

# \* Accessing Accessibility

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- \*What are we really aiming for?
- \*Sociological
- \*Medical
- \*Technological
- \*Personal

**\*Ways of looking**

- \* Condition-centred
- \* Fix the condition
- \* Easier to put similar conditions in the same place
- \* Treat/cure
- \* Care
- \* Optimise treatment(s)

**\* Medical model**

- \* Environment-centred
  - \* Political/social/economic
- \* Attitudinal
  - \* Self
  - \* Others
- \* Treat environment
- \* Optimise treatment

**\* Social model**

- \* Neither puts the person at the centre
- \* Some things require medical treatment
- \* Some things require environmental treatment
- \* Most things require both
  
- \* Places treatment at the centre rather than the person
- \* How do we know which treatment to apply?
- \* What happens when different people require conflicting treatments?

**\* But ...**

\*What does the person want to do?

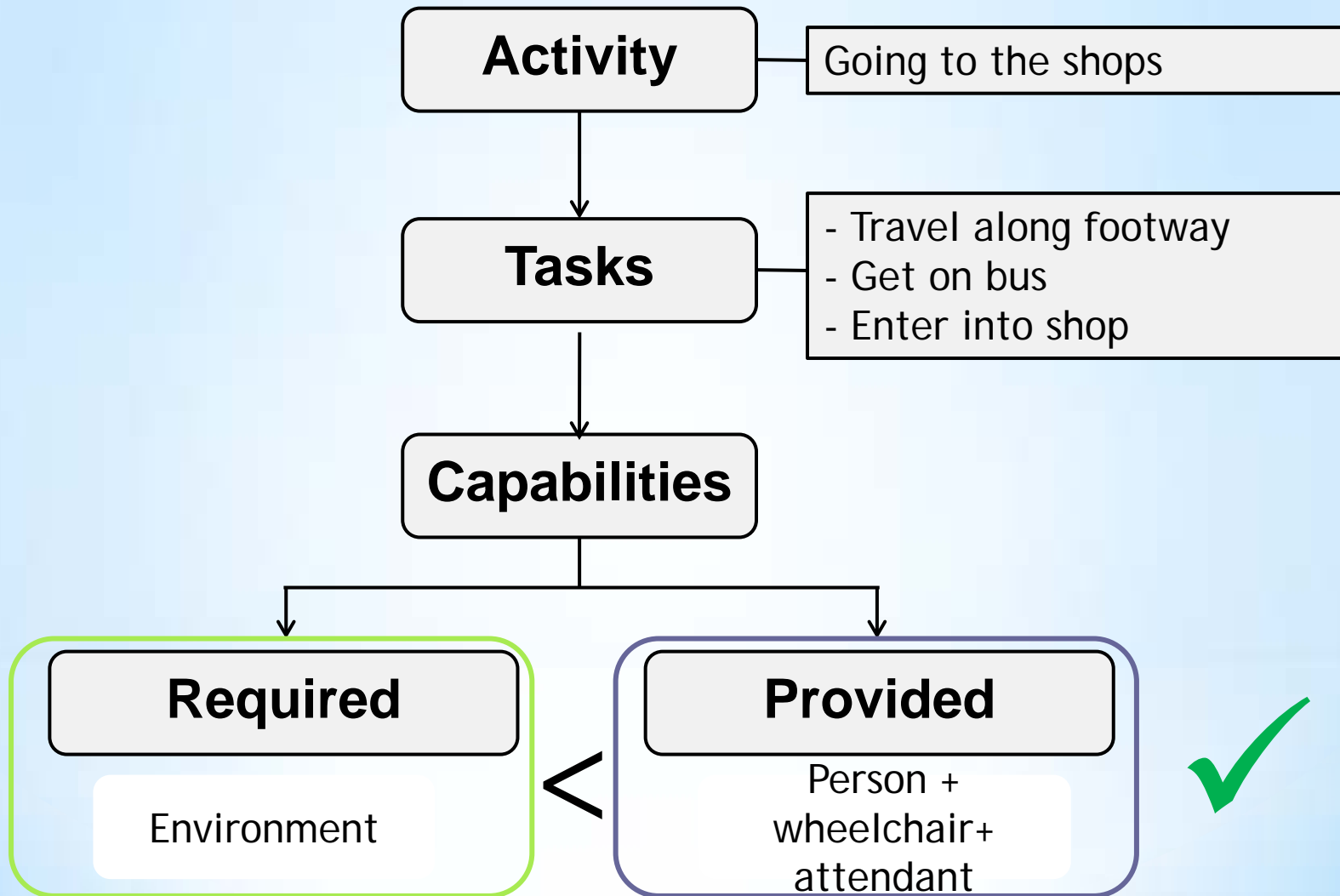
\*What do they need in order to do it?

\*What does that imply about the environment?

\*What does that imply about the person?

**\*How to include the person**

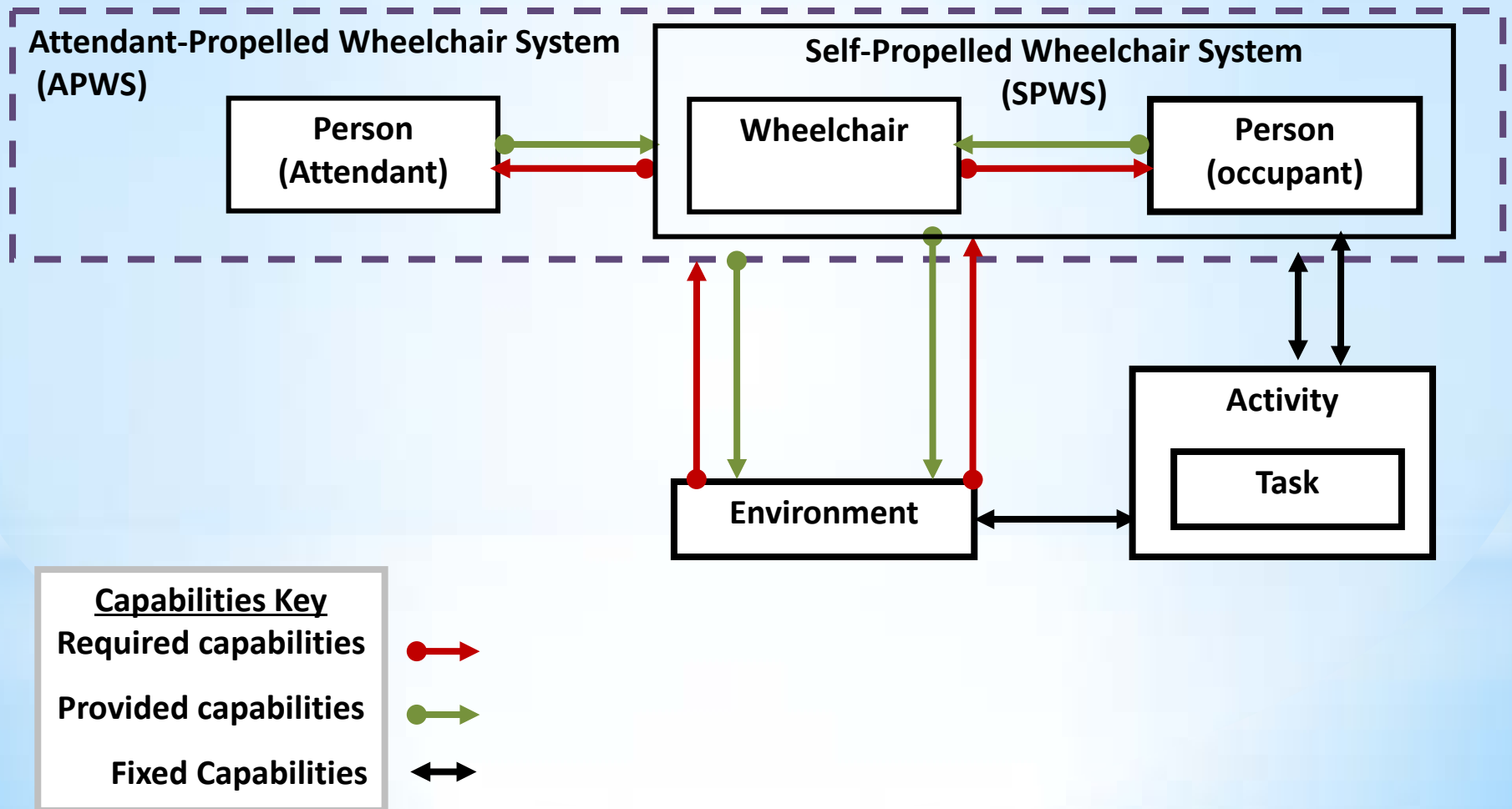
# \*The Capability Model



If



# The Capability Model in detail





.. Η με προστιμολογηλ δήλωση

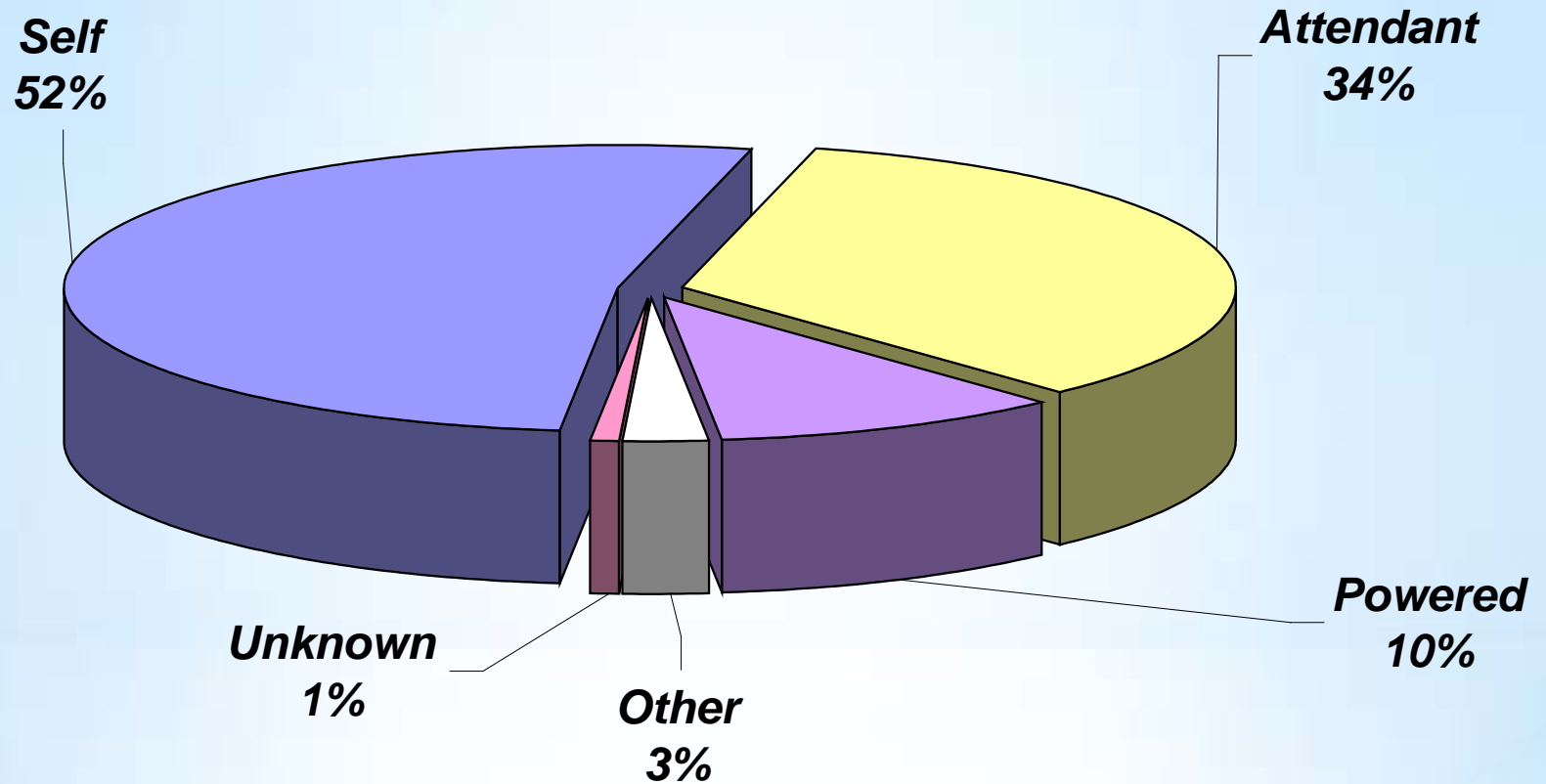
\* **An example**  
Catherine Holloway

# \*Footways & Crossfalls

- \*Footways allow people to access services and other transport options
- \*Crossfalls are present to aid water drainage from footways
- \*There is agreement worldwide that 2.0% to 2.5% gradient is acceptable for wheelchair users



# Wheelchair Types

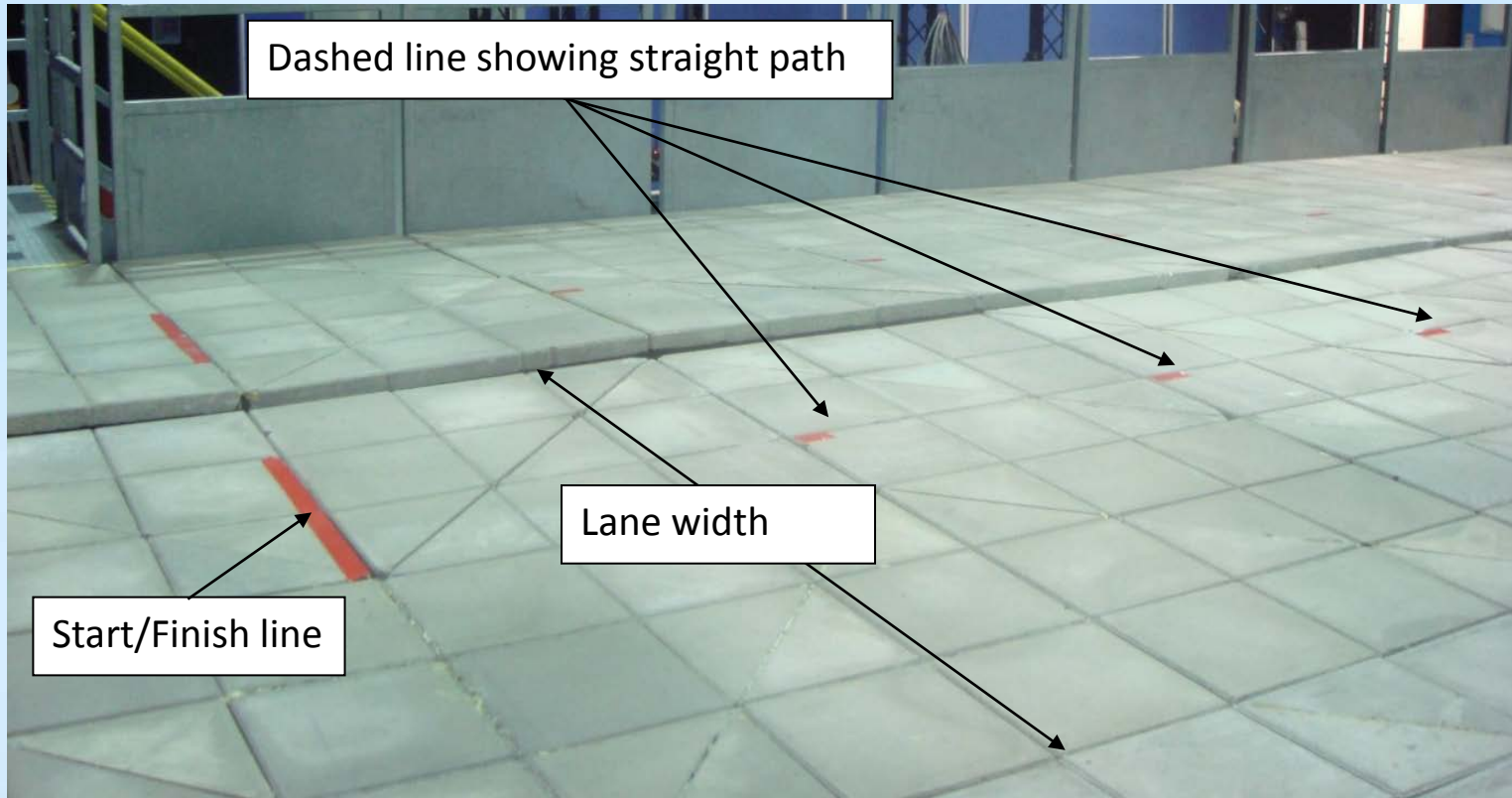


Sapey, Stewart, Donaldson . "The Social Implications of Increases in Wheelchair Use"

# \* Experimental Methods

- \* Set-up footways with different crossfall gradients
- \* Measure *provided capabilities* by estimating
  - \* How much they deviated from a straight line
  - \* Their maximum push strength
  - \* The forces used to start the wheelchair,
  - \* The work used to keep the wheelchair moving
  - \* The forces used to stop the wheelchair

# \* PAMELA set-up

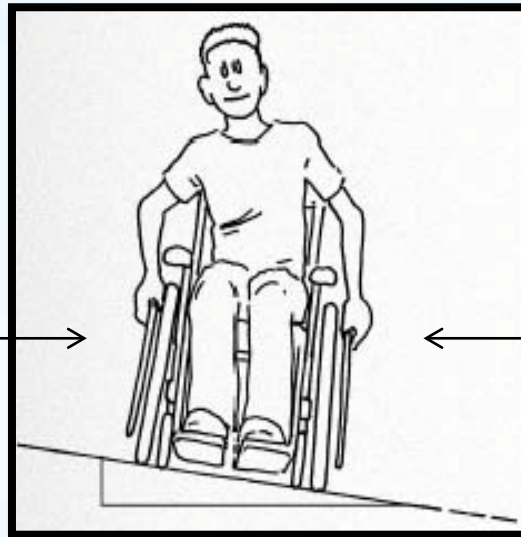


- \* 3 lanes 2.4 m wide x 10.8 m long
- \* 0%, 2.5% & 4%
- \* Concrete interlocking paving stones

# \* Upslope and Downslope

Upslope

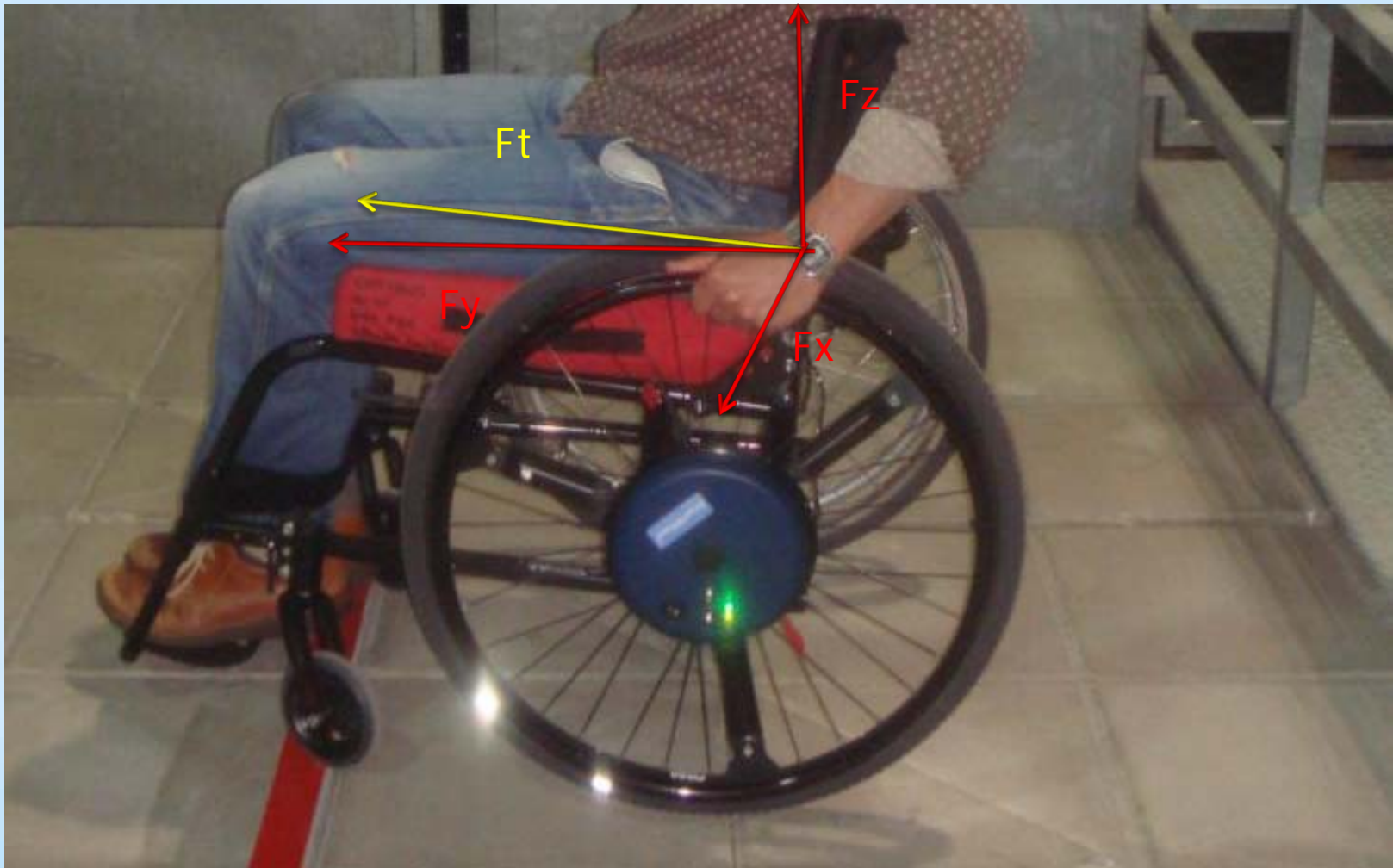
Downslope



Would expect:  
decreased  
force/braking with  
increased crossfall

Would expect:  
increased force with  
increased crossfall

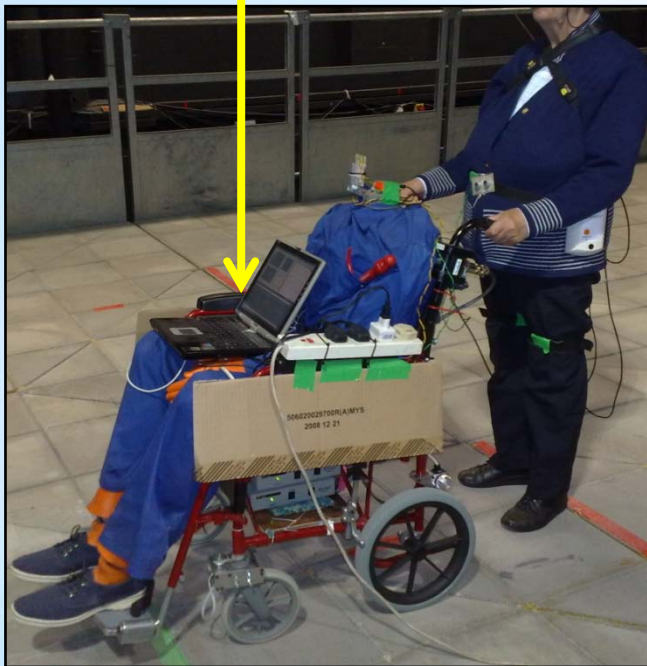
# \*Self-propulsion





# \* Attendant propulsion

Standard NHS UK issue wheelchair for attendant propulsion



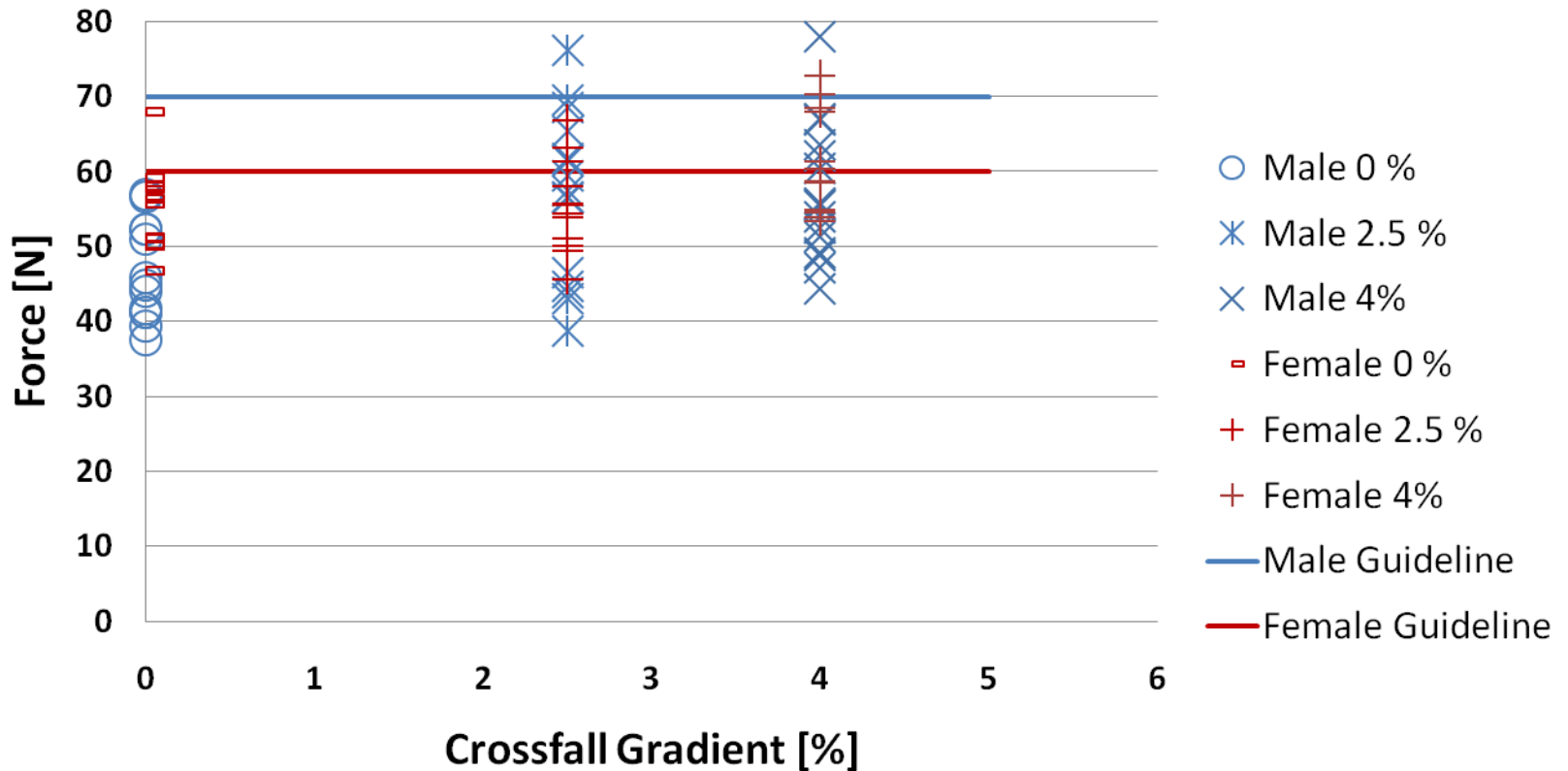
3-dimensional forces



Rear wheel velocity

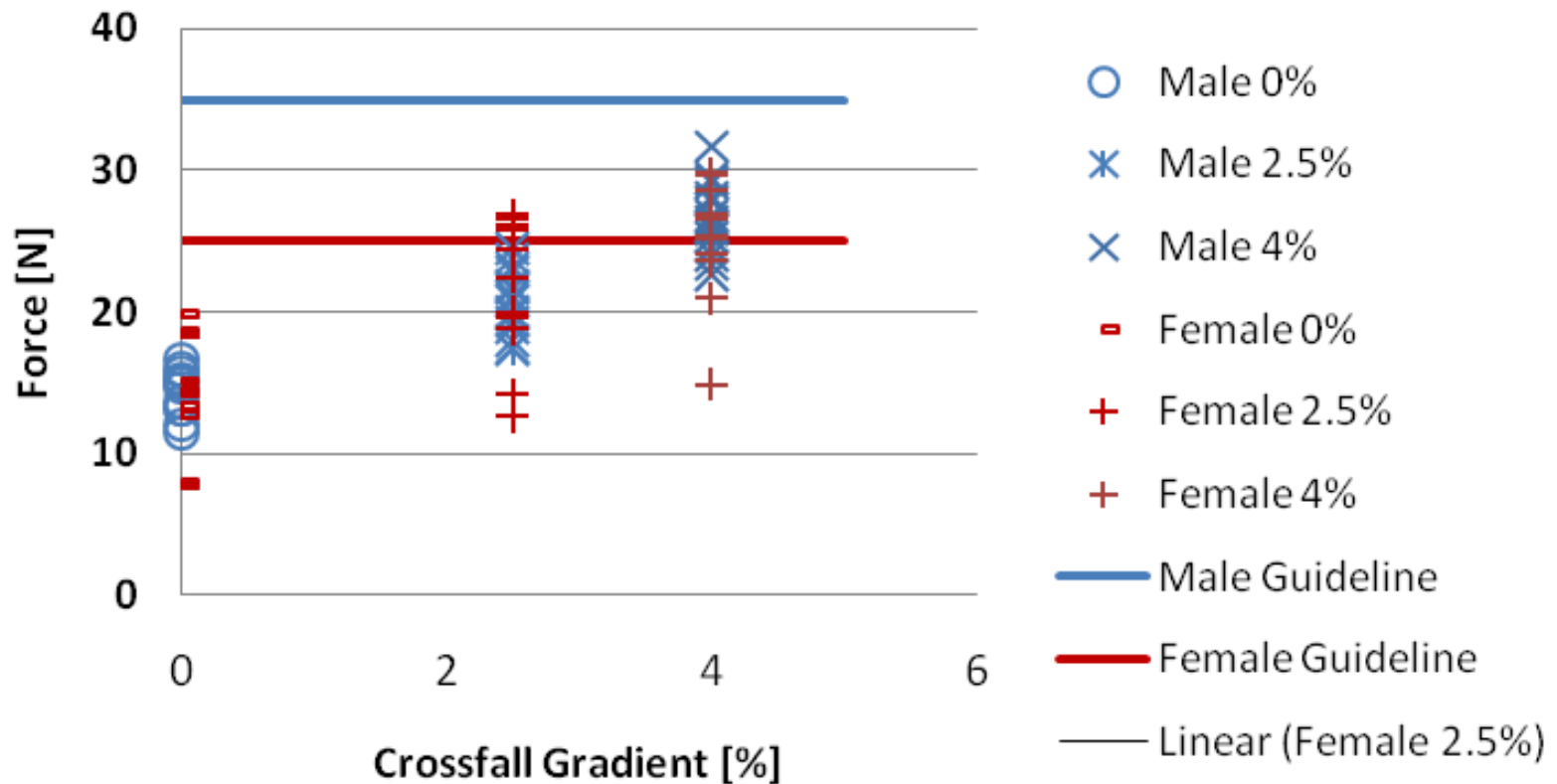
Total weight of wheelchair, equipment & dummy = 104kg

## Downslope Starting Force & Guidelines



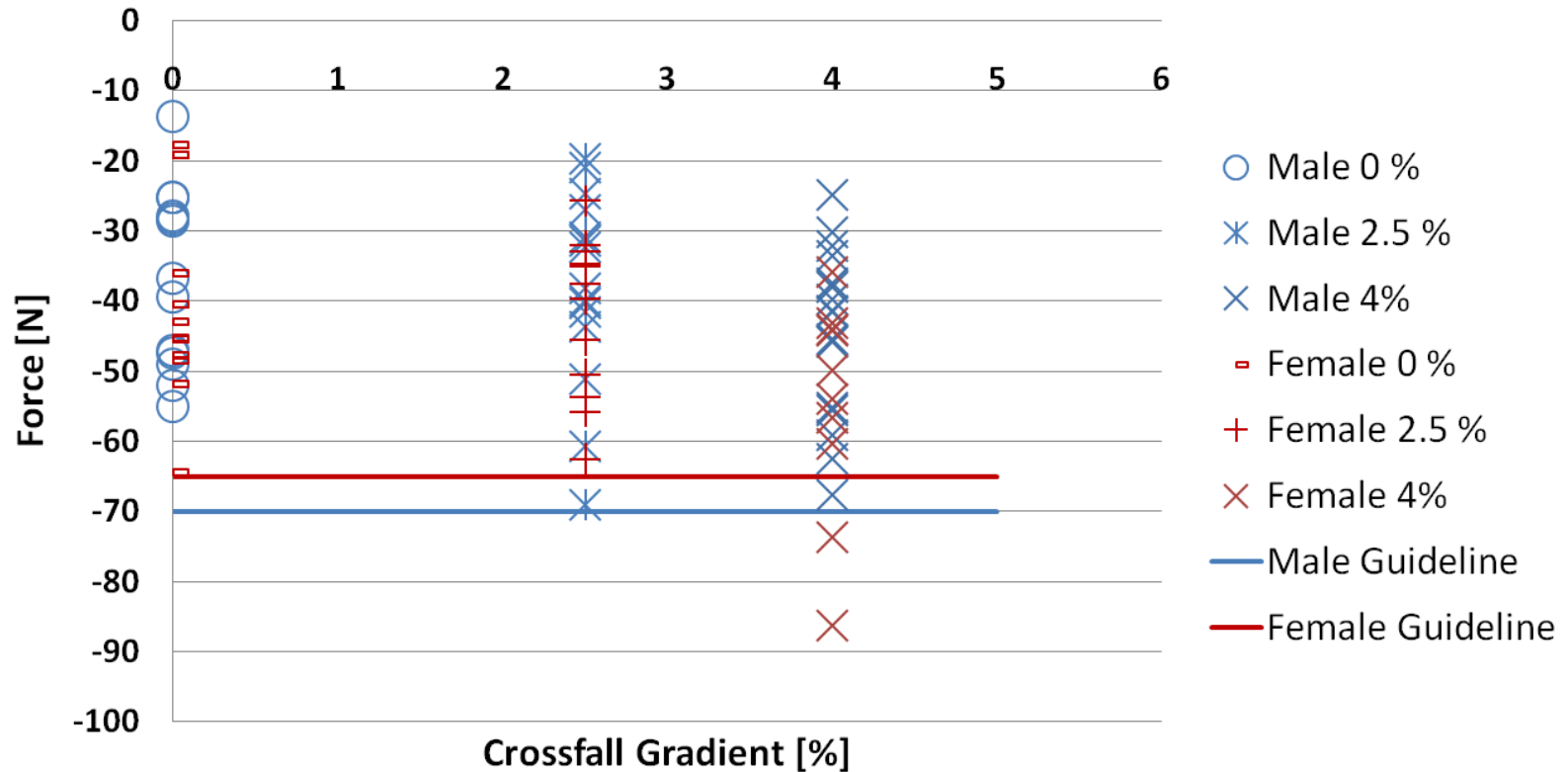
Guidelines taken from Snook & Ciriello 1991

## Downslope Going Forces & Guidelines



Guidelines taken from Snook & Ciriello 1991

# Upslope Stopping Force & Guidelines



Guidelines taken from Snook & Ciriello 1991

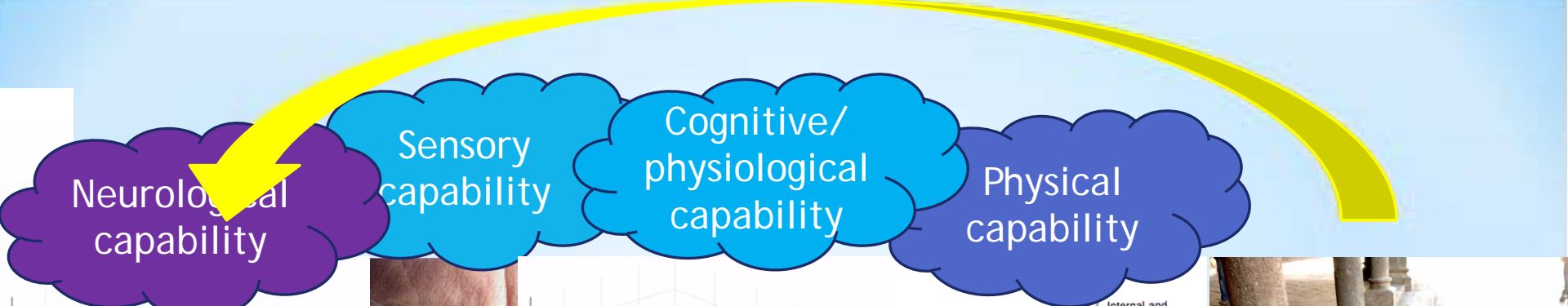
- \* Managing to travel along a normal footway is a challenge
- \* Emphasis in treatment and research on the person in the wheelchair
- \* Attendant propulsion is less studied
- \* Many (most?) attendants are older people
- \* Quality of life is compromised for both the person in the wheelchair and the person behind it

**\* What do we learn from this?**

**\* Another example**

- \* Falls are a big problem
  - \* Only a tiny fraction of incidents are presented in hospital
  - \* Costs immense but hidden (upper femur fracture costs the NHS ~£1.5bn/year)
  - \* Psychological issue probably greater than the physical problems
  - \* Affects older people a lot
  - \* So why does a fall occur?

**\* Why do we fall over?**

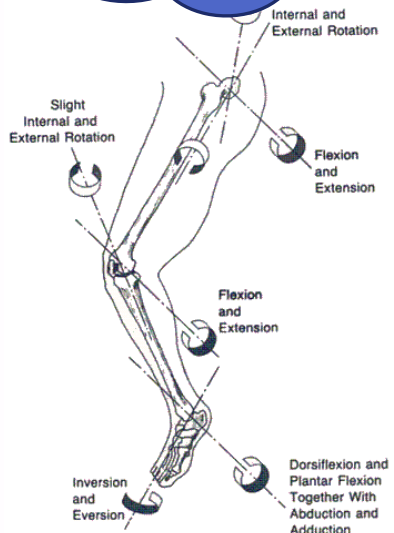
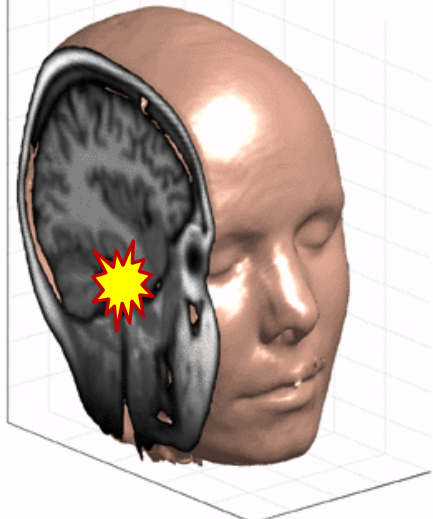
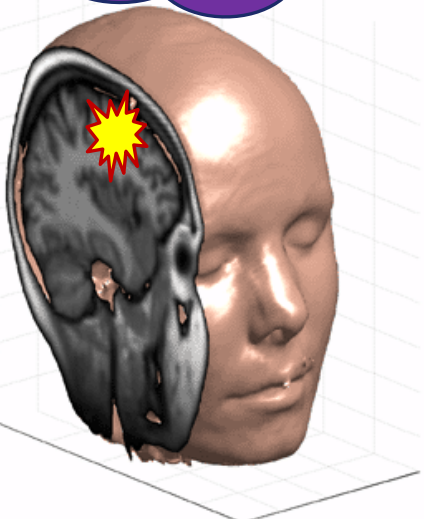


Neurological capability

Sensory capability

Cognitive/ physiological capability

Physical capability



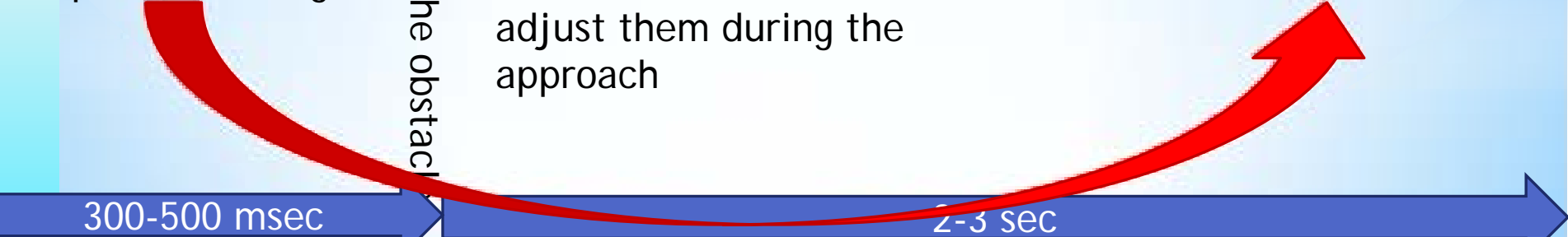
The brain recognises the obstacle and instructs the eyes to look out for the potential danger

Perceive the obstacle

Calculate the required movement and the correct physiological stimulus for the movement ... recalculate and adjust them during the approach

Lift the leg

The obstacle



300-500 msec

2-3 sec



- \* How many steps per stumble?
- \* We make 10,000 steps per day so the special ingredient for a fall is a very rare and highly changeable beast
- \* Starting from the model just described, we can see that a lot of things precede the encounter with an obstacle and we are now looking to see if we can begin to understand these.

**\* So why don't we fall  
over all the time?**

- \* We need to understand the mechanisms that keep us upright in order to understand the possible ways to help
- \* Serious problem for older people - even those who do not fall
- \* Falling in moving vehicles?

**\* Older people**

- \* Complex messy problems
- \* Multidisciplinary approaches
- \* Person-centred
  
- \* Be clear how the person-environment combination can be managed
- \* Ask awkward questions
  - \* what about conflicting needs?

**\* So how do we resolve these problems?**

- \* How do we ensure that the desired activities are still possible?
- \* How do we understand how to apply the understanding of the phenomena to the real world scale?
- \* What do we really mean by 'assistive technology'?
- \* Do interventions make things worse?

## \* Questions