

# Using Grounded Theory to Elicit the Driving Needs of Older People



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# To come...

- The Issue
- The Research Study
- The importance of travel
- Driving Behaviour
- The future
- Conclusion
- Current and future proposed work





# The Issue

# Ageing Population

**People over 65 rise nearly 60% in the next 25 years - from 9.6 million in 2005 to over 15 million in 2031**

- The percentage of the total population who are over 65 is predicted to rise from 16% to nearly 20% in 2031 and 26.6% in 2071

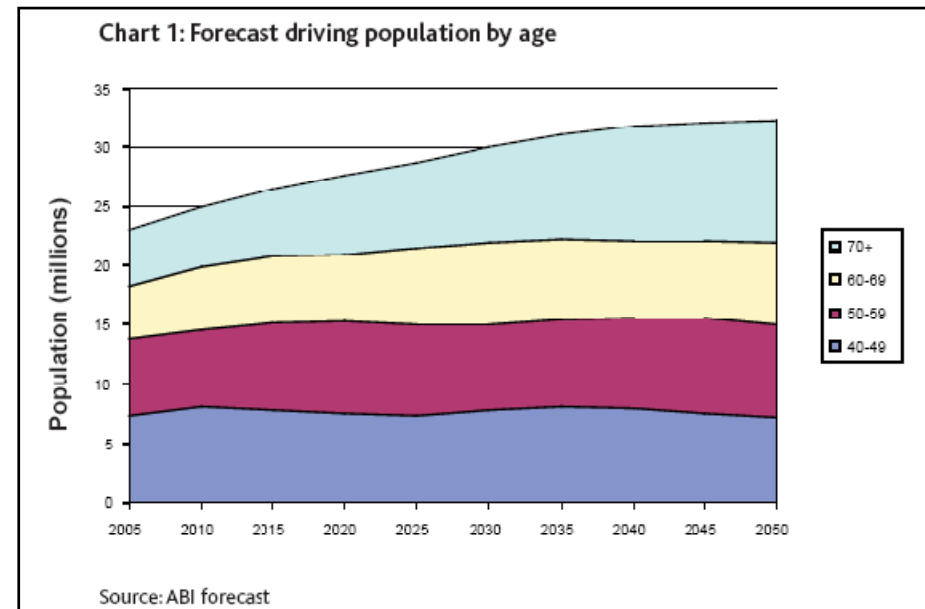
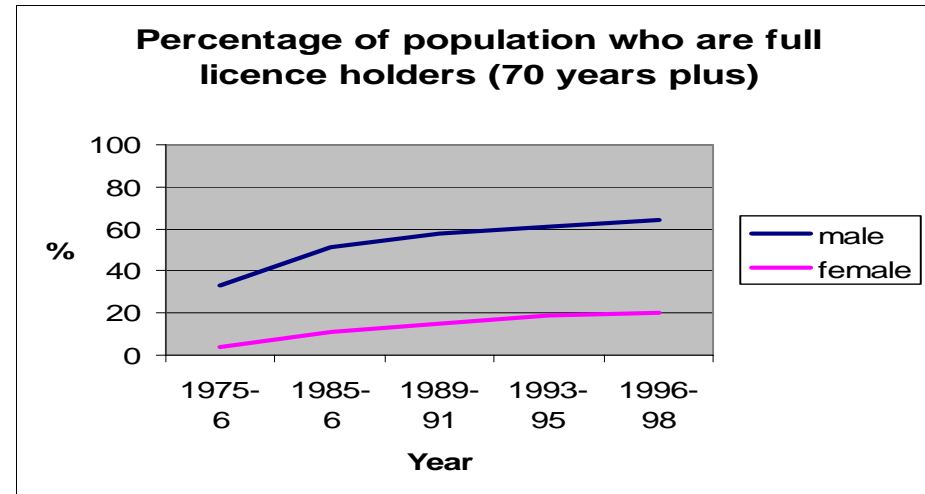
**The biggest growth in relative terms will be amongst the oldest old**

- The number of people over 85 in the UK is predicted to double in the next 20 years and treble in the next 30.



# Background: Older Driver Statistics

- 5,400,000 drivers over 65 in the UK
  - 47% of population over 70 hold driving licence (compared to 15% in 1975)
- 200% increase in male drivers over 65; 600% increase in female drivers over 65 in past 30 years
- Predicted growth
  - 10,000,000 drivers over 70 in the UK by 2050



# Mobility Deprivation

- Always driven – car based society
- Increasing level of services moving out of town centres and residential zones
- Sense of control over environment
- Driving increases self-confidence, mastery and self-esteem and feelings of autonomy, protection and prestige (Ellaway et al, 2003)
- Giving up driving is associated with an increase in depressive symptoms (Ra et al, 1997)



# The Research Study

# What could we offer?

Previous research has given us a real mixed bag.  
It tends to:

- treat drivers as a homogenous group
- Be technologically led
- Ignore attitudes
- Concentrate only on objective measures

# Type of Research to Fill the Gap

- Needs-led
  - Attitudes and acceptance
- Bottom-up
  - Driven by end-user
- Participatory
  - Thoroughly involved throughout the research process
- Iterative and Dynamic
  - Responsive and open to change





# Methodology

Prolonging the safe driving of older people through technology

**PHASE ONE -  
25 driving (3 groups)**

**Wave 1 focus group**  
Understanding older people's driving needs

**Driver Diary**  
Reflecting on driving needs in practice

**Telephone Interviews**  
Re-visiting driving needs and assessing attitudes to technology



**Wave 2 focus group**  
Understanding how driving needs might be met with modern technology



**PHASE TWO -  
31 no longer driving**

**Interviews**  
Why people gave up driving and assessing the feasibility of technologies

**PHASE THREE -  
18 users/experts**

**E-Discussion**  
To examine the generalisability and feasibility of developing the new technologies

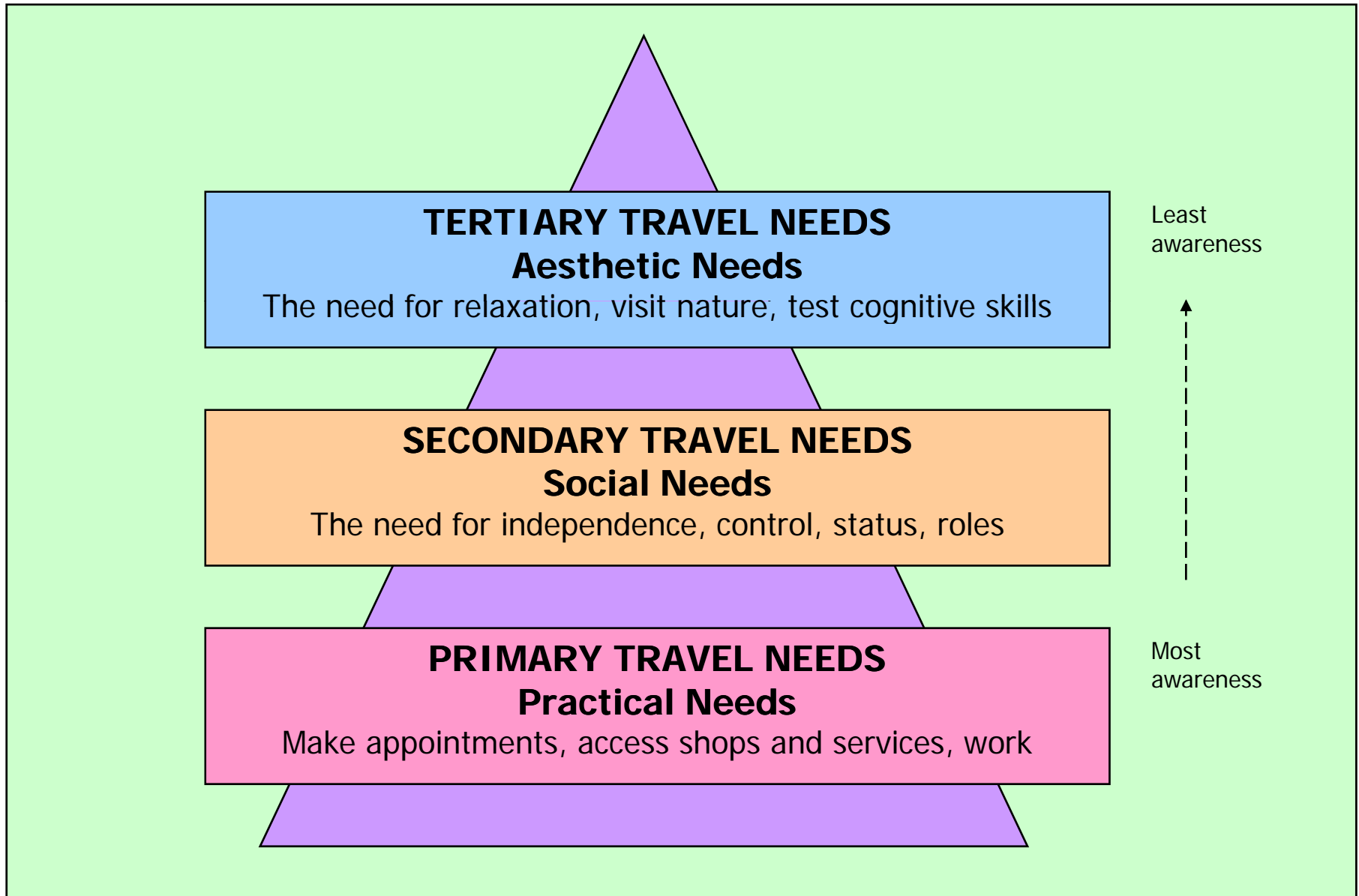


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# The importance of travel for older people

# Travel Needs





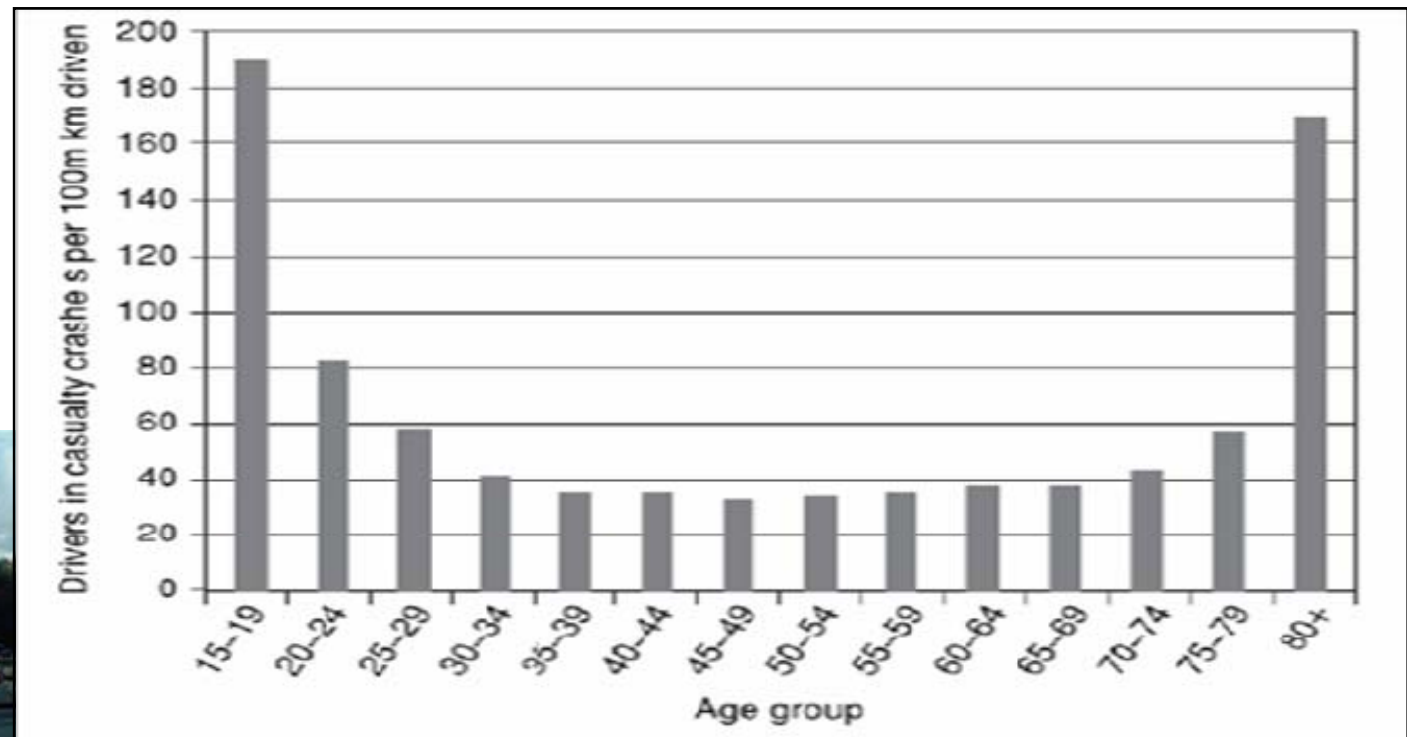
# Driving Behaviour

# Background: How Safe are Older Drivers?

- Older drivers are the safest drivers but...
- Taking into account miles driven, there is a slight increase for over 60s age group, which increases for 70+ age group and again for over 80s age group

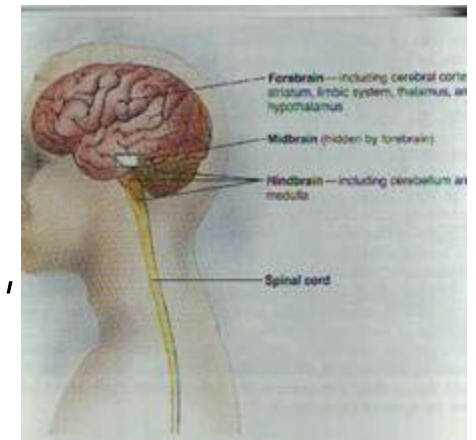
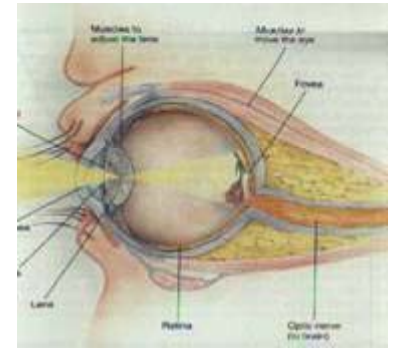
- Distractions

- Junctions



# Reasons for Increase in Accidents

- Visual search problems, divided attention, poor contrast sensitivity, poor judgement of approaching speeds, slow decision making (Clarke, 2009)
- **Physiological** - eye-sight and hearing problems, restricted physical mobility
- **Cognitive** - working memory problems, decrease in information processing capacity decision making under pressure
- **Psychological** - Lack of confidence, anxiety, social norms, stereotypes, labelling



# Driver Needs

**EXTERNAL DISTRACTIONS**

**MAINTAINING A CONSTANT SPEED**

**TIREDNESS**

**REACTIONS**

**GLARE AND LUMINANCE**

# EXTERNAL DISTRACTIONS



- An issue for all drivers, especially older drivers
- Older drivers need to be closer to and need longer to read and process signs
- External (too many signs) and internal (processing time) factors

**Technology wanted**

## MAINTAINING A CONSTANT SPEED

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“If you have to drive that slow, put on your emergency flashers to warn other drivers. Or better still, wear a hat.”

## MAINTAINING A CONSTANT SPEED



- Unawareness of speed limit
- Muscle stiffness
- Feedback
- Distraction and workload
- Accommodation
- Just Noticeable Difference

**Technology wanted**

# TIREDNESS



- Especially on longer journeys
- Especially in unknown areas
- Self-awareness is high
- Compensate by allowing extra time for journeys

**Self-awareness accepted**

## REACTIONS

- Reaction time increases from around 20 years of age
- Drivers over 55 take 22% longer to react than drivers under the age of 30 years
- Compensate with increased headway and slower speeds

**Compensation accepted**

## GLARE AND LUMINANCE



- Between 16 and 65 susceptibility to glare increases
- Recovery time from glare (the “white out”) at age 16 is 2 seconds, at age 65 is 9 seconds.
- A 75 year old driver requires 32 times the brightness they did at age 25.

**Technology wanted**



# The Future

# Driver Needs

TIREDFNESS

REACTION

**Compensatory  
Behaviour**

EXTERNAL DISTRACTIONS

MAINTAINING A CONSTANT SPEED

GLARE DOMINANCE

**Help  
Wanted**

# EXTERNAL DISTRACTIONS

## Dashboard sign display

- Most preferred amongst older people

## Head-up sign display

- Most preferred option amongst car designers, technologists and academics.
- Mixed dashboard & head-up has some support
- User-prioritisation increases popularity.
- Older people also advocate clearer signs and a change in legislation about amount of signs.





# MAINTAINING A CONSTANT SPEED

## Head-up display of current vehicle speed

- preferred by older people

## Audible speed cue

- preferred by older people

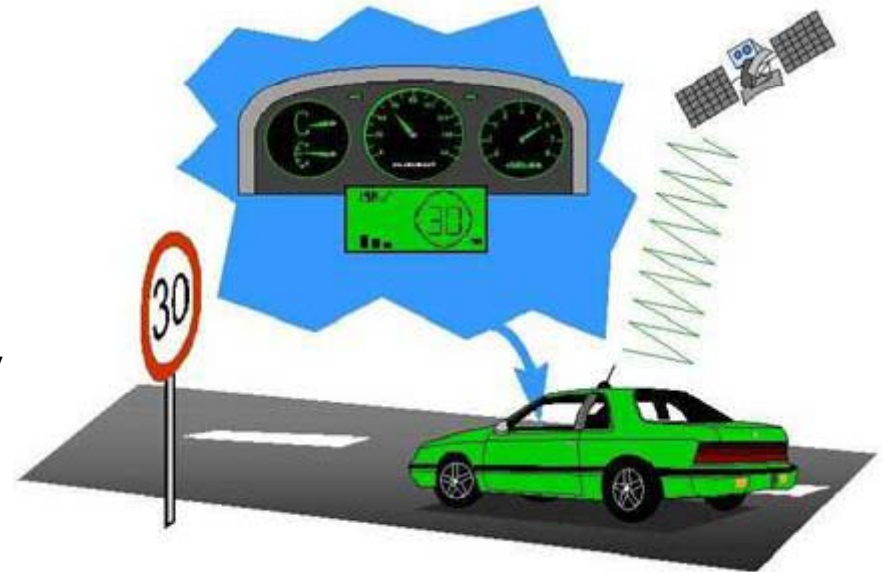
## Intelligent Speed Adaptation

### Audible warning when reach actual speed limit (Advisory ISA)

- Preferred by academics and technology experts

### Take over speed (Supportive ISA)

- Preferred by academics and car manufacturers and by older people if everyone has it fitted.



# GLARE AND LUMINANCE

## Night vision enhancement

- Head-up display
- Dashboard display
  
- Either system is preferred by academics, technologists and car designers
  
- Older people remain more sceptical about use of such system





# CONCLUSIONS

# Conclusions (1)

- Older drivers view car as important to their lives
  - Functional –Day to day activities, services, A to B.
  - Psychological –personality, prestige, self-esteem, mastery, identity
  - Aesthetic – need to see nature, relax, and test cognitive skills
- Keep technology simple to use and aesthetically pleasing
  - In line with expectations and norms
  - Older people don't want adaptations that make their car look like an old person's car
- Key driving issues for older drivers are
  - Distraction
  - Keeping to the speed limit
  - Fatigue/tiredness
  - Reactions
  - Glare and luminance

# Conclusions (2)

- Older drivers feel they have good awareness of tiredness and are able to compensate for having slower reactions
- Technologies to take forwards and be developed along with older people
  - Sign display and prioritisation
  - Additional speed warning and cues
  - Intelligent Speed Adaptation
  - Night vision?
- Lobby for better signs.
- Maintain needs-led and bottom-up approach.

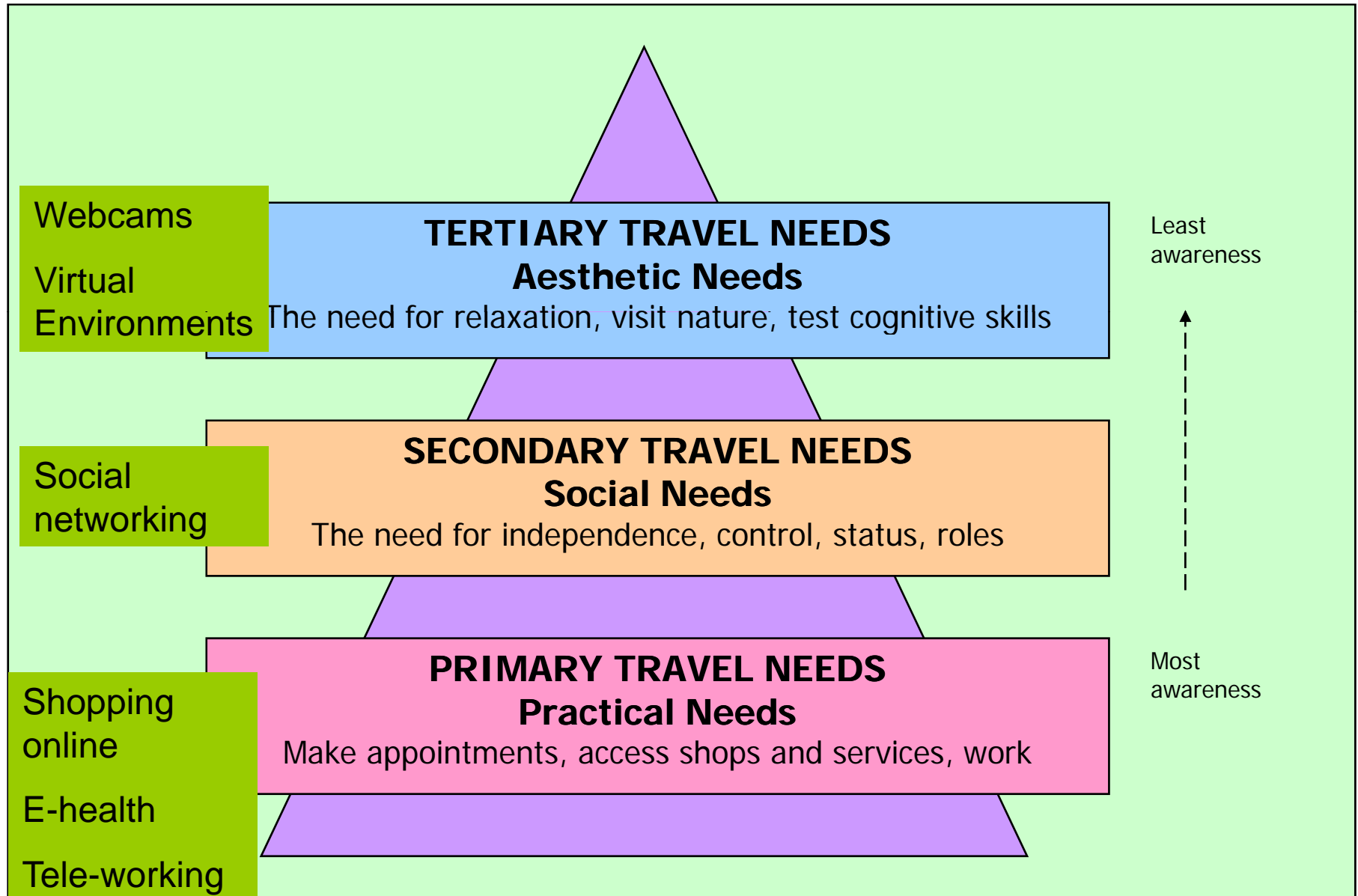


# CURRENT AND PROPOSED FUTURE WORK

# Role of technology in improving driver behaviour

- Bottom-up, inclusive methodology
- Technology and design specialist
  - Sign display and prioritisation
  - Additional speed warning and cues
  - Intelligent Speed Adaptation
  - Night vision?

# Role of Virtual Mobility



# Non-direct current research

- Involvement in direct ageing research:
  - New Dynamics of Ageing (NDA) Co-I on Transport workpackage of Grey and Pleasant Land led by Catherine Hennessey, Plymouth
- Make sure older people agenda is addressed in other research projects:
  - PI on Dept for Transport – Understanding public attitudes to road user safety. Contains substantial element on older people's attitudes and safety
  - Co-I on EU Project Renaissance – design elements of built environment affect behaviour – making sure older people have a specific element of the project
  - Co-I on EPSRC research on Suburban Neighbourhood Sustainability – making sure older people had a substantial role to play in the project.
  - Co-I on GOSW research addressing active travel in the South West – make sure that active travel for older people is included.
- 2 PhD students
  - Older people attitudes to road pricing
  - Older people and free bus travel

Thanks for listening

Many thanks to Hebba Haddad, my Researcher, and all the participants on my older driver's project for their valuable time and help and to the SPARC team for their help, guidance and funding – Verity Smith, Peter Lansley, Nicky Hewson and Richard Faragher.

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