

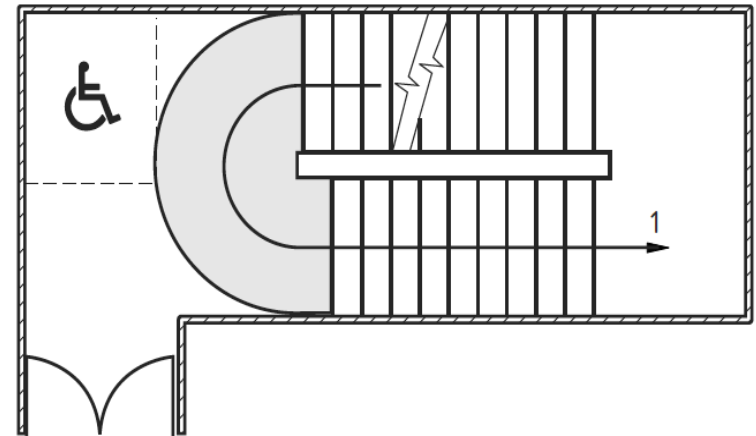
Refuge Areas and Vertical Evacuation of Multistorey Buildings: The End Users' Perspectives

Dr. Nigel C McConnell

Fire Engineering Research Technology (FireSERT)
Built Environment Research Institute
University of Ulster

- ❖ Approximately 11% in Great Britain have a mobility impairment (Department of Work and Pensions, 2013)
- ❖ Prevalence of disability increases with age
 - Numbers of people aged 65 and over is projected to increase by 42% by 2025.
- ❖ Accessibility ... responsibility of safe egress
- ❖ Traditionally the definition of the 'means of escape' has been recognised as insufficient
- ❖ Partial answer is to provide a Refuge Area to facilitate a more efficient evacuation
 - Fire Evacuation Lifts would be the preferred option in combination with the refuge

- ❖ Refuge area definition ... ‘temporary’ and ‘safe space’
- ❖ UK Guidance (BS9999, 2008) recommends that a refuge needs to:
 - Accommodate a wheelchair
 - Not less than 900x1400mm
 - Not obstruct the evacuation flow
 - Protected stairway affording egress from each storey and each final exit leading onto a flight of stairs external to the building

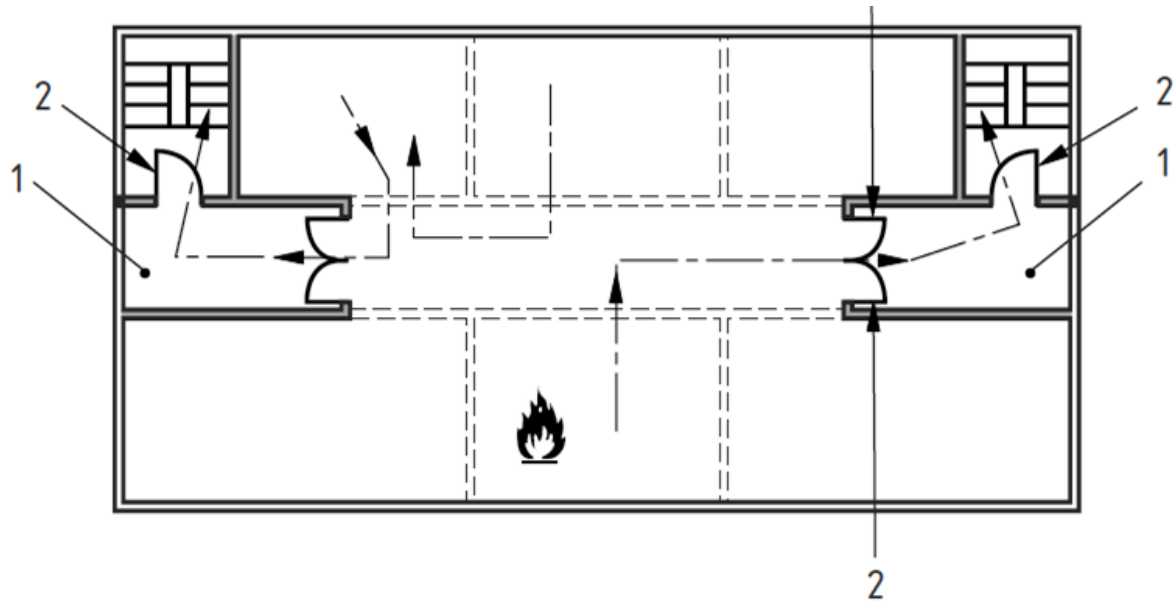


NOTE In this example the landing is larger to allow access to the wheelchair space without disrupting the flow of persons escaping.

Figure taken from BS9999 (2008) p360

❖ Protected Lobbies used as refuges (No. 1)

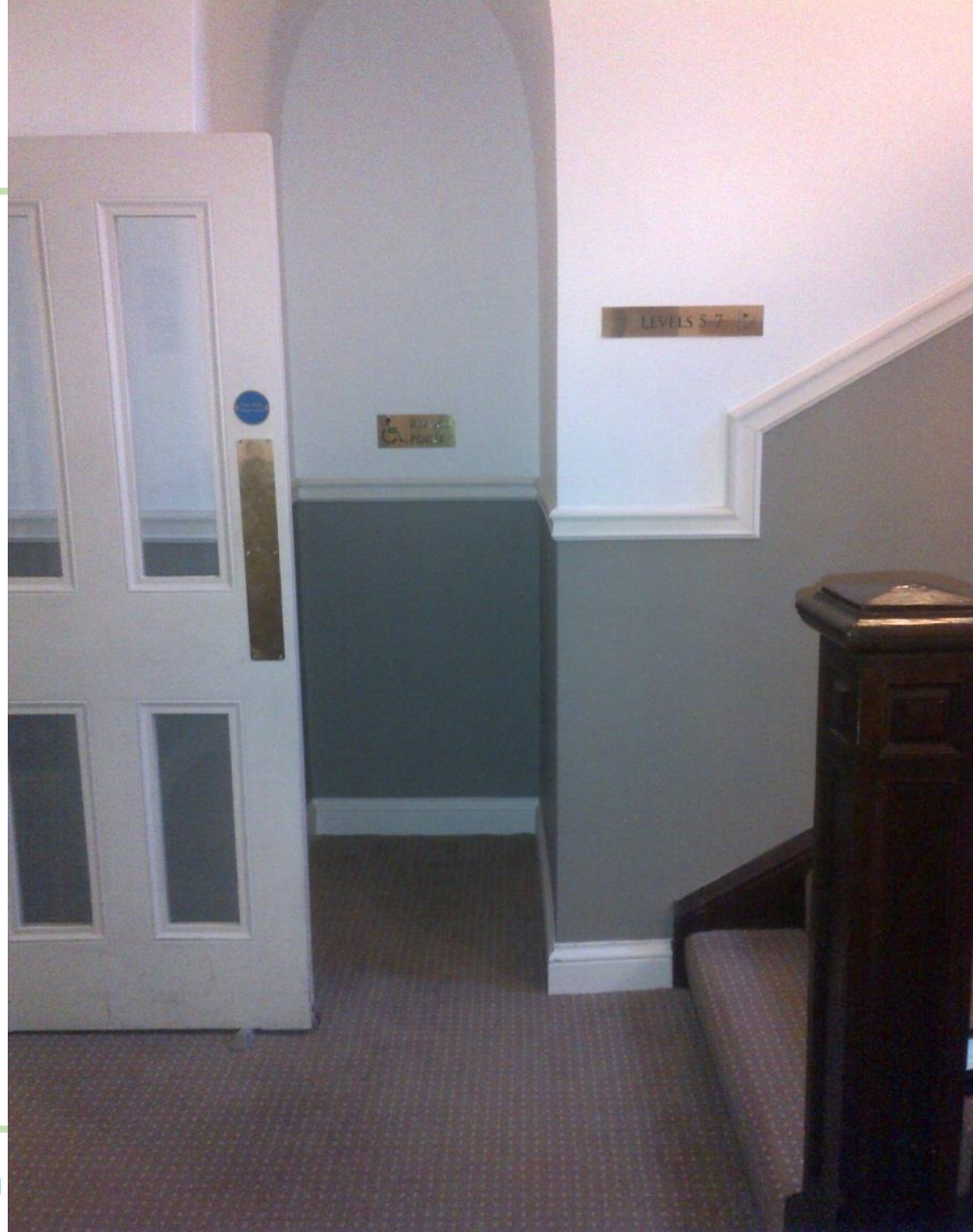
Figure taken from
BS9999 (2008) p362



b) Protected lobbies used as refuges

- ❖ Would you be happy to use this in the event of a fire?
- ❖ Would it instill you with confidence?
 1. Size
 2. Location
 3. Communication
 4. Information/signage
 - ‘familiarity’ and ‘acceptance’

*Picture of a refuge area in a 4 star hotel in Scotland



❖ The aim of this study is:

- to determine the level of awareness, understanding, willingness and potential concerns about using refuge areas and understanding of vertical evacuation

❖ Methods:

- Questionnaires distribution to charities and local authorities throughout Northern and Southern Ireland.
- Main Areas of questioning were:

Knowledge	Willingness to use	Waiting time
Concerns	Reducing concerns	Alternative actions
	Vertical evacuation	

❖ Sample

- 258 respondents in total (207 classified level of disability)
- Age ranged from 19 to 70 plus
- 73.4% classified themselves as having difficulties walking
 - 37.7% 'would find it difficult' and 35.75% 'would not' be able to descend one storey of stairs without assistance
- 72% who regularly visit multistorey buildings 'would not be able to' or would find it difficult

❖ Data Analyses

- Focus will be on respondents that are potentially at a greater need of using a refuge area, i.e.
 - 'would find it difficult' & 'would not' be able to descend one storey.

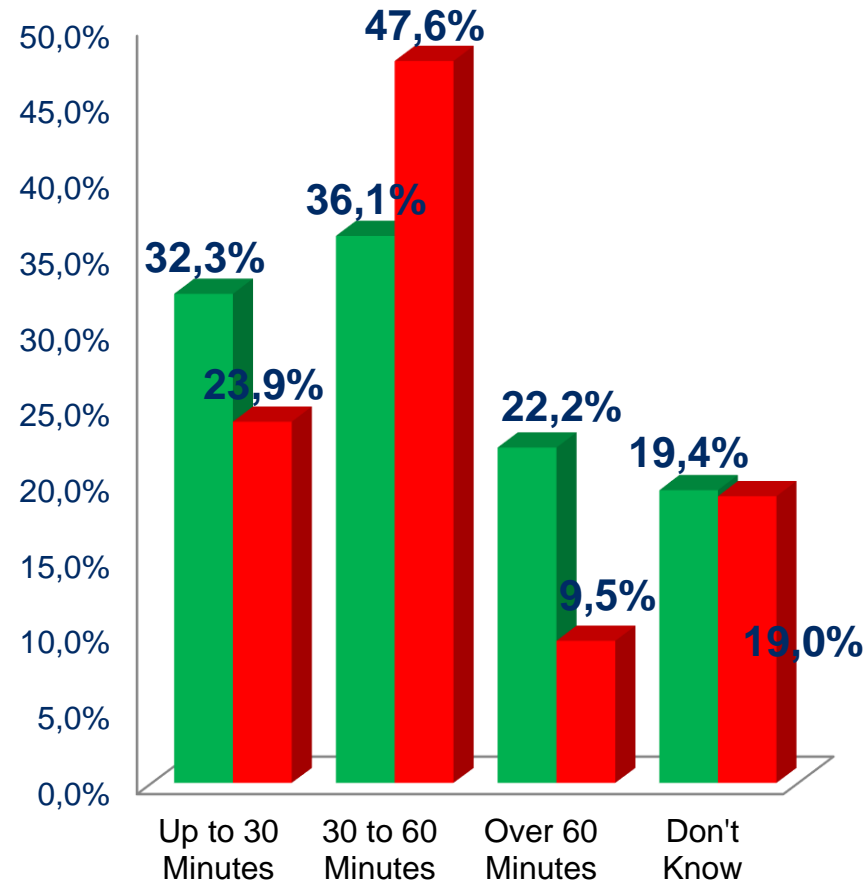
❖ 55.9% never heard of the term ‘refuge area’

- Of those who never heard of a refuge area, 53% may need to make use of refuge

❖ Findings for those reporting knowledge of refuge areas:

- Minimum Safe Time...
- Size of Refuge:
 - Over 40% did not know
 - 25% indicated 2 to 3 persons (e.g. wheelchair user, others needing assistance and accompanying person)

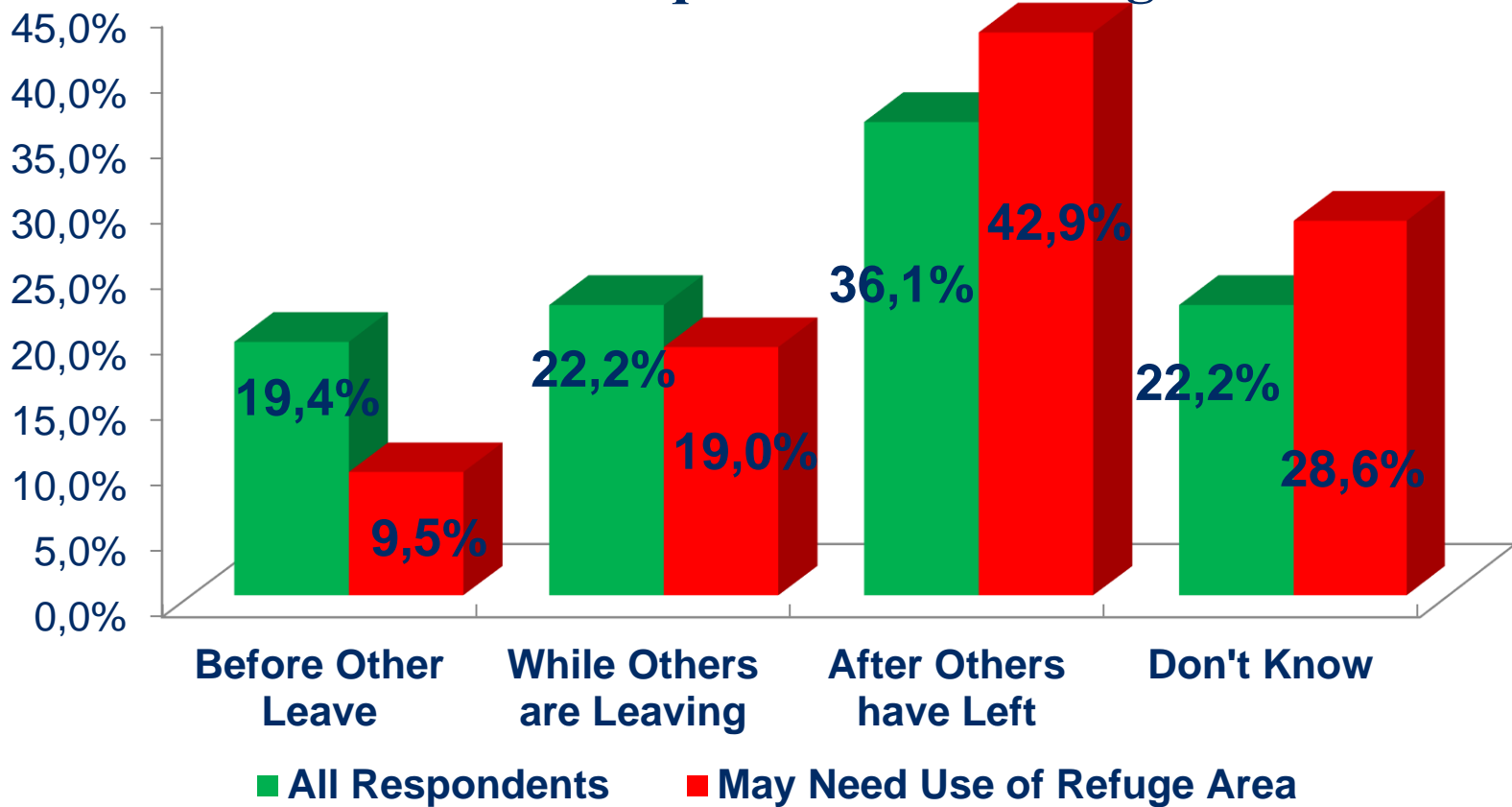
Refuge Area - Minimum Safety Time



■ All Respondents

■ May Need Use of Refuge Area

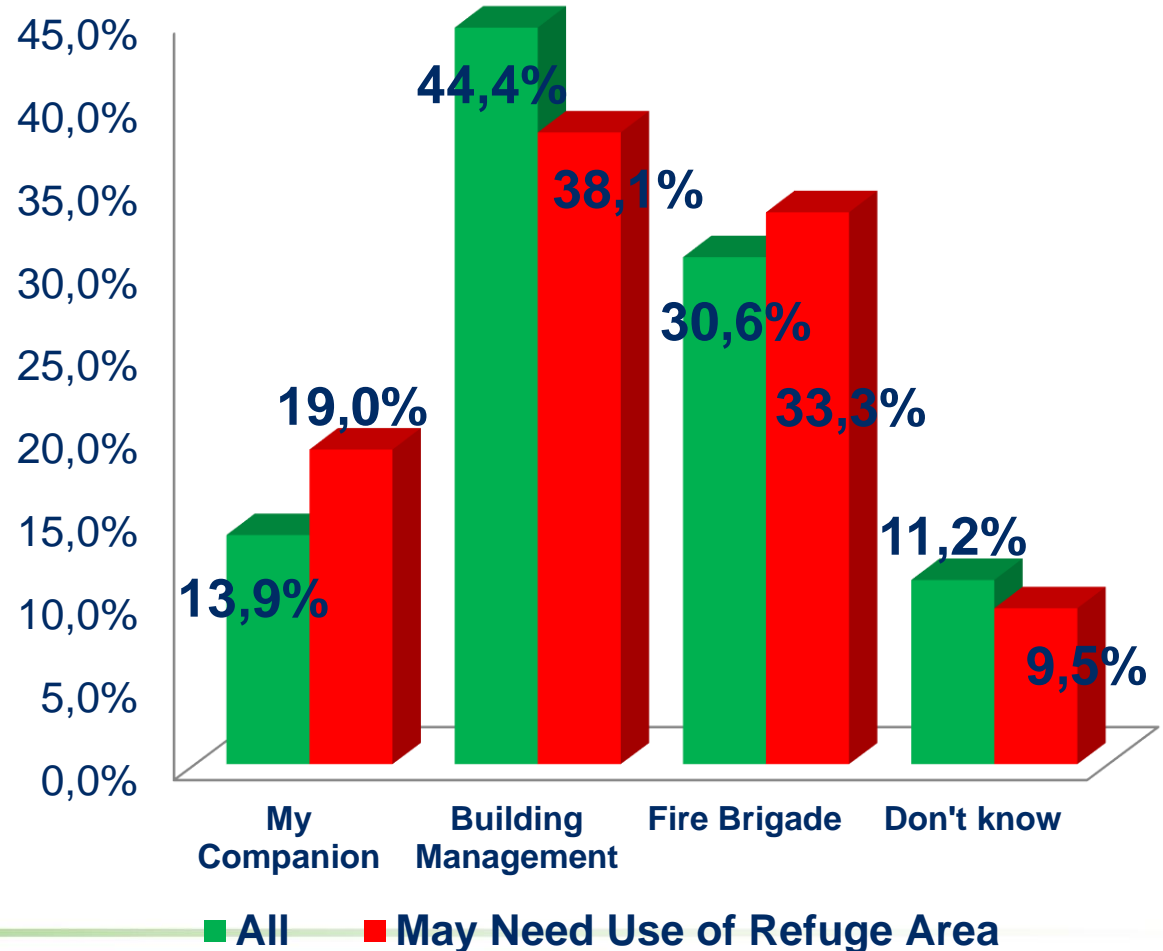
Evacuation Sequence from Refuge Area



- ❖ 63.9% did not know that they may be evacuated from the building last
- ❖ 69% would not be happy to wait until others have evacuated

Results – Knowledge and Understanding

Responsibility to Evacuate Users from Refuge Areas



- ❖ Responsibility to safely evacuate people with disabilities from the building?
- ❖ ‘Should NOT be used as a place to leave people with disabilities to await rescue by the fire service (BS9999 (p359)).

❖ Willingness to use Refuge Areas

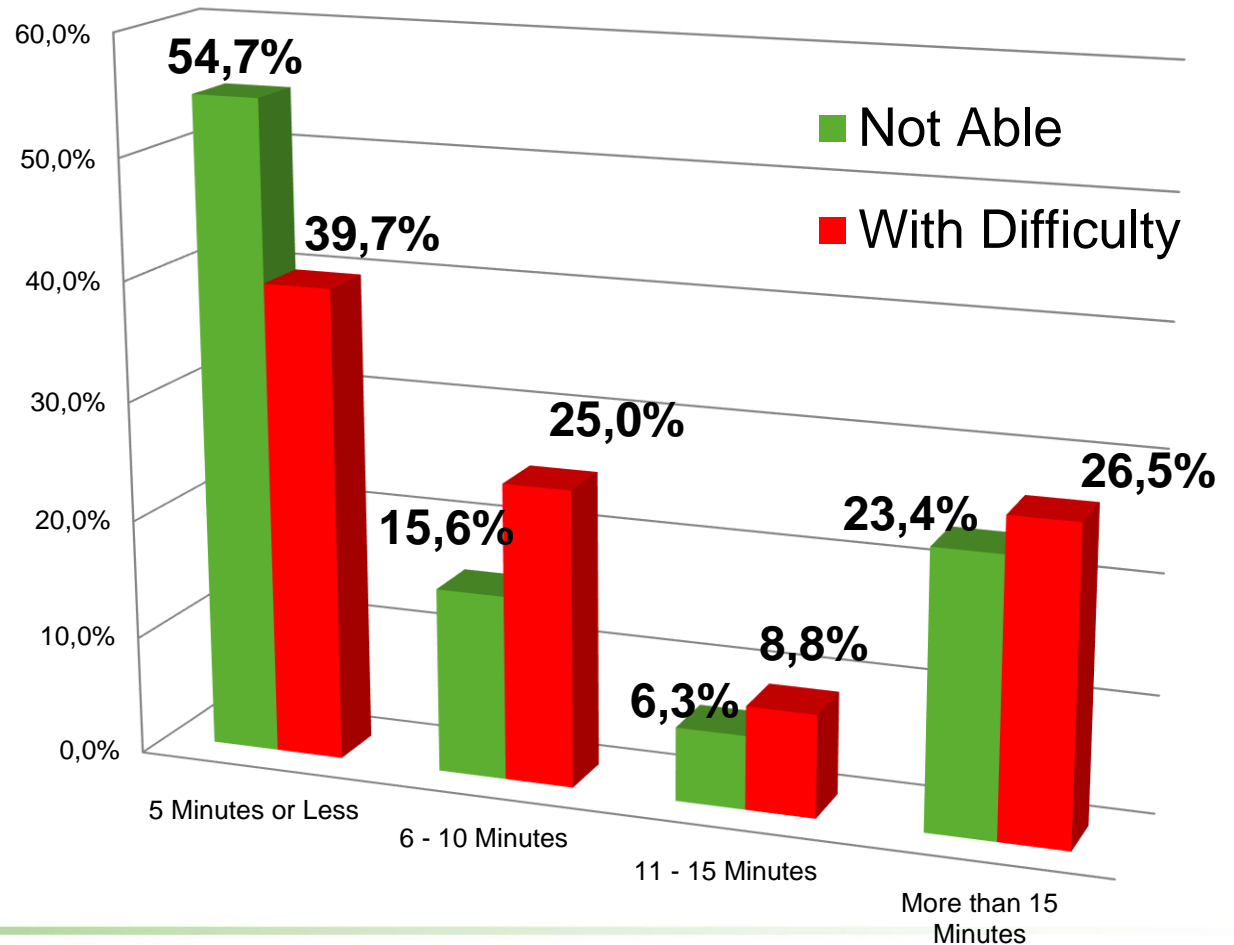
- 66% reported that they would ‘probably’ or ‘most definitely’ use the refuge area
- Willingness to use the refuge increased (71.8%) amongst those with less ability to descend stairs
 - More importantly, the remainder would ‘probably not’ or ‘definitely not’ be prepared to use a refuge
- Included one person who reported ...

“downstairs on my butt (bottom) - classmates carried my chair down”

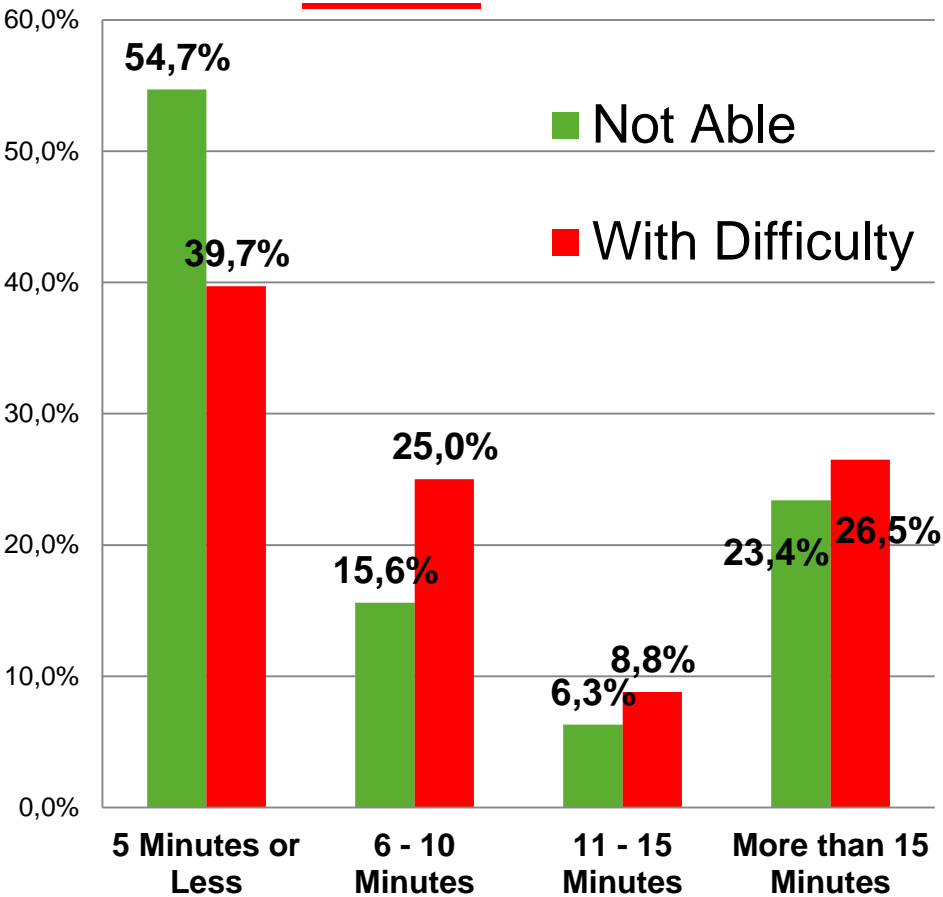
Results - Waiting time!

Time Prepared to Wait in Refuge Without Information

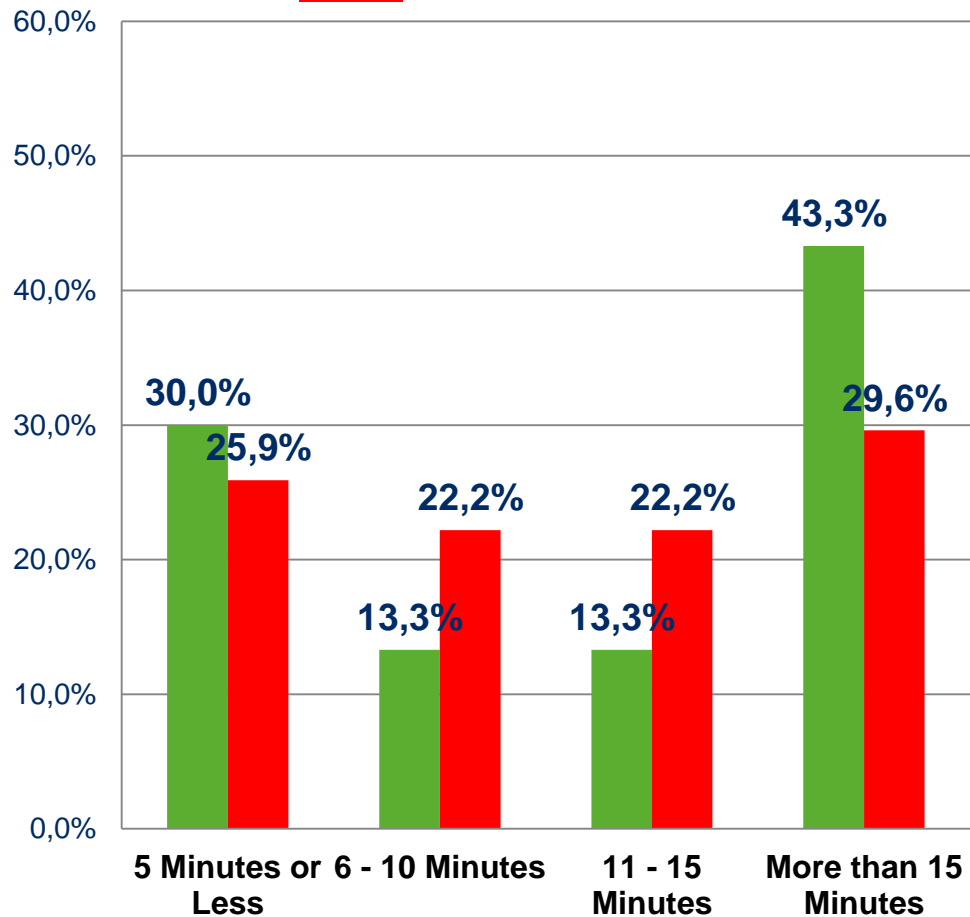
- ❖ 71.7% would not remain for >10 minutes without information.
- ❖ Those 'not able' to descend one Storey are less willing to remain for longer periods.



Time Prepared to Wait in Refuge Without Information



Time Prepared to Wait in Refuge With Information



Results - Concerns

- ❖ Areas point towards a general fear of isolation for those
 - ❖ Concerns how safe the refuge area would be.
 - ❖ *“Very isolating & upsetting to be expected to wait in such an area even if it is for safety reasons”*
- VS
- ❖ *“No issues over using refuge areas provided building staff are well trained and informed of these specific areas”*

Area of Concern	Very Concerned (%)
Being Forgotten	68.2
Info: Waiting Time	64.7
Being Left Alone	61.2
Info: Who Will Assist Me	57.9
Refuge Area Is Not Safe	54.1
Info: What Will Happen Next	52.4

	Important / Very Important %
Visibility Panel to Building Interior	87.7
Seating Provision	84
Window to Outside	83.9
Fire Blanket Provision	79.1
Hose Reel Provision	78.8
Fire Extinguisher Provision	77.7
Sprinkler System Provision	77.7
CCTV in Refuge	76.3
Info. How to be Assisted	74
Info. On What Action to take	71.9
Info. Expected Waiting Time	71.6
Someone to Wait With	71.3
Two-way Communication	70.7
Info. Time Refuge Affords	67.8
Emergency Lighting	64.6

❖ Find assistance

- 65.4% 'unable' to descend one storey vs. 43.6% who 'would find it difficult' would remain in the refuge
- Between 34.6% that are 'not able' and 56.4% of those that would have 'difficulty descending' one storey would potentially leave the refuge area to find assistance

❖ Use Mobile Phone to Call for Help

- Over 75% of respondents reported that it was 'very probable' / 'most definite'.

- ❖ Initiate vertical evacuation by using the stairs
 - 80% 'cannot descend one storey' vs. 35.7% who would find it 'difficult descend one storey' would remain in the refuge
 - 37.5% of those who would have 'difficulties' descending would 'very probably' or 'most definitely'

- ❖ *"Feet first on my back using my hands behind me",*
- ❖ *"Scoot on my bottom lifting my legs with my arms to move legs down"*
- ❖ *"Swing down a few steps at a time using handrail"*

❖ Awareness of vertical evacuation strategies

- Overall, respondents indicated 'no' to 'little' awareness of:
 - evacuation lift (89%)
 - evacuation chair (72.4%)
 - being assisted on own wheelchair (69.1%)

❖ Evacuation lifts

- power supply failure, doors opening on smoke filled floors, overloading and being trapped

❖ Assisted downstairs in own wheelchair

- Fear of falling and being injured & putting others in danger

- ❖ Confidence levels of techniques for assisting persons with disabilities:
 - Respondents indicated 'reasonable / very confident' in potentially using:
 - evacuation lift... (73.5%)
 - evacuation chair... (63%)
 - attachable powered evacuation devices... (56.8%)
 - BUT
 - own wheelchair... (14.3%)
 - Feel as safe as a non-disabled person:
 - 60% Disagree / strongly disagree
 - 21.7% agree / strongly Agree

- ❖ Not a ‘ball bearing’ approach to people with disabilities!
- ❖ Negative feelings and concerns stem from limited awareness
- ❖ “a system based on refuges is only effective if the end users of that system fully understand it and are confident to use it” (DCLG, 2008, p18).
- ❖ Regular communication and reassurance
 - Highlights need for preparedness by building management
 - *‘management of evacuation procedures, and of refuges ... requires a major overhaul’* (Communities and Local Government, 2008) .

- ❖ If refuge areas are not being utilized as we expect, this challenges the assumptions made in design:
 - Sizing of stairs & refuge areas and Evacuation procedures
- ❖ Dissemination of information!
 - An (increased) awareness may result in a readiness to use a refuge
- ❖ Deserves further consideration, both from an ethical, design and end users point of view.

“I am very glad to be made aware that such an area exists”