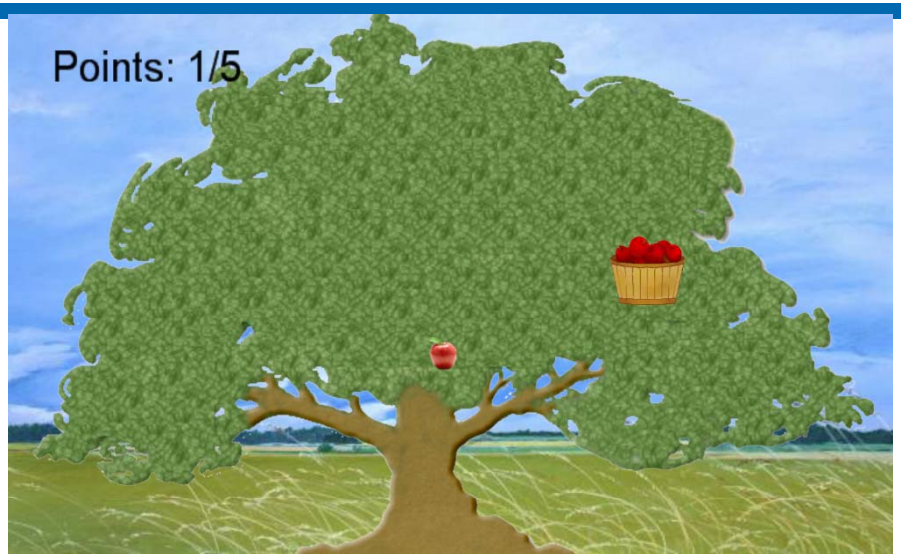
Light walking on the spot. Move both arms and legs. Raise each knee to a point midway between the kneecap and top hip bone.
Try to keep a constant speed of 0-3km/h
In case you move faster the time sign at the top left corner will become red.
Press the Start Button so to start with the task.

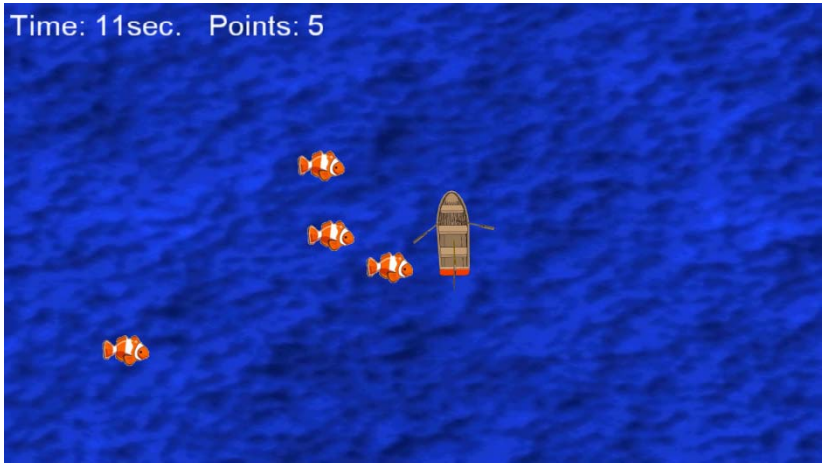
START

Repetitive approach for process/exercise execution

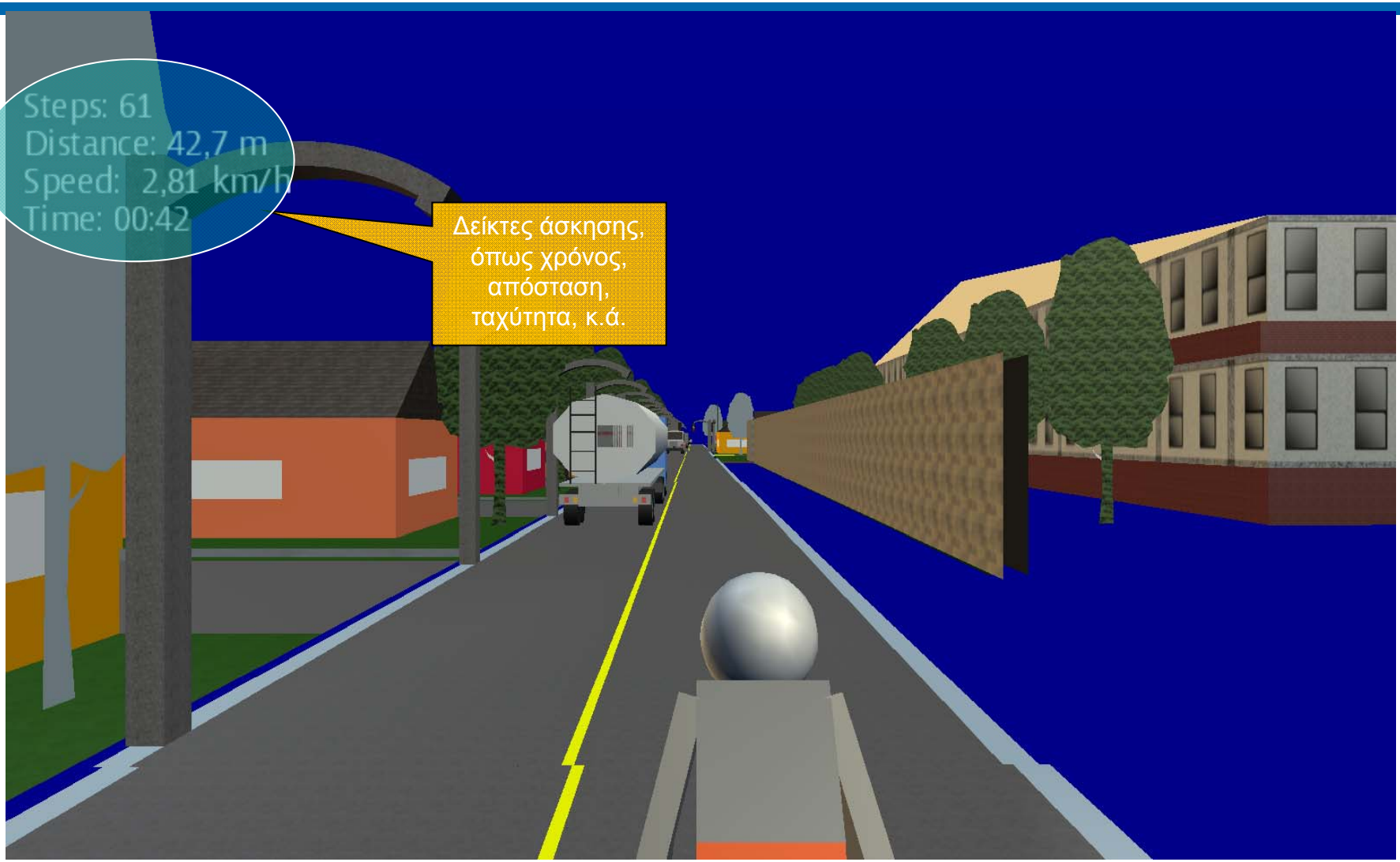


Easy interface – simple/familiar content

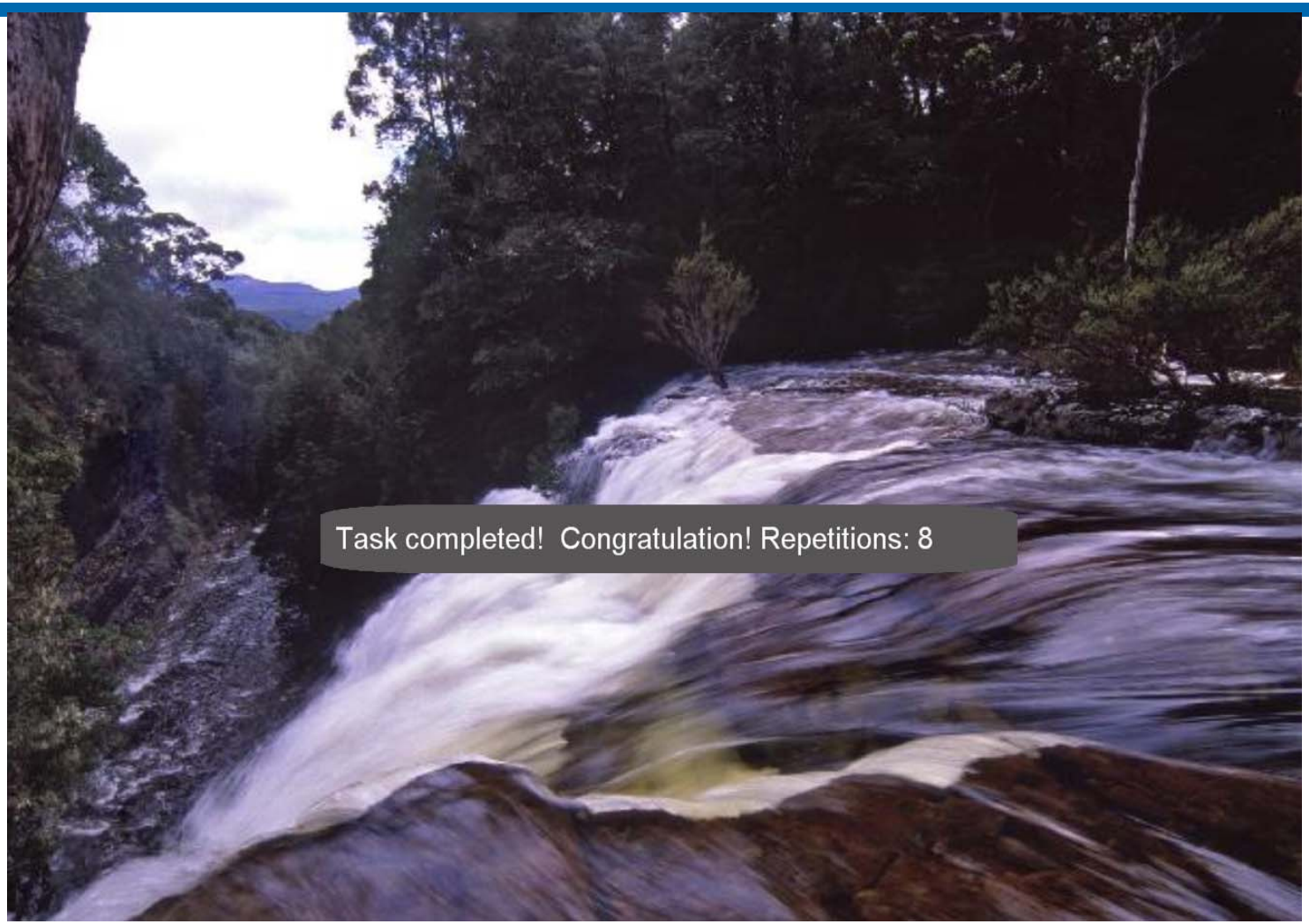




Feedback based

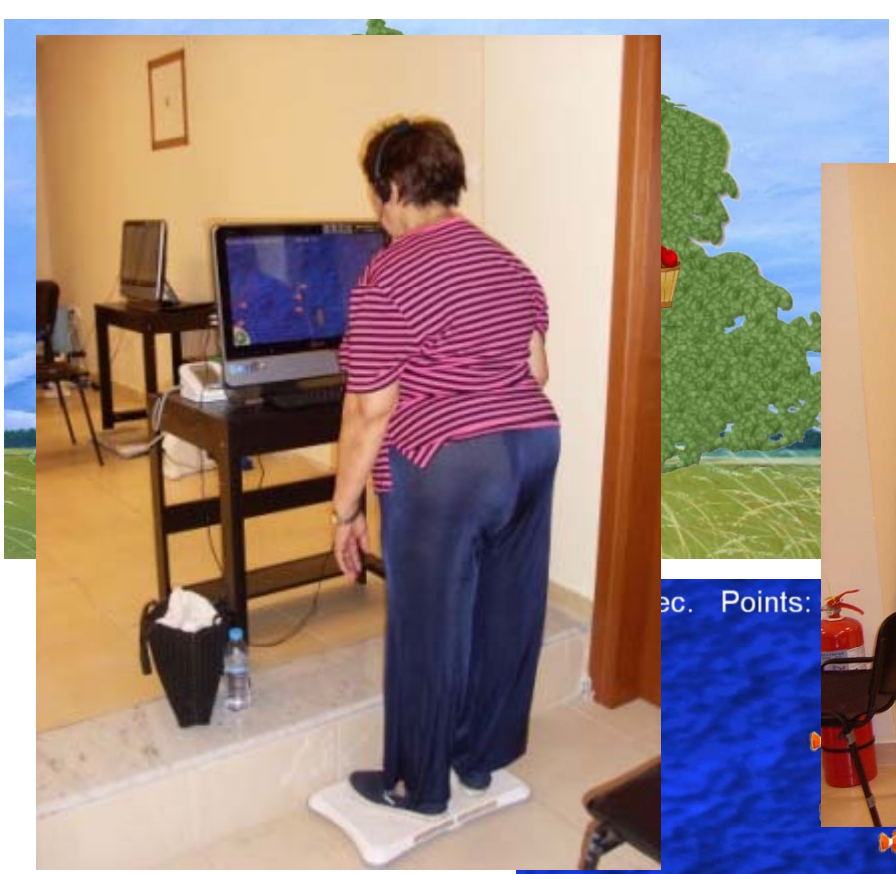


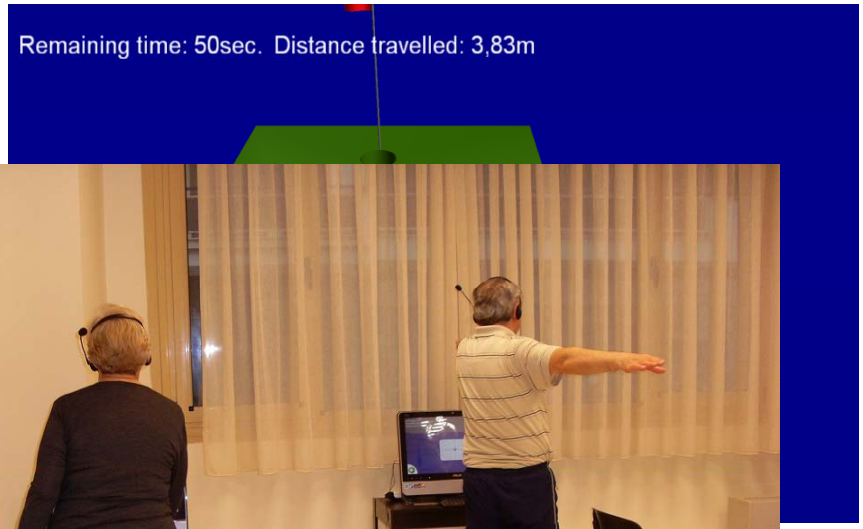
Reward inclusive

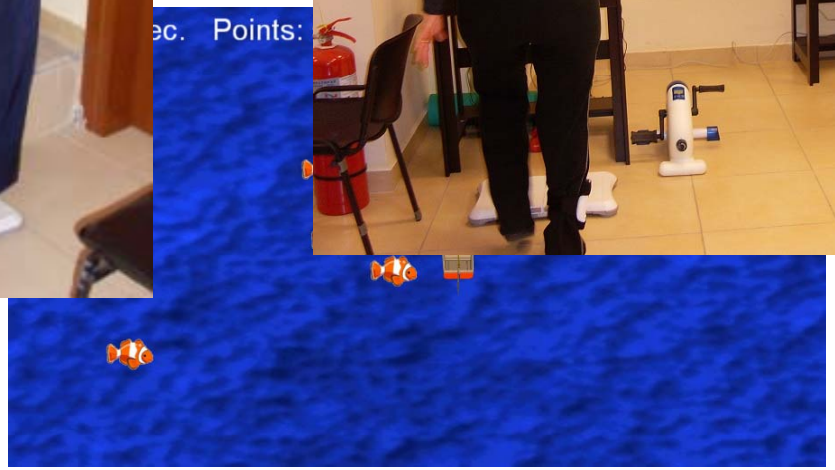


Long Lasting Memories
Mind and body fitness for life

Pilots in Thessaloniki







Fit For All

Platform evaluation by questionnaires

Questionnaire items (I)

- **Usability**[1,2]
  - Was FitForAll difficult to learn how to use?
  - Were the instructions given by the computer clear and understandable and easy to follow?
  - Were the letters on the screen easy to read?
  - Was the physical training installation well adapting to your exercising abilities?
- **User satisfaction**[1,2]
  - How beneficial do you believe is FitForAll for you?
  - How often would you use FitForAll if you had it at home?
  - FitForAll was amusing and I enjoyed my sessions with it.
  - Using Fit-For-All was boring and did not interest me.

1. Bertoa, M. F., Troya, J. M., & Vallecillo, A. (2006). Measuring the usability of software components. *Journal of Systems and Software, 79,* 427–439.
2. Hornbaek, K. (2006). Current practice in measuring usability: Challenges to usability studies and research. *International Journal of Human-Computer Studies 64,* 79–102.

Billis, A. S., Konstantinidis, E. I., Zilidou, V., Wadhwa, K., Ladas, A. K., & Bamidis, P. D. (2013). Biomedical Engineering and Elderly Support. International Journal of Reliable and Quality E-Healthcare (IJRQEH), 2(2), 21-37. doi:10.4018/ijrqeh.2013040102

Questionnaire items (II)

- Affective evaluations of an object → implicitly influence and even shape one's perception and attitudes regarding that object, as well as to predict engagement with that object
- Existing usability measurement tools lack this feature
- Affective
  - It is fun / unpleasant
  - I dislike it
  - I am feeling cheerful / strong / tired / refreshed / stressed / calm / bored

1. Gauvin, L. & Rejeski, W. J. (1993). The Exercise-Induced Feeling Inventory: Development and initial validation. *Journal of Sport and Exercise Psychology*, *15*, 403-423.
2. D. Kendzierski, Kenneth J. DeCarlo, Physical Activity Enjoyment Scale: Two Validation Studies, Journal of Sport and Exercise Phychology
3. Paxton, R. J., Nigg, C., Motl, R.W., Yamashita, M., Chung, R., Battista, J., et al. (2008). Physical activity enjoyment scale short form--does it fit for children? *Research Quarterly for Exercise and Sport*, *1*

Billis, A. S., Konstantinidis, E. I., Zilidou, V., Wadhwa, K., Ladas, A. K., & Bamidis, P. D. (2013). Biomedical Engineering and Elderly Support. International Journal of Reliable and Quality E-Healthcare (IJRQEH), 2(2), 21-37. doi:10.4018/ijrqeh.2013040102

Results (I)

Section	Range[a] (min-max score)	Mean (SD) [b]	Neutral Mean[c]	p value
Affective	10 – 70	57.43 (5.64)	30.00	$p < .00001^{d}$
Usability	5 – 34	28.21 (3.29)	17.00	$p < .00001^{e}$
Satisfaction	7 – 35	28.43 (3.72)	14.00	$p < .00001^{f}$

[a]Range = the possible minimum and maximum score for each section

[b]SD= standard deviation

[c]Neutral Mean= the value that would be anticipated if all the answers indicated a rating that was equally positive or negative.

[d,e,f] significant at the 0.05 level

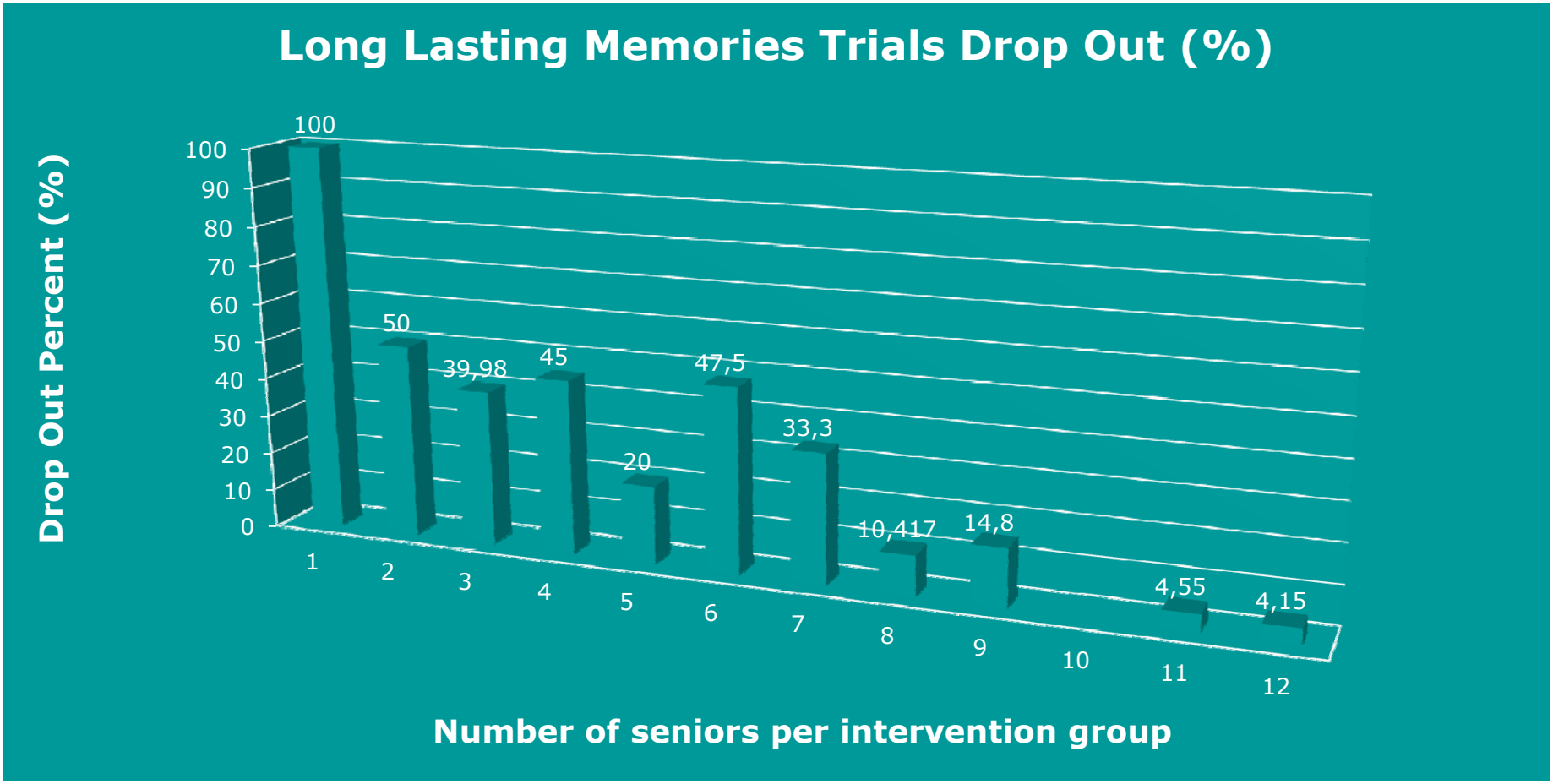
Billis, A. S., Konstantinidis, E. I., Zilidou, V., Wadhwa, K., Ladas, A. K., & Bamidis, P. D. (2013). Biomedical Engineering and Elderly Support. International Journal of Reliable and Quality E-Healthcare (IJRQEH), 2(2), 21-37. doi:10.4018/ijrqeh.2013040102

User experiences

1.	Perceived improvements in motor functions and related activities (e.g., mobility, balance, walking).
2.	Benefits of learning new things, including how to use the computer.
3.	Affective improvements, more cheerful (“feel more alive!”).
4.	Lost weight.
5.	Not everyone may have the aptitude to do the program (e.g. severe arthritis or advanced dementia patients)
6.	The background should be more colorful; add music during exercises; Have a virtual coach to give instructions and commands for exercises.

Billis, A. S., Konstantinidis, E. I., Zilidou, V., Wadhwa, K., Ladas, A. K., & Bamidis, P. D. (2013). Biomedical Engineering and Elderly Support. International Journal of Reliable and Quality E-Healthcare (IJRQEH), 2(2), 21-37. doi:10.4018/ijrqeh.2013040102

Drop out compared to number of seniors per group



Konstantinidis, E.I., Billis, A., Grigoriadou, E., Sidiropoulos, S., Fasnaki, S., Bamidis, P.D.
Affective computing on elderly physical and cognitive training within live social networks (2012)
Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 7297 LNCS, pp. 339-344.

Long Lasting Memories
Mind and body fitness for life

Some preliminary conclusions

- Positive emotions (joy, calm)
- Easy-to-learn
- Well understandable instruction set
- Perceived satisfaction
- Positive emotions increase usability and training engagement
- Emotions play a significant role in accepting an HCI platform such as FFA

Long Lasting Memories
Mind and body fitness for life

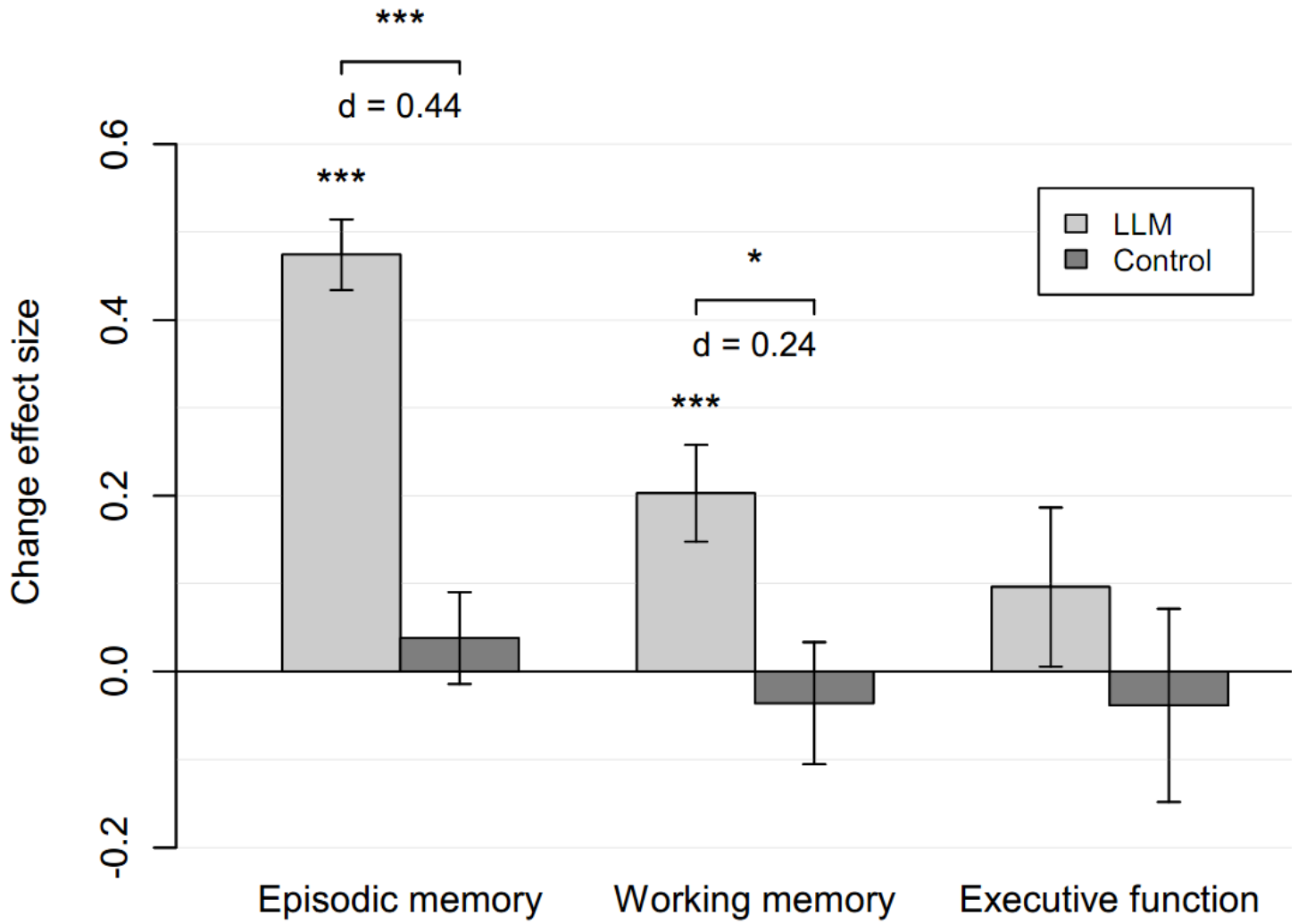
Suggestions

- …currently "passive" affective elements
- …have to be transformed into a more affectively "active" interaction system
  - Recognize affective state of user
  - Readjust and reshape game characteristics e.g. scenario, content, difficulty level
- Further pilots are in progress and are already planned for few next months to highlight and support present findings

Overall preliminary results

- From all trial sites
- 4 countries

Cognitive improvements



* p < .05
** p < .01
*** p < .001

significant Group × Session interactions for

episodic memory
F(1,293) = 40.27,
p = < .0001

and

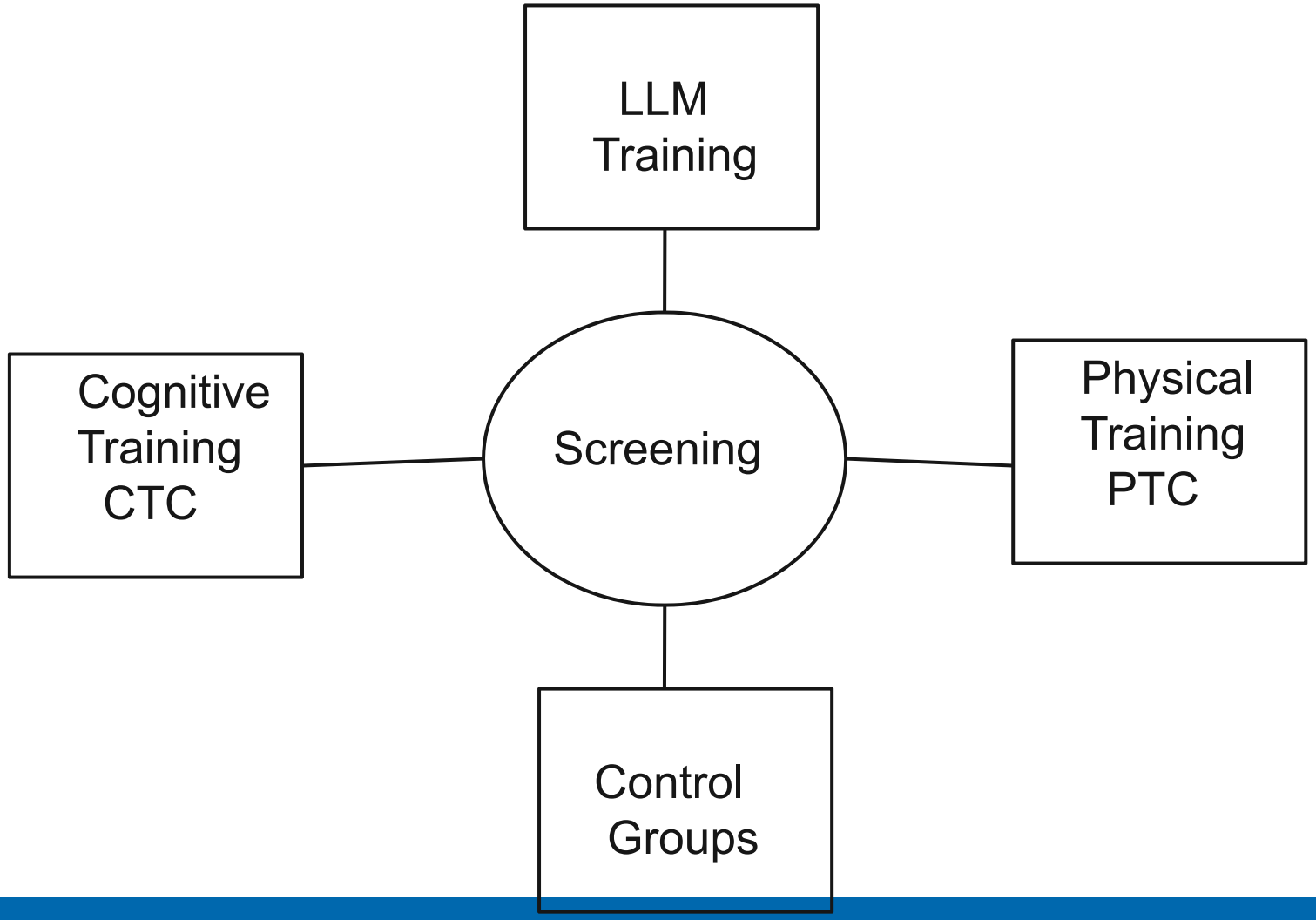
working memory
F(1,295) = 6.22,
p = < .013

Bamidis et al, D1.4 Final report: http://www.longlastingmemories.eu/sites/default/files/LLM_D1.4_final_report_public_v2.2doc.pdf

Key Aspects of AUTH Pilot

- Compare cognitive status groups
- Different interventions (integrated solution vs isolated components)
- Measured intervention-related brain changes
- Measured physical condition in addition to cognitive performance
- Follow up measures (6 and 12 months)
- Neurophysiological investigation

Randomised control intervention

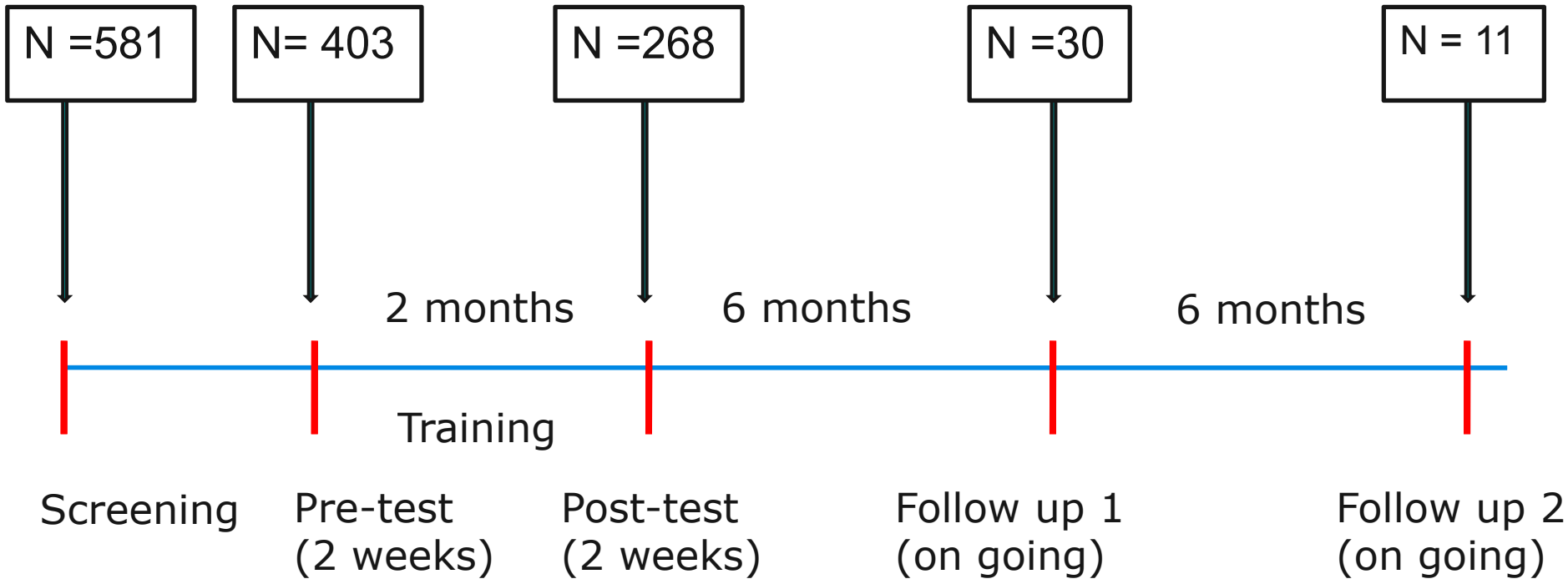


Pilot Overview

Timeline for the pilot	Start Date	End Date
1st iteration	01/11/2010	15/01/2011
2nd iteration	14/02/2011	15/04/2011
3rd iteration	11/05/2011	06/07/2011
4th iteration	18/10/2011	20/12/2011
5th Iteration	26/01/2012	21/03/2012

Long Lasting Memories
Mind and body fitness for life

Timeline of iterations



Long Lasting Memories
Mind and body fitness for life

Analysis as a function of type of intervention

LLM intervention

Long Lasting Memories
Mind and body fitness for life

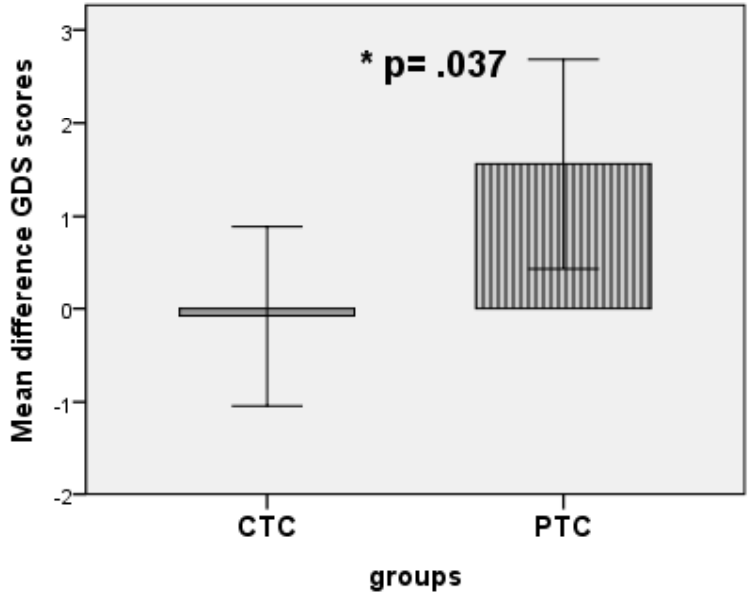
Intervention Group

- LLM (N= 98)
- CTC (cognitive, N= 26)
- PTC (physical, N= 16)
- Active controls (N= 70)
- Passive controls (N= 34)

Long Lasting Memories
Mind and body fitness for life

Physical training
Clinical symptoms

PTC vs CTC



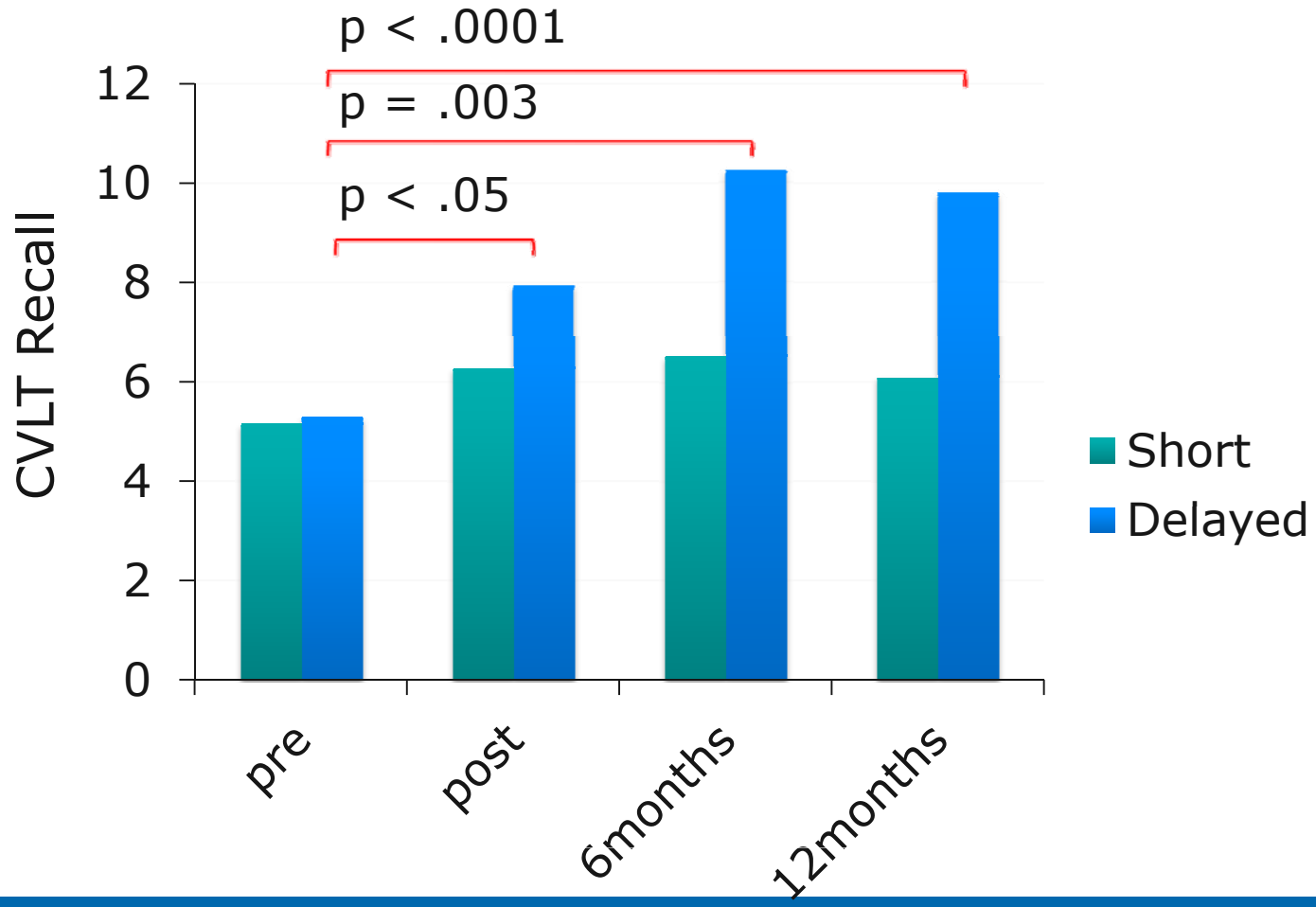
LLM intervention

Follow up Analyses

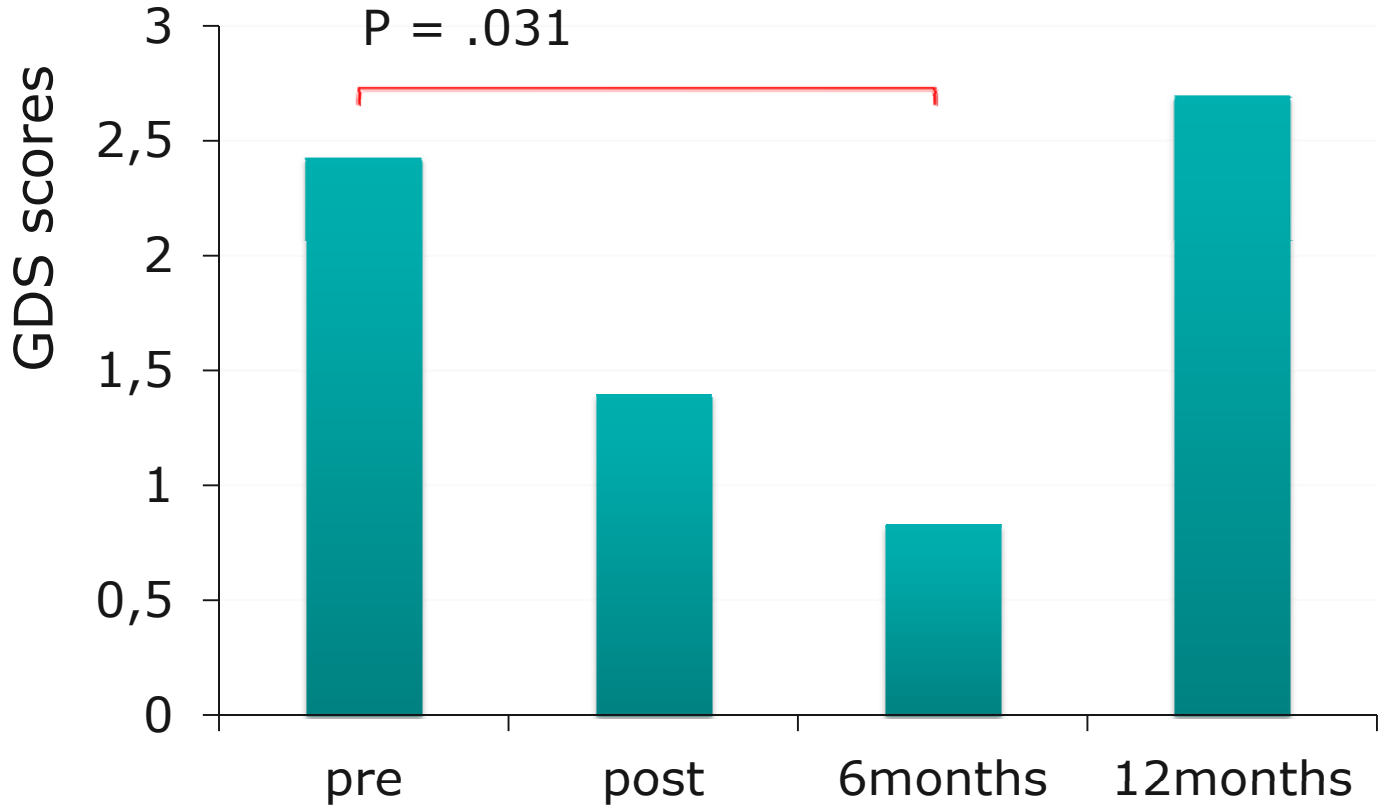
How long does it last?

Long Lasting Memories
Mind and body fitness for life

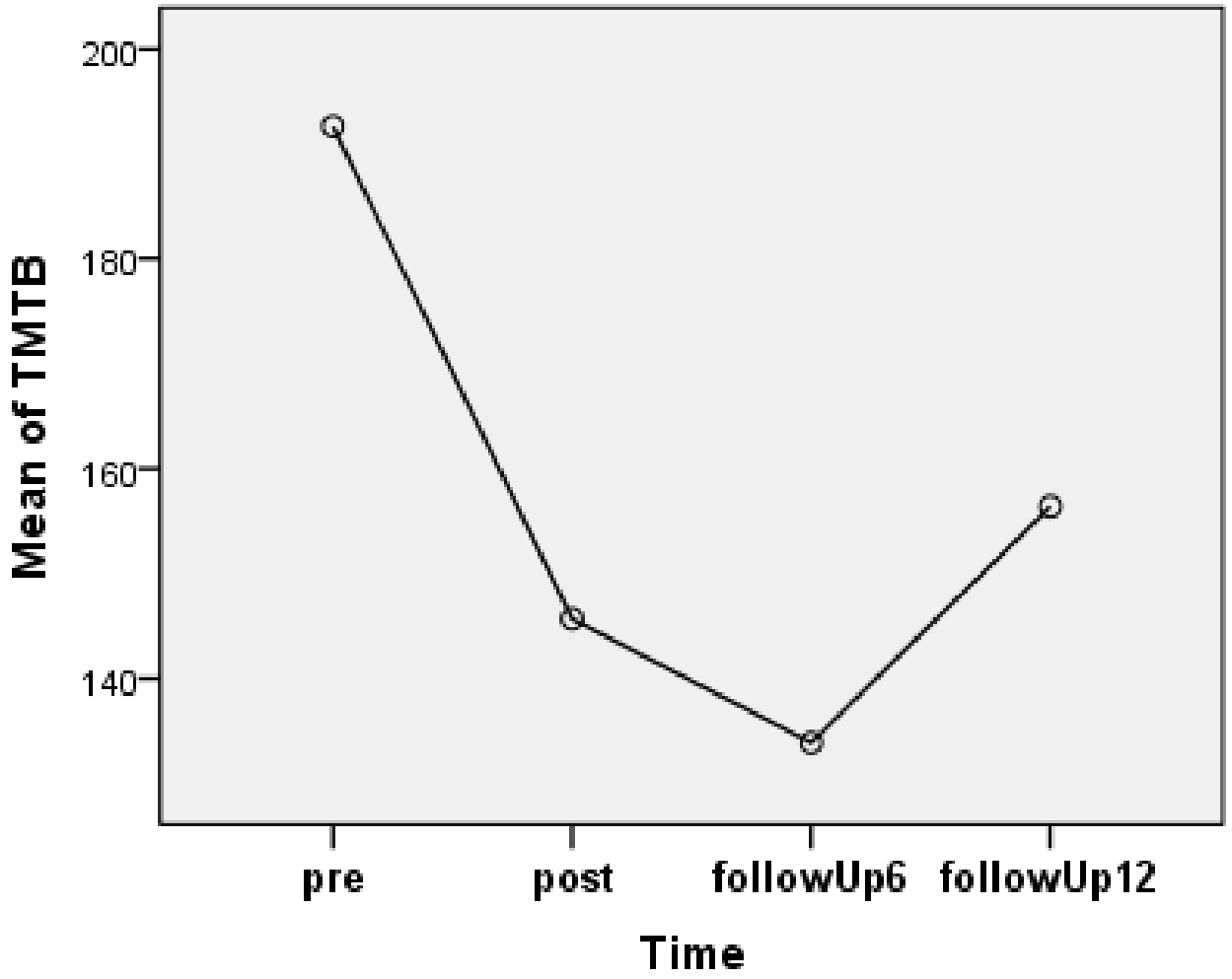
Follow up analyses Memory



Follow up Analyses
Clinical symptoms



Follow up Attention



Neuphysiological investigation of the LLM intervention

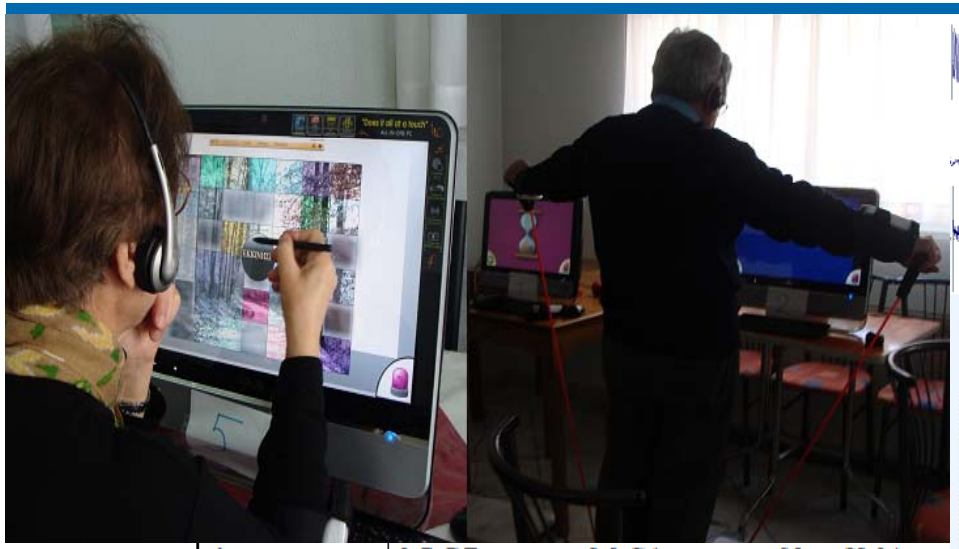
Brain changes (EEG analyses)

Synchronization analysis

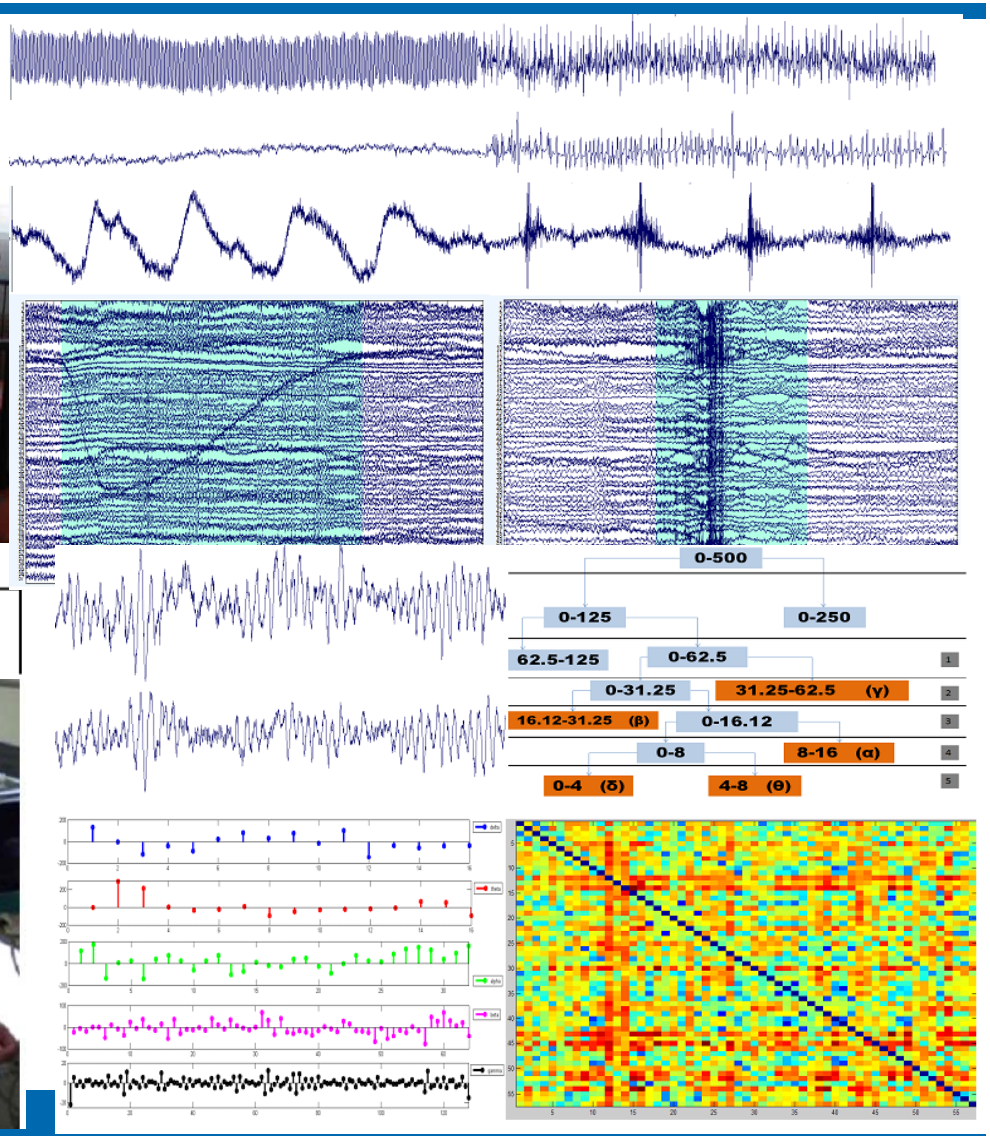
Does synchronization increase after LLM intervention?

Long Lasting Memories
Mind and body fitness for life

EEG Analysis



	Age	MMSE	MoCA	No. of Males
LLM Training	70.78 ± 5.90	26.09 ± 3.03	22.40 ± 1.25	14/56 (25%)
Active Control	67.30 ± 6.12	25.90 ± 3.72	22.56 ± 4.02	10/50 (20%)



Long Lasting Memories
Mind and body fitness for life

Synchronization analysis

- Pathological aging (AD) is associated with loss of synchronization (may index loss of connectivity between distant brain regions –anterior/posterior-)
- Greater synchronization is expressed in lower mean values
- Comparison LLM vs Active controls on mean synchronization difference between pre and post for pair of channels
- 109 participants (56 LLM, 53 Active controls)

What else? Synchronisation and desyncronisation

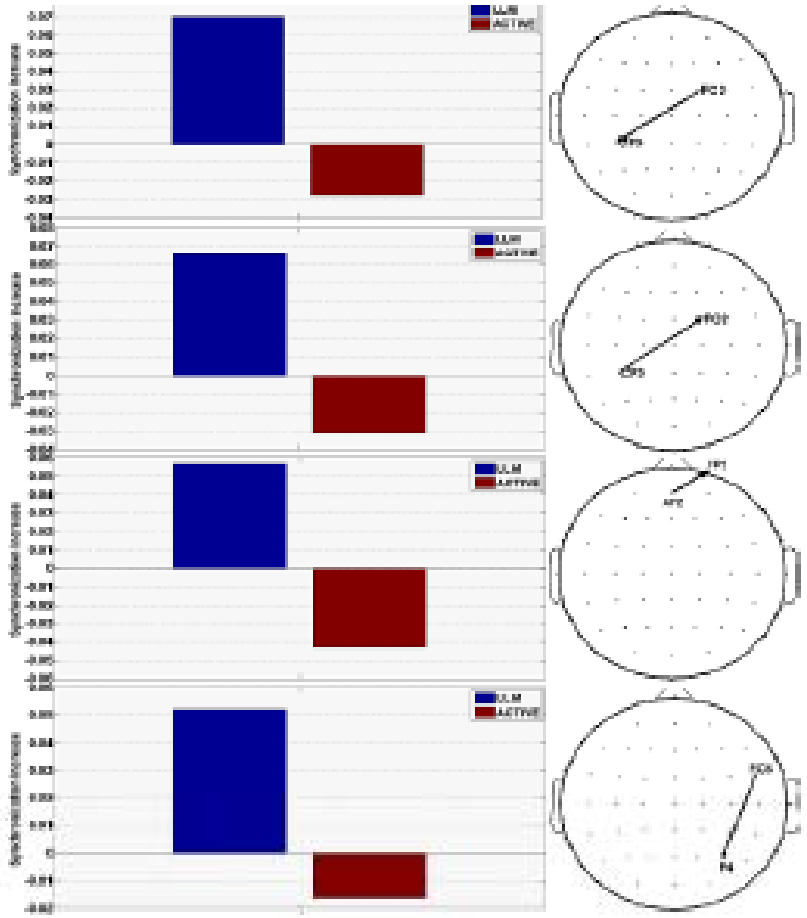


Figure 5: Visualization of the average values for each statistically significant feature, computed for both the LLM (blue bar) and for the Active Control (AC) training group (red bar).

Frantzidis, C., et al., Cognitive and physical training for the elderly: evaluating outcome efficacy by means of neurophysiological synchronization,

International Journal of Psychophysiology (2013), Under review

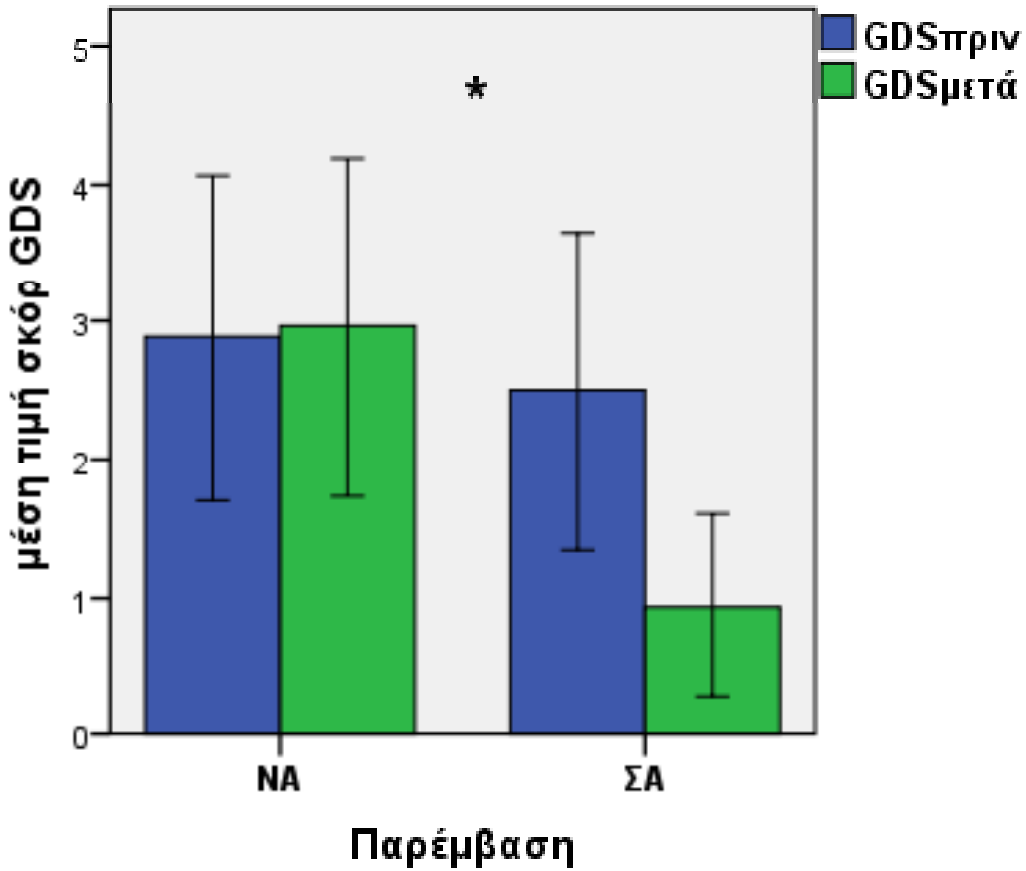
Neurophysiological analysis on FFA

Effects of exergaming on brain synchronisation?

Comparison of mean differences between regions and the overall scores before and after intervention (pre-post)

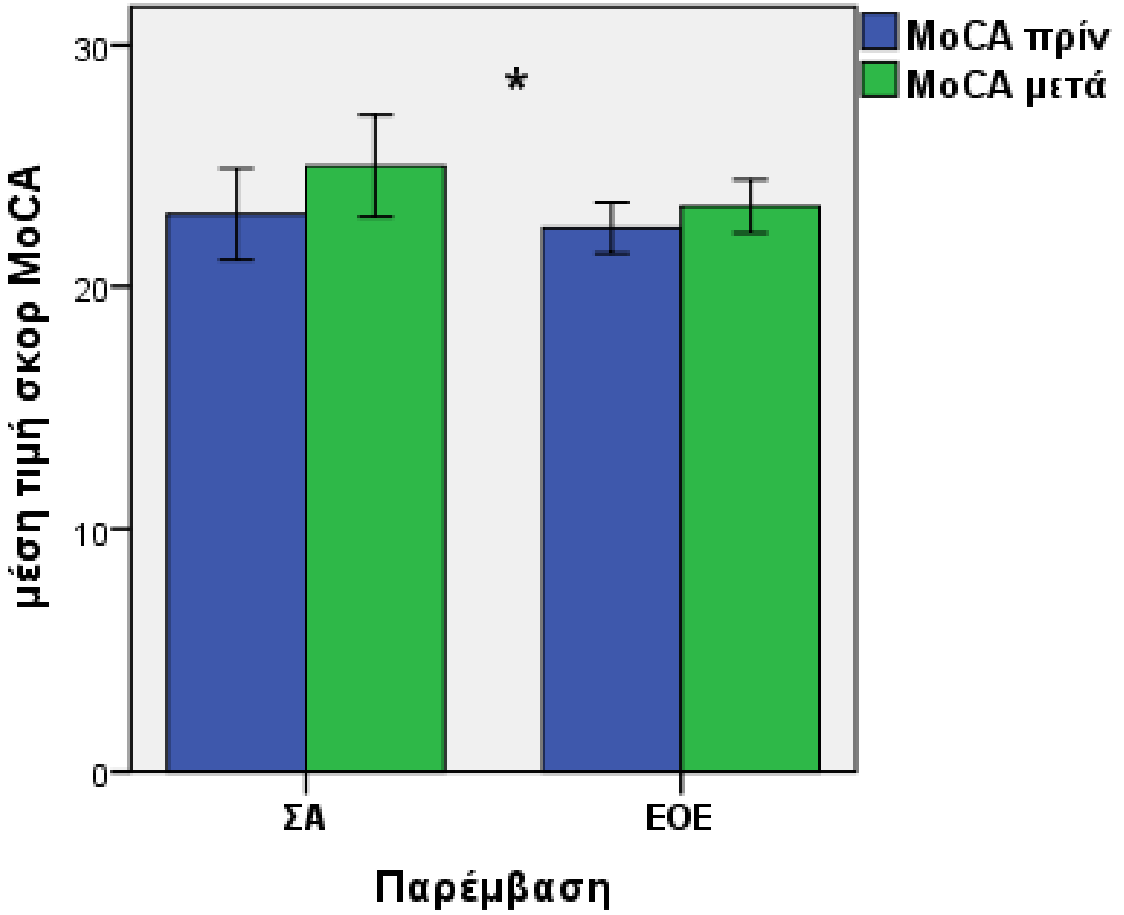
- (1)tests:
  - MMSE, MoCA, TMTb, GDS,
  - Paired t-tests (Bonferroni correction)
- (2) Pearson's *r* correlation, correlations for synchronisations of regions (pre-post) & test scores (pre-post) (Bonferroni correction)
- 13 participants with Physical exercise (ΣA)

ΣΑ vs NA:
on geriatric depression (GDS)



Physical training (ΣΑ) significantly better than cognitive (NA)

ΣΑ vs ΕΟΕ:
general cognitive functioning (MoCA)



Significant improvement of physical training group compared to active control

Body capacity improvement:

Fullerton scale (Rose, Lucchese & Wiersma,2006)

- Loss of weight
- Muscle strengthening
- Improvement of flexibility
- Improvement of aerobic capacity
- Improvement of balance

…and also: decrease of pain symptoms (!!!)

What else? Functional Neuroimaging

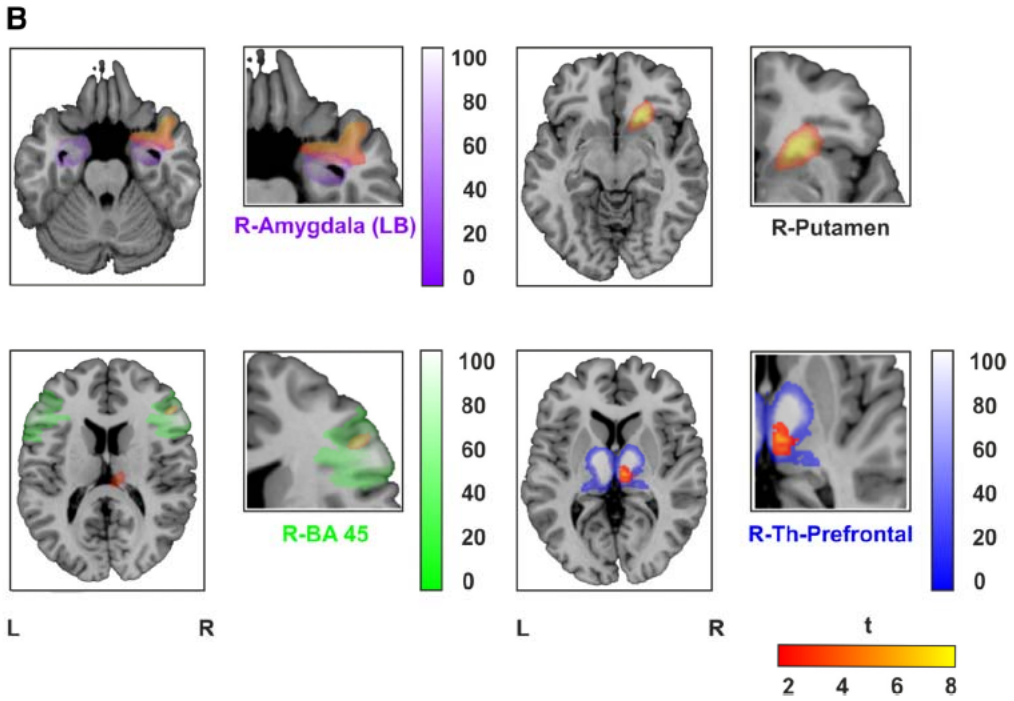


Fig. 4. Group parametric (T) maps for valence. (i) The effect of pleasant pictures (A) was localized on the right middle frontal gyrus (BA 6) and right primary visual cortex (V1). (ii) The effect of unpleasant pictures (B) was localized on the right amygdala (LB), right putamen, right broca area (BA 45) and right thalamus. Points counted as left or right were at least 6 mm from the midline. The brain region is superimposed with orthogonal sections (sagittal, coronal, and axial) of an anatomical scan rendered in standard MNI space and overlaid by the cytoarchitectonic regions. The corresponding t-value is shown in blue to green color scale for pleasant stimuli and in red to yellow scale for unpleasant stimuli. Uncorrected $p < 0.001$ was adopted as the height threshold for valence, minimum is thirty contiguous voxels.

Styliadis, C., et al., Amygdala responses to valence and its interaction by arousal revealed by MEG, International Journal of Psychophysiology (2013), http://dx.doi.org/10.1016/j.ijpsycho.2013.05.006

What else? Functional brain connectivity

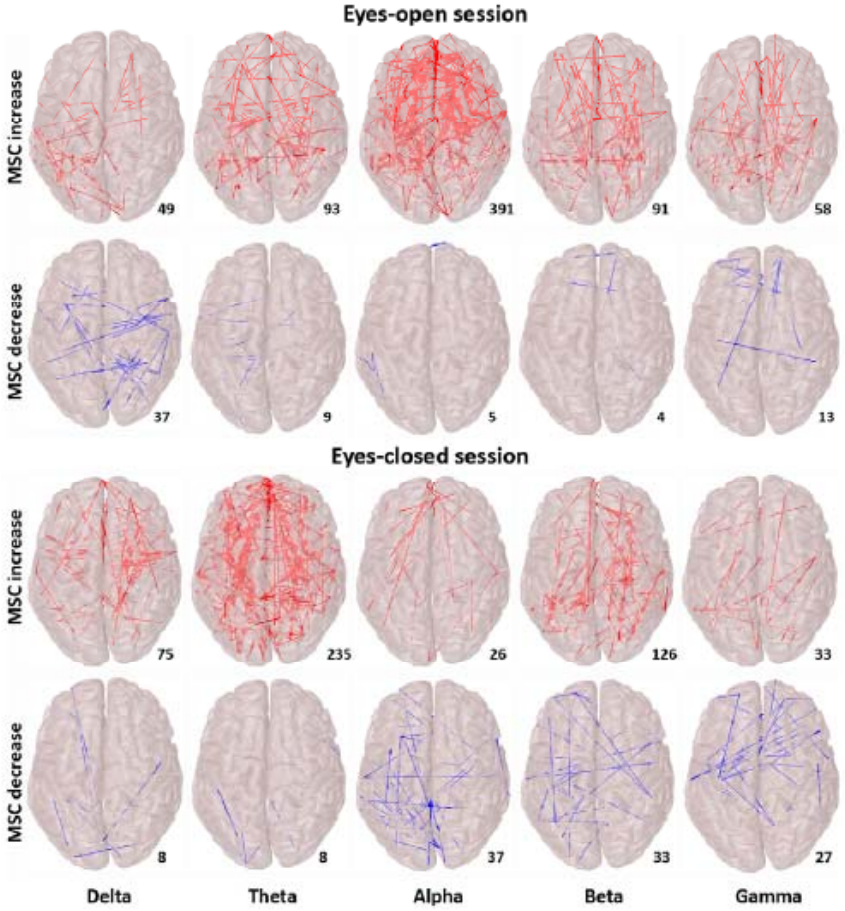
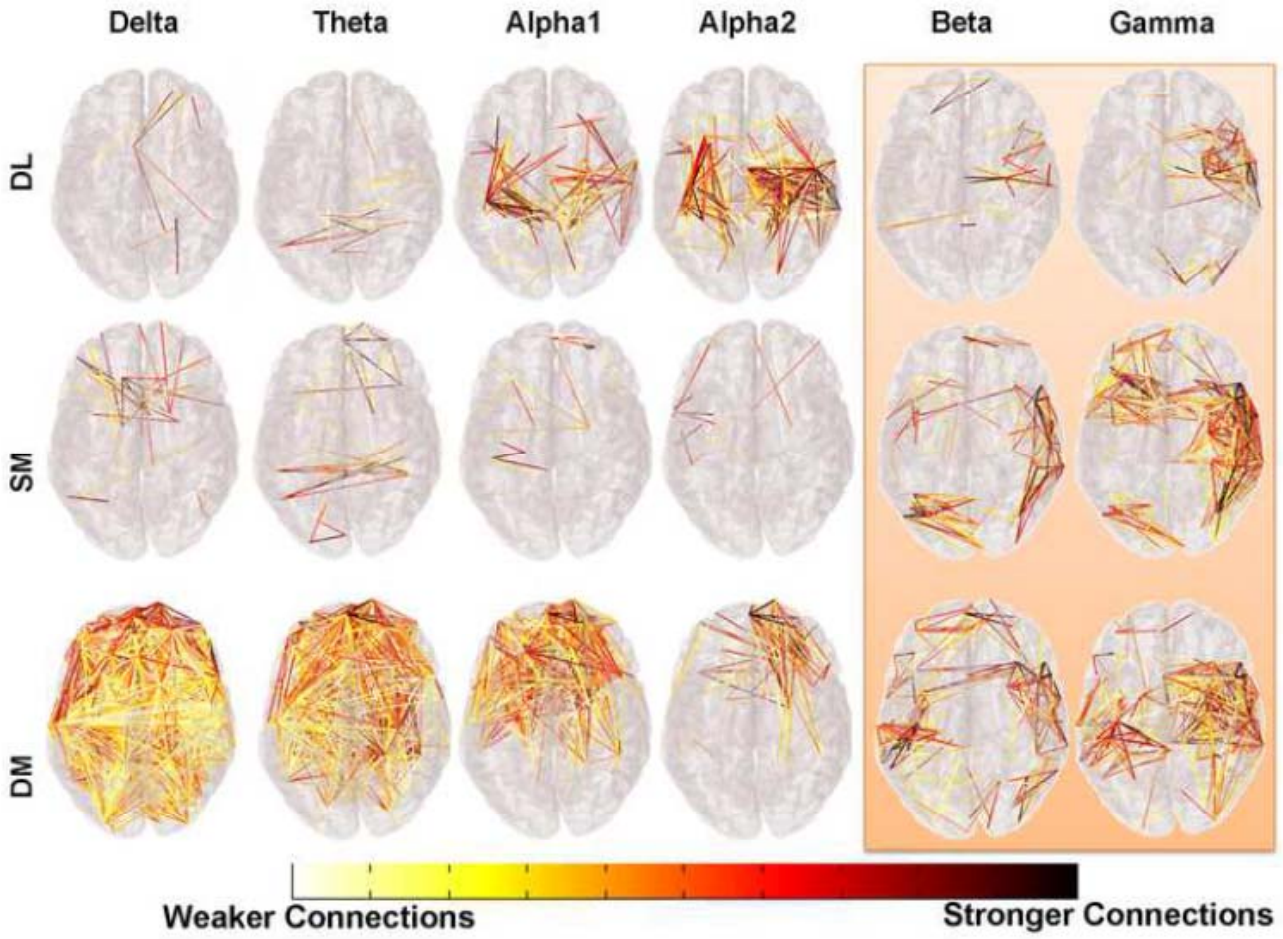


Figure 1. Alcohol-induced significant connectivity differences. Differences during eyes-open and during eyes-closed sessions are presented in the upper and lower panel respectively. Significantly ($p<.05$, FDR corrected) increased connectivity is shown in the upper rows (red connections), decreased in the lower rows (blue connections). The number of significantly affected connections is also presented for each frequency band.
doi:10.1371/journal.pone.0048641.g001

- Lithari C, et al. (2012) Alcohol Affects the Brain's Resting-State Network in Social Drinkers.

PLoS ONE 7(10): e48641. doi:10.1371/journal.pone.0048641

What else? Functional brain connectivity in bands



- Klados MA et al. (2013) A graph theoretical approach to study the organization of the cortical networks during different mathematical tasks. PLoS ONE, Aug 19;8(8):e71800. doi: 10.1371/journal.pone.0071800.

Long Lasting Memories
Mind and body fitness for life

General Conclusions

- LLM intervention effective in improving cognitive performance
- LLM benefits not only for healthy old adults, but for the impaired participants too
- Stronger and longer lasting effects for memory
- Positive effects in other domains for at least 6 months

Long Lasting Memories
Mind and body fitness for life

General Conclusions

- Also, greater synchronization in LLM group relative to active control in several brain areas
- Cognitive processes important for independent living
- LLM important service to promote healthy aging

Commercialisation

- Business plans in 5 EU countries (local business plans
- Greek business plan through the Research Committee of AUTH
- Admin issues completed July 2013
- Market ready, low-priced product …

ARISTOTLE UNIVERSITY OF THESSALONIKI

Long Lasting Memories
Mind and body fitness for life

USEFIL
Unobtrusive Smart Environments For Independent Living

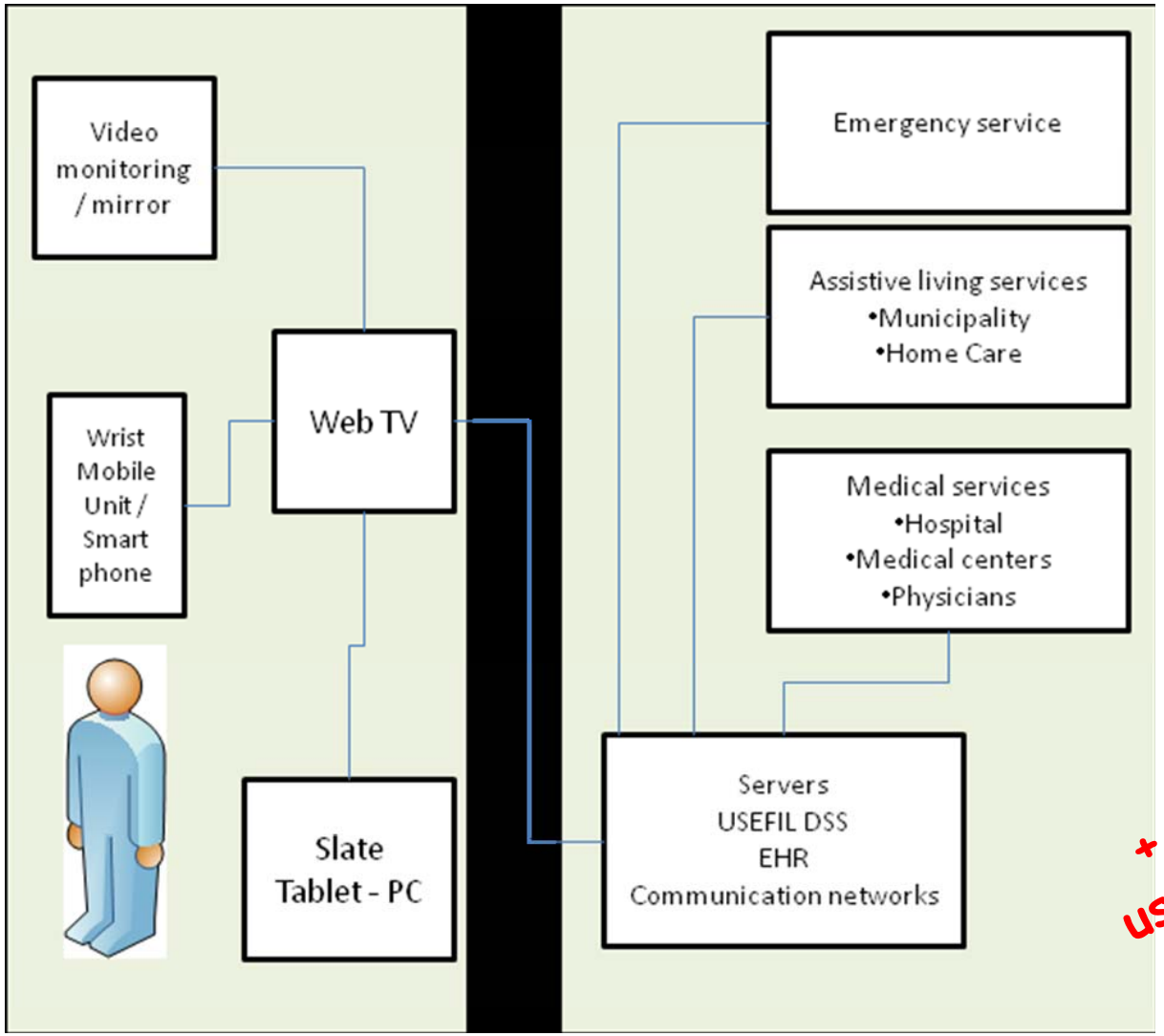
DISCOVER
SKILLS FOR CARERS

co-funded by the European Commission

Current developments

- Motion support in space through Kinect
- Creation of FitForAll protocol for SmartTV
- Personalised training
- along the physical condition and performance of the user

TECHNICAL OVERVIEW



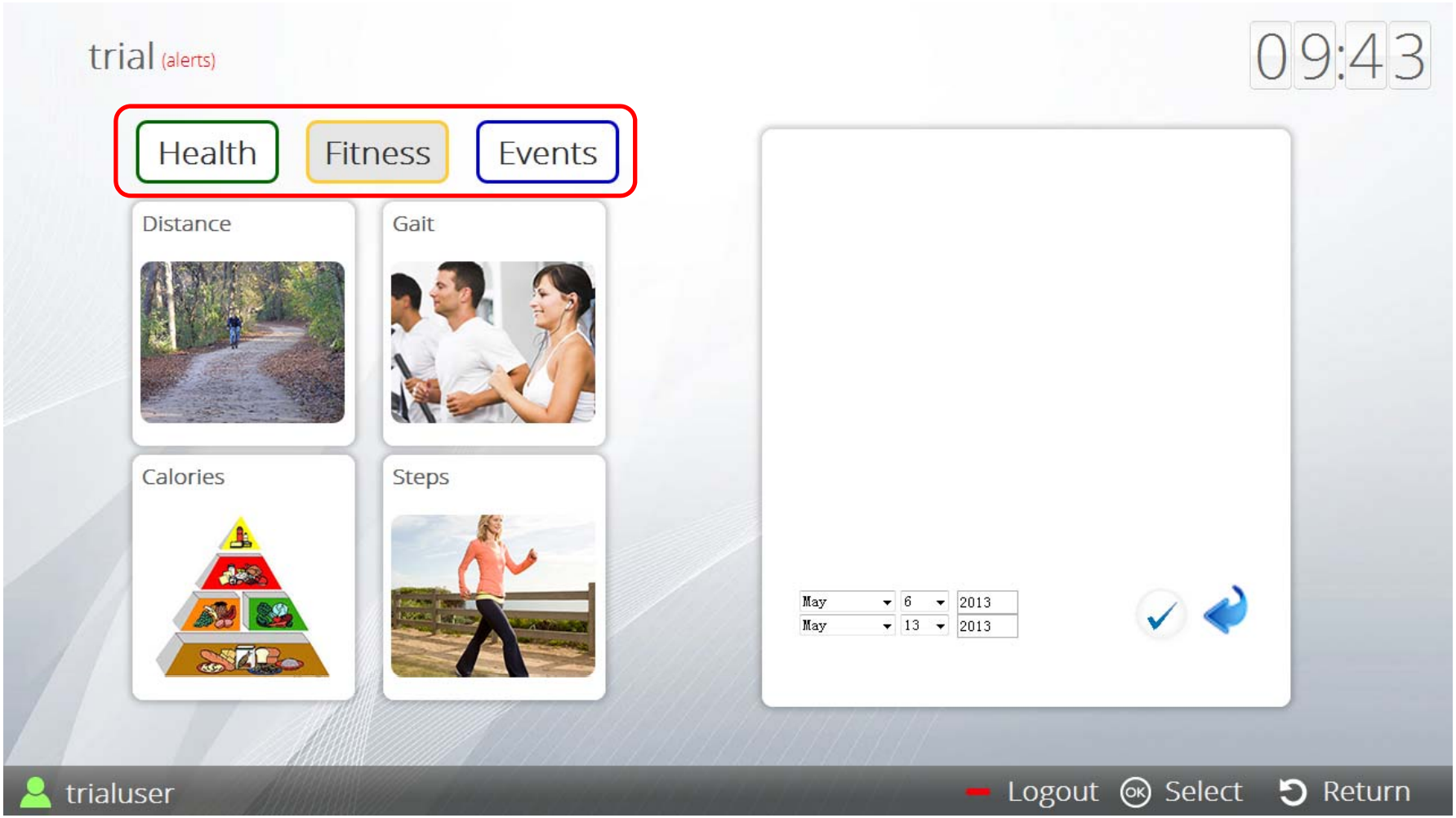
+ off the shelf components

+ low cost

+ data fusion & trending

+ investigate user acceptance

Smart TV User Interface



DISCOVER – Skills for Carers

- Pan-European project, offering **information**, **advice**, **guidance** and **training** to support the **wellbeing of carers** in their caring role.

- Fostering a **shared learning environment** for communities of carers; to share experiences, knowledge, challenges and questions.

- Using **everyday technologies** like the internet, mobile phones and other digital devices to reach carers in the comfort of their own home as well as through the use of community locations.

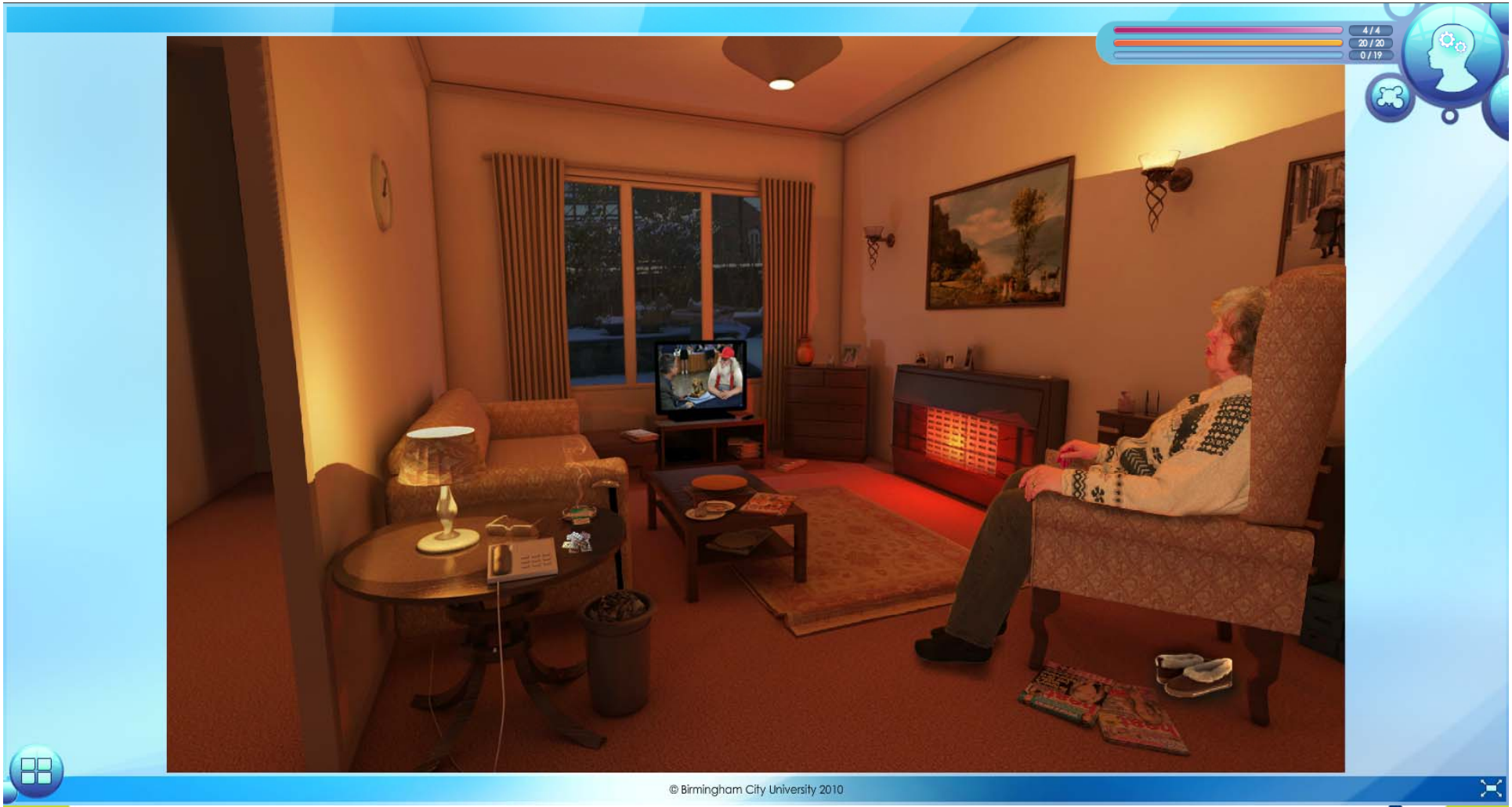
- **Raising awareness** of the **benefits** of acquiring digital based skills for carers as well as sharing this with those they care for, all of which will be done in a mutually supportive way.

Sample eLearning content

DISCOVER
SKILLS FOR CARERS

Sample eLearning content

DISCOVER
SKILLS FOR CARERS



ARISTOTLE UNIVERSITY OF THESSALONIKI

Long Lasting Memories
Mind and body fitness for life

USEFIL
Unobtrusive Smart Environments For Independent Living

DISCOVER
SKILLS FOR CARERS

co-funded by the European Commission

Projects Info:

- LLM:
  - www.longlastingmemories.eu
  - YouTube llmdissemination channel
- USEFIL:
  - www.usefil.eu
  - Follow @USEFIL in twitter
  - http://www.linkedin.com/groups/USEFIL-FP7-Project-4327695?gid=4327695&trk=hb_side_g
- DISCOVER:
  - http://www.discover4carers.eu/
  - Follow @DISCOVER4carers in twitter

- pdbamidis@gmail.com, @bamidis

ARISTOTLE UNIVERSITY OF THESSALONIKI

Long Lasting Memories
Mind and body fitness for life

USEFIL
Unobtrusive Smart Environments For Independent Living

DISCOVER
SKILLS FOR CARERS

co-funded by the European Commission

Thank you !