



## WELCOME TO SILVERFIT

Dear reader,

This is the new SilverFit catalogue.

SilverFit is a Dutch company, established in 2008 by Maaïke Dekkers and Joris Wiersinga. We create innovative technology aimed at fundamentally improving the life of the elderly in our society. Our primary aim is to stimulate rehabilitation by using computer games and media in therapy, supervised exercise and in order to increase physical activity in daily life.

Our systems are used at over 1600 locations in 18 countries around the world. We are proud to have been able to develop these innovative products together with our clients and we hope to continue doing so. Meanwhile we have 22 people working at our office in The Netherlands. Should you have any questions or ideas as a result of reading this catalogue, we would love to hear from you!

The SilverFit Team

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 SILVERFIT

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## **FIELDS OF APPLICATION**

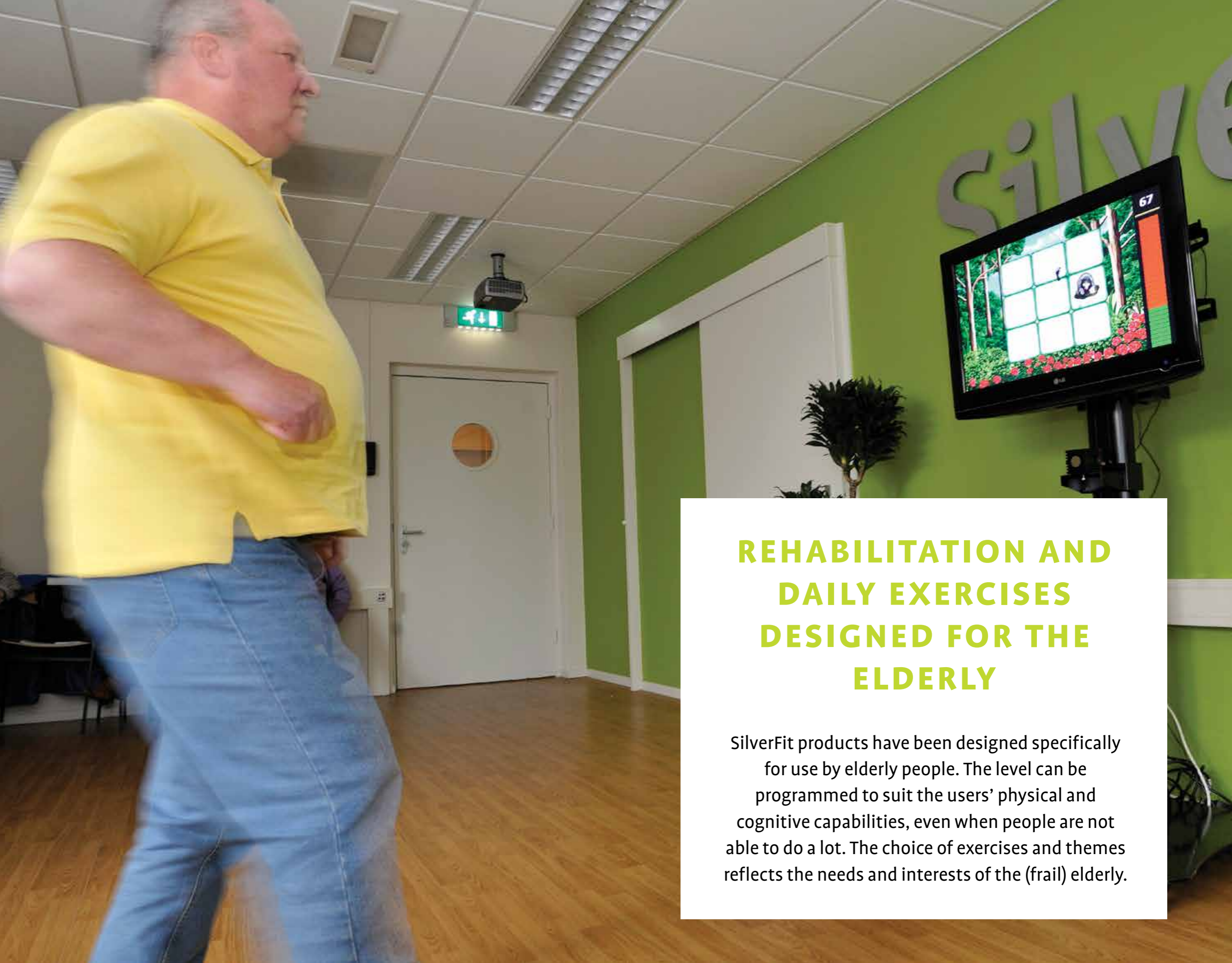
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## **REHABILITATION AND DAILY EXERCISES DESIGNED FOR THE ELDERLY**

SilverFit products have been designed specifically for use by elderly people. The level can be programmed to suit the users' physical and cognitive capabilities, even when people are not able to do a lot. The choice of exercises and themes reflects the needs and interests of the (frail) elderly.

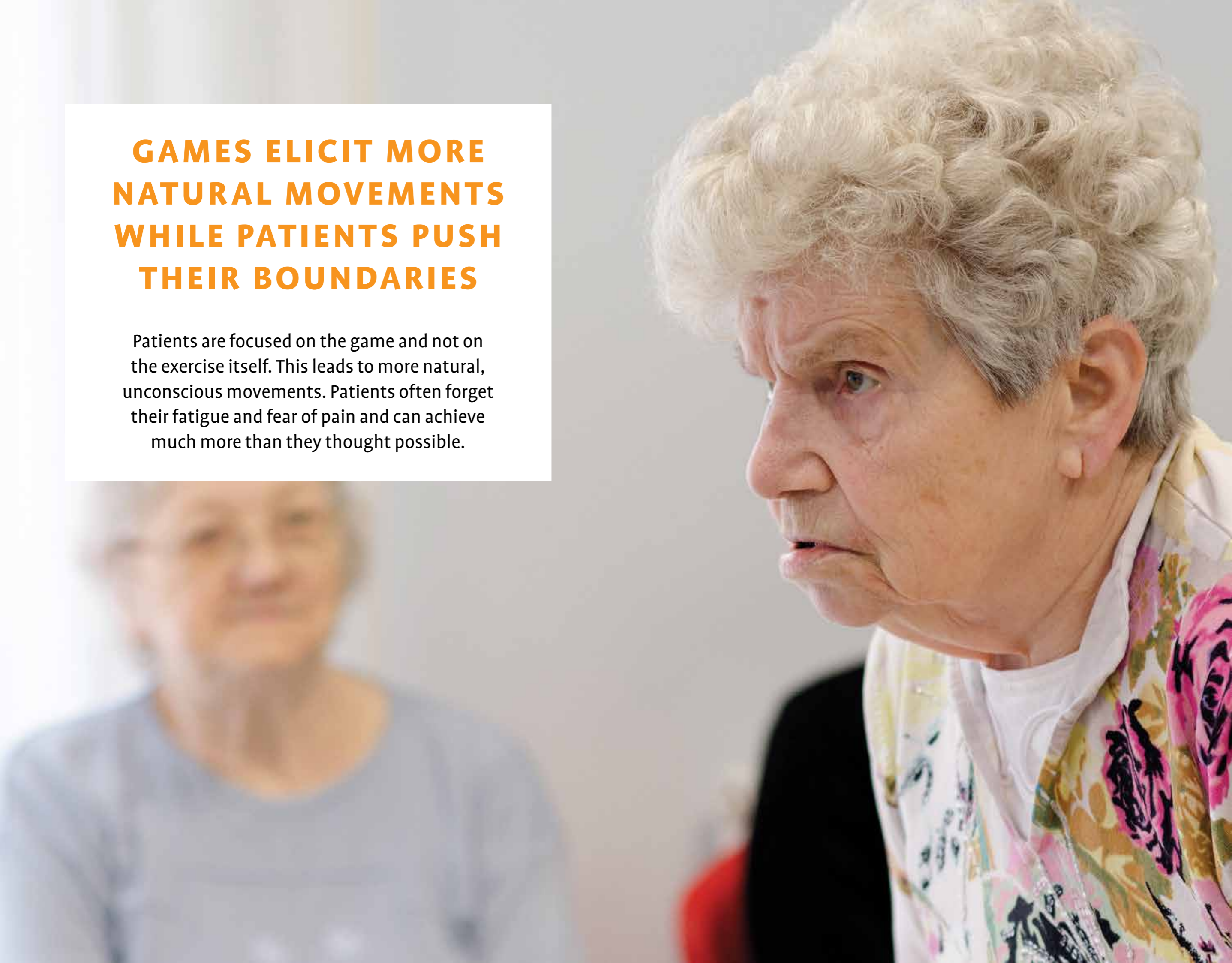


## **FEEDBACK MOTIVATES REGULAR EXERCISE**

Exercising regularly can be boring and physically exhausting. Functional exercises presented in games provide direct feedback and compliments that create an immediate positive emotion. Moreover, each game provides clear medical outcome in the form of scores. These allow patients to set long term goals and monitor progress.

## **GAMES ELICIT MORE NATURAL MOVEMENTS WHILE PATIENTS PUSH THEIR BOUNDARIES**

Patients are focused on the game and not on the exercise itself. This leads to more natural, unconscious movements. Patients often forget their fatigue and fear of pain and can achieve much more than they thought possible.



# REHABILITATION AND THERAPY



Active functional training is an important evidence-based tool for the physiotherapist, occupational therapist and speech and language pathologist. Evidence shows that for most ailments, increased intensity of training leads to better results. However this is not always easy to achieve. Doing exercises in the form of games motivates patients. This has positive effects on therapy outcome, the number of sessions that can be offered per day, and the intensity of each session.

## DESIGNED FOR REHABILITATION

Most of SilverFit's products have been originally designed to be used during geriatric rehabilitation. The exercises are based on guidelines drawn up by the Royal Dutch Society of Physiotherapy and clinical practice. Each of our products has been co-designed by physiotherapists within the field of geriatrics and have been widely tested in the field.

## NEUROLOGICAL REHABILITATION

Our systems are used a lot for patients with MS, Parkinson's or post-stroke. The systems strongly motivate patients to train more frequently. Typical exercises include upper body stability, sit to stand transfers, upper extremity exercises, endurance and gait training. Cognitive deficits, such as hemianopsia and swallowing deficits can also be addressed. Patients directly see the

results of their efforts, are rewarded with positive feedback. And a competitive element will sometimes challenge them even more. Patients experience a feeling of success and become motivated to improve their achievements.

## ORTHOPEDIC REHABILITATION

The SilverFit includes specific protocols of exercises to be used after a total hip or total knee operation. The first exercises can be done seated; the patient taps the floor with his feet. After that, they can progress with walking forwards and backward, walking laterally, lifting the knees on the spot, and squatting. A number of arm exercises can be used after a shoulder operation. In addition, the SilverFit Newton is often used to guide patients doing strength training. The Newton can help patients time exercises, so as to avoid sudden or uncontrolled movements and overstraining.



*The SilverFit offers exercises for gross motor skills*



*The SilverFit Mile makes treadmill exercises more appealing*



*The SilverFit Mile can be installed on any kind of bike*



*The SilverFit Newton motivates and guides people during strength building exercises*



*Rephagia helps to provide intensive training for swallowing problems.*



*The SilverFit @Home can be used in someone's room with remote supervision by the fysiotherapist*

# ACTIVE AGEING AND FALL PREVENTION



Remaining independent is a priority for many elderly people. Regular exercise improves mobility, diminishes the risk of falls and has a positive impact on cognitive abilities. But for many older people exercise is boring or too difficult if traditional exercise equipment is used. SilverFit makes exercising inviting and fun. Social conversations are easily initiated and people enjoy training together.

## PHYSICAL ACTIVITY PROGRAMMES

SilverFit has a lot of experience in developing programmes to motivate elderly people to maintain an active life. We design physical activity programmes for care homes, skilled nursing facilities, day care centers, housing associations and elderly meeting centers. The virtual fitness areas exert a strong pull on people to come and train regularly. In this way, people can work on maintaining their independence and boost their health and well-being while having fun.

## FALL PREVENTION

Loss of independence amongst elderly people is often caused by falls and falls-related injuries. There is strong evidence that fall risk and fall rates can be reduced by exercise programmes that combine balance training with additional forms of exercise such as coordination and muscle strengthening.<sup>1</sup>

The SilverFit provides a fall prevention protocol. Research in collaboration with the Avans University (Netherlands) shows that the SilverFit exercises have a number of characteristics that make them especially useful:

- They stimulate the player to continuously shift balance
- They train lateral and backwards step better than traditional exercises
- They offer dynamic, unpredictable exteroceptive cues
- They offer a cognitive/physical dual task
- They make the patient focus on the game. In traditional exercises, patients look at their legs or feet, which makes the movement less natural.

A recent study by the University of Trondheim (Norway) concludes that the SilverFit is the most applicable exergame for fall prevention.<sup>2</sup>

<sup>1</sup> Gillespie, L.D., Robertson, M.C., Gillespie, W.J., Sherrington, C., Gates, S., Clemson, L.M., Lamb, S.E. (2012). Interventions for preventing falls in older people living in the community. Cochrane Database Syst Rev., CD007146.

<sup>2</sup> Skjaeret et al. (2014). Designing for Movement Quality in Exergames: Lessons Learned from Observing Senior Citizens Playing Stepping Games. Gerontology November 10.1159/000365755





**Long-term inactivity is disastrous for our brains. That is why it is so important that people with dementia take part in physical activity, preferably in a social setting. However it is often difficult to engage people living with dementia. The activities provided by SilverFit result in a successful experience and strengthen the clients self-confidence and the bond with their surroundings.**



## EARLY-STAGE DEMENTIA

People in early stages of dementia often live at home, but may attend day care or community centers. An adapted fitness room can be highly beneficial for this group. SilverFit can offer advice on the layout of such exercise rooms, the required exercise programs, and train your staff. People with early stage dementia are often still able to do many activities independently or under the supervision of a physical trainer or staff members.

## STRUCTURED PHYSICAL ACTIVITY

Care home residents can benefit greatly from the exercises on the SilverFit systems. Based on our expertise, we have developed a best practice approach to not only install the systems, but ensure uptake and implementation as well. We have formulated a model approach based on our experience with a number of homes. It is important to bring structure to the activities and ensure there is ample supervision in the form of staff, volunteers and family



members. The most effective option is to offer the activities in small groups and make good use of stimulating social interaction. The activities build confidence for the participants because they are able to show themselves and their environment what they are able to do – often surprising many. Our French customers call this ‘valorisation’: rebuilding mutual respect between participants, staff and family.

## THE SILVERFIT ALOIS BRINGS PEOPLE TOGETHER

We have developed the SilverFit Alois for people in the further stages of dementia. Besides physical activity, this system also offers activities such as moving to music, reminiscence therapy, and stimulating enriched environment specifically suited to people with dementia. The SilverFit Alois can be used for group activity such as conducting to music as well as 1:1 activities with family members. The programmes help to structure visits so that both parties feel engaged. Please see page 40 for a detailed description of the Alois.





# PEOPLE WITH MULTIPLE DISABILITIES



Physical activity is very important for people with multiple disabilities. Exercise goals can be any of the following: preventing a sedentary lifestyle, rehabilitation, health improvement or improved functioning in daily life. Research shows that even in the functionally least restricted group, barely 17% reaches the exercise norm. Clearly it is important to stimulate physical activity among people with multiple disabilities.

## ACCESSIBLE AND STIMULATING

The SilverFit systems motivate and stimulate so that physical activity becomes more enjoyable. The game provides a clear objective to the exercise and offers a challenge. The systems shown below can be used to train people with severely restricted physical and cognitive abilities. The SilverFit is used frequently as all exercises can be adjusted to the cognitive and physical needs of the

participant. The SilverFit trains gross motor skills in an open space. A number of protocols are available to provide the right exercises for people with multiple disabilities.

The SilverFit Mile is often used on a bike or a passive-active seated bike and where possible on a treadmill. This creates the sense of being outside. The SilverFit Mile is very easy to use and adoption by residents and staff is almost immediate.



Using the SilverFit Mile on the Thera Trainer Tigo, one can create the sense of being outside.



Adaption of SilverFit Mile is almost immediate



The SilverFit trains gross motor skills in an open space.



Exercising on a treadmill becomes fun

## REAL STORIES

A while ago we received a phone call from a lady whose son exercises on the SilverFit at Ipse de Bruggen, a care home organisation in the South of Holland. She told us that her son's disabilities limit how active he can be. At home they had tried all sorts of measures such as the Kinect and the Wii. Now that there is a SilverFit at Ipse, her son has become very enthusiastic and fully enjoys the games. He manages to play the games and improves a little every time.

Would we be able to create a SilverFit for home use?

The developments for the SilverFit for home use are in full swing.

For more information please see page 56.

# A PURPOSE BUILT GYM



There are a lot of things to consider when it comes to furnishing a new exercise room. Based on our experience with geriatric physiotherapy and physical activity programmes in multiple countries, we are able to help you find the right exercise equipment that fits your needs and requirements. The equipment is only one aspect of creating a successful gym. The layout of the room and the way it will be staffed and operated are also vital. We will gladly help you with these aspects too!

## PERFECTLY CRAFTED EXERCISE EQUIPMENT

Training with a vulnerable group is a whole different ball game. It is very important that the exercises correspond with essential functional movements, and that they can be offered at the right level. A lot of standard exercise equipment is not an option when working with fragile elderly people. A good selection of exercise equipment is of the essence. It goes without saying that we deliver excellent quality and service on all of the equipment.

## BRINGING ON ENTHUSIASM

Making participants enthusiastic is an extremely valuable asset within physiotherapy, and perhaps even more important during voluntary physical activity. The SilverFit systems offer therapy and exercising in game form so that users can train more independently, for longer periods of time and have more fun while doing so.

## COSTS AND BENEFITS

An exercise room is a big investment. This investment can be regained in different ways, depending on the objectives. Through group therapy for example, or through reducing the length of stay due to more intense training and increased target therapy. The Silverfitness room

often functions as a flagship feature, attracting outpatients, and/or increasing room occupancy. The gym can also be used for preventive training, for example fall prevention or COPD or cardiac training groups. Many insurance companies and governments are starting to recognize the importance of such activities.

## THE SHOWPIECE OF YOUR LOCATION

The new purpose built gym generally creates a buzz in the local community and attracts a lot of attention from potential new tenants, visitors and the press. A SilverFit gym combines a large number of game-based exercises. Patients with very low to high physical or cognitive capabilities can enjoy Silverfitness. A SilverFit room often becomes the showpiece of a client's location!

## DESIGN AND MARKETING

SilverFit can help you design the room professionally. We create one or more designs based on the existing equipment and available space. If necessary we can advise about new systems that may need to be purchased or refurbishments of the room itself. We also pay close attention to the layout and styling of the gym. In order to strengthen the position of your organisation we will be happy to help in compiling a press report and other marketing materials.



# Silverfitness



The SilverFit provides game-based exercises to train gross motor skills. The exercises are recorded with a 3D camera so that the user does not need to use a controller or to adjust any settings. The SilverFit has a wide range of exercises that can be accommodated to suit both the physical and cognitive needs of the user, even if it is at a very low level. We are proud to say that over 1200 institutions now use the SilverFit.

## CLINICALLY RELEVANT EXERCISES

The SilverFit offers a wide range of exercises: balance, sitting, walking, arm-related exercises, wheelchair skills, ADL and cognitive exercises. These exercises have been designed, based on the guidelines laid down by the Royal Dutch Society of Physiotherapy and clinical practice. Therefore most of the exercises are task oriented and functional.

## SPECIALLY AIMED AT GERIATRICS

The SilverFit has been specially developed for use within the field of geriatrics. All of the games can be adapted to suit the capabilities of the user. The games can be adjusted in terms of physical activity, cognitive challenge and visual field. The client can successfully participate starting from a very low level. This means that many exercises can be done from a seated position.

## MORE IS BETTER

SilverFit strengthens people's intrinsic motivation to do their exercises. People

set a goal and aim to reach that goal. Therefore they are more motivated to do a particular exercise than they would be without the game element. The system's continual feedback stimulates the client to proceed further.

## PUSHING BOUNDARIES

As a result of the person becoming so involved in the game, they are more likely to do things they would otherwise not have thought themselves capable of doing. This happens both on a physical and cognitive level. This way the SilverFit builds self confidence; often even family members and staff are positively surprised at what a person can (still) do.

## IN CONSTANT DEVELOPMENT

The SilverFit is constantly being improved based on our users' experiences and ideas. During the first year you will receive all the updates for free, after that it becomes a subscription. On the one hand updates consist of new games, on the other hand, they provide improvements and extra activities in existing exercises.



# SILVERFIT

## A MEDICAL PRODUCT

# SILVERFIT

## DEVELOPING A GAME-BASED EXERCISE



### MEDICAL PRODUCT

The SilverFit software has the CE quality label for a class 1 medical device according to the European standard 93/42/EEC.



### TREATMENT PROTOCOLS

The SilverFit contains treatment plans for a number of clinical pathways that are common within the field of geriatrics, such as fall prevention and total hip rehabilitation.



### MEDICAL OUTCOMES TRACKING

It is possible to measure every participant's progress over a period of time. This allows the therapist to document and review the performance of patients over time in an efficient way.



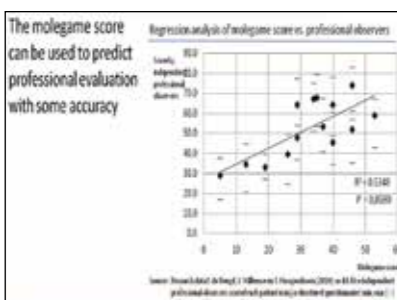
### CLINIMETRICS

The SilverFit offers a number of standardised tests such as Functional Reach, Timed Up and Go, and a series of sit-stand tests. It is also possible to switch on a clinimetric module which collects a number of relevant measurements during the exercise and can subsequently be printed out.



### REVIEWING PERFORMANCE ON VIDEO

Participants can record their performance and review these afterwards. This also enables the therapist and patients to view and discuss performance. It is also possible to view a series of video's from different sessions in order to provide insight to the progress made.



### SCIENTIFIC RESEARCH

SilverFit collaborates with a number of scientific research institutions to validate different aspects of the trainings. For example, the scores in the mole game have been shown to correlate with a number of validated clinical tests. Other researchers have investigated the patterns of movement and the effects of fall prevention training.

### EVIDENCE BASED EXERCISES

We choose the exercises based on the guidelines laid down by the Royal Dutch Society of Physiotherapy and/or clinical practice. In this example we wanted to create an exercise that will train the sit-stand transfer.



### A GAME THAT APPEALS TO PEOPLE

A game's theme is picked in collaboration with the participants. A team of programmers and graphic artists then work on the implementation. The game is tested every three weeks, until the participants enjoy the game so much they no longer want to stop! This process lasts about 3-4 months for each game. In this case we developed sit-stand Bingo, a game for 1-2- players, whereby you are to stand up when the number on your Bingo card is picked.



### ADJUSTABLE WITH DETAILED SETTINGS

Therapists can make use of detailed settings to make the exercises perfectly suited to the needs of the patient. Pre-programmed settings are available for quick, daily use.



### EXAMPLE SETTINGS SIT-STAND BINGO

- Besides standing, bending over and partial standing must be detected separately.
- In the case of two players, it must be possible to adjust each player's level separately.
- Cognitive level must be adjustable; size of card, shuffle or sort numbers.
- Must be able to insert a pause in between sit-stand options.
- Must be accessible for people with poor eyesight.
- Some people want competition whilst others want to cooperate.

### USER FEEDBACK

We are constantly improving the existing set of exercises based on insights gained from scientific research and user experience. For example in the Bingo game we have used a number of updates to improve the variety of movements, the poor eyesight setting and the precision by which the movement is detected.



 <b>SEATED</b>	 <b>BALANCE</b>	 <b>TESTS</b>
 Balance upper body	 Dynamic balance in standing	 Functional reach
 Sit-stand transfer	 Squatting and bending	 Sit to stand test
 Bend over forwards and sideways, sit-stand	 Bending from standing position	 Timed up and go
 Lower extremity	 <b>WHEELCHAIR PROFICIENCY</b>	 <b>WALKING</b>
 <b>COGNITION</b> (various movement options)	 Moving forward and backward	 Walking sideways
 Short term memory	 Manoeuvring in the wheelchair	 Walking forwards and backwards
 Calculations	 <b>ARMS</b>	 Walking in all directions
 Abstract figures	 Reaching	 Walking on the spot
 Object-object recognition	 Moving and lifting arm	 <b>ADL EXERCISES</b>
 Word-image recognition	 Timing arm movements	 In the kitchen
 Sound-image recognition	 Throwing	 Sequences

<b>STANDARD COMPONENTS</b>	<b>ALTERNATIVE ASSEMBLY OPTIONS</b>
 <b>SilverFit software suite</b> A professional and complete set of exercises and settings	 <b>For small spaces</b> If the SilverFit is used in relatively small spaces, a lowered mobile stand can be an option. Not all exercises are available in this option.
 <b>Mobile stand</b> The SilverFit is situated on a mobile stand. Please see other assembly options on the right	 <b>Wall mount</b> The SilverFit can be mounted on to the wall if system mobility is not required.
 <b>Computer</b> A pre-installed computer system	
 <b>Display</b> A 42" flat screen mounted on the standard or on the wall	
 <b>3D camera</b> The 3D camera is integrated in the system	
 <b>Professional remote control</b> SilverFit is standard-equipped with a remote control for the therapist	
 <b>Simplified remote control</b> A simplified remote control can be supplied for use by patients or volunteers	
 <b>Service package (1 year, extendable)</b> On-site installation, training of all potential users, 1 year hardware guarantee, quick service in case of any problems, software updates	





Cycling and walking are both important elements in many rehabilitation programmes. Unfortunately, exercising on a machine is far less motivating than actually going outside. The SilverFit Mile projects a film, so that the indoor experience resembles reality. The aim is to increase the duration of individual sessions and improve therapy adherence. The SilverFit Mile can be connected to any home trainer, active-passive trainer (e.g. *MotoMed*) or treadmill.

### HOW DOES IT WORK?

The SilverFit Mile is installed onto an existing treadmill, home trainer, or active/passive trainer (for example the *Thera* or *MotoMed*). It is also possible to connect the Mile to more than one apparatus at a time. A route is shown on the big screen in front of the apparatus. The speed at which the film plays is determined by the speed at which the user moves. This gives a feeling of actually exercising outside.

### VISUAL IMPACT

The screen is impressive and immediately attracts attention. The user is absorbed into the experience. The film is not animated, but recorded live with a camera creating a unique and realistic experience. People who are present in the room, but not actively participating in the exercise enjoy looking on. This results in conversation and increased social cohesion. There is a wide range of routes, through towns, countryside and unique locations such as Amsterdam, Paris, Ravello, Patagonia, Swiss Alps and Schiphol Airport. You will find a full list on page 30.

### PROLONGED TRAINING

As the user is focused on the experience, they are likely to walk or cycle longer because they lose track of time. People often aim for a specific goal in terms of the film, such as, 'now I am going to walk to the church'. As their attention is focused on the screen and not on the control panel, they are more likely to walk in an upright position. It is also possible to do a route in different stages, carrying on where the user left off the last time.

### PROFESSIONAL MEDICAL TOOL

The SilverFit Mile is a CE certified medical tool. This means that it has been through a lengthy control process to establish the system's operation and avoid any possible risks. Besides the fact that this certification is mandatory in healthcare, it also brings with it many practical advantages. For example, it is important that the speed of the films adjusts automatically and that the imagery does not move or jolt. If it moves too much it can cause a risk of falling (see page 34). SilverFit installs the entire system at your location and offers good quality and service. We are also happy to advise you when purchasing a new bicycle, trainer or treadmill.



Purpose-built set to guarantee CE certified quality

## SILVERFIT MILE APPLICATIONS



### TREADMILL

The SilverFit Mile can be connected to an existing treadmill and facilitates gait training. The image can be displayed on a large or small flat screen display. If you need to purchase a new treadmill, SilverFit can advise you as well.



### BICYCLE / HOME TRAINER

For many people riding a bike is a familiar activity which they still enjoy in later stages of life. The SilverFit Mile can be connected to any existing bike, home trainer or recumbent trainer.

## SILVERFIT MILE APPLICATIONS



### ACTIVE-PASSIVE TRAINER

The SilverFit Mile can also be attached to an active-passive trainer such as the *Thera Trainer* or the *MotoMed*. SilverFit can install the SilverFit Mile onto your existing apparatus. Should you wish to purchase a new active-passive trainer, we are happy to advise you.



### LIVING ROOM

It is also possible to use SilverFit Mile films in small-scale housing or even at home. In this case we would advise a small touch screen, connected to an exercise bike that takes up a small amount of space.

# SILVERFIT MILE

## AN OVERVIEW OF THE FILMS INCLUDED

This is just a selection of our films. We provide all films at installation.



Blossoming trees route



Four seasons in the woods



Patagonia



Paris



Swiss Alps



Amsterdam



Sydney



The Betuwe Rhineland



Dutch Canal trip



Italian Ravello



The Hague



Germany



Alberta Rockies



American Southwest



British Columbia Coast



Tierra del Fuego



Trinity Mountains



Costa Rica



Northern Italy



Panama



South Island New Zealand



Utrecht



Taiwan



Kinderdijk Windmills



Beach Scheveningen



National Park Hoge Veluwe



Schiphol Airport



Angels Crest



Mahone Bay



Buenos Aires



Los Angeles



Chicago



Rotterdam



Den Bosch



Zoo Blijdorp

**RECORDING YOUR OWN ROUTE**  
*Many people enjoy walking or cycling in their own familiar environment. You can order a film to be made of your environment which SilverFit can then integrate into the SilverFit Mile.*



# SILVERFIT MILE

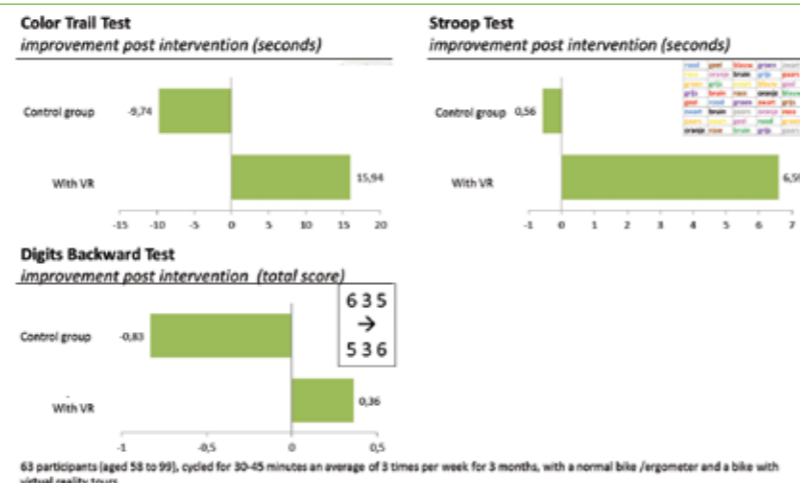
## SCIENTIFIC BACKGROUND

The next pages give a brief overview of the scientific background of training with virtual images for cycling and walking. Virtual therapy for walking or cycling leads to better results on cognitive tests and balance parameters, higher exercise adherence, quicker achievement of training goals; and in addition, people enjoy it much more.

### COGNITION

A study by Anderson-Hanley et al. (2012) explored the effect of exercise on cognitive function in older adults. They looked specifically at executive functions such as planning and divided attention. To identify this effect, three tests were used. The results (see the below figure) show that the group that cycled with virtual images (with VR) showed a significantly better cognitive performance than the control group.

Cycling with virtual images improves cognitive function

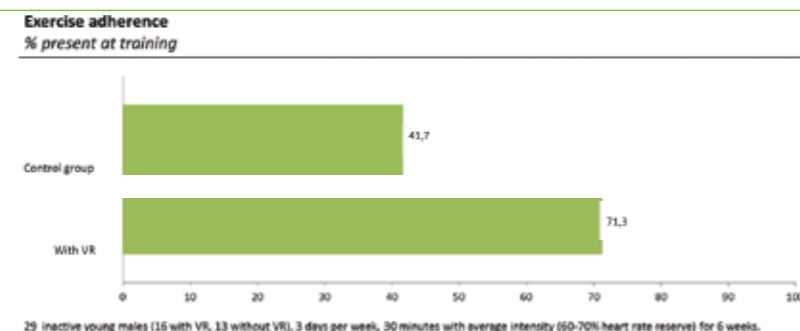


Source: Anderson-Hanley et al. (2012)

### EXERCISE ADHERENCE

The study by Rhodes et al. (2009) into cycling with and without video games showed that exercise adherence was higher when cycling with video games compared to cycling without video games. The study showed that this higher exercise adherence was caused by the fact that the participants found training with the video games to be more fun.

Cycling with video-games improves exercise adherence

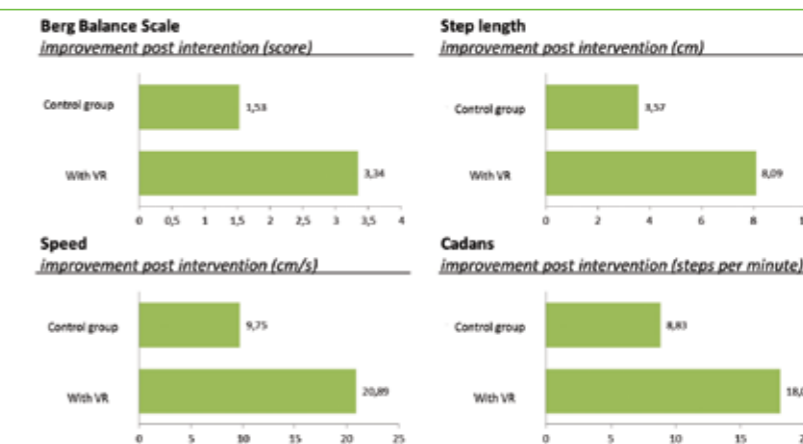


Source: Rhodes et al. (2009)

### BALANCE

Using real-world videos improves balance and gait in stroke patients

Cho and Lee (2014) showed that using virtual images has a positive effect on balance during walking. Compared to the control group, the VR group scored significantly better after the intervention with regard to the parameters and test, shown below.



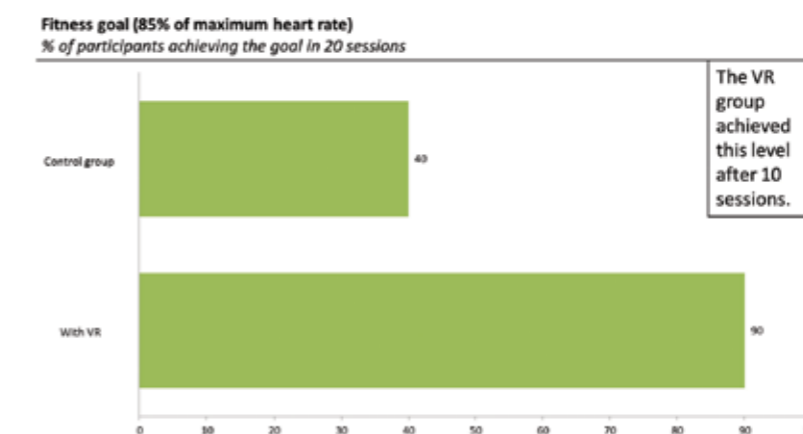
Source: Cho & Lee (2014)

30 stroke survivors (average ± 65 years of age) walked on a treadmill for 30 minutes, 3 times per week for 6 weeks, with or without real-world videos.

### CARDIOVASCULAR FUNCTION

Treadmill training in a virtual environment increases the recovery of cardiovascular functions after coronary bypass

Chuang et al. (2006) showed that walking with virtual images has a positive impact on achieving fitness goals. After a coronary bypass, one of the training goals was to reach 85% of maximum heart rate. After 20 training sessions, it was observed that less than half of the control group had achieved this. However, almost all of the VR group achieved this goal. Moreover, the VR group achieved this after 10 training sessions.



Source: Chuang et al. (2006)

20 participants (10 with VR, 10 without VR) walked for 30 minutes 2 times per week over 3 months. Goal: 85% of maximum heart rate.

### EXERTION AND ENJOYMENT

Feenstra (2013, unpublished) studied the effects on exertion while cycling with or without virtual images using the SilverFit Mile. The results show that patients enjoyed cycling with images much more than without. The addition of virtual images to cycling in most cases improved exertion tolerance as well.

# SILVERFIT MILE

## SCIENTIFIC BACKGROUND

Cycling with the SilverFit Mile is more fun than cycling without it

PP	Enjoyment	Perceived exertion			Conclusion
	How did you find it?	VAS	BORG	Cycle further?	
1	+	-	=	-	reduced
2	+	-	+	+	mixed
3	+	=	=	+	improved
4	+	+	+	+	improved
5	+	+	-	+	mixed
6	=	+	+	=	improved
7	+	-	=	-	reduced
8	+	=	-	=	reduced
9	+	=	=	+	improved
10	+	+	+	+	improved
11	+	+	=	-	mixed

It was observed that people who can cycle a short distance cycle further with VR. People who cycle a relatively long distance cycle slightly less far with VR.

11 frail elderly people (aged 81-96), cycle 3x10 minutes; baseline (cycling with effort between rather light and very hard; Borg score 12 to 16); 1x with VR, 1x without VR. Minimum of 48 hours between sessions.

Bron: Feenstra (2013, niet gepubliceerd)

### AVOID RISKS

There is a number of research done to the effect of video images on balance and equilibrium. Every research stress the importance that the images connect closely to the subjective movement experience. Research done by Nishiike (2013) for example, analysed the speed of the film and pointed out undesired movements of a video. Especially movements in which the horizon rotates too much or gets shaky and wobbly can cause a nauseous feeling similar to seasickness. Bonato (2009) describes this effect with healthy 19 year old participants.

SilverFit has therefore developed a specific methodology to avoid these kind of shaky movements. A film is recorded with a scooter mobile that is adapted for this purpose and uses a self-stabilizing camera. Furthermore, all images are edited afterwards with stabilisation software and tested by a person who is highly sensitive herself for the above described effect. In this way we can be sure that the videos we record do meet the very strict requirements of a medical device.

### LITERATURE

ANDERSON- HANLEY, C., Arciero, P.J., Brickman, A.M., Nimon, J.P., Okuma, N., Westen, S.C., Merz, M.E., Pence, B.D., Woods, J.A., Kramer, A.F. & Zimmerman,

e.a. (2012). Exergaming and older adult cognition: a cluster randomized clinical trial. *American Journal of Preventive Medicine* 42 (2): 109-119.

BONATO, F., Bubka, A., & Palmissiano, S. (2009), Combined pitch and roll and cybersickness in a virtual environment. *Aviation, Space and Environmental Medicine* 80 (11): 941-945

CHO, K.H. & LEE, W.H. (2014). Effect of treadmill training based real-world video recording on balance and gait in chronic stroke patients: a randomized controlled trial. *Gait & Posture* 39: 523-528.

CHUANG, T.Y., Sung, W.H., Chang, H.A. & Wang, R.Y. (2006). Effect of a virtual reality-enhanced exercise protocol after coronary artery bypass grafting. *Physical Therapy* 86: 1369-1377.

FEENSTRA, A. (2013, niet gepubliceerd). Onderzoek naar belastbaarheid op de fiets mét en zonder SilverFit Mile bij kwetsbare ouderen.

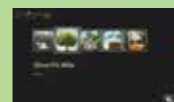
NISHIIKE, S. et al., (2013). The effect of visual-vestibulosomatosensory conflict induced by virtual reality on postural stability in humans. *Journal of Medical Investigation* 60 (3-4): 236-239

RHODES, R.E., Warburton, D.E.R. & Bredin, S.S.D. (2009). Predicting the effect of interactive video bikes on exercise adherence: an efficacy trial. *Psychology, Health & Medicine* 14 (6): 631-640.

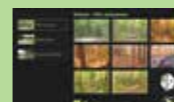
# SILVERFIT MILE

## COMPONENTS AND OPTIONS

### STANDARD COMPONENTS



**SilverFit Mile control software**  
A simplified menu to control the SilverFit Mile



**Filmset**  
A series of films recorded in different environments at varying speeds.



**Computer**  
Computer, pre-programmed with SilverFit Mile software and films



**Professional remote control**  
Remote control for the supervisor



**Sensor**  
Sensor used to measure speed is built in to the exercise apparatus.



**Service package (1 year, extendable)**  
On-site installation, training of all potential users, 1 year hardware guarantee, quick on-site service in case of any problems, software updates and new films.

### DISPLAY OPTIONS



**Wall-mounted HD screen**  
For a crystal clear screen

### OPTIONAL EXTRA'S



**Own film**  
One or more films recorded in familiar environment.



The SilverFit Newton provides exercises in game form for your existing strength training equipment. Strength training exercises are often repetitive and many people find them tedious. The games used by SilverFit Newton make strength building exercises fun and dynamic. The Newton can be used on each type of equipment that uses a set of weights, such as the pulley, or leg press. The patient plays the game on a user friendly touch screen.



## STRENGTH TRAINING EXERCISES IN REHABILITATION

Although functional training is often preferred, strength training exercises play an important role in rehabilitation. For example, exercises on a leg press after an orthopaedic surgery; recuperating from sarcopenia after long-term bed rest. Often these exercises are repetitive and have to be performed over a period of time.

## EXERCISES IN THE FORM OF GAMES

Games motivate people more than straight-forward exercises. The games used on the Newton are professionally designed in terms of graphics, sound and game layout. The level can be adjusted to suit the abilities and experience of the patient.



## EXERCISES WITH FEEDBACK

The SilverFit Newton can also be used to make standard exercises easier. For example, counting down the number of repetitions by indicating the pattern in which the exercises are done, or by measuring the recovery time.

## TESTS

The SilverFit Newton can also assist in taking a series of standard tests, such as the RM test. Whereby a series of interpolations calculate the maximum weight that is to be lifted.

## VIDEOANALYSIS

The system allows patients to be recorded and compare their performance over a period of time.



# SILVERFIT NEWTON

## APPLICATIONS



### ON A LEG PRESS

The SilverFit Newton is used most on a leg press. People can follow an entire training programme independently. The system can be connected to your existing equipment provided this works using weights.



### ON A PULLEY

The SilverFit Newton can be mounted on every type of pulley that uses a series of weights. We can install the Newton on your existing system.

# SILVERFIT NEWTON

## TRAINING PACKAGE

**TRAINING ON NUMBER OF REPETITIONS**

- Counting down sets and repetitions
- Desert: practicing repetitions. The desert starts to blossom with every repetition.

**DYNAMIC REACTION TO EXTERNAL STIMULI**

- Lift: focus on holding a position
- Diver: dynamic eccentric/concentric movement

**TRAINING TO TIME**

- Doing as many repetitions as possible in a set amount of time

**TESTS**

- Determining range of motion
- Determining RM (repetition maximum)

**TRAINING TO RHYTHM**

- Training with a stable, even rhythm
- Training eccentric/concentric difference
- Training while maintaining position
- Australia game: training explosive power

**VIDEO**

- Recording and reviewing a client's achievements on video.

### SILVERFIT NEWTON COMPONENTS



**SilverFit Newton software**  
The complete software suite for SilverFit Newton



**Touchscreen computer**  
SilverFit Newton all-in-one touch screen with built-in computer.



**SilverFit Newton standard**  
Mobile standard with mounted screen.

### SILVERFIT NEWTON COMPONENTS



**SilverFit Newton sensor**  
One sensor is needed for every piece of exercise apparatus to which you want to connect the SilverFit Newton.



**Service package**  
(1 year, extendable)  
On-site installation, training of all potential users, 1 year hardware guarantee, quick on-site service in case of any problems.

# SILVERFIT ALOIS

## FOR PEOPLE LIVING WITH DEMENTIA



The Alois has been specially designed for people living with dementia. The aim is to create moments of joy in order to improve the quality of life. The Alois stimulates physical exercises, cognitive activities and social contacts. Personal photos and other material from the user's life are used in several games. The various activities can be used in different stages of dementia. The Alois can be used in a group but also in a more intimate setting such as with family or friends.

### ACTIVITY

People who suffer from dementia often have limited social and physical activities. This can pull them into a downward spiral as they lose more and more capabilities. The more active people are, the happier they tend to be. Activity can lead to a decrease in challenging behaviour. Often, all sorts of small tasks can be performed much more independently.

### PERSONAL EXPERIENCE

In recent years there has been a rise in person-centred care whereby the resident's wishes and interests are leading. People have very different wishes and interests. The Alois uses photo's, music and where possible video's from the user's life and offers a personal training package. For many people old photos of the place they grew up in can trigger a wealth of recognition. The man who discovered Alzheimers was Dr Alzheimer. His first name was Alois. Our activities are aimed at the person, not the disease itself. That is why we have chosen this name.

**“Residents come to the realisation that there are many things they are still able to do, and that boosts their self-esteem.”**

*Activity supervisor*

### INVOLVING THE FAMILY

Family members often say that they do not know what to do during a visit. Sometimes this gives them the feeling

that there is no point going to visit their loved one. Yet people are happier when they have regular visitors. The Alois offers activities which can be done together, by adults as well as (great) grandchildren. The family is engaged from the start, thanks to the structured introduction programme.

**“This thing brings structure. I finally feel I can do something useful with my mother.”**

*Family member*

### INTRODUCTION AND USE OF THE ALOIS

The Alois can be used in a number of different places, depending on its purpose: in the living room, activity room, as recreation or as an activity programme in all departments. Family members and volunteers can play an important role. Wherever possible they are involved from the start in collecting personal photos and music. SilverFit has an example action plan available. Based on our customers' experiences we have put together a best practices which we will gladly share with you.

**“The Alois stimulates after dinner conversations and residents are active instead of being bored and sleepy.”**

*Staff member*

# SILVERFIT ALOIS

## WHEN USED



*Enjoying old photo's, individually or with family*



*Group activity: moving to music*



*Individual activity: a trip through home town*



*The Alois can also be used to relax*

# SILVERFIT ALOIS

## SCIENTIFIC BACKGROUND

### SCIENTIFIC BASIS

The Alois is based on the most up-to-date scientific insights. We have based both the overall design and the development of specific exercises on scientific research, complemented with experience from informal care providers, care professionals and people suffering from dementia.

### ALWAYS SOMETHING TO DO

A study conducted in the US (Schreiner et al., 2005) shows that care home occupants who suffer from dementia are 7 times more likely to laugh or have fun during an activity than during the rest of the day. They usually spend the rest of their time alone and/or idle. The research suggests an approach whereby activities are done throughout the day in which people can participate. An appealing approach is described by Volicer et al. (2006) in which all kinds of suitable activities are organised in a Veterans' care home: morning call, marching, a military club. This is possible without the need to hire extra staff: all staff members, at all levels, contribute to this approach.

### CYCLING WITH IMAGES

A motorized passive active bike can be placed in front of the Alois. Cycling with video imagery has positive effects on a person's stamina and cognition, in particular on the capacity to plan tasks. People living with dementia enhance positive emotions when biking in familiar scenes again. We hear that residents also enjoy seeing new parts of the world and feel they are really traveling around!

### WHY EXERCISE?

In The Netherlands, Professor Scherder (Scherder, 2010) is a leading and well known

advocate of the importance of an active lifestyle for people living in a care home. He demonstrates that being physically and socially active improves a person's well-being and decreases problematic behaviour. Based on the evaluation of 30 studies, Heyn et al. (2004) conclude that for people suffering from dementia, physical activity has a positive effect in areas such as cardiovascular fitness, strength and flexibility. But it also has a positive effect on functioning in daily life, cognition and behavioural problems.

### MUSIC AND PHOTOS

Testad et al. (2014) looked at the different types of activities in care homes. They showed that by using reminiscence: exercises using personal photos, depression is less likely to occur. Activities involving music lead to less agitation and unrest.

### AQUARIUM AND EATING

Edwards (2013) researched the effect of an aquarium in the living room at nursing homes housing people who suffer from dementia. It was shown that people who could look at an aquarium while eating, on average ate better and had less weight problems. This is why Alois has its own (virtual) aquarium!

### PERSONAL APPROACH

A personal approach is essential: offering activities that are suited to a person's specific needs. Brownie et al (2013) show that people are less likely to become bored, depressed and needy when the approach is of a personal nature. Family members are more satisfied and staff members say they have a more personal relationship with the occupants.

### LITERATURE

- BROWNIE, S. and Nancarrow, S. (2013) Effects of person-centered care on residents and staff in aged-care facilities: a systematic review. *Clinical Interventions in Aging* 8: 1-10
- DAZ (2014) *Evaluatierapport 'Bewoners met dementie in beweging. Over de ervaringen met 16 SilverFits'*
- EDWARDS, N.E. and Beck, A.M. (2013) The influence of aquariums on weight in individuals with dementia. *Alzheimer Disease and Associated Disorders* 27(4): 379-383
- HEYN, P. (2004) The effects of exercise training on elderly persons with cognitive impairment and dementia: a meta-analysis. *Archives of Physical Medicine and Rehabilitation* 85: 1694-1703
- SCHERDER, E.J.A. et al. (2010) The more physical inactivity, the more agitation

- in dementia. *International Psychogeriatrics* 22(8): 1203-1208
- SCHREINER, A.S., Yamamoto, E., and Shiotani, H. (2005) Positive affect among nursing home residents with Alzheimer's dementia: The effect of recreational activity. *Aging and Mental Health* 9: 129-134
- SMIT, M., (2014) *Kennisbrochure SilverFit Mile*
- TESTAD, I. (2014) The value of personalized psychosocial interventions to address behavioral and psychological symptoms in people with dementia living in care home settings: a systematic review. *International Psychogeriatrics*: 1-16
- VOLICER, L., et al. (2006) Effects of continuous activity programming on behavioral symptoms of dementia. *Journal of the American Medical Directors Association* 7: 426-431



Individual physical activity with a computer game

# SILVERFIT ALOIS

## ACTIVITY PACKAGE


# SILVERFIT ALOIS

## TYPES AND OPTIONS


<h3>MAKING TRIPS</h3>  <p><b>Nature trips</b> Cycling through woods and over moors</p>  <p><b>City trips</b> Trips through historical and famous cities</p>  <p><b>A day out</b> The Zoo, Windmills, Canal trip, Airport</p>	<h3>MOVING TO MUSIC</h3>  <p><b>Conducting</b> Conducting classical music (<i>Conductorcise</i>)</p>  <p><b>Chair dancing</b> Making big movements to various types of music</p>  <p><b>Music box</b> Intuitive interaction with sound and colour</p>	<h3>COGNITIVE GAMES</h3>  <p><b>Mental arithmetic</b> Physical activity based on doing sums in your head.</p>  <p><b>Recognising sound</b> Physical activity based on different sounds</p>
<h3>VIEWING PHOTOS</h3>  <p><b>Personal photos</b> Photos or drawings provided by family</p>  <p><b>Themed photos</b> Young life, travel, history, nature, objects</p>	<h3>ENRICHED ENVIRONMENT</h3>  <p><b>Aquarium</b> Life-size aquarium to view and enjoy</p>  <p><b>Fireplace*</b> Warm images for long winter evening</p>	<h3>ACTIVITY GAMES</h3>  <p><b>Bingo</b> Bingo whereby the player has to stand up or bend over</p>  <p><b>The fox</b> Practicing balancing the upper body</p>
<h3>VIEWING FILMS</h3>  <p><b>Personal films</b> Watching personal video's such as the person's wedding</p>  <p><b>Young life</b> A selection of films showing young life</p>	<h3>LISTENING TO MUSIC</h3>  <p><b>Personal music*</b> Enjoying listening to personal music</p>	 <p><b>Polishing</b> Polishing the screen and gradually revealing personal photos</p>  <p><b>Puzzles</b> Making puzzles with personal photos</p>  <p><b>The Fairground *</b> Throwing balls at a fairground</p>

\*In development


### DISPLAY OPTIONS



**Wall-mounting**  
The Alois is mounted to the wall




**On a cupboard**  
The Alois is placed on a cupboard, like a TV




**Mobile stand**  
The Alois can be moved to different departments (extra cost)


### OPTIONAL EXTRAS



**Active/Passive trainer**  
Motorised bicycle for hand or leg training



**Headphones**  
To listen individually (can be used with hearing aids)



**Scanner**  
To scan photos



# SILVERFIT REPHAGIA

## RELEARNING TO SWALLOW



**Dysphagia, commonly known as swallowing problems, is quite common. A significant number of people in long-term elderly care suffer from some form of dysphagia. Treating the condition is a challenge for many therapists. It can be difficult to explain to patients what exercises they should be doing. In many cases, treatment is not completed, and instead, a special diet is prescribed. These diets are not ideal from a social, medical, and financial point of view. Many forms of dysphagia can be treated by intensive exercise training. The SilverFit Rephagia helps to provide this type of training.**

# SILVERFIT REPHAGIA

## RELEARNING TO SWALLOW

### SOCIAL ISOLATION

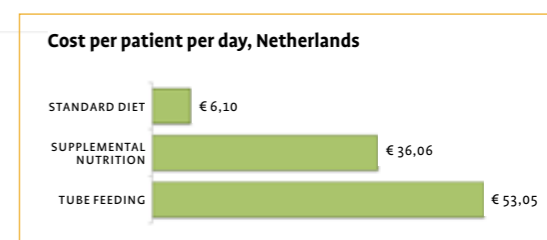
Enjoying eating and drinking together is an essential part of social interaction: lunch, tea, coffee, dinner, drinks. Even mild forms of dysphagia-related symptoms such as drooling can contribute to social isolation. Research shows that 55% of people with dysphagia are no longer able to enjoy food, and 36% try to avoid eating with others (Ekberg et al., 2002).

### MEDICAL RISKS

Dysphagia can lead to dehydration, malnutrition, weight loss, respiratory problems, pneumonia and upper respiratory infections. For example, 44% of people suffering from dysphagia lose weight (Ekberg et al., 2002). Data from the us show that people with severe forms of dysphagia after a stroke were 3-15 times more likely to suffer from various complications, and 2x more likely to die within a year after the stroke occurred (Medicare). Pneumonia is responsible for about 34% of all stroke-related deaths and represents the 3rd highest cause of death during the first month after a stroke (Kil-Byung Lim et al., 2009).

### FINANCIAL COSTS

Providing special diets is costly because the food has to be bought and prepared separately, and the patient requires assistance and supervision. An analysis by SilverFit of Dutch care homes shows that tube feeding cost 8-9 times more than average food costs.



Source: SilverFit analysis of data from Health Care Centers. Costs include staff and material costs.

Serious forms of dysphagia are quite prevalent. In our analysis of 8 care homes, 7-22% of patients received food supplements. For an “average” care center with 70 beds, this translates into tens of thousands of euro per year in additional costs. This does not take into account the cost of treating complications.



# SILVERFIT REPHAGIA

## RELEARNING TO SWALLOW

### VALUABLE INSIGHTS

The Rephagia system supports the speech and language therapist. It helps the therapist provide the patient with a series of exercises known to improve swallowing function. During the exercises, both the therapist and the patient get valuable insights into the patient's performance. The patient's swallowing response is characterized using sEMG, a method that measures the activity of the patient's muscles.

### MOTIVATING

The biofeedback system can be shown in the form of graphs, or as game-like exercises that are easy for the patient to understand. Games improve motivation, which is vital in the case of swallowing exercises: the patient has to work hard for a prolonged period of time to regain function. During

the tests of the Rephagia, clinicians noted that in comparison to sEMG devices used in research, the Rephagia games made it possible to engage patients with lower cognitive function more easily.

### TREATMENT COURSE

The treatment on average takes 12 sessions of half an hour, administered three times a week for four weeks. At the start of the treatment, the patient takes an assessment determining the swallowing function. The key to improve the swallow function is performing a lot of repetitions with progressive resistance. The patient then moves on to training the timing and specificity of the swallow movement. The final part of the training covers coordination and prolongation of the swallow, as in the well-known Mendelsohn maneuver.

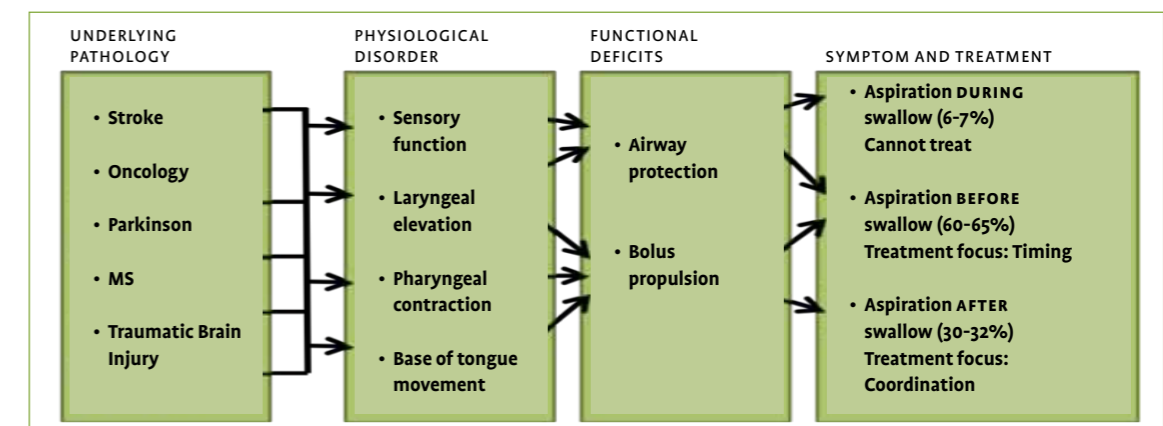
# SILVERFIT REPHAGIA

## CLINICAL APPROACH

### DIFFERENT PATHOLOGIES MAY LEAD TO SIMILAR SYMPTOMS OF DYSPHAGIA

Dysphagia can be caused by a number of underlying pathologies, such as stroke (including Wallenberg), oncological pathologies, Parkinson's, Multiple Sclerosis, traumatic brain injury, or genetic factors. The underlying pathology determines

the effectiveness of treatment. However, during treatment the therapist focuses on functional deficits, which manifest themselves as deficits in airway protection, bolus transport, or both.

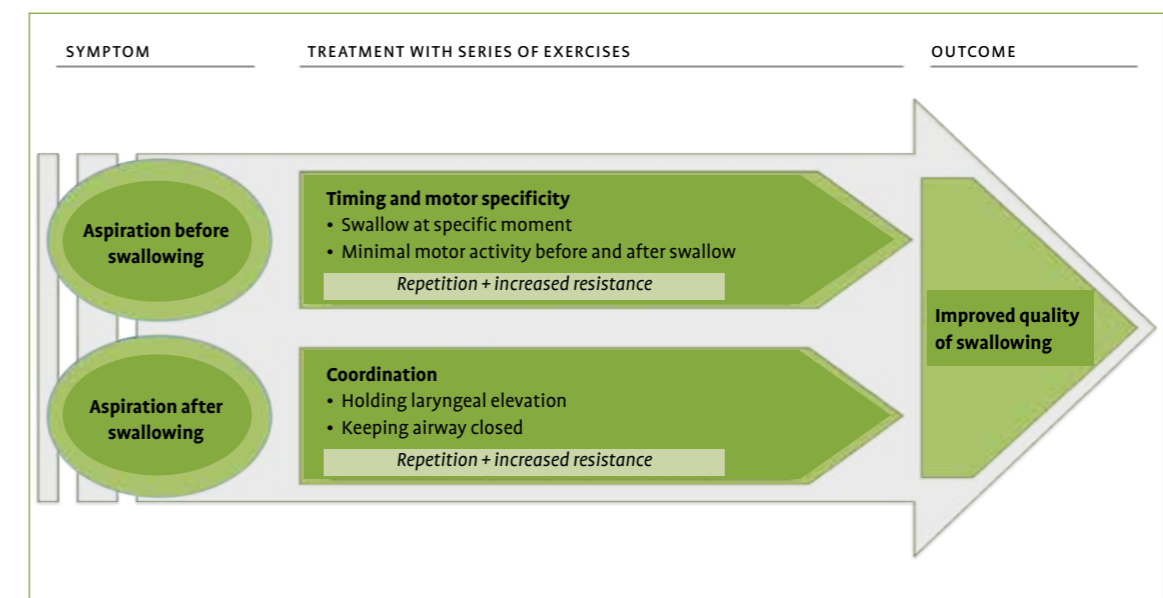


Source: Scholten, E. (2014), unpublished. This diagram shows how physiological and functional disorders observed during objective dysphagia diagnostics determine the moment of aspiration. Patients mostly aspirate before or after swallowing.

### CLINICAL PATHWAYS FOR DYSPHAGIA TREATMENT

The treatment plan depends on when the aspiration takes place (before or after the swallow). In both cases, repetition and increased resistance are vital. In addition,

the treatment focuses on timing and motor specificity, or on coordination, as summarized in the diagram below.



Source: Clinical pathways developed by Scholten, E. (2014) based on research from Carnaby-Mann, G.D. et al., (2010) and McCullough, G.H. et al., (2012)

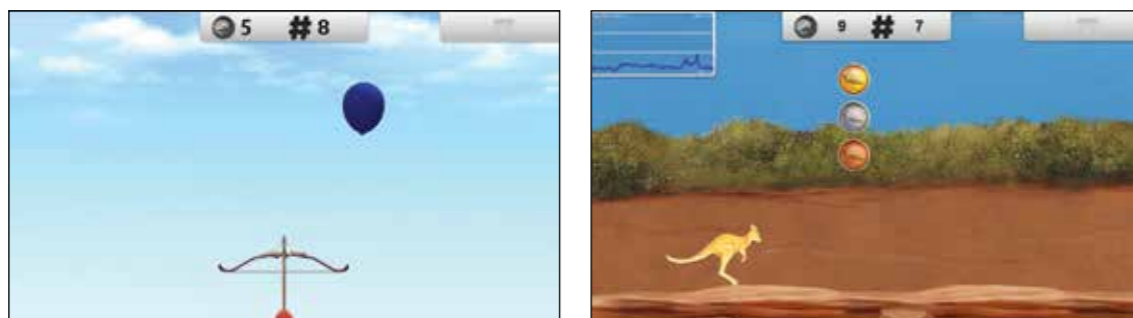


# SILVERFIT REPHAGIA

## CLINICAL APPROACH

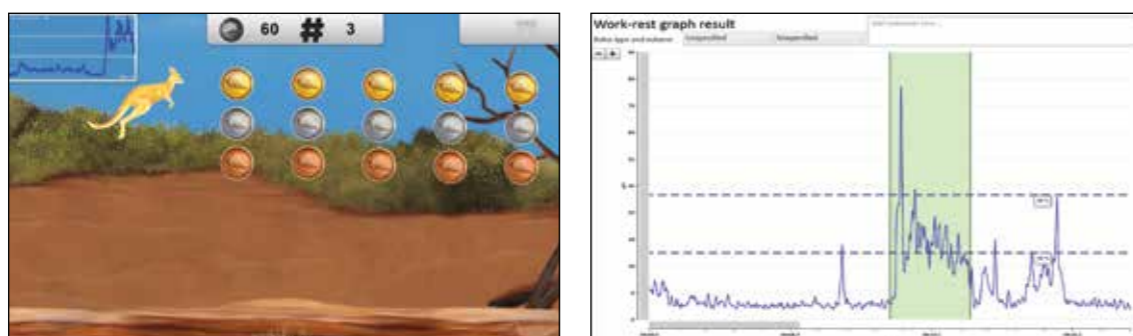
### TIMING AND MOTOR SPECIFICITY

To improve control of swallow onset the patient tries to time their swallow to visual cues. The time between cues can be adjusted to the capabilities and needs of a patient to make it easier or harder.



### COORDINATION

In order to gain improved coordination of muscles used for swallowing, the well-known Mendelsohn maneuver is used. Supported by intuitive games or graphs the patient learns to indirectly modify specific aspects of swallowing, such as laryngeal elevation, and pharyngeal wall contraction.



### REPETITION & INCREASED RESISTANCE

Repetitions and increased resistance are important in both clinical pathways. They contribute to improved strength. As games strongly motivate patients to keep practicing the swallow movement, this form of biofeedback facilitates the rehabilitation process. Functional patterns of swallowing are trained over and over with increased resistance (different consistencies). This has an impact on the timing and specificity of the swallow movement.

A program of repeated exercise for dysphagia treatment can induce changes in neuroplasticity, and contribute to an increased volume and strength of muscles and enhanced cooperation of the affected swallowing muscles, which will improve the swallowing capacity (Robbins, J., 2007).

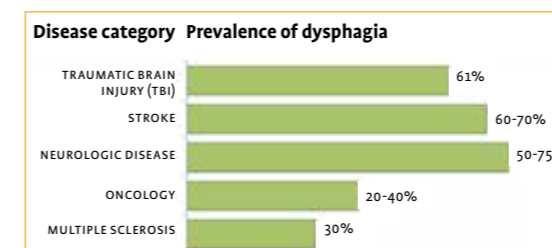
Surface EMG-guided dysphagia therapy that incorporates systematic and progressively more challenging swallowing exercises generates superior clinical outcomes compared to sEMG-guided exercises that do not (Carnaby-Mann, G.D. et al., 2010).

# SILVERFIT REPHAGIA

## SCIENTIFIC BACKGROUND

### PREVALENCE

Research done by ASHA (American Speech, Language and Hearing Association) shows that dysphagia is a very common condition having important medical as well as social impacts that drastically decrease a patient's quality of life.

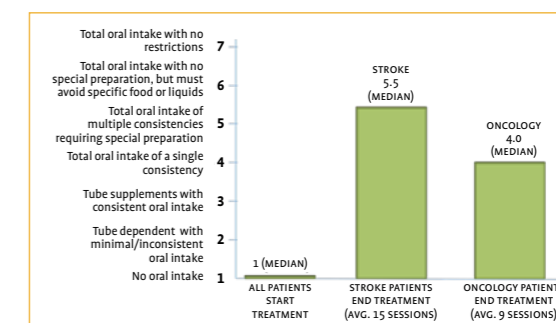


Source: American Speech-Language-Hearing Association (2008), Mann et al. (2000), Nguyen et al. (2006), Nguyen et al (2008), American Speech-Language-Hearing Association (1994)

### REPHAGIA: ADJUNCTIVE SURFACE ELECTRO MYOGRAPHY (SEMG)

There is an accumulating body of research in which sEMG is used for rehabilitation of swallowing disorders. Biofeedback from sEMG has been widely described to be effective improving both oral and

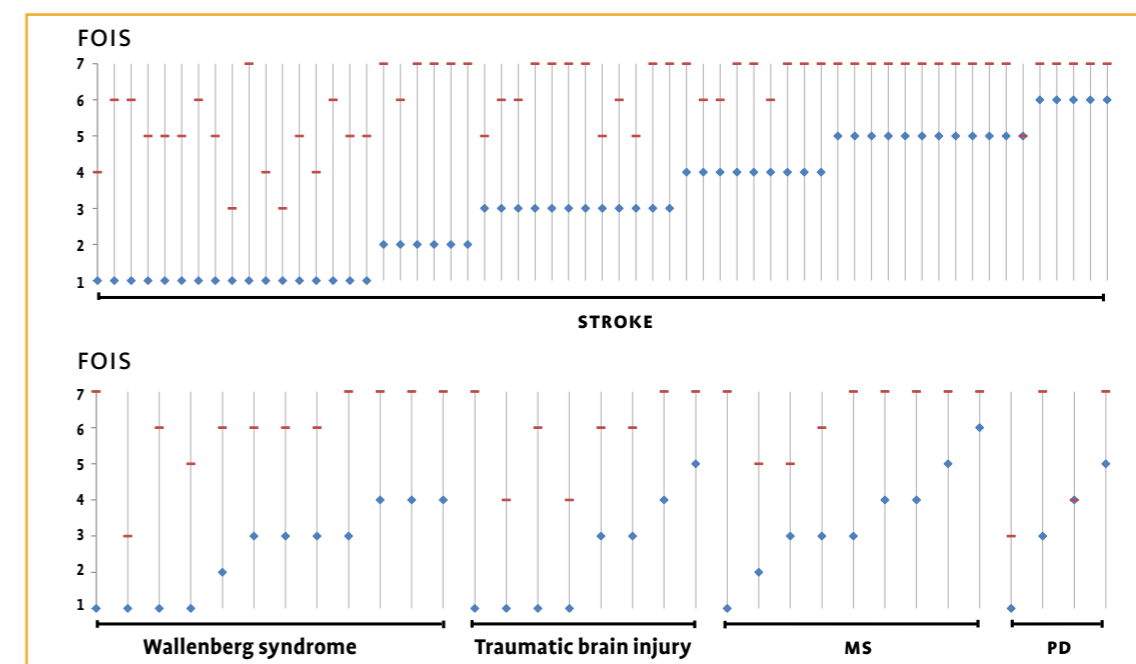
pharyngeal aspects of the swallow (Crary & Groher, 2000). The graph below illustrates the beneficial impact of sEMG on oral intake for post-stroke survivors and oncology patients.



Source: Crary, M.A. et al. (2004)

### IMPACT

The graph below summarizes the impact of the proposed protocol in one of our test locations. A total of 94 patients underwent treatment. On average, the patients improved 3 steps on the 7-point FOIS score. Brain trauma and Wallenberg patients improved the most (3.5 and 3.6 steps, respectively) and patients with Parkinson's disease showed more moderate improvement (2 steps).



Each vertical line represents one patient. ♦ Swallowing capability at the start of the treatment indicated on the FOIS scale  
 – Swallowing capability at the end of the treatment indicated on the FOIS scale. Source: Scholten, E. (2013-2015), Not published

**Sensors**  
Specially developed sensors remain in place and are easy to apply. The carefully designed shape makes them easy to position correctly.

**Electrodes**  
Tailor-made wireless sEMG pharyngeal sensing electrodes measure muscle activity.

**Footswitch**  
The therapist can make annotations during the session by using a special footswitch and remote controlled mouse.

**Software**  
Rephagia virtual reality software is an assistive device for the speech and language therapist.

Through a diverse set of graphs the user receives objective information and can try to change specific parts of the graph to work on better timing, coordination or strength.

The user can intuitively train timing of swallowing onset and strength through a bow and arrow game.

The kangaroo game can train coordination and control using a Mendelsohn manoeuvre among others.

The oral phase can be trained by doing the diver exercise.

The therapist is able to map, analyze and annotate the swallowing movements, and subsequently export or print these.

The therapist can track improvement over time per patient.

**Rephagia on a stand**  
The information is shown on a big screen which can be adjusted in accordance to its use. Patient data can be printed directly. Food and drink for swallow therapy can be placed on the shelf.

**Rephagia laptop**  
The system is easy to use in different locations and easy to bring to someone's home. A custom-made suitcase makes transport easy.

### LITERATURE

- ASHA Communication Facts (2008). Special Populations: Dysphagia. *American Speech-Language-Hearing Association*.
- ASHA Prevalence of speech, voice and language disorders in the United States (1994). *American Speech-Language-Hearing Association*.
- CARNABY-MANN G.D., Crary M.A. (2010). McNeill Dysphagia Therapy Program: a case control study. *Archives of Physical Medicine and Rehabilitation*, 91:743-9
- CRARY, M.A., Carnaby-Mann, G.D, Groher, M.E., Helseth, E. (2004). MA: Functional Benefits of Dysphagia Therapy Using Adjunctive sEMG Biofeedback. *Dysphagia*, 19: 160-164 (2004), doi 10.1007/s00455-004-0003-8
- CRARY, M.A., Groher, M.E. (2000). Basic Concepts of Surface Electromyographic Biofeedback in the Treatment of Dysphagia: A Tutorial. *American Journal of Speech-Language Pathology*, Vol 9, 116-125, asha 1058-0360/00/0902-0116
- EKBERG, O., Hamdy, S., Woisard, V., Wuttge-Hannig, A. & Ortega, P. (2002). Social and psychological burden of dysphagia: its impact on diagnosis and treatment. *Dysphagia*, 17: 139-146.
- KAYS, S., Robbins, J., (2006). Effects of Sensorimotor Exercise on Swallowing Outcomes relative to Age and Age-Related Disease. *Seminars in Speech and Language*, Vol 27, nr 4
- KIL-BYUNG LIM, M.D., et al. (2009). Neuromuscular electrical and thermal-tactile stimulation for dysphagia caused by stroke: a randomized control trial. *Journal of Rehabilitation Medicine*, 41: 174-178
- MANN, G., Hankey, G.J., Cameron, D. (2000). Swallowing disorders following acute stroke: prevalence and diagnostic accuracy. *Cerebrovascular Diseases*, 10: 380-386, 2000.
- MCCULLOUGH, G.H., Kamarunas, E., Mann, G.C., Schmidley, J.W., Robbins, J.A., Crary, M.A. (2012). Effects of Mendelsohn Maneuver on Measures of Swallowing Duration Post Stroke. *Top Stroke Rehabilitation*, Volume 19, Issue 3, pp. 234-243
- MCCULLOUGH, G.H., Kim, Y. (2013). Effects of Mendelsohn Maneuver on Extent of Hyoid Movement and Ues Opening Post-Stroke. *Dysphagia*, 28:511-519.
- MEDICARE (2001-2002). data from Medicare Standard Analytic File
- NGUYEN, N.P., Frank, C., Moltz, C.C., Vos, P., Smith, H.J., Bhamidipati, P.V., Karlsson, U., Nguyen, P.D., Alfieri, A., Nguyen, L.M., Lemanski, C., Chan, W., Rose, S., Sallah, S. (2006). Aspiration rate following chemoradiation for head and neck cancer: an underreported occurrence. *Radiotherapy and Oncology* 80: 302-306
- NGUYEN, N.P., Moltz, C.C., Frank, C., Vos, P., Smith, H.J., Karlsson, U., Nguyen, L.M., Rose, S., Dutta, S., Nguyen, N., Sallah. S. (2008). Long-term aspiration following treatment for head and neck cancer. *Oncology*, 74: 25-30
- ROBBINS, J.A., Kays, S.A., Gangnon, R.E., Hind, J.A., Hewitt, A.L., Gentry, L.R., Taylor, A.J. (2007). The effects of lingual exercise in stroke patients with dysphagia. *Archives of Physical Medicine and Rehabilitation*, 88:150-158.
- STEELE, C.M., Bennett, J.W., Chapman-Jay, S., Polacco, R.C., Molfenter, S.M., Oshalla, M. (2012). Electromyography as a Biofeedback Tool for Rehabilitating Swallowing Muscle Function. *Applications of EMG in Clinical and Sports Medicine*, ISBN 978-953-307-798-7
- STEPP, C.E. (2012). Surface Electromyography for Speech and Swallowing Systems: Measurement, Analysis, and Interpretation. *Journal of Speech, Language, and Hearing Research*, vol. 55, 1232-1246 asha
- STEPP, C.E. Britton, D., Chang, C., Merati, A.L., Matsuoka, Y. (2011). Feasibility of game-based electromyographic biofeedback for dysphagia rehabilitation. *Proceedings of the 5th International IEEE EMBS Conference of Neural Engineering*, 978-1-4244-4141-9/11



**The SilverFit Home offers the opportunity to do the same exercises that are available on the SilverFit, but now in the comfort of someone's own home. The aim of intensifying the therapy is to reduce the time spent in bed rest during rehabilitation. As soon as clients return home they can keep doing the activities in order to maintain and strengthen the functions. A built in internet connection enables the exercise routine to be adjusted and if necessary supervised, at a distance.**

## SELF-PRACTICE ALONGSIDE THERAPY

The SilverFit Home allows the client to practice on their own. This can be done in the bedroom during a short-term stay, thus increasing exercise time by 2-3 times on a daily basis. The aim is to reduce time spent in bed rest. It also helps that the client can continue the exercises at home.

## PRACTICING THREE TIMES A DAY

Some of the exercises on the SilverFit Home are the same as on the large SilverFit system, except that the controls are easier. The therapist maps out a programme beforehand detailing the exercises and length of time. The system has an alarm function to help remind the client about the agreed exercises. The SilverFit Home can be placed on a table. All of the prescribed exercises are provided in sequence. A short instruction video precedes the exercises. The SilverFit Home verbally supports the exercises as they are shown. There is a short pause after every exercise, after which the following exercise starts.

## REVIEWING AND ADJUSTING

Both the client and the therapist can review the exercises and see how well they have been done. This enables the therapist to discuss the exercises with the patient and adjust them where necessary.

## PACKAGE OF EXERCISES

The first set of exercises is designed for clients in rehabilitation following a stroke. We are increasing the number of exercises, just like with the SilverFit. The first exercises are as follows:

- Balance the upper body from sitting position, in game form and as ADL exercise
- Upper extremity, in game form and as cognitive exercise
- Lower extremity, in game form and as cognitive exercise
- Coordination and control of the shoulder

## BE A PART OF THE DEVELOPMENT?

The SilverFit Home is currently in full development. As a care organisation you can actively participate in the development of this system. If you are interested, please do not hesitate to contact us.



*Continue rehabilitation at home as soon as possible*



## TURNKEY INSTALLATION

All our systems are installed on-site and made ready for immediate use.

## TRAINING AT YOUR LOCATION

One of our trainers will give all team members who will be working with the systems, a detailed training at your location.

## ONLINE INSTRUCTION AND USER MANUAL

The system has an incorporated user manual. The user manual is also available as hard copy or online. We are in the process of making instruction films to further explain the exercises. Of course we are always available to answer any questions by phone, e-mail or facebook!

## USER MEETINGS

SilverFit organises annual user meetings. This is where we show our newest applications; and more importantly users can share their experiences with one another and put forward ideas for further development.

## IMPLEMENTATION

SilverFit has a lot of experience to implement innovative geriatric exercise programmes. We organise workshops to engage staff and make them feel the importance of exercise. We assist in setting a very clear schedule which clients will exercise at what time under whose supervision. We also often help to identify the most suitable location for a gym.

## UPDATES

Our team is constantly improving the SilverFit software systems based on ideas put forward by our users. New releases with new games and numerous improvements appear every 8-12 months. During the first year the updates are free, afterwards you can secure a service subscription.

## UPDATE TRAINING

With every update we offer a training in which we explain the systems' new capabilities and answer any questions that may arise concerning its' operation.

## SERVICE TEAM

Our service team is at your disposal. We are available 5 days a week, by phone, email, or facebook. During the first year this service is free, afterwards you can secure a service subscription.

## GUARANTEE

SilverFit offers a standard one year guarantee on all hard- and software.



# NOTES

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