

# Personas and Storyboards for Motivating Mobility

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## Functional Activities Matrix

This matrix illustrates requirements for technologies which were established at the Motivating Mobility meeting on 20 <sup>th</sup> February.			
	<b>Class of activity</b>		
	<b>Elbow/ shoulder movement</b>	<b>Grasp and release</b>	<b>Elbow / shoulder movement combined with grasp and release</b>
<b>LOW ABILITY</b>	Technology needs to support slow , accurate movements, in 2 degrees of freedom. Either close to the body or directly in front of the body.		
<b>MEDIUM ABILITY</b>	Technology needs to support faster movements in three degrees of freedom. Moving further from the body and out to the sides.	Technology needs to support the grasp and release of moderately large, soft, non-slippery objects. These should be placed close to the body.	Technology needs to support the grasp and release of objects, along with their movement through small distances close to and in front of the body, in 2 degrees of freedom.
<b>HIGH ABILITY</b>	Technology needs to support faster movements in three degrees of freedom. Even greater distances away from the body, and activities may feature more integration (for example, activities might be performed whilst standing).	Technology needs to support the grasp of smaller objects that require more advanced manipulation. This might include pronation or supination. Tasks might involve some element of speed or competition.	Technology needs to support the use of small objects in performing highly skilled, complex tasks that involve 3 degrees of freedom. Tasks might include some elements of speed or competition, and some integration with other abilities.

Additional attributes of the arrangements that we may want to consider:

- Precision, repetition, variation
- Capturing performance – for motivating the user and documenting performance / progress
- Adaptability of an arrangement to suit different ability levels
- Competitive element to the activity
- Transferable to standing

## **Sheila**

**67, left-sided hemiplegia, left-handed  
Low ability, elbow and shoulder only**

# Sheila



This 67 year old lady, lives 20 miles outside Edinburgh with her husband Ron and they have a comfortable income from his pension

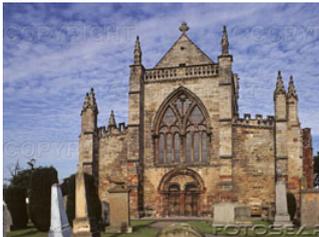


They live in a bungalow and Ron manages most of the daily care with social services carers helping in the mornings to get Sheila up, washed and dressed.



Their only daughter has 4 young children and lives half an hour away –she helps her husband run a farm and finances are difficult so she is too busy to visit her mum easily.

Hobbies / Interests – Sheila has friends in the local community, used to play bridge, loves gardening, likes musicals and knitting and was a regular church goer but is now limited by lack of mobility.



No IT experience, but uses TV, press button phone, video recorder

## Sheila (Low Elbow Shoulder)

	Shoulder /elbow	grasp	both
low	✓		
med			
hi			

### Stroke History

- Stroke 6 months ago, Left sided hemiplegia (left handed), walks with assistance, wheelchair for outdoor mobility, outpatient Physio once a week with home exercise programme
- Can move arm slowly across and in front of body if supported, no hand movement
- Suffers with extreme fatigue and some mild visual field and visuo-spatial neglect problems

**Motivation** –needs help from others to organise any practice - wants to get better be able to improve independence and do more around the house – worries that Ron is under too much stress. Wants to lessen isolation – have more contact with friends and daughter and grandchildren.

### Functional Goals :

To be able to place affected arm easily into a sleeve of clothing

To be able to place arm on grab rails for balance purposes

To lessen feeling of isolation

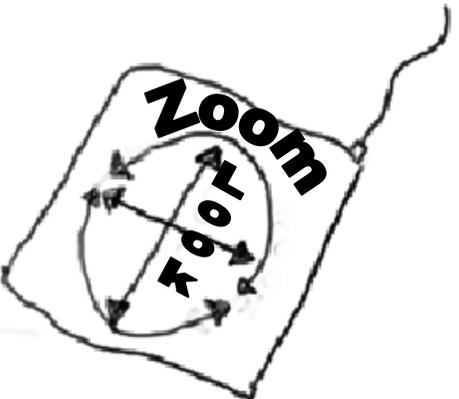
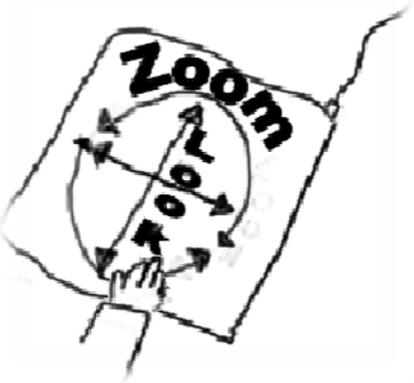
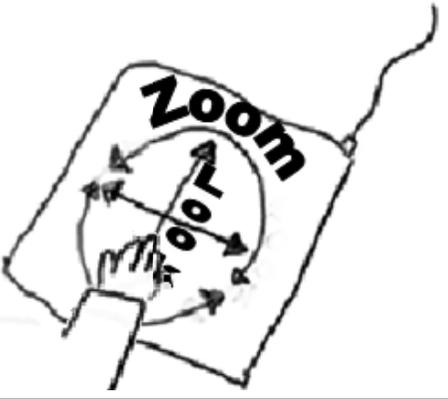
### Treatment

To improve range, speed and control of active movement in 2 DOF e.g. Supported sliding movements on a horizontal surface

### Storyboard 1 - Sheila - Webcam

This storyboard shows how Sheila could have more interaction with her Grandchildren while at the same time exercising her arm. The activity mat needs to be large enough to challenge her range of movement but can be folded for easy storage at home. It has some privacy issues, with which both the patient and her family would need to be happy. This is an exploratory activity with no goal or end point; but it is easy to use for those with some cognitive problems. There has to be some reminder for the patient to move or else it would be easy to just zoom out and watch the children without needing to move her arm. The task could be made harder by changing the scale on the activity mat to increase the range in which she has to move her arm in order to move the camera. Other places for the webcam – her garden, her stroke club

## Storyboard 1 – Sheila – Webcam

<p>1.</p> 	<p>2.</p> 	<p>3.</p> 	<p>4.</p> 
<p>A camera is put on top of Sheila and Ron's television.</p> <p>A light on top of the camera indicates that it is not on.</p>	<p>Sheila's daughter and her family have the same setup in their living room.</p>	<p>When both homes choose, the special channel can be turned on.</p> <p>The light on top of the camera turns bright green to indicate that it is on.</p>	<p>Sheila and Ron can see and talk to their daughter and her family, including their grandchildren - and they can talk back through their microphone, just like using a telephone.</p>
<p>5.</p> 	<p>6.</p> 	<p>7.</p> 	<p>8.</p> 
<p>Sheila can control the camera through a special exercise control mat which is placed on the table in front of her.</p>	<p>Sheila's hand is resting on a curved shaped object which moves easily on the mat. By moving her hand in a circular motion around the mat....</p>	<p>...the camera zooms in.</p>	<p>By moving her hand towards and away from her, the camera will tilt up and down. If Sheila stops exercising for more than 10 seconds the camera will begin to drift off target.</p>

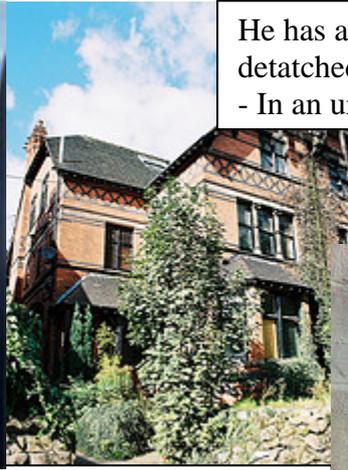
## **Ewan**

**81, left-sided hemiplegia, right-handed  
Medium ability, elbow and shoulder only**

# Ewan

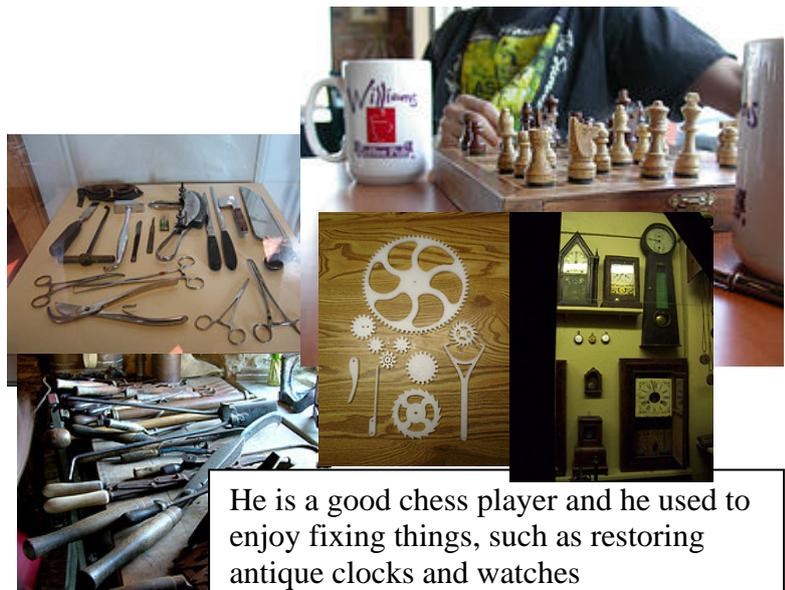
Ewan, an 81 year old gentleman, lives with his wife, Avril (a retired nurse manager). He has three middle aged children who live away and two grandchildren at university.

He has a comfortable semi detached home with adaptations - In an urban area of Nottingham



They live quite comfortably on a good pension since Ewan's retirement as a doctor in occupational health at Plavers

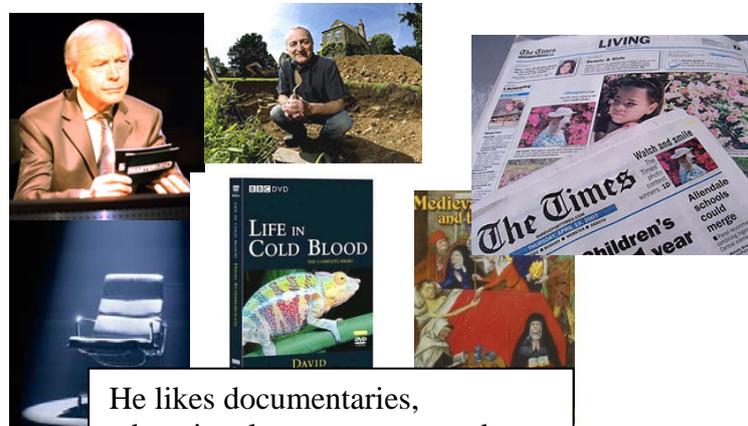
Before his stroke, Ewan was enjoying spending retirement researching and writing a book about medicine in history



He is a good chess player and he used to enjoy fixing things, such as restoring antique clocks and watches



He had a moderate interest in technology which he took on to support his wife who needed IT skills to keep up in the workplace, but he has now got out of date. They have an old computer but no internet



He likes documentaries, educational programmes and factual literature as he is keen to

## Ewan (medium elbow shoulder)

	Shoulder /elbow	grasp	both
low			
med	✓		
hi			

### Stroke History

- Stroke 8 months ago, L sided hemiplegia (R handed), walking independently, on review with community **Physio**
- Some hand grasp and release but main problem is impaired ability to lift arm
- Some shoulder pain when arm is inactive, vision difficulties (uses glasses)

### Motivation

Self motivated –seeks independence – doesn’t want to rely on wife – wants to help her and help children / grandchildren - disliked organised sports – like educational / informative activities and detailed feedback. He wants to reduce the pain in his shoulder.

### Functional Goals

To be able to lift arm up to open and close doors / place clothing or other objects in cupboards  
To be able to use both hands to wash / comb his hair  
To be able to lift arm without pain in shoulder

**Treatment:** To improve range, speed and control of active movement in 3 DOF– lift arm up to shoulder height forwards and out to the side away from body

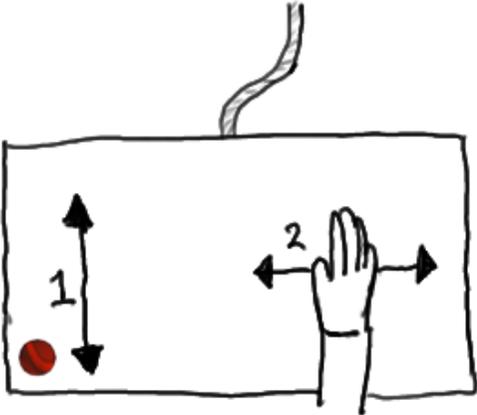
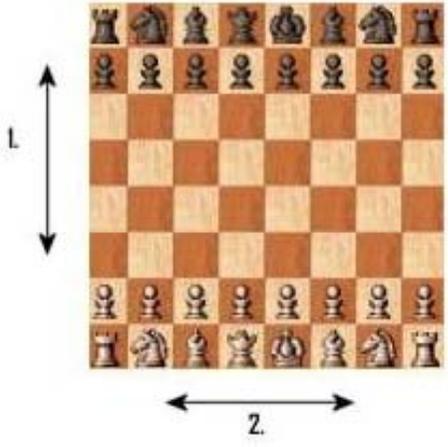
### Storyboard 2 - Chess

This storyboard shows how Eddie can exercise his shoulder and elbow whilst absorbed in a game of chess – this could be competitive against someone else, or against the computer. It requires a higher level of cognitive ability – and an enjoyment of chess. The mat needs to be large enough to challenge his range of movement but can be folded for easy storage at home. The range of movement can be adapted for individuals’ problems and needs. The start/select buttons can be pressed by the non-hemi hand to encourage activity of both arms. The task can be made harder by increasing the range of movement needed to move the chess pieces, or the mat can be placed on a surface at an angle towards vertical. A button for a timer / turn switcher could be included to give added time pressure and encourage speed of movement.

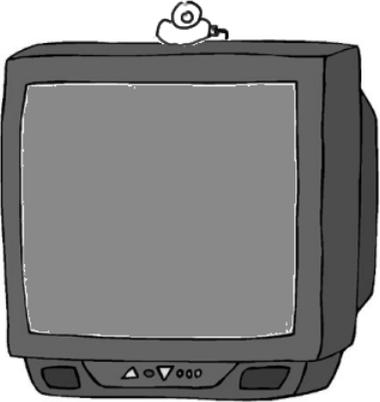
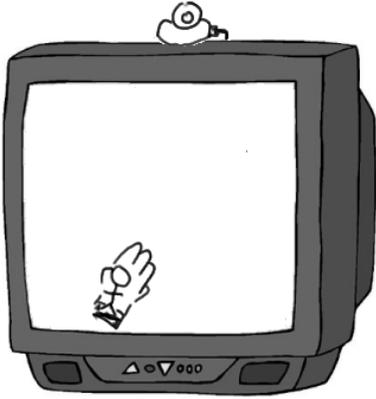
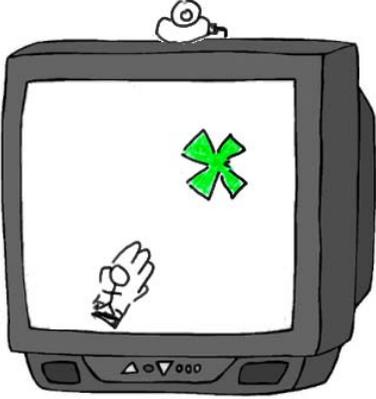
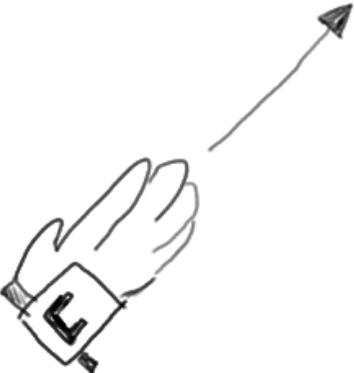
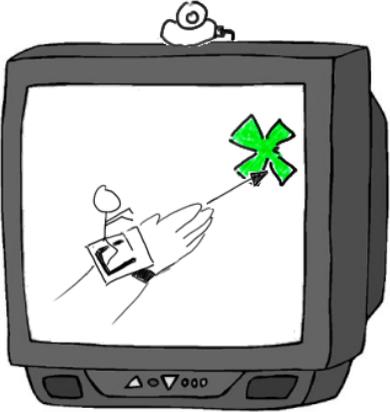
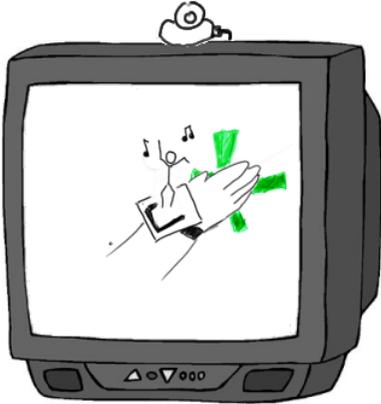
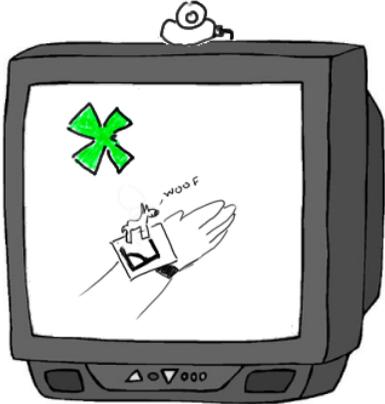
### Storyboard 3 – AR TV

This storyboard shows how AR technology can be used to motivate Eddie to move his arm. It requires a good sense of where the arm is, and how to move the arm, in space without visual input to be able to move their arm whilst looking at the screen. Because of the amount of equipment this type of technology may be more useful for a hospital / stroke club setting than at home. Games could be very varied according to individual motivations.

## Ewan - Storyboard 2 - Chess

<p>1.</p> 	<p>2.</p> 	<p>3.</p> 	<p>4.</p> 
<p>Eddie likes to play chess. He can play against a skilled computer opponent or with his friends or family.</p>	<p>Eddie controls the game by moving his hand on a special exercise mat. The red select button can be pressed by either hand.</p>	<p>Eddie selects a piece by moving his arm up and down on the exercise patterns.</p>	<p>When he has the piece he wants to move highlighted, he presses the red select button.</p>
<p>5.</p> 	<p>6.</p> 	<p>7.</p>	<p>8.</p>
<p>He selects a destination for the piece in the same way.</p>	<p>Next the computer makes its move.</p>		

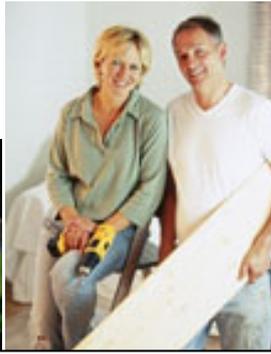
## Ewan - Storyboard 3 – AR TV

<p>1.</p> 	<p>2.</p> 	<p>3.</p> 	<p>4.</p> 
<p>Eddie attaches a piece of card to the back of his hand. The card has a symbol on it. He is sitting and places his hand on a table in front of him</p>	<p>Eddie has a television with a camera on the top which is positioned to look at the table and his hand.</p>	<p>When Eddie switches to the game channel he can see his hand and the table but he can also see a little computer generated man standing on the top of his hand</p>	<p>When Eddie starts the game, a green cross appears on the screen.</p>
<p>5.</p> 	<p>6.</p> 	<p>7.</p> 	<p>8.</p> 
<p>Eddie has to look at the television screen and move his hand along the table towards the green cross</p>	<p>As he slides his hand along the table the little man on the screen also walks along with it.</p>	<p>When his hand is over the green spot the little man starts dancing and music plays.</p>	<p>The game begins again with a different location for the cross.</p> <p>Eddie can change to other characters by using different symbol cards.</p>

## **Mark**

**59, right-sided hemiplegia, right-handed  
Medium ability, grasp and release only**

# Mark



Mark is a 59 year old man who lives near Gatwick in a detached house with wife Julie and their 15 yr old daughter Sophie.



He works full-time as a Civil Engineer for the Borough Council. He used to also do private consultancy but less so since the stroke, so his income has reduced

He used to like doing DIY – but now he has to project manage and get others to do the work



His main relaxation used to be playing golf, but now he has to use a buggy and his swing is limited



Mark is IT savvy – experienced, online at work and has broadband at home – uses emails, Office, Excel, Word etc He helps Sophie with research for her homework and he enjoys some computer games, especially if Sophie introduces him to them.

## Mark – (Medium grasp and release)

	Shoulder /elbow	grasp	both
low			
med		✓	
hi			

### Stroke History

- Stroke 18 months ago, Right sided hemiplegia (R handed), now independently walking
- L eye very partially sighted from accident as a child, cognitively able but has a slight memory problems since stroke and has had to adapt and compensate
- Some activity in his affected shoulder and elbow has returned but his hand remains weak with spasticity. Some hand grasp and release of moderately sized (dimensions of a small drinks can) objects placed close to the body with effort and concentration

### Motivations

- Self motivated and hard working
- self worth, wants his arm to work better and look more normal
- family – would like to find some common ground with his daughter

### Functional Goals

To be able to perform bilateral activities:  
Use affected hand to hold a bottle / can / jar when opening;  
Be able to pick up and carry a tray;  
Hold a golf club and swing;  
Shake people's hands.

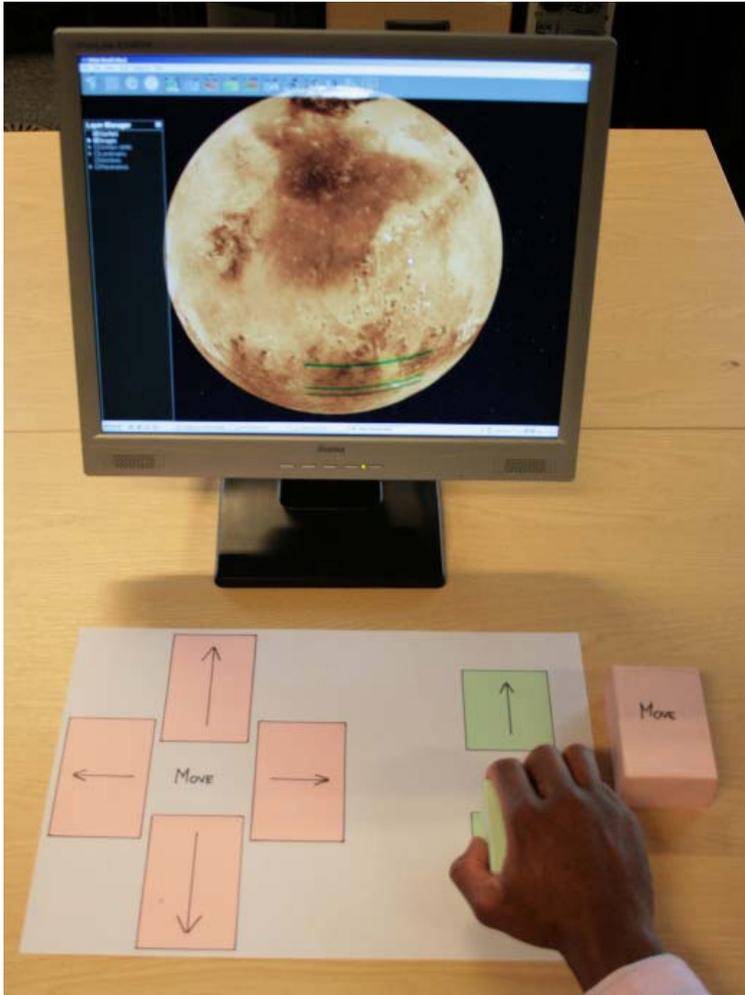
### Treatment

To improve ability to grip and release different sized objects (range of movement, speed and control)

### Storyboard 4 – Block World

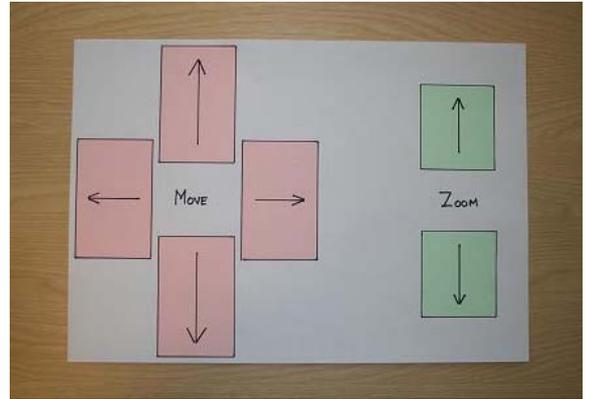
This storyboard shows the use of different sized blocks to practice grasp and release. The size / type of block would be selected by the therapist according to Mark's needs and progress. The placement of blocks allows Mark to navigate and explore planets in the solar system – other applications could be used, e.g. Google earth. This technology could easily be used at home, but also in a centre. Feedback for correct placement of the blocks in terms of vibration or music can be an additional feature.

1.



Mike is given an application that allows him to explore planets in the solar system. To interact with this application he uses an *active surface* and a set of blocks.

2.



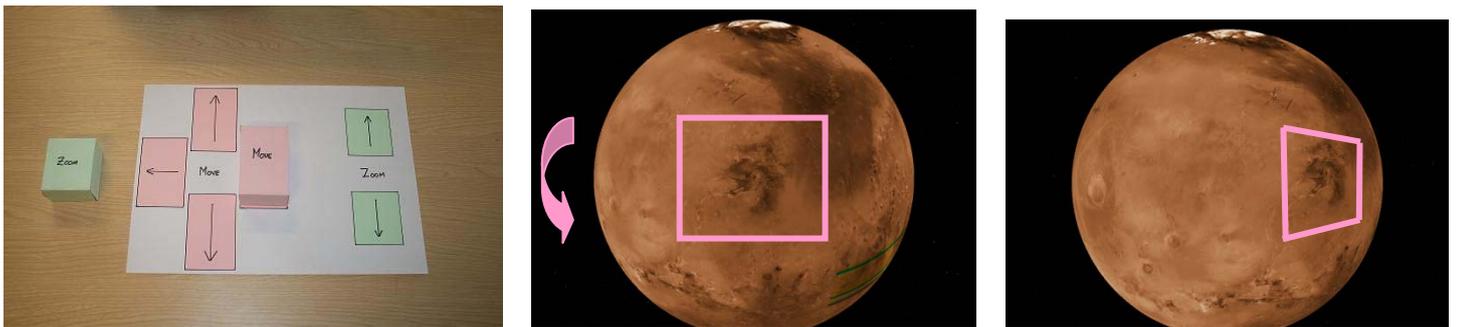
The active surface is labelled with a set of *active areas*. Mike interacts with these areas by placing blocks on them.

3.



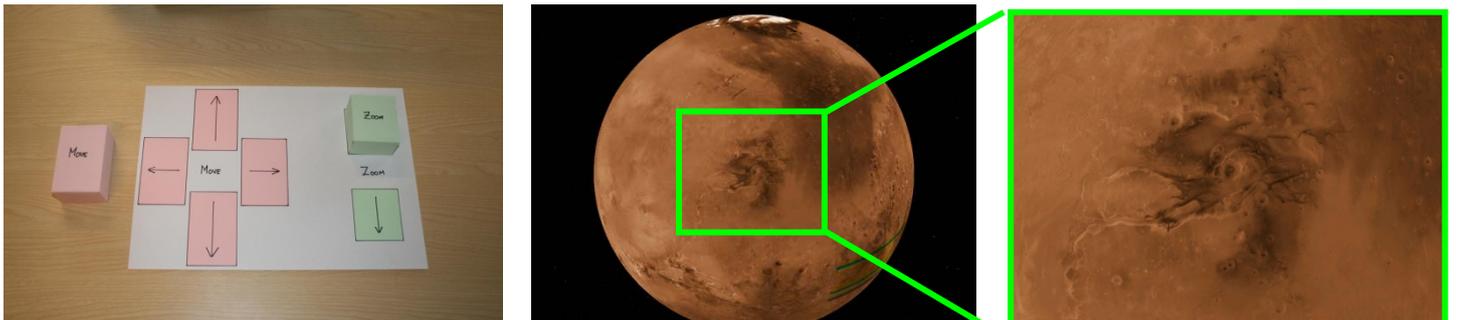
Blocks are provided in a range of sizes and materials, and this enables Mike to practice different “grasp and release” movements.

4.



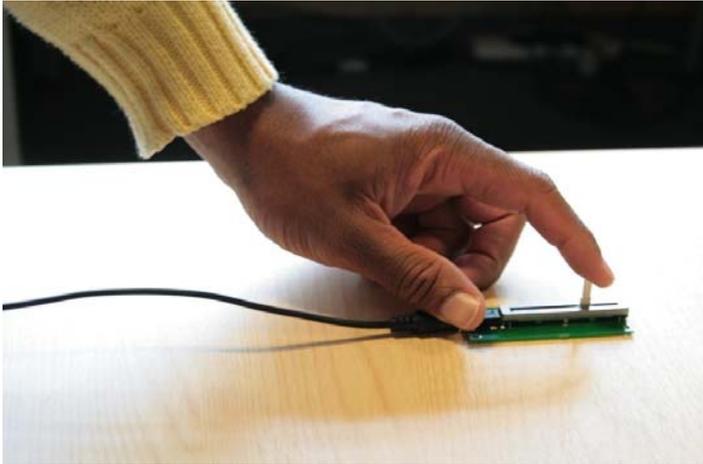
Placing a block on one of the areas in the pink section rotates the globe in one of four directions.

5



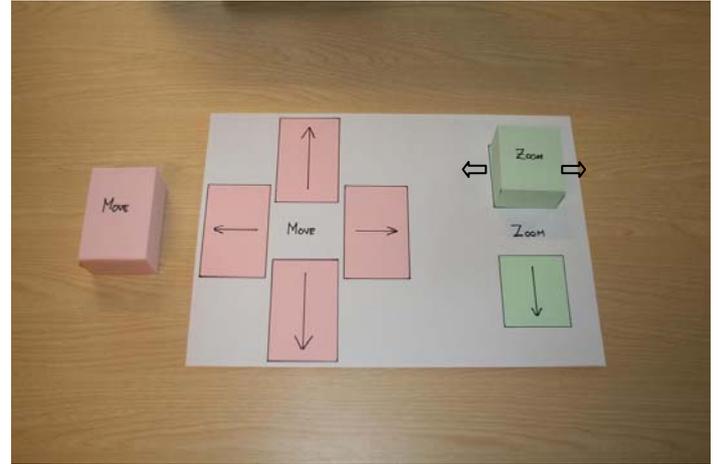
Placing a block on one of the areas in the green section zooms into or out of the globe.

1. additional



Mark could use his non-hemiplegic hand to provide additional input to the application.

2. additional



Blocks could vibrate, or a sound could be produced, to indicate when Mark has placed a block correctly.

## **Irene**

**84, right-sided hemiplegia, right-handed**

**Medium ability, elbow/shoulder combined with grasp/release**

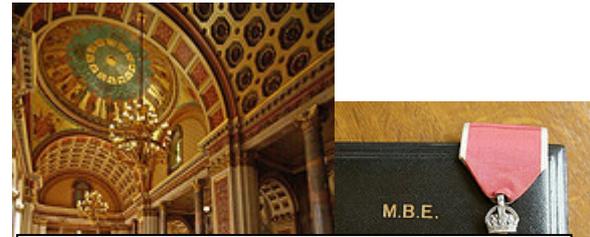
# Irene

This lovely 84 yr old lady lives in a SW London suburb in the terraced house where she was born in



She lives alone, has no close family, never married or had children, because of years spent caring for her elderly parents. Her extended family consists of a

Before her stroke Irene was a regular church-goer, but is now nervous about getting out. She goes along to the local stroke club once a week where she acts as a helper to others.

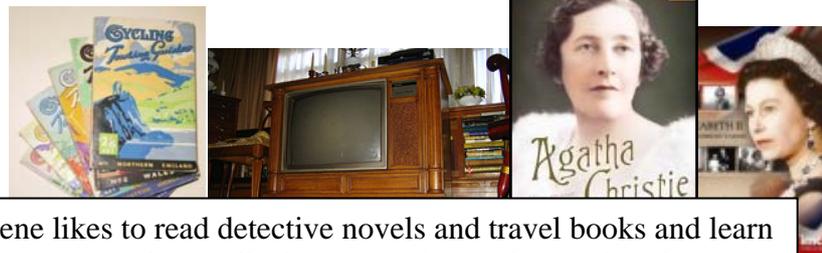


Irene has a pension as she spent her working life in the Civil Service, as well as finding time for charity work. She was awarded an MBE for her

Irene could play the piano to a high standard. She used to enjoy gardening and creating tapestries in her spare time. These pastimes are now too difficult with one hand. She collects objets d'art brought back from all over the world by



Irene has had a couple of blackouts / falls and had trouble getting help. Now she has an emergency call button.



Irene likes to read detective novels and travel books and learn of far away places. She has a TV she rarely watches, has no video or DVD player and no means of playing music, except on the kitchen radio. She has no IT experience, has heard about computers and the internet but says she doesn't understand what it is all about and she is rather averse to

## Irene – (Medium Elbow / shoulder combined with grasp and release)

	Shoulder /elbow	grasp	both
low			
med			✓
hi			

### Stroke History

- Stroke 6 months ago (second stroke – one 6 years ago where she made good recovery in weeks). Right sided hemiplegia (R handed). Was independently walking quickly after stroke, her arm has been the main problem.
- Some hand grasp and release of moderately large (size of water bottle / drinks can) objects short distances away from the body
- Mild dysphasia – some problems understanding and retaining verbal information – some problems with following instructions – written or spoken - and often struggles to find the word she wants.
- Cognitively has poor memory, very aware of problems but problems with writing reminders
- Lot of problems with feet and needs frequent chiropody

### Motivation

- stay independent – help others - comply with instructions
- duty, the church, helping others, garden flowers, foreign lands, countryside, piano music / orchestration, tapestry, galleries and museum trips, things of beauty – especially china and glass objets d’art
- misses the sensory enjoyment she got from hobbies – such as colours / sights / sounds

### Functional Goals

To be able to hold food while cutting / peeling with the unaffected hand

To be able to put crockery / cutlery away on shelves using both hands

To be able to wash up using both hands

### Treatment

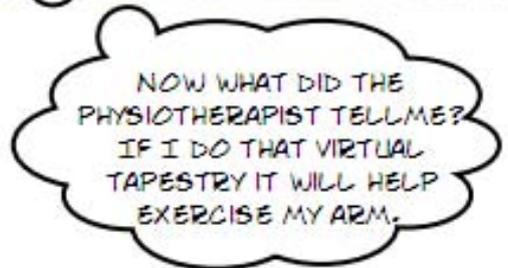
To improve ability to grasp and release different sized objects (range of movement, speed and control) further away from the body in 3 DOF

### Storyboard 5 - Classical tapestry

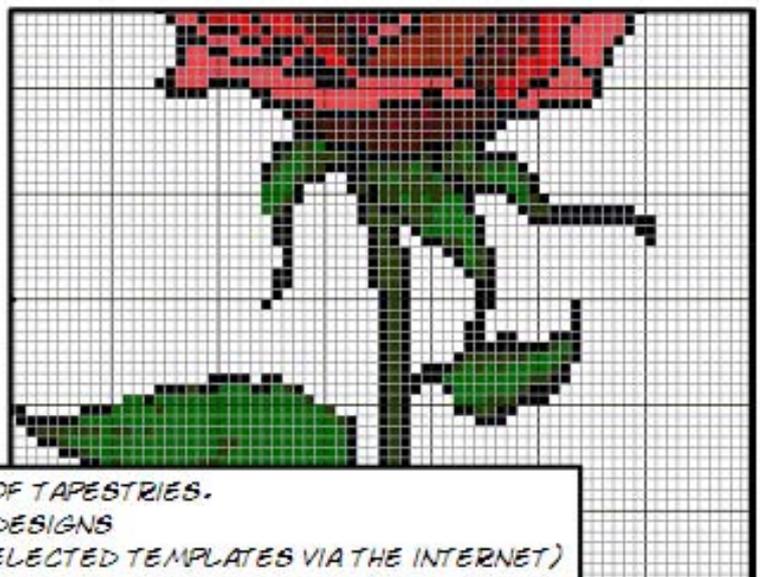
Irene is afraid of falling and her balance is not too good so she likes to practise exercise sitting at her desk. She has a block game to play which will result in a new kneeler for her local church.

First she chooses a coloured block and then she places it in the grid. Each time she places a block, a virtual tapestry stitch is completed. At the moment she is designing one of a series of kneelers based on garden flowers. A computer literate friend from her church receives a copy of her design and prints it off – then the local WI make the actual tapestry. At the same time as building up the tapestry, with every placement of a block, Irene is ‘releasing’ a bar of one of her favourite classical music pieces – (or an instrument track) which plays when the grid is full.

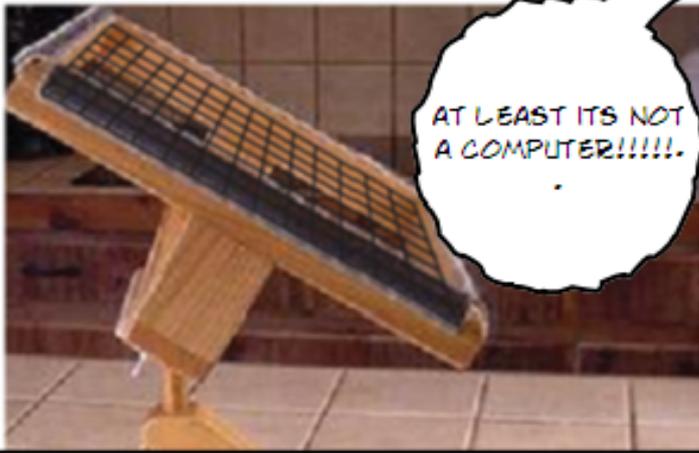
# Storyboard 5 Irene Virtual Tapestry



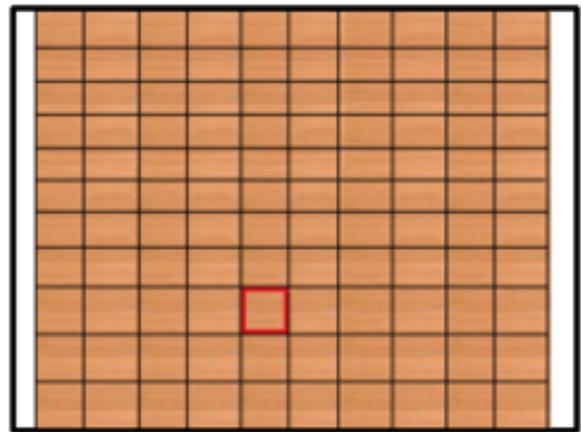
IRENE HAS A SPECIAL COLOUR PALATE SHE KEEPS ON HER TROLLEY.



IRENE IS AN EXPERIENCED MAKER OF TAPESTRIES. SHE CAN STILL THINK UP HER OWN DESIGNS (OR HER PHYSIO CAN DOWNLOAD SELECTED TEMPLATES VIA THE INTERNET)

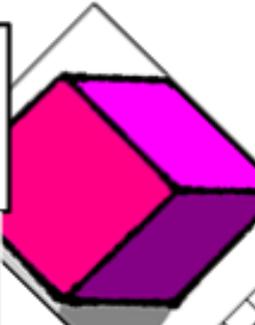


AT LEAST ITS NOT A COMPUTER!!!!.

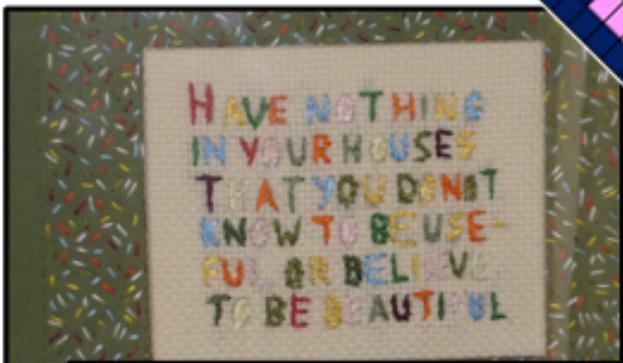
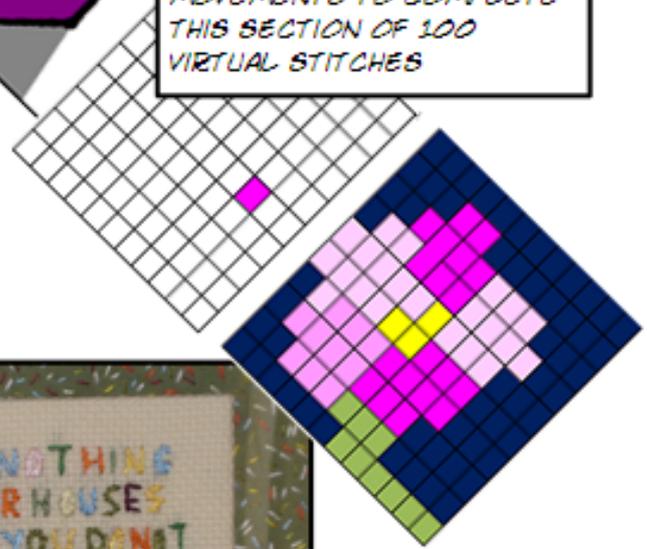


IRENE HAS A SPECIAL FRAME FOR MAKING VIRTUAL TAPESTRIES - IT STANDS ON HER DESK AND CAN BE ANGLED TO ENCOURAGE HER TO REACH WITH HER ARM. THE FRAME CONTAINS A 10X10 GRIDWORK OF LINES WHICH SHOW WHERE THE 'STITCHES' WILL GO. IT IS PRELOADED WITH THE PATTERN SHE HAS CHOSEN..... THE FIRST VIRTUAL 'STITCH' LIGHTS UP. ONE OF THE SQUARES IS OUTLINED BY A PINK LIGHT.

IRENE LIFTS THE 'NEEDLE' BLOCK UP AND TOUCHES IT TO THE SHADE OF PINK SHE WANTS TO USE FROM HER PALATE..... AS THE BLOCK TOUCHES THE PALATE, IT LIGHTS UP GLOWING PINK.



WHEN SHE TOUCHES THE GLOWING BLOCK TO THE SQUARE OUTLINED IN PINK ON THE FRAME - THE WHOLE SQUARE TURNS PINK. THAT IS ONE STITCH DONE. IT WILL TAKE ONE HUNDRED MOVEMENTS TO COMPLETE THIS SECTION OF 100 VIRTUAL STITCHES



AFTER THE FIRST 10 STITCHES .... ONE OF HER FAVOURITE PIANO SONATAS STARTS TO PLAY

SESSIONS FLY BY - EACH TIME ANOTHER SECTION OF 100 STITCHES OF TAPESTRY IS COMPLETED. FRIENDS CAN ADMIRE IRENE'S PROGRESS AND COPY HER DESIGNS (VIA THE INTERNET) AND USE THEM TO MAKE A REAL VERSION OF THE DESIGN....

## **Andy**

**52, left-sided hemiplegia, right-handed  
High ability, elbow and shoulder only**

# Andy

Andy is 52 and lives with his wife, Marie in a terraced council house, in Southampton. They have no children and Marie also cares for her mother who lives nearby



Andy and Marie are not very well off and have to manage on benefits and a small pension. After years of labouring and practical heavy work, Andy had a good job as a street cleaner for the local council.

He enjoyed carpentry and other DIY and still spends time in his workshop set up in his shed - but it's questionable how much he achieves now

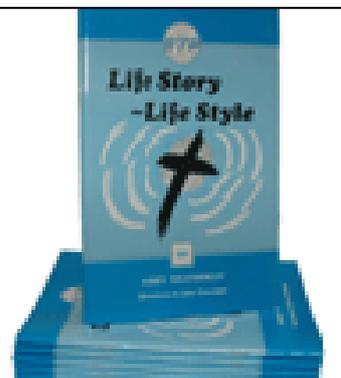


Andy is a gentle giant. Before his stroke he was always doing jobs for other people or giving lifts, as he loved driving, but is not allowed since his stroke.



Andy has a computer at home and is on the internet (but not broadband). He mainly plays games like solitaire – almost to obsession. He also likes to watch sport and game shows on TV

Andy is a staunch Baptist and his faith is important to him.



## Andy – (High Elbow Shoulder)

	Shoulder /elbow	grasp	both
low			
med			
hi	✓		

### Stroke History

- Stroke 12 months ago, left sided hemiplegia (R handed), can walk independently, on review with outpatient Physio, has short bursts of treatment at times
- Some activity in affected arm has returned especially in hand but ability to lift arm remains impaired, hand grasps and releases, good elbow and shoulder activity but only up to shoulder height
- Moderate Memory / problem solving problems – reliant on wife and lack of awareness of problems, fatigue – affects everything – other symptoms get worse when tired, has history of inexplicable sleepiness, obese with associated problems, arthritis – pain in right knee

### Motivation

- Needs another person – wife – to help to be motivated, then works hard
- Needs obvious success as can't see own improvement – doesn't respond to criticism or negative feedback – needs constant positive feedback
- Carpentry and other DIY, solitaire on computer, driving, watches sport / game shows

### Goal of Treatment

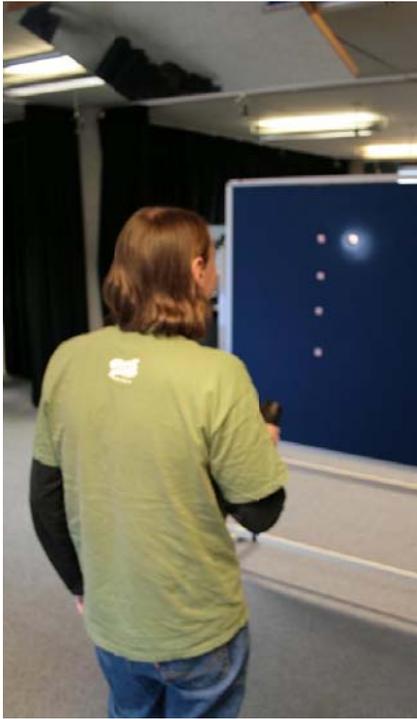
- To improve range speed and control of active movement in 3 DOF– lift arm above shoulder height forwards and out to the side away from body
- To be able to lift arm whilst doing other things: standing/ stepping / talking

### Storyboard 6 - Andy – Torches

This technology involving a pointing action towards targets on a wall allows Andy to practice lifting his arm above shoulder height. The system could be set up at home at the right height on a convenient wall, or could be used in a centre. The targets appear randomly around the screen in preset sequences at varying levels of difficulty (some at higher levels and some at lower). The floor lights up where he is to stand and if he moves from this position negative feedback (eg the floor light flashes) is given. He could also be required to point down at the floor light he is standing on at times – either for a rest period, or to point down between each wall target lighting up. To progress the difficulty of the game, different sections of the floor could light up in order to make him move around as well as point. The feedback given after each task is very important for Andy and could include a 'personal best' to beat, or a goal in terms of speed/accuracy made explicit at the beginning of the task. Games could be very varied according to individual motivations. As Andy likes sports and game shows, the torch could be modified into some sort of pistol and this could be made into a target shooting game

# Storyboard 6 Andy - Torches

1.



Andy is given a task in which he must use a standard torch to illuminate a sequence of lights.

2.



A torch is chosen that he can comfortably hold.

3.

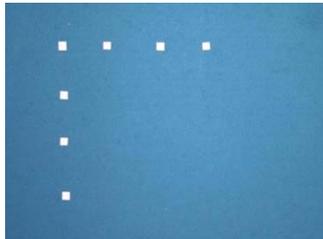


A section of the floor lights up to indicate where he should stand during the task.

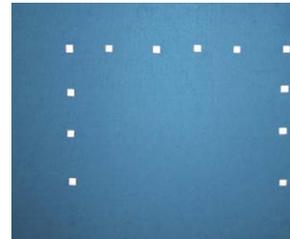
4.a



4.b

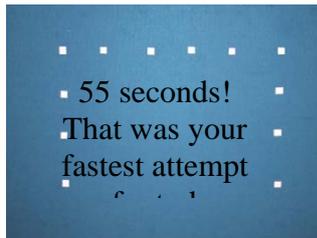


4.c

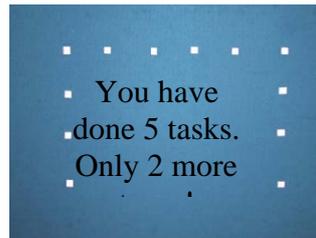


Lights in each sequence appear one by one. Each must be successfully illuminated before the next appears.

5.a



5.b



After each task has finished, feedback can be given in a variety of ways.

## **Roland**

**71, left-sided hemiplegia, right-handed  
High ability, grasp and release only**

# Roland

Roland is 71 and lives alone in semi-detached house. He is of Polish descent and lives in Brighton. His wife died 30 years ago, and now his son and 2 grandchildren live 10 miles away. Roland lives to watch his grandchildren playing football at weekends – that is his main contact with the family. He has a heart of gold and tries to support a schizophrenic neighbour.



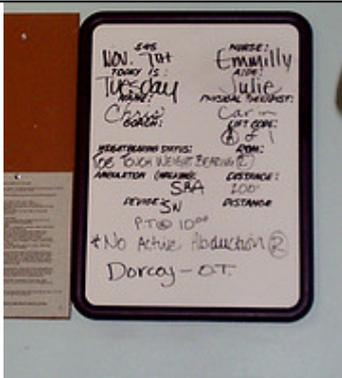
Roland has a couple of hifi sets and an ancient TV, but no computer at home. He is keen to use technology but finds it difficult to learn to use new appliances. He tried using PC at community centre with help from the manager.



Roland has had a number of jobs – He has done just about everything - from working as a musician on a cruise ship to cab driving with all sorts in between. He now has job at a local community centre helping with caretaker duties and his income is topped up with state benefits.

Roland has significant difficulty with memory and organisation skills such as managing money / credit card bills etc.

Roland likes drumming and tries to exercise by walking. He used to do DIY and gardening, but now finds it too hard to keep up with home



# Roland

	Shoulder /elbow	grasp	both
low			
med			
hi		✓	

## Stroke History

- Stroke 7 years ago, left sided hemiplegia (R handed), now walking without any problems
- Good return of activity in his affected shoulder and elbow but still some difficulty with hand control, difficulty with controlling smaller objects (eg pens / knives marble sized objects that require precision), difficulty grasping and releasing large objects – (eg where hand has to stretch eg mixing bowl or heavy box)
- Cognitive problems – numeracy, organizing time, paying bills, overly optimistic. He can forget to take medication and attend medical appointments; Dyspraxia - difficulty in ordering and sequencing activities – including speech at times and sometimes clumsy in handling things; Hearing problems from loud music – has self-bought hearing aid but it doesn't really work; Asthma – occasionally has bad attack and is hospitalized; Has suffered from carbon monoxide poisoning due to faulty boiler.

## Motivation

- Humour, family contact with grandchildren – helping others – drumming / jazz – reminiscence of cruise ships and magical / dreamy ideas.
- Distractible – needs to see real benefits from what he does –needs an absorbing activity but not too cognitively challenging – needs something or someone to remind him to sit and do it.

## Goal of Treatment

To improve ability to release large sized objects (range of movement, speed and control)

To improve precision grip of small objects – be able to pick up tiny things like paper clips or screws

Improve writing skills

## Storyboard 7 - Roland – cubes to go – moving cubes to play music and contact family

This technology reminds Roland to practice and gives him lots of prompts as to what to do as he is forgetful. It involves following sequences of movements which may help with his dyspraxia, as well as his fine motor control and mobility. He has to move a tiny block to the position that flashes up and he is rewarded with a point for each time he places the block. He just moves one tiny block around. Once placed - a virtual block appears so he is not going to have the problem of knocking over lots of tiny items. He needs lots of praise to boost his self esteem and keep him going at the task. Every once in a while he gets bonus points for effort, accuracy and speed. When he has completed 50 movements one of his favourite show tunes plays (from a database of hundreds of tunes) and a set of 10 images display (from a database of several hundred sent by his family – either of family members or memorabilia from his past journeying and life.) Meanwhile the virtual blocks reassemble for the next round. After 10 rounds a motivational message plays with the sound of his family congratulating him and cheering him on. As he improves at the task – the task can adjust and get harder so that a sequence of two or three places might flash (for increasingly short spell of time) for him to recall - so he has to remember the sequence and place the tiny block accordingly.

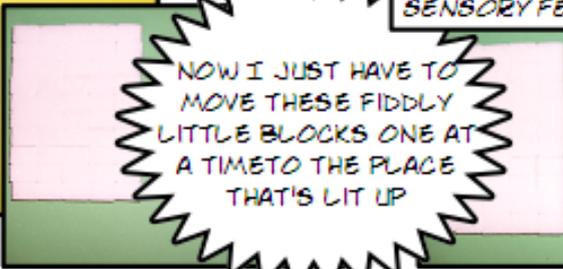
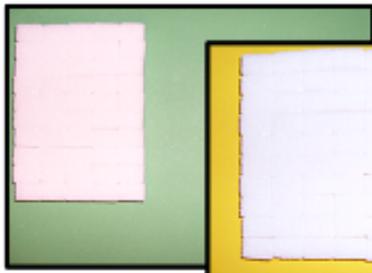
## Storyboard 8 - Roland – pen control

Roland would also benefit from the second game where he has to follow images or patterns to improve his control and speed with a digital pen.

# Storyboard 7 - Roland – cubes to go – moving cubes to play music and contact family



WHAT'S THAT FLASHING?  
OH DAMN -  
I HAVEN'T DONE  
THOSE  
EXERCISES!

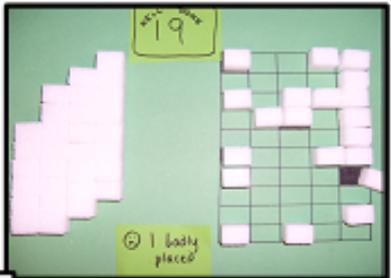
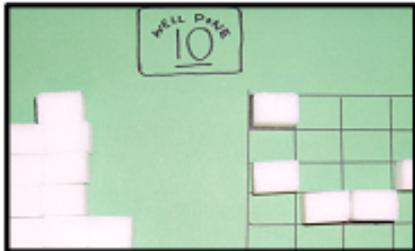
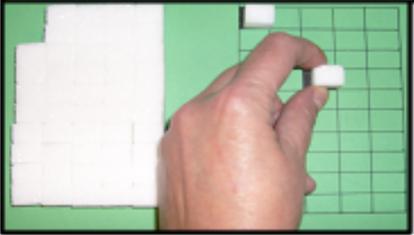


EACH BLOCK VIBRATES AS IT IS PLACED TO GIVE ADDED SENSORY FEEDBACK

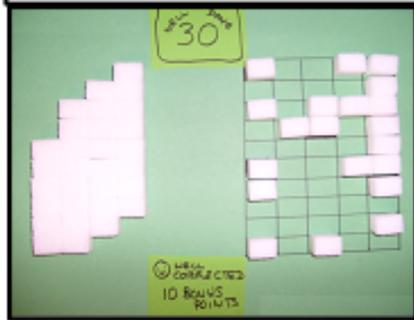
NOW I JUST HAVE TO  
MOVE THESE FIDDLY  
LITTLE BLOCKS ONE AT  
A TIME TO THE PLACE  
THAT'S LIT UP



ROLAND GETS POINTS FOR EACH BLOCK HE MOVES.



AND A BONUS WHEN HE CORRECTS HIMSELF OR JUST WHEN HE SEEMS TO NEED A BIT OF A BOOST.....



.....AND WHEN HE COMPLETES A SET OF 50 CUBES - A FAVOURITE MUSIC TRACK PLAYS WHILE FAMILY PHOTOS DISPLAY



AND AFTER HE HITS 10 SETS - (500 MOVES) A DRUM ROLL RINGS OUT AND HIS FAMILY CAN BE HEARD CHEERING AND CALLING OUT ..... AND FIREWORKS APPEAR.....

YOU'RE A CHAMP DAD!

WELL DONE GRANDPA



# Storyboard 8 - Roland - Pen control

OH LOOK ---  
LITTLE GEMMA'S  
PHOTO HAS JUST LIT  
UP.....  
SHE MUST WANT ME  
TO PLAY THAT GAME  
WITH HER

SHE'S BUSY SCORING POINTS  
ON THESE GAMES - IT MUST BE TIME  
FOR ME TO DO MY HOMEWORK AND PLAY TOO -  
....SHALL I CHOOSE MAZES  
OR THOSE FUNNY ART THINGS?  
NOW WHERE IS THAT SPEICAL PEN...

MAZES      AMAZING ART

FIRST ROLAND TRIES A MAZE....  
AND ENJOYS THE USUAL FEEDBACK....

THEN HE SELECTS A  
COUPLE OF  
INTERACTIVE ART  
GAMES WHERE HE  
HAS TO TAP THE PEN  
TO CATCH A FALLING  
OBJECT...  
WHICH MAKES HIM  
LAUGH.....  
AS WELL AS GIVING  
HIM POINTS TO  
COMPARE TO LITTLE  
GEMMAS SCORE

Gemma 22

Grandpa 20

## **Farah**

**43, right-sided hemiplegia, right-handed  
High ability, elbow/shoulder and grasp/release**

# Farah



Farah was a journalist until her stroke forced her to stop and her ex-husband runs a successful import business.

Farah is a 43 yr old lady who lives in a beautiful detached house in an Oxford village with her 10 year old son Josh. She has recently divorced. Her home was originally in Indonesia where her parents still live, but her sister lives nearby and has supported her through recent times.

Farah loves to shop for clothes and jewellery since the stroke she shops more



Farah is very IT literate – she has broadband internet and is proficient using it– although not in setting it up – so she pays for technical support . She enjoys monitoring her son’s usage – and playing games with him. She uses facebook + friends reunited for social networking. She has every labour saving or lifestyle



Appearance is important to Farah and she likes to keep herself in trim – she enjoys beauty therapies – spas – regular hairdos – plays tennis at local tennis club, has regular

## Farah – (High Elbow / shoulder combined with grasp and release)

	Shoulder /elb	grasp	both
low			
med			
hi			✓

### Stroke History

- Stroke 11 months ago, Right sided hemiplegia (R handed), immediately was independently walking
- Her arm showed some quick recovery but still has some difficulty with fine control of smaller objects especially away from the body and difficulty with hand control when reaching above shoulder height
- Dysphasia – severe word finding difficulties – and severe trouble with comprehension. Often has to resort to gestures or mime or point to things or draw things.

### Motivation

Family contact – sister and son first – extended family in Indonesia use email and send photos / Skype  
Competitive sports – likes to compare herself to others. Keeping up with friends and neighbours.  
Wanting to look good and ‘normal’

### Goal of Treatment

- To improve ability to grasp control and release very large and very small objects in 3 DOF lifting arm above shoulder height
- To be able to grasp and place objects whilst doing other things: standing/ stepping / talking

### Storyboard 9 - Farah –Block / shelves game

This is a high energy game for patients who need more of a physical challenge. Although bookshelves are shown in the storyboard, we envisage something more gym-like equipment with a shelving system not only in front but possibly also on either side. Again, the block size and type needs to be selected by the therapist according to Farah’s needs and progress. Each block could also be mixed colours so Farah would have to turn the block to place the correct colour on the shelf – this encourages pronation / supination movements. As Farah has dysphasia she has some speech therapy exercises built into her regime. Instructions are given visually via a screen and verbally – but verbal is presented a second or two ahead of visual so she tries to follow the spoken word. In order to progress the exercises instructions get more complex over time. Farah is quite competitive so feedback on successful placement and timing can be added on the screen (or even on a small screen on each block) with some stats on Farah’s performance and comparison to others (like the Nike interface).

## Storyboard 9 - Farah – block shelves

1.



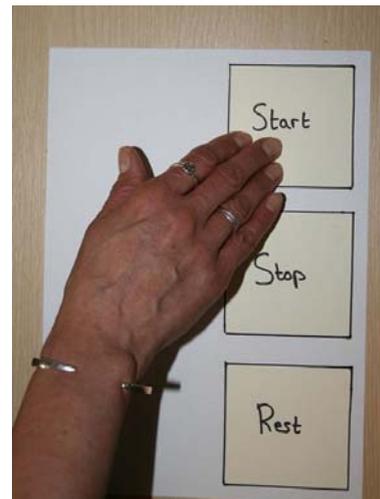
Farah is given a task in which she has to repeatedly place blocks onto shelves of different heights.

2.



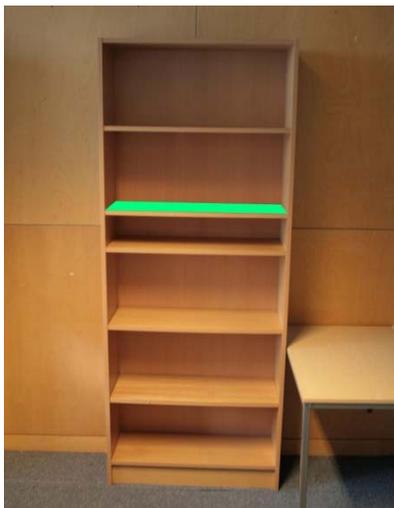
She is provided with coloured blocks, which are of different shapes and sizes.

3.



To start and stop her task, Farah uses a control pad. She can also use this to take a break from the task when she is tired.

4.



During each task, one shelf is lit up. The colour of this light indicates which block should be placed on this shelf.

5.



Tasks continue until Farah indicates that they should stop.