VERRES CONSORTIUM

V E R R E S

VLTA EMERGENCY

REQUIREMENTS RESEARCH

EVACUATION STUDY

Work Package 3

Report 3.2 - Appendices of Verres evacuation trials

Contract number	GMA2/2000/32039
Distribution Status	Public
Delieverable Number	3.2
Type of release	Final document
Date	23/06/03
Author(s)	Cranfield University: R.L Wilson, L.J Thomas and H.C Muir University of Greenwich: E.R.Galea, S.J.Blake, A.J.P. Dixon and S.Gwynne Sofréavia: S. Joseph, L. Moulin and E. Andlauer
Reviewer(s)	
Review date	
Authorisation	H.C Muir, E.R. Galea and E. Andlauer
Authorisation Date	23/06/03
Document Reference	VERRES_WP3_CU_UOG_SOF_.3.2_Appendices_Final_v1.1.doc
File Name	VERRES_WP3_CU_UOG_SOF_.3.2_Appendices_Final_v1.1.doc
Abstract	Report 3.2. Appendices for evacuation trial analysis conducted by Cranfield University, University of Greenwich and Sofreavia
Keyword List	Report 3.2. Appendices for evacuation trial analysis

Document Changes			
Version	**Date**	**Description of amendment**	**Comments**
1.0	23/05/03	Final version	Finalisation
1.1	23/06/03	Editorial changes	
1.1	23/06/03	Status change	Change to public

Document Distribution				
to/cc	**Paper**	**File**	**Organisation**	**Name**
To		1	JAA/PAG/HF	S. Deharvengt
To		1	SOFREAVIA	E. Andlauer, L. Moulin, S. Joseph,
To		1	CAA/SRG	G. Greene
To		1	EADS AIRBUS	P. Friedrich
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GLOSSARY

A/c	Aircraft
AIRBUS	AIRBUS Deutschland
CC	Cabin Crew
CON	Contribution Report
CU	Cranfield University
D	Deliverable
$Dn_1.n_2$	**"D"** means day, $\mathbf{n_1}$: day number, $\mathbf{n_2}$: session number
DG TREN	Directorate General Transport & Energy
ETF	ETF/SNPNC
FC	Free Choice (experimental scenario)
GD	Going Down (experimental scenario)
Gp	Passenger Group
GUp	Going Up (experimental scenario)
JAA	Joint Aviation Authority
ND	Non Defined
NOSC	Experimental session without Stair Crew (NO Stair Crew)
Pax	Passengers
SC	Stair Crew
SOF	Sofréavia
SRG	CAA/SRG
UOG	University of Greenwich
VAA	Virgin Atlantic Airways
VERRES	VLTA Emergency Requirements Research Evacuation Study
VLTA	Very Large Transport Aircraft
WP	Work-Package

1. APPENDIX A: CABIN CONFIGURATION (CU)

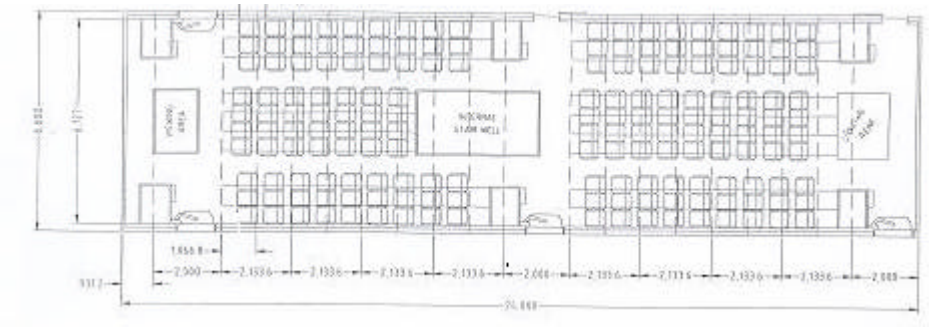


Figure 1: The lower deck of the Cranfield University Large Evacuation Simulator

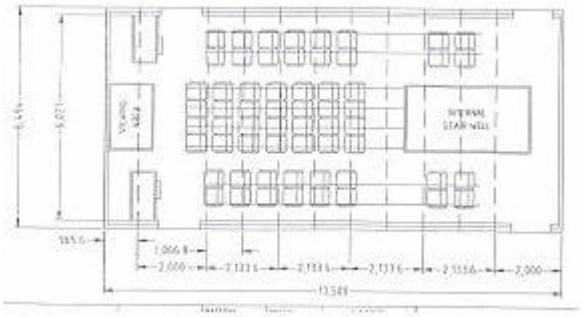


Figure 2: The upper deck of the Cranfield University Large Evacuation Simulator

2. APPENDIX B: PRE-TRIAL CORRESPONDENCE (CU)

Cranfield University
Cranfield,
Bedfordshire
MK43 0AL
Fax 01234 750192
Tel 01234 750111 ext. 5001

Dear

Thank you for volunteering to take part in the cabin evacuation research trials which are to take place on the morning of Saturday, 25 January 2003.

We will require you to take part in four evacuations during this session. The session should last no longer than approximately 3 hours. **Some of the evacuations may require you to use the emergency chutes from the upper deck of the simulator, this is approximately 8 metres from the ground.** During the evacuations you may also be required to use an internal staircase and the evacuations may take place in low-level lighting. All volunteers will be paid £25 for attending the session.

For insurance reasons, all volunteers must be between the ages of 20 and 50, and be normally fit and healthy. Volunteers should weigh no more than approximately 15 stones/95.25 kg, and should not be excessively overweight. The trials may be physically demanding, so please do not take part if you have any history of the following illnesses: heart disease, high blood pressure, fainting or blackouts, diabetes, epilepsy or fits, deafness, chronic back pain, ankle swelling, depression, anxiety, other nervous/psychiatric illnesses, fear of enclosed spaces, fear of heights, fear of flying, brittle bones, bronchitis, breathlessness, chest trouble, allergy, lumbago sciatica, or any other serious illness. Women who are pregnant, or who think they may be pregnant, should not take part. On arrival at the session, you will be asked to complete a medical questionnaire. You may also be asked to see the doctor or nurse for a brief medical examination if you have had recent surgery, or if you are currently receiving medical treatment.

To ensure that the trials run smoothly, it is essential that you arrive at Hangar 3 (Building 83, College of Aeronautics) between 9.00 and 9.30 am. Your safety is of the utmost importance. Please ensure that you **wear jeans or trousers made from natural fibres, a top or sweatshirt with long sleeves, socks and trainers or flat fastened shoes and sturdy cotton underwear.** Please do not wear earrings which may come loose, or which may get caught on clothing. It is not advisable to wear spectacles during the actual evacuations. Coats and bags will not be allowed on the aircraft, although we will provide a secure, supervised area in which they may be left.

Please ensure that you have read and completely understand this information, as you will be asked to sign a form to confirm your agreement to participate in the trials. Please do not hesitate to contact us if you have any queries about the information which has been supplied. Also, **we would be grateful if you could let us know in advance if you are no longer able to participate**.

Again, thank you for volunteering. We look forward to seeing you on 25 January.

Tricia Jolly
Human Factors Group
Telephone (01234) 750111 ext. 5001

3. APPENDIX C: VOLUNTEER INFORMATION SHEET (CU)

AIRCRAFT CABIN EVACUATION TRIALS - VOLUNTEER INFORMATION

It is essential that you read this document carefully, and fully understand its contents before completing the Volunteer Consent and Medical Clearance form. If you feel after reading this document that you do not wish to take part, then please do not feel obliged to do so.

1) Health and Medical

a) For insurance purposes, all volunteers must be aged between 20 and 50.

b) Volunteers must have no history of the following: Heart disease, high blood pressure, fainting or blackouts, diabetes, epilepsy or fits, deafness, chronic back pain, ankle swelling, depression, anxiety, other nervous/psychiatric illnesses, fear of enclosed spaces, fear of heights, fear of flying, brittle bones, bronchitis, breathlessness, chest trouble, allergy, lumbago sciatica, or any other serious illness.

c) All volunteers who are currently undergoing medical treatment or who have recently undergone surgery should consult with the medical officer or nurse before agreeing to participate in these trials.

d) Women who are pregnant, or who think they may be pregnant, should not take part.

2) Safety

To ensure the safety of all volunteers, a number of precautions have been taken:

a) If an evacuation of the aircraft is necessary, the cabin crew will make the necessary exits available. You may be required to use the emergency chute. In order to ensure your safety while using this chute, it is essential that you are wearing jeans or trousers made from natural fibres, socks and flat fastened shoes or trainers, a long sleeved top or sweatshirt, and sturdy cotton underwear.

b) You may also be required to use exits onto platforms. When moving through the exits, please follow the directions provided by the cabin crew. Research staff will be available outside the exit, to assist you in moving away from the door. You may also be required during an evacuation to use the internal staircase within the aircraft.

c) The evacuation slide has been specially fitted with a speed resistant surface to slow passengers down on descent. Additional support has been built beneath the slide. Padded mats have been placed at the bottom of the slide, to ensure that injury is minimised in the event of an accident.

d) If you are required to use the chute, you must fold your arms on your chest in front of your body. Move forwards to the sill, and step onto the slide. You must land on the slide on your bottom, keeping your legs straight and out in front of your body. Keep your arms folded on your chest, so that your hands stay clear of the slide. Cabin crew will be available at the top of the slide to instruct and physically assist if necessary. Research staff will also be available to assist you in moving away from the base of the slide.

e) At least three members of the Cranfield research team will be present on the aircraft at all times; these individuals will make themselves known to you. Researchers on the aircraft carry alarms, as do research and medical personnel located outside the exits. If you hear an alarm, then this is a signal to HALT. This indicates that a problem has occurred, and that the trial has therefore been stopped. If a trial is stopped, you must stop immediately and await instruction from the research team.

f) A doctor and several nurses are on hand. If you feel the need to consult one of these individuals, please do not hesitate to do so.

3) Payment

Today we will require you to take part in four evacuations. Some of the evacuations may take place in low level lighting and you may be required to use the emergency chutes and/or the internal staircase. All volunteers will be paid £25 for attending. There are no bonus payments for being the first participants to exit the aircraft. However, it is important that you exit the aircraft as quickly as possible, since there is a time limit for the evacuation.

4) Insurance

You are advised that the tests are undertaken at your own risk. The University has arranged personal accident insurance which provides benefit in the event of you sustaining accidental bodily harm. No further claims are admissible, nor shall the University be held liable in the event of any accidental injury or damage outside these benefits.

3.1.1. Scope of Insurance Cover: Accidental Bodily Injury

Temporary Total Disablement, per week	£150
Temporary Total Disablement, where not otherwise gainfully employed, per week (Maximum 104 weeks)	£25
Permanent Total Disablement (Other than loss of sight of one or both eyes or loss of one or more limbs)	£100,000
Loss of one or more limbs	£100,000
Permanent Total Loss of Sight of One or Two Eyes	£100,000
Death	£100,000

5) Personal Information

a) All personal information that you provide will be treated with the strictest confidence. You have been provided with a volunteer number to ensure that all information you provide remains anonymous. This means that although the information you provide will be used by Cranfield University for research purposes, you will not be personally identifiable by name, age or other personal characteristic.

b) These trials will be video recorded by Cranfield University. The video footage will be used in research to investigate the factors which influence survival in the event of an aircraft emergency. Some of this footage may also be used for promotional purposes. If you take part in these trials, you consent to your image being used in this manner, although any other personal details you provide will of course remain confidential.

c) You are free to withdraw from these trials at any stage during the session. If you wish to do so, then simply inform a member of the research team or the medical officer.

After reading this document carefully, you will be called by Cranfield research staff to be weighed and measured. You should also complete the Volunteer Consent and Medical Clearance form. This will be signed by the doctor or nurse, and you may also have a brief medical.

4. APPENDIX D: VOLUNTEER CONSENT AND MEDICAL CLEARANCE FORM (CU)

Volunteer number: _____

Age: _____

Sex: _____

Part A: To be completed by the Cranfield Research Team

Volunteer height: _____ Volunteer Weight:_____

Part B: Your Medical History

It is essential that you answer these questions truthfully and completely. The answers you provide to these questions will be treated with the strictest confidence. However, it will be necessary for you to have a brief medical with a doctor or nurse in order to obtain medical clearance to take part in these trials. To answer, place a tick in the appropriate box.

1. Have you ever experienced any of the following:	Please tick: No	Yes
a. Heart disease		
b. High blood pressure		
c. Fainting or blackouts		
d. Diabetes		
e. Epilepsy or fits		
f. Deafness		
g. Chronic back pain		
h. Ankle swelling		
i. Depression		
j. Anxiety		
k. Nervous/psychiatric illness		
l. Fear of enclosed spaces		
m. Fear of heights		
n. Fear of flying		
o. Brittle bones		

Have you ever experienced any of the following (cont.)	**Please tick: No**	**Yes**
p. Asthma		
q. Bronchitis		
r. Breathlessness		
s. Chest trouble		
t. Allergy		
u. Lumbago sciatica		
v. Any other serious illness		
2. Are you currently receiving medical treatment?		
3. Have you undergone surgery within the last six months?		
4. Is there any possibility that you may be pregnant?		

Part C: Volunteer Consent Declaration

I, _____ (please print your name in block capitals) confirm that I have read and completely and fully understand the "Volunteer Information" provided. I have completed my Medical History details fully and truthfully. I believe my health and fitness are good enough for me to cope with the work involved in the aircraft safety trials which are to take place today. I therefore give my consent to taking part in this research.

Signature_____ Date_____

Part D: Medical Clearance

Please confirm that volunteers are wearing the following:	**Please tick: No**	**Yes**
1. Jeans or trousers made from natural fibres		
2. Socks and flat fastened shoes or trainers		
3. A top or sweatshirt with long sleeves		
4. Sturdy cotton underwear		

Evacuation Nurse: _____ Date_____

or

Dr Logan: _____ Date_____

5. APPENDIX E: PROFESSOR MUIR'S TRIAL BRIEFING ON 25TH JANUARY 2003 (CU)

"Well good morning ladies and gentlemen. Thank you very much indeed for coming to help us this morning. I hope that you will find it interesting, can you all hear me?

This morning you are going to take part in some evacuations from an aircraft, as you already know. I would like to spend a few minutes telling you a little bit of the background and what is going to happen. I think the first thing to say is that we at Cranfield have been performing tests looking at issues associated with passenger safety in aircraft for nearly 20 years and this is just one in a long series of experiments that we have been conducting.

What you are going to do it is especially interesting because you will be doing tests which have never been done before and so that is interesting. As you know, you could be asked to go down a slide as you could be asked to go out of an upper deck exit. Don't worry about the detail but the thing I would like to impress upon you is that we mind very much that no one gets hurt in these experiments so would you please all be very careful at all times to ensure that you don't injure yourself or anybody else. We will be having video cameras going all of the time so I don't think that you need me to remind you, don't do anything that you don't want to see played back afterwards. Just bear that in mind. So, be careful with yourselves and with other people because your own safety is the first priority.

Having said that, what we are looking at is how people can get out of an aircraft in the event of an emergency. And if there ever is an emergency, it is very important that people can get out very quickly. Typically in an aircraft accident where there is a fire, there are maybe only two minutes in which to get all of the passengers out of the aeroplane. That is why we have such a large number of you today so that we can look at how a large number of people can get out through various parts of the aeroplane and that is what this is about. I do not want to tell you any more details than those because that might influence what you do and how you behave.

So when I have finished talking here, I will ask you to leave your clipboards on your chairs. For those of you who have got coats and baggage, and so on, you can go and put them in the room at the back, where you were weighed and measured, which will be locked up throughout the morning. And then I will ask you in groups to go up through the stairs there, up to the platform, and into our aircraft which is on the top there.

As you know, we are going to do four evacuations. They all will be different and you will just have to do and see what you feel is most appropriate at the time. But of course, as always, as in a real aircraft emergency, do take notice of the cabin staff and what they tell you to do. So when you board the aircraft for the first time, it will be very like boarding a real aircraft just for a real flight, hopefully not with an emergency. But there to guide you will be our Virgin cabin crew, who you can see there in their uniforms. Flying with Virgin this morning! They will show you to your seats as they would do on any normal flight, give you a pre-flight briefing, be there to help you at all times. But you will find that as the flight starts, things do start to go wrong and then you just simply wait and do as you are told. If you are told to get out of the aeroplane then get out of the aeroplane. If you are told to stay where you are, stay where you are. So whatever you are told to do, you just do as if it was a real situation. When you have to leave the aeroplane, you want to get to the exits as quickly as you can, out of the exits as quickly as you can, if you are told to wait by the cabin crew you must wait. You must not try and push passed them at any time. When you get outside the aircraft you will be shown to go and the people who will show you where to go will be our marshals. You can see two of them at the back here. The marshals have got white shirts on, that is how you can tell who they are, and please do

what you are told because when you get to an exit we do not want you to stop so as people behind you cannot get out. So you will be told where to move onto and please do that quickly.

When everybody is out, we will all come back down here and you will fill in your questionnaire. Your questionnaires, you will see, there are two questionnaires to be filled in after each evacuation. When everybody has finished their questionnaires, we will start the next evacuation. You will find that you will be sitting in a different seat, perhaps in a different part of the aeroplane. Do not worry about that, just go to where you are told to sit. Your seat numbers are the numbers on the sticky labels which are on the front of your bibs. Not the big number, but you will see you have got a sequence of four numbers. On the first evacuation you will sit in that first number, and I will give you details of that when we start to board.

As I mentioned, you could be going down the slide or going down the stairs. If some of you have come here today specifically wanting to go down the slide, and I can see a few smiles, do not worry if you find that you do not go down in the course of the tests. For anyone who doesn't have a seat that enables them to go down the slide, we will have an opportunity for anyone who has not gone down the slide to go down at the end afterwards if you want to. But we are going to be serious about the slide. It is very easy to injure yourself going down the slide. There have been, in the past, terrible accidents. People have been very seriously injured so it is very, very important that you listen very carefully now to what I am about to tell you. If you are going down the slide and you get to the doorway, there will be cabin crew there, take notice of what they say. The first thing to do is to cross your arms like this. The reason for that is because when you jump on the slide, if you put your arms out to slow yourself down, you will get friction burns. So you must keep your arms crossed and that is why you must keep you sleeves down so that you elbows do not hit any part of the slide. So you get to the door, you simply step forward and as you step forward you will find you sit down. You do not need to do a massive jump, you just need to step out, step forward and you will find you sit on the slide. You sit there with your arms crossed and with your legs out in front of you, legs together like this. So you want your legs out in front of you with your toes up in the air. Do not try and get your legs apart and try and slow yourself down with your legs, it will not be successful and you could hurt yourself. Just go with it and you will find that you get nicely down to the bottom. At the bottom of the slide you will find that there are more of our marshals here to help you get up quickly. If you think, in an emergency, you have to get away from the bottom of the slide as quickly as you can because that will ensure that the person coming down behind you will not crash into you. So get away and go out into the car park away from everybody who comes down. But try and remember, slides can be dangerous and you must be careful and think about what you are doing at all times.

As I mentioned, you may also be going down stairs. One of the things we learnt when we did a practice yesterday is that if your shoelaces are not tightly done up, they can become a serious hazard. So could I ask you all to make doubly sure that you shoe laces are really tightly done up so that they are not likely to come undone. Because if you tread on your shoe lace and you trip will fall and if you fall you will fall on top of somebody else perhaps, and we will have a big pile up and that is the last thing that you want. I think it is more common sense really but it is useful to be reminded.

Now you may hear a couple of sounds from the aircraft. You may get sometimes this whistle (*whistle is blown*). Do not take any notice of it, it is nothing to do with you, it is just a way we are communicating which stage the experiment is up to. Just ignore the whistle. On the other hand we do have an alarm system so if we have a real emergency. If those people did fall going down the stairs, we wouldn't want everybody to carry on climbing over the top of them. We would need to stop it quickly. And if we have to stop the evacuation you will hear this sound (*rape alarm is sounded*). If you hear that sound, that does matter, you have got to stop immediately where you are and wait for instructions. We will hope not to use it but it is there for your protection so if you do hear this sound stop and wait immediately.

We ask you please not to wear anything, any piece of jewellery or chain that could get broken. So if you have got chains, either tuck them in or dangly ear-rings or, if you would like, we can look after

them for you. We have got some brown envelopes in the box at the back. If you have got anything that you would like us to look after for you then, when I have finished talking, get an envelope, write your name on it, put your things inside, seal it up and we will look after it and give you your envelope back at the end of the morning. If you have got spectacles, if you need to wear, can you please make sure they are very secure. If you do not need to wear them, again if you want to put them in the brown envelopes, we will look after them and, of course, some of you made need the spectacles to fill in your questionnaires. The other thing that you may want to leave with us, anything that you have got in your back pockets because if you are going to go down a slide, the last thing you want is a wallet or a set of keys in your back pocket because they could be very painful by the time that you get to the bottom.

I think then, those are the main points. If you are in any doubt at any time ask either myself or some of the marshals for information. If you think that you may have hurt yourself or you want to see the medical team, they are here all of the time. The doctor will be on the aircraft actually during the evacuation. If he is there, do not take any notice of him, ignore him. Has anyone got any questions?" If anyone has decided that they do not want to carry on. It is ok to drop out. Just come and have a word with me and we will sort it out for you to drop out, if there is anyone who is getting anxious or they are not happy. In which case, if you have anything for a brown envelope or have coats or bags that you want to leave in the back of the room, if you would like to go and do that now".

6. APPENDIX F: SEATING PLANS (CU)

DAY 1 – 25th January- GROUP A

Volunteer Number	FREE CHOICE	GOING DOWN without crew	GOING UP	GOING DOWN with crew
GROUP A	Upper	Lower	Lower	Upper
1	5E	11A	6A	6G
2	9B	8J	13G	9C
3	1C	5C	8B	4D
4	8A	6B	8H	2J
5	9K	7A	10J	3G
6	3H	13C	7A	9B
7	2E	10B	9C	4A
8	1D	12K	12C	8C
9	4K	5H	12A	7C
10	3E	6E	8A	1G
11	3J	12G	11B	7B
12	4D	5F	6E	1E
13	7E	11K	5E	4J
14	5C	8A	5J	1F
15	10K	12A	14K	4F
16	6H	11D	12B	2E
17	1B	10G	13H	5A
18	3C	10D	11H	6C
19	9J	7C	6H	3F
20	5F	13B	7J	3D
21	2H	7H	6C	10B
22	5J	11F	6J	2C
23	2C	12J	12F	6A
24	9C	7G	14A	3J
25	7C	9C	7K	1H
26	9A	13A	8C	5C
27	7A	13G (WD)	12H (WD)	6K (WD)
28	10B	13D	5A	7G
29	7H	6H	9K	10K
30	5G	9K	13E	4K
31	8B	11E	7C	9J
32	7G	12D	5H	1B
33	1H	9H	14B	4G
34	2B	11G	10K	7H
35	1E	5B	7B	10H
36	4H	10K	11F	9A
37	6K	13F	9H	5G
38	4G	13H	12J	3K
39	5D	5J	10G	3A
40	6C	7D	5K	10J
41	6G	12F	9A	4B

42	4C	14B	5B	5H
43	6A	12H	10F	8H
44	3G	8C	10B	7A
45	5H	10A	13D	1D
46	10C	8H	5G	3H
47	5K	11C	9J	2H
48	7F	5E	7G	5J
49	10A	10J	10D	2F
50	1F	10F	8K	2D
51	3K	5A	6K	2B
52	2F	12B	13A	9K
53	2A	7B	12D	5K
54	7B	7E	13C	6D
55	6F	14J	12K	8K
56	3A	13K	6G	6F
57	8J	6C	11D	6B
58	10H	5K	10E	7K
59	1G	14A	7E	10C
60	8H	11H	13F	4E
61	5B	6K	11E	8A
62	3D	9J	8J	10A
63	4F	7J	11G	9H
64	6B	12C	7F	4C
65	8C	12E	11C	7E
66	2J	11B	5F	2A
67	6D	5D	11J	7F
68	2D	14K	11K	5B
69	4B	13J	12E	3E
70	5A	6D	12G	3C
71	3F	10E	7H	5D
72	4E	9A	6F	1C
73	2G	6G	10A	5E
74	8K	13E	6D	6J
75	7D	6A	13B	2G
76	4J	7F	13J	8B
77	10J	5G	11A	5F
78	6E	6F	13K	7J
79	4A	7K	7D	6E
80	7J	11J	6B	6H
81	3B	9B	5C	8J
82	7K	6J	5D	7D
83	6J	8K	9B	4H
84	9H	8B	14J	3B

DAY 1 – 25th January - GROUP B

Volunteer Number	FREE CHOICE	GOING DOWN without crew	GOING UP	GOING DOWN with crew
GROUP B	**Lower**	**Upper**	**Upper**	**Lower**
101	**5D**	**1B**	**7K**	**12C**
102	**11H**	**5G**	**2D**	**6K**
103	**10D**	**1H**	**5E**	**5F**
104	**6F**	**3E**	**3K**	**5K**
105	**11B**	**6E**	**2F**	**10A**
106	**9H**	**7E**	**10H**	**5B**
107	**10E**	**3B**	**4H**	**12H**
108	**10J**	**3A**	**2B**	**7H**
109	**7H**	**1E**	**5A**	**12F**
110	**6C**	**8J**	**5D**	**12D**
111	**13J**	**6G**	**9C**	**6H**
112	**13H**	**2B**	**3F**	**10D**
113	**12F**	**8K**	**6G**	**11B**
114	**9C**	**2C**	**10C**	**12B**
115	**11C**	**1C**	**2A**	**9K**
116	**5B**	**6D**	**3C**	**13G**
117	**10F**	**4C**	**7D**	**9H**
118	**13F**	**7C**	**1D**	**9A**
119	**13K**	**4F**	**5H**	**11E**
120	**14B**	**9K**	**9B**	**13F**
121	**11J**	**1D**	**7G**	**13K**
122	**5H**	**7A**	**3B**	**10K**
123	**7G**	**7D**	**1H**	**13A**
124	**6K**	**6B**	**3G**	**11F**
125	**13B**	**5D**	**1C**	**7F**
126	**10K**	**4D**	**4A**	**6J**
127	**5F**	**9B**	**4B**	**7B**
128	**8K**	**8A**	**6E**	**9C**
129	**13G**	**8C**	**10B**	**12J**
130	**6D**	**7H**	**8C**	**7G**
131	**5C**	**7F**	**8H**	**13J**
132	**5A**	**2F**	**4K**	**9B**
133	**12C**	**10C**	**5J**	**6D**
134	**7A**	**4E**	**6B**	**13E**
135	**9J**	**2G**	**6A**	**10F**
136	**13A**	**7K**	**2C**	**5D**
137	**12A**	**2H**	**1E**	**5E**
138	**7F**	**5F**	**10A**	**6A**
139	**12B**	**4J**	**2H**	**7E**
140	**6B**	**10B**	**5K**	**10J**
141	**7J**	**5A**	**5C**	**14B**
142	**8A**	**8B**	**3H**	**11K**
143	**7D**	**3C**	**4D**	**11J**
144	**13E**	**5J**	**5G**	**6G**

145	9K	10A	6D	6B
146	7B	6J	7C	8A
147	12E	3D	8K	13D
148	10G	10J	4F	13H
149	7K	5H	3D	12G
150	6A	7G	5B	13C
151	9B	9H	3E	7D
152	5G	4A	9H	7C
153	11E	4B	7H	6F
154	14J	6F	9J	5J
155	6H	3G	6C	11G
156	7E	9J	4C	11C
157	12G	4H	1F	8K
158	8J	6C	7B	7A
159	11K	6K	2E	9J
160	8B	1F	7F	14J
161	11G	2E	3A	12A
162	11F	4G	6J	10G
163	9A	3K	7E	8C
164	12J	8H	7A	10B
165	13D	5K	1G	7J
166	12H	3F	8B	12K
167	7C	1G	8J	6E
168	6G	3H	6F	13B
169	8C	5B	2G	11A
170	12K	2D	5F	8J
171	10B	6H	4G	5C
172	8H	5C	1B	12E
173	14A	2A	7J	8B
174	5E	2J	4E	11D
175	14K	10K	2J	11H
176	10A	6A	10K	6C
177	6J	4K	3J	14K
178	11D	10H	9A	5G
179	13C	7B	4J	10E
180	6E	9C	6K	5A
181	5K	3J	10J	14A
182	12D	9A	6H	7K
183	11A	5E	8A	8H
184	5J	7J	9K	5H

DAY 2 – 1st February - GROUP A

Volunteer Number	GOING DOWN with crew	GOING UP	GOING DOWN without crew	FREE CHOICE
	Upper	Upper	Lower	Lower
1	6G	7K	11A	5D
2	9C	2D	8J	11H
3	4D	5E	5C	10D
4	2J	3K	6B	6F
5	3G	2F	7A	11B
6	9B	10H	13C	9H
7	4A	4H	10B	10E
8	8C	2B	12K	10J
9	7C	5A	5H	7H
10	1G	5D	6E	6C
11	7B	9C	12G	13J
12	1E	3F	5F	13H
13	4J	6G	11K	12F
14	1F	10C	8A	9C
15	4F	2A	12A	11C
16	2E	3C	11D	5B
17	5A	7D	10G	10F
18	6C	1D	10D	13F
19	3F	5H	7C	13K
20	3D	9B	13B	14B
21	10B	7G	7H	11J
22	2C	3B	11F	5H
23	6A	1H	12J	7G
24	3J	3G	7G	6K
25	1H	1C	9C	13B
26	5C	4A	13A	10K
27	6K	4B	13G	5F
28	7G	6E	13D	8K
29	10K	10B	6H	13G
30	4K	8C	9K	6D
31	9J	8H	11E	5C
32	1B	4K	12D	5A
33	4G	5J	9H	12C
34	7H	6B	11G	7A
35	10H	6A	5B	9J
36	9A	2C	10K	13A
37	5G	1E	13F	12A
38	3K	10A	13H	7F
39	3A	2H	5J	12B
40	10J	5K	7D	6B
41	4B	5C	12F	7J
42	5H	3H	14B	8A
43	8H	4D	12H	7D

44	7A	5G	8C	13E
45	1D	6D	10A	9K
46	3H	7C	8H	7B
47	2H	8K	11C	12E
48	5J	4F	5E	10G
49	2F	3D	10J	7K
50	2D	5B	10F	6A
51	2B	3E	5A	9B
52	9K	9H	12B	5G
53	5K	7H	7B	11E
54	6D	9J	7E	14J
55	8K	6C	14J	6H
56	6F	4C	13K	7E
57	6B	1F	6C	12G
58	7K	7B	5K	8J
59	10C	2E	14A	11K
60	4E	7F	11H	8B
61	8A	3A	6K	11G
62	10A	6J	9J	11F
63	9H	7E	7J	9A
64	4C	7A	12C	12J
65	7E	1G	12E	13D
66	2A	8B	11B	12H
67	7F	8J	5D	7C
68	5B	6F	14K	6G
69	3E	2G	13J	8C
70	3C	5F	6D	12K
71	5D	4G	10E	10B
72	1C	1B	9A	8H
73	5E	7J	6G	14A
74	6J	4E	13E	5E
75	2G	2J	6A	14K
76	8B	10K	7F	10A
77	5F	3J	5G	6J
78	7J	9A	6F	11D
79	6E	4J	7K	13C
80	6H	6K	11J	6E
81	8J	10J	9B	5K
82	7D	6H	6J	12D
83	4H	8A	8K	11A
84	3B	9K	8B	5J

DAY 2 – 1st February - GROUP B

Volunteer Number	GOING DOWN with crew	GOING UP	GOING DOWN without crew	FREE CHOICE
	Lower	Lower	Upper	Upper
101	12C	6A	1B	5E
102	6K	13G	5G	9B
103	5F	8B	1H	1C
104	5K	8H	3E	8A
105	10A	10J	6E	9K
106	5B	7A	7E	3H
107	12H	9C	3B	2E
108	7H	12C	3A	1D
109	12F	12A	1E	4K
110	12D	8A	8J	3E
111	6H	11B	6G	3J
112	10D	6E	2B	4D
113	11B	5E	8K	7E
114	12B	5J	2C	5C
115	9K	14K	1C	10K
116	13G	12B	6D	6H
117	9H	13H	4C	1B
118	9A	11H	7C	3C
119	11E	6H	4F	9J
120	13F	7J	9K	5F
121	13K	6C	1D	2H
122	10K	6J	7A	5J
123	13A	12F	7D	2C
124	11F	14A	6B	9C
125	7F	7K	5D	7C
126	6J	8C	4D	9A
127	7B	12H	9B	7A
128	9C	5A	8A	10B
129	12J	9K	8C	7H
130	7G	13E	7H	5G
131	13J	7C	7F	8B
132	9B	5H	2F	7G
133	6D	14B	10C	1H
134	13E	10K	4E	2B
135	10F	7B	2G	1E
136	5D	11F	7K	4H
137	5E	9H	2H	6K
138	6A	12J	5F	4G
139	7E	10G	4J	5D
140	10J	5K	10B	6C
141	14B	9A	5A	6G
142	11K	5B	8B	4C
143	11J	10F	3C	6A

144	6G	10B	5J	3G
145	6B	13D	10A	5H
146	8A	5G	6J	10C
147	13D	9J	3D	5K
148	13H	7G	10J	7F
149	12G	10D	5H	10A
150	13C	8K	7G	1F
151	7D	6K	9H	3K
152	7C	13A	4A	2F
153	6F	12D	4B	2A
154	5J	13C	6F	7B
155	11G	12K	3G	6F
156	11C	6G	9J	3A
157	8K	11D	4H	8J
158	7A	10E	6C	10H
159	9J	7E	6K	1G
160	14J	13F	1F	8H
161	12A	11E	2E	5B
162	10G	8J	4G	3D
163	8C	11G	3K	4F
164	10B	7F	8H	6B
165	7J	11C	5K	8C
166	12K	5F	3F	2J
167	6E	11J	1G	6D
168	13B	11K	3H	2D
169	11A	12E	5B	4B
170	8J	12G	2D	5A
171	5C	7H	6H	3F
172	12E	6F	5C	4E
173	8B	10A	2A	2G
174	11D	6D	2J	8K
175	11H	13B	10K	7D
176	6C	13J	6A	4J
177	14K	11A	4K	10J
178	5G	13K	10H	6E
179	10E	7D	7B	4A
180	5A	6B	9C	7J
181	14A	5C	3J	3B
182	7K	5D	9A	7K
183	8H	9B	5E	6J
184	5H	14J	7J	9H

7. APPENDIX G: LIGHTING LEVELS WITHIN CABIN (CU)

All measurements are in lux.

Measurements within the cabin were taken at the centre point of the main aisle, at armrest height at intervals within the cabin. For safety, additional lighting was placed on the staircase; measurements were taken at the centre handrail, at handrail height.

On the lower deck the front section of the cabin is defined as the nine rows of seats in front of the internal staircase and aft section of the cabin is defined as the ten rows of seats to the rear of the staircase. On the upper deck there is only one cabin section.

Light levels within cabin during boarding (take off and landing conditions)

Location in cabin	**Light level in lux**	
	Port aisle (left)	**Starboard aisle (right)**
Lower Deck		
Row 1 (first row of front section of cabin)	80.6	80.4
Row 9 (last row of front section)	24.3	23.8
Row 10 (first row of aft section of cabin)	112.8	112.3
Row 18 (last row of aft section of cabin)	75.1	71.5
Upper deck		
Row 1 (first row of seating)	44.2	45.7
Row 10 (last row of seating)	9.4	9.5

Light levels within cabin during engine noise (night conditions)

Location in cabin	**Light level in lux**	
	Port aisle (left)	**Starboard aisle (right)**
Lower Deck		
Row 1 (first row of front section of cabin)	28.0	29.2
Row 9 (last row of front section)	0.03	0.03
Row 10 (first row of aft section of cabin)	18.1	19.7
Row 18 (last row of aft section of cabin)	1.5	1.4
Upper deck		
Row 1 (first row of seating)	0.02	0.03
Row 10 (last row of seating)	1.6	1.4

Light levels within cabin during evacuation (emergency conditions)

Location in cabin	**Light level in lux**	
	Port aisle (left)	**Starboard aisle (right)**
Lower Deck		
Row 1 (first row of front section of cabin)	0.09	0.08
Row 9 (last row of front section)	0.03	0.03
Row 10 (first row of aft section of cabin)	1.1	1.1
Row 18 (last row of aft section of cabin)	0.03	0.03
Upper deck		
Row 1 (first row of seating)	0.02	0.03
Row 10 (last row of seating)	0.07	0.07

Light levels on staircase during boarding (take off and landing conditions)

Location on staircase	**Light level in lux**
Top step of staircase	0.6
Middle step of staircase	20.6
Bottom step of staircase	168.0

Light levels on staircase during engine noise (night conditions)

Location on staircase	**Light level in lux**
Top step of staircase	0.09
Middle step of staircase	8.1
Bottom step of staircase	165.3

Light levels on staircase during evacuation (emergency conditions)

Location on staircase	**Light level in lux**
Top of staircase	0.04
Middle step of staircase	10.2
Base of staircase	2.7

8. APPENDIX H: TRANSCRIPT OF SAFETY BRIEFING (CU)

Ladies & Gentlemen, welcome on board.

As the safety equipment on this aircraft may differ from that on other aircraft, it is in your own best interests to pay attention to this safety briefing. In the seat pocket in front of you there is a safety card, which the Captain would like you to read carefully before takeoff… *(cabin crew to demonstrate)* This contains details of the demonstration.

The emergency exits are clearly marked, and are being pointed out to you. These are the doors at the front of the cabin… *(cabin crew to demonstrate)* the doors in the centre of the cabin… *(cabin crew to demonstrate)* and the doors in the rear of the cabin… *(cabin crew to demonstrate)*. In the event of an emergency, floor level lighting will illuminate, showing the routes to these exits... *(cabin crew to demonstrate)*.

For those of you unfamiliar with the operation of the seat belt, it is fastened and adjusted as demonstrated… *(cabin crew to demonstrate)* and unfastened like this... *(cabin crew to demonstrate)*.

We would also like to advise you of the emergency oxygen supply on board. Should additional oxygen be required throughout the cabin, the panel above your head will open automatically… *(cabin crew to demonstrate)* and masks like these will drop down... *(cabin crew to demonstrate)*. Remain seated, pull the mask towards you, place over nose and mouth and breathe normally... *(cabin crew to demonstrate)*. Adults should fit their own masks before assisting children.

Please now ensure that your seat table is folded away, your seat back is upright with the arm rest down, and your seatbelt is tightly fastened.

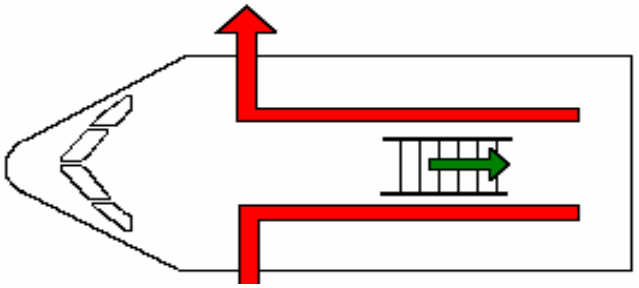
Thank you for your attention. We would like to wish you a pleasant flight *(cabin crew to check that passenger seatbelts are fastened).*

9. APPENDIX I: PASSENGER SAFETY CARD (CU)

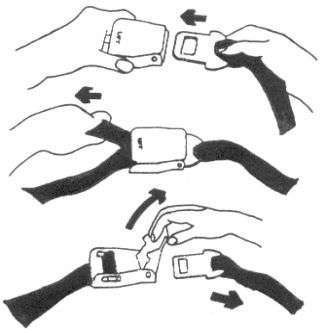
Cranfield Airways

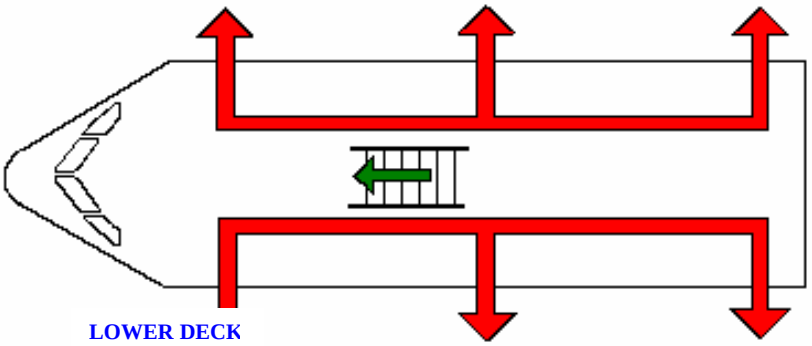
Please study and leave on the aircraft

FOR YOUR SAFETY
POUR VOTRE SECURITE
FUR IHRE SICHERHEIT
PER LA VOSTRA SICUREZZA
PARA SU SEGURIDAD
PARA A SUA SEGURANÇA

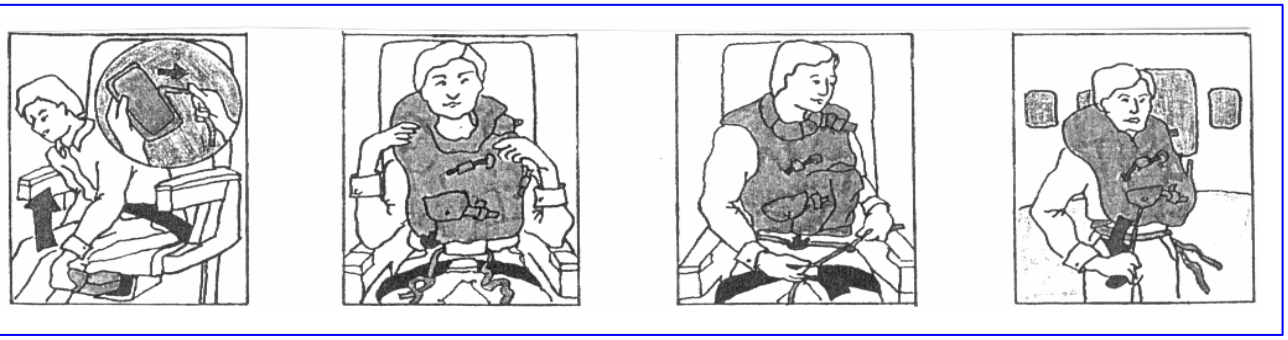


UPPER DECK





LOWER DECK



We would like to remind you that this is a non-smoking flight

10. APPENDIX J: EVACUATION SCENARIOS (CU)

The event within the evacuation scenarios were based on those used by Virgin Atlantic Airways.

Lights on normal lighting for safety briefing

5 seconds of silence for crew to check cabin

As the engine noise started the cabin lights were transferred to a night setting.

The duration of engine noise was dependent on the trial number during trial 1 there was 60 seconds, during trial 2 there was 90 seconds, during trial 3 there was 120 seconds and during trial 4 there was 30 seconds of engine noise. The engine scenarios were identical for each test day.

Engine noise was then played continuously until the evacuation call.

After 5 seconds of engine noise the Captain said ‘emergency stations’. This signal was for the crew only, a further 10 seconds of engine noise were heard followed by the Captain saying ‘brace, brace’, the crew responded by shouting ‘heads down and feet back’ initially twice and then at five second intervals for 20 seconds until the captain gave the cue to evacuate ‘This is an emergency, evacuate, evacuate, evacuate! - Lights to emergency lighting only.

On the cue the crew opened their exits and began issuing evacuation commands ‘Open seatbelts and get out!’ ‘Come this way’ and ‘Leave everything behind’.

After a 10 second delay to represented the slide deployment time, a whistle was sounded to allow stewards located outside the exits to make the exit status know to the cabin crew.

11. APPENDIX K: CRANFIELD UNIVERSITY PASSENGER POST-EVACUATION QUESTIONNAIRE (CU)

TRIAL 1

Volunteer Number: _____

The questions in this questionnaire all relate to the evacuation that you have just completed. Please be honest, and complete as much as possible. Your answers will help us to improve the safety of air travel for passengers.

1. On a scale of 1 to 7, where 1 is very easy and 7 is very difficult, please indicate the difficulty in **moving out of your seat** to reach an aisle. Please circle **one** option only.

1	2	3	4	5	6	7
Very easy						**Very difficult**

2. On a scale of 1 to 7, where 1 is very easy and 7 is very difficult, please indicate the difficulty you experienced in **finding an open door**. Please circle **one** option only.

1	2	3	4	5	6	7
Very easy						**Very difficult**

3. On a scale of 1 to 7, where 1 is very easy and 7 is very difficult, please indicate the difficulty you experienced in **moving towards an open door**. Please circle **one** option only.

1	2	3	4	5	6	7
Very easy						**Very difficult**

4. On a scale of 1 to 7, where 1 is very easy and 7 is very difficult, please indicate the difficulty you experienced in **moving through the door itself**. Please circle **one** option only.

1	2	3	4	5	6	7
Very easy						**Very difficult**

5. Why did you use the door that you chose to **evacuate** through? Please circle the **one** factor that was **most important** in making your decision.

   a. It was the nearest available door
   b. It was the door that I had entered/boarded by
   c. It was the door that the cabin crew directed me to
   d. It was the door with the shortest queue
   e. It was the first available door that I passed
   f. It was the only door I could see
   g. I followed the passengers in front
   h. I knew about the door location from the safety briefing and/or safety card
   i. Other (please specify)

      _____

6. Did you use the **internal staircase** during your evacuation? Please circle **one** option only.

   a. **No (Please go to question 9)**
   b. Yes

7. **If yes,** did anything relating to the internal staircase **help** your evacuation?

   _____
   _____
   _____

8. **If yes,** did anything relating to the internal staircase **hinder** your evacuation?

   _____
   _____
   _____

9. Did you use the **slide** during your evacuation? Please circle **one** option only.

   a. **No (Please go to question 12)**
   b. Yes

10. **If yes,** did anything relating to the slide **help** your evacuation?

    _____
    _____
    _____

11. **If yes,** did anything relating to the slide **hinder** your evacuation?

    _____
    _____
    _____

12. On a scale of 1 to 7, where 1 is very helpful and 7 is not at all helpful, please indicate the extent to which **your awareness of the cabin layout** assisted you in this evacuation. Please circle **one** option only.

1	2	3	4	5	6	7
Very helpful						**Not at all helpful**

13. If there are any comments you would like to make about **your awareness of the cabin layout** in this evacuation, please provide them here.

_____
_____
_____

14. On a scale of 1 to 7, where 1 is very helpful and 7 is not at all helpful, please indicate the extent to which **cabin crew instructions** assisted you in this evacuation. Please circle **one** option only.

1	2	3	4	5	6	7
Very helpful						**Not at all helpful**

15. If there are any comments you would like to make about **cabin crew instructions** in this evacuation, please provide them here.

_____
_____
_____

16. The cabin crew provided a **safety briefing and demonstration** prior to this evacuation. With hindsight, what information do you think could have been included to improve your evacuation?

_____
_____
_____

17. If there are any other comments you would like to make regarding the evacuation you have just completed, please provide them here.

_____
_____
_____
_____
_____

Please check that you have answered all of the questions. Thank you.

12. APPENDIX L: THANK YOU LETTER (CU)

Cranfield University
Cranfield
Bedfordshire
MK43 0AL
England

Fax: 01234 750192
Tel: 01234 750111

Thank you for taking part in these evacuation trials. Should you experience any problems following these trials, and would like to talk to someone, please do not hesitate to contact the Human Factors Group at the above address.

13. APPENDIX M: CRANFIELD UNIVERSITY RAW EVACUATION DATA (CU)

13.1.1. Raw evacuation times - Day 1, 25 January 2003

- Video footage was time coded from the command "Evacuate, evacuate, evacuate!" Exits were made available 10.7 seconds later.
- Seat numbers in blue correspond to the lower deck and seat numbers in red correspond to the upper deck.

Volunteer Number	Trial 1			Trial 2			Trial 3			Trial 4		
	Seat	Exit	Time	Seat	Exit	Time	Seat	Exit	Time	Seat	Exit	Time
1	5E	LR2	36.7	11A	LL2	18.6	6A	UL1	65.2	6G	LR2	39.1
2	9B	LR2	59.5	8J	LR2	21.5	13G	UL1	48.9	9C	LL2	18.6
3	1C	UR1	43.7	5C	LR2	29.9	8B	UL1	69.2	4D	LL2	40.7
4	8A	LR2	47.6	6B	LL2	24.4	8H	UL1	55.2	2J	LR2	42.7
5	9K	LR2	44.7	7A	LL2	21.6	10J	UR1	62.4	3G	LR2	47.6
6	3H	UR1	19.4	13C	LL2	15.7	7A	UL1	73.2	9B	LL2	25.6
7	2E	UR1	53.6	10B	LL2	14.3	9C	UL1	73.7	4A	LL2	37.7
8	1D	UR1	33.5	12K	LR2	23.0	12C	UL1	56.9	8C	LL2	21.2
9	4K	LR2	55.0	5H	LR2	24.6	12A	UL1	56.3	7C	LL2	20.7
10	3E	LL2	57.0	6E	LL2	23.5	8A	UL1	77.7	1G	LR2	52.1
11	3J	UR1	27.7	12G	LR2	15.5	11B	UL1	42.6	7B	LR2	27.3
12	4D	UR1	55.8	5F	LR2	23.0	6E	UL1	59.8	1E	LL2	52.7
13	7E	LR2	27.3	7E	LR2	18.6	5E	UL1	72.9	4J	LR2	38.6
14	5C	UR1	75.4	8A	LL2	19.5	5J	UL1	64.5	1F	LR2	51.1
15	10K	LR2	40.3	12A	LL2	24.4	14K	UL1	64.8	4F	LL2	42.3
16	6H	LL2	55.2	11D	LL2	15.4	12B	UL1	43.8	2E	LR2	49.1
17	1B	UR1	50.8	10G	LR2	16.3	13H	UL1	46.8	5A	LL2	32.3
18	3C	UR1	42.4	10D	LL2	14.8	11H	UR1	54.9	6C	LL2	39.8
19	9J	LR2	45.8	7C	LL2	28.0	6H	UL1	66.0	3F	LR2	43.8
20	5F	LR2	56.4	13B	LL2	20.2	7J	UL1	70.6	3D	LL2	53.2
21	2H	UR1	15.7	7H	LR2	28.3	6C	UL1	57.9	10B	LL2	19.2
22	5J	LL2	57.7	11F	LR2	17.2	6J	UL1	76.8	2C	LL2	50.7
23	2C	UR1	64.0	12J	LR2	22.6	12F	UL1	48.3	6A	LL2	36.0
24	9C	LR2	62.1	7G	LR2	15.8	14A	UR1	54.9	3J	LL2	35.0
25	7C	LL2	54.2	9C	LL2	14.2	7K	UR1	73.5	1H	LR2	43.4

26	9A	LR2	46.7	13A	LL2	23.8	8C	UL1	71.8	5C	LL2	41.3
27	7A	LR2	68.7	WD	WD	WD	WD	WD	WD	WD	WD	WD
28	10B	LR2	33.9	13D	LL2	21.7	5A	UL1	75.4	7G	LR2	31.2
29	7H	LL2	51.6	6H	LR2	27.1	9K	UR1	68.1	10K	LR2	17.7
30	5G	UR1	38.8	9K	LR2	17.3	13E	UL1	43.3	4K	LR2	34.5
31	8B	LR2	45.1	11E	LL2	16.4	7C	UL1	54.5	9J	LR2	20.5
32	7G	LR2	69.2	12D	LL2	13.7	5H	UL1	61.8	1B	LL2	45.9
33	1H	UR1	17.1	9H	LR2	15.6	14B	UL1	44.9	4G	LR2	41.5
34	2B	LR2	61.1	11G	LR2	14.3	10K	UL1	63.0	7H	LR2	17.1
35	1E	UR1	36.4	5B	LL2	28.8	7B	UL1	60.8	10H	LR2	30.5
36	4H	UR1	75.6	10K	LR2	14.7	11F	UL1	51.5	9A	LL2	24.6
37	6K	LL2	51.8	13F	LR2	19.5	9H	UR1	52.6	5G	LL2	36.4
38	4G	UR1	20.2	13H	LR2	19.0	12J	UL1	44.3	3K	LR2	39.6
39	5D	LL2	60.2	5J	LR2	29.4	10G	UR1	51.1	3A	LL2	44.9
40	6C	LL2	59.2	7D	LL2	27.3	5K	UR1	74.5	10J	LR2	22.0
41	6G	UR1	26.1	12F	LR2	15.9	9A	UR1	71.8	4B	LR2	35.5
42	4C	UR1	63.0	14B	LL2	22.0	5B	UL1	72.0	5H	LR2	37.9
43	6A	LL2	58.0	12H	LR2	17.7	10F	UL1	59.1	8H	LR2	32.5
44	3G	UR1	40.4	8C	LL2	18.0	10B	UR1	78.2	7A	LL2	28.6
45	5H	UR1	30.7	10A	LL2	12.8	13D	UL1	40.9	1D	LL2	49.7
46	10C	LR2	32.7	8H	LR2	13.3	5G	UL1	62.1	3H	LR2	45.1
47	5K	LR2	57.6	11C	LL2	13.3	9J	UL1	49.7	2H	LR2	44.6
48	7F	LR2	43.5	5E	LL2	29.4	7G	UR1	64.7	5J	LR2	34.0
49	10A	LR2	44.0	10J	LR2	13.6	10D	UL1	51.9	2F	LR2	49.6
50	1F	UR1	22.9	10F	LR2	15.0	8K	UL1	67.5	2D	LL2	52.1
51	3K	UR1	52.5	5A	LL2	26.5	6K	UL1	75.4	2B	LL2	51.1
52	2F	UR1	48.1	12B	LL2	23.2	13A	UL1	53.1	9K	LR2	25.4
53	2A	LL2	61.1	7B	LL2	25.1	12D	UL1	74.8	5K	LR2	32.0
54	7B	UR1	69.8	7E	LL2	16.4	13C	UR1	44.5	6D	LL2	44.0
55	6F	LR2	54.0	14J	LR2	21.0	12K	UR1	62.6	8K	LR2	21.2
56	3A	LL2	64.5	13K	LR2	20.6	6G	UL1	68.4	6F	LL2	33.5
57	8J	LR2	52.5	6C	LL2	31.0	11D	UL1	55.5	6B	LR2	33.5
58	10H	LR2	42.9	5K	LR2	26.3	10E	UL1	58.6	7K	LR2	27.9

59	1G	UR1	31.8	14A	LL2	27.5	7E	UL1	71.2	10C	LL2	23.9
60	8H	LR2	48.0	11H	LR2	14.0	13F	UL1	50.3	4E	LR2	46.6
61	5B	LL2	48.0	6K	LR2	22.2	11E	UL1	41.8	8A	LL2	31.0
62	3D	UR1	46.0	9J	LR2	16.5	8J	UR1	66.9	10A	LL2	26.3
63	4F	UR1	72.9	7J	LR2	25.1	11G	UL1	46.5	9H	LR2	19.6
64	6B	LR2	46.3	12C	LL2	17.2	7F	UR1	70.7	4C	LL2	43.2
65	8C	LR2	42.1	12E	LL2	26.4	11C	UL1	57.6	7E	LL2	32.0
66	2J	UR1	22.5	11B	LL2	15.0	5F	UL1	76.3	2A	LL2	47.0
67	6D	LL2	49.4	5D	LL2	31.5	11J	UR1	57.0	7F	LR2	30.0
68	2D	UR1	34.9	14K	LR2	21.5	11K	UL1	49.1	5B	LR2	37.1
69	4B	UR1	67.8	13J	LR2	20.0	12E	UL1	40.1	3E	LL2	48.0
70	5A	LL2	48.8	6D	LL2	30.1	12G	UL1	45.9	3C	LR2	45.5
71	3F	UR1	56.5	10E	LL2	16.9	7H	UL1	74.9	5D	LL2	38.6
72	4E	LL2	52.4	9A	LL2	17.2	6F	UL1	68.8	1C	LL2	48.7
73	2G	UR1	29.3	6G	LR2	27.7	10A	UL1	53.8	5E	LL2	34.3
74	8K	LR2	48.5	13E	LL2	18.3	6D	UL1	60.3	6J	LR2	29.2
75	7D	LR2	55.9	6A	LL2	22.8	13B	UR1	59.9	2G	LR2	50.8
76	4J	LR2	59.0	7F	LR2	18.2	13J	UR1	70.3	8B	LL2	28.0
77	10J	LR2	37.9	5G	LR2	25.4	11A	UL1	40.5	5F	LR2	34.9
78	6E	LL2	50.6	6F	LL2	20.8	13K	UL1	54.5	7J	LR2	27.0
79	4A	LL2	53.3	7K	LR2	19.0	7D	UL1	74.0	6E	LR2	29.0
80	7J	LR2	51.0	11J	LR2	16.8	6B	UL1	67.6	6H	LR2	36.3
81	3B	LL2	62.7	9B	LL2	15.7	5C	UL1	63.9	8J	LR2	26.2
82	7K	LR2	51.7	7K	LR2	23.8	5D	UL1	69.2	7D	LL2	29.1
83	6J	LR2	53.3	8K	LR2	20.6	9B	UR1	73.6	4H	LR2	40.1
84	9H	LL2	51.0	8B	LL2	18.6	14J	UL1	50.8	3B	LL2	49.4
100[1]	1J	UR1	13.4	1J	LR2	54.8	1J	UR1	13.0	1J	LR2	48.1
101	5D	LL2	27.8	1B	LL2	50.8	7K	UR1	37.3	12C	LL2	14.3
102	11H	LR2	19.7	5G	LR2	42.0	2D	UL1	15.7	6K	LR2	21.5
103	10D	LL2	14.0	1H	LR2	56.2	5E	UL1	20.6	5F	LR2	26.1

[1] Volunteer 100 was a member of the Cranfield University research team, who sat on the upper deck in seat 1J for all trials. This was done to ensure protection for the cabin crew at UR1 when opening the exit.

104	6F	LR2	23.6	3E	LL2	46.3	3K	UL1	32.2	5K	LR2	24.3
105	11B	LL2	21.8	6E	LR2	35.4	2F	UR1	26.8	10A	LL2	13.4
106	9H	LR2	15.7	7E	LR2	27.5	10H	UL1	45.5	5B	LL2	30.1
107	10E	LL2	13.4	3B	LL2	40.3	4H	UR1	39.8	12H	LR2	16.1
108	10J	LR2	14.2	3A	LL2	41.0	2B	UL1	17.0	7H	LR2	25.5
109	7H	LR2	22.6	1E	LL2	52.0	5A	UR1	38.3	12F	LR2	17.5
110	6C	LL2	27.5	8J	LR2	26.0	5D	UR1	25.2	12D	LL2	13.0
111	13J	LR2	23.8	6G	LR2	36.5	9C	UR1	49.4	6H	LR2	26.6
112	13H	LR2	18.6	2B	LR2	46.4	3F	UL1	27.7	10D	LL2	15.4
113	12F	LR2	16.6	8K	LR2	17.8	6G	UL1	34.4	11B	LL2	14.0
114	9C	LL2	14.4	2C	LL2	49.7	10C	UR1	46.7	12B	LL2	19.2
115	11C	LL2	16.2	1C	LL2	47.9	2A	UL1	18.6	9K	LR2	18.8
116	5B	LL2	26.8	6D	LL2	35.3	3C	UL1	17.9	13G	LR2	20.9
117	10F	LR2	17.8	4C	LR2	37.3	7D	UL1	47.8	9H	LR2	14.4
118	13F	LR2	20.5	7C	LL2	32.5	1D	UL1	13.9	9A	LL2	17.9
119	13K	LR2	25.1	4F	LR2	42.7	5H	UL1	33.3	11E	LL2	18.3
120	14B	LL2	25.0	9K	LL2	20.7	9B	UL1	35.5	13F	LR2	21.7
121	11J	LR2	20.9	1D	LL2	51.6	7G	UR1	43.9	13K	LR2	22.3
122	5H	LR2	28.6	7A	LL2	29.7	3B	UL1	18.7	10K	LR2	13.6
123	7G	LR2	21.2	7D	LL2	34.1	1H	UR1	19.5	13A	LL2	23.0
124	6K	LR2	22.1	6B	LL2	31.7	3G	UR1	33.4	11F	LR2	16.5
125	13B	LL2	21.1	5D	LL2	36.4	1C	UL1	13.6	7F	LR2	20.7
126	10K	LR2	14.0	4D	LR2	45.2	4A	UL1	23.7	6J	LR2	23.1
127	5F	LR2	24.4	9B	LL2	29.1	4B	UL1	21.4	7B	LL2	19.8
128	8K	LR2	17.2	8A	LL2	20.1	6E	UL1	21.9	9C	LL2	13.8
129	13G	LR2	19.1	8C	LR2	20.2	10B	UL1	38.1	12J	LR2	19.4
130	6D	LL2	25.3	7H	LL2	25.3	8C	UR1	52.9	7G	LR2	23.7
131	5C	LL2	28.3	7F	LR2	24.2	8H	UR1	46.7	13J	LR2	23.5
132	5A	LL2	24.6	2F	LR2	51.2	4K	UR1	38.5	9B	LL2	16.4
133	12C	LL2	17.4	10C	LL2	19.0	5J	UL1	37.7	6D	LL2	28.7
134	7A	LL2	20.1	4E	LR2	47.0	6B	UL1	36.1	13E	LL2	24.2
135	9J	LR2	16.1	2G	LR2	50.3	6A	UL1	26.3	10F	LR2	15.8
136	13A	LL2	23.5	7K	LR2	22.0	2C	UL1	15.0	5D	LL2	29.4

137	12A	LL2	25.5	2H	LR2	51.4	1E	UL1	15.2	5E	LL2	24.7
138	7F	LR2	18.4	5F	LR2	38.6	10A	UL1	28.8	6A	LL2	24.2
139	12B	LL2	23.1	4J	LR2	39.4	2H	UR1	32.2	7E	LL2	22.7
140	6B	LL2	26.0	10B	LL2	26.7	5K	UL1	31.1	10J	LR2	13.2
141	7J	LL2	17.8	5A	LL2	36.0	5C	UR1	21.8	14B	LL2	16.8
142	8A	LL2	16.6	8B	LL2	33.3	3H	UL1	26.6	11K	LR2	19.2
143	7D	LL2	23.6	3C	LR2	43.7	4D	UL1	19.9	11J	LR2	18.0
144	13E	LL2	24.1	5J	LR2	34.3	5G	UL1	33.5	6G	LR2	28.2
145	9K	LR2	16.6	10A	LR2	28.0	6D	UL1	16.2	6B	LL2	28.3
146	7B	LL2	19.2	6J	LR2	25.6	7C	UL1	48.9	8A	LL2	19.1
147	12E	LL2	20.3	3D	LL2	49.8	8K	UL1	30.0	13D	LL2	20.7
148	10G	LR2	15.6	10J	LR2	21.0	4F	UL1	28.4	13H	LR2	18.4
149	7K	LR2	20.7	5H	LR2	35.8	3D	UL1	14.2	12G	LR2	15.4
150	6A	LL2	22.2	7G	LL2	28.2	5B	UL1	32.8	13C	LL2	17.5
151	9B	LL2	15.8	9H	LL2	17.8	3E	UL1	30.5	7D	LL2	25.9
152	5G	LR2	27.6	4A	LL2	38.4	9H	UL1	42.5	7C	LL2	23.7
153	11E	LL2	16.9	4B	LL2	39.1	7H	UL1	34.7	6F	LR2	18.1
154	14J	LR2	24.5	6F	LR2	31.1	9J	UL1	36.7	5J	LR2	27.7
155	6H	LR2	25.5	3G	LR2	49.8	6C	UL1	39.6	11G	LR2	13.9
156	7E	LL2	17.2	9J	LL2	19.4	4C	UR1	19.1	11C	LL2	14.5
157	12G	LR2	15.1	4H	LR2	47.2	1F	UR1	14.4	8K	LR2	17.1
158	8J	LR2	19.6	6C	LR2	31.7	7B	UL1	37.6	7A	LL2	22.0
159	11K	LR2	22.4	6K	LR2	25.9	2E	UL1	16.6	9J	LR2	15.9
160	8B	LL2	20.7	1F	LL2	57.1	7F	UR1	41.6	14J	LR2	24.3
161	11G	LR2	13.5	2E	LR2	52.6	3A	UR1	26.7	12A	LL2	21.6
162	11F	LR2	17.3	4G	LR2	44.8	6J	UR1	39.4	10G	LR2	15.0
163	9A	LL2	18.2	3K	LR2	45.6	7E	UL1	37.0	8C	LL2	15.2
164	12J	LR2	21.8	8H	LR2	30.3	7A	UL1	24.8	10B	LL2	15.1
165	13D	LL2	19.6	5K	LR2	29.0	1G	UR1	16.3	7J	LR2	19.9
166	12H	LR2	14.8	3F	LR2	49.0	8B	UL1	38.7	12K	LR2	20.1
167	7C	LL2	21.5	1G	LL2	54.5	8J	UL1	34.7	6E	LL2	26.9
168	6G	LR2	26.3	3H	LR2	48.4	6F	UL1	27.0	13B	LL2	22.3
169	8C	LL2	15.2	5B	LR2	33.5	2G	UR1	23.4	11A	LL2	16.1

170	12K	LR2	23.0	2D	LL2	52.9	5F	UR1	35.7	8J	LR2	16.8
171	10B	LL2	14.8	6H	LR2	32.4	4G	UR1	28.9	5C	LL2	31.4
172	8H	LR2	20.1	5C	LL2	37.9	1B	UL1	14.4	12E	LL2	20.2
173	14A	LL2	24.4	2A	LL2	45.6	7J	UR1	42.5	8B	LL2	16.9
174	5E	LL2	27.2	2J	LR2	53.4	4E	UR1	34.3	11D	LL2	17.7
175	14K	LR2	25.7	10K	LR2	23.6	2J	UL1	29.6	11H	LR2	14.3
176	10A	LL2	13.2	6A	LR2	30.7	10K	UR1	41.5	6C	LL2	30.5
177	6J	LR2	25.1	4K	LR2	40.3	3J	UR1	35.3	14K	LR2	23.0
178	11D	LL2	15.5	10H	LR2	19.7	9A	UL1	25.7	5G	LR2	29.3
179	13C	LL2	18.5	7B	LL2	26.0	4J	UL1	38.3	10E	LL2	16.2
180	6E	LL2	22.9	9C	LL2	22.3	6K	UL1	32.0	5A	LL2	27.7
181	5K	LR2	26.8	3J	LR2	47.9	10J	UR1	48.9	14A	LL2	24.7
182	12D	LL2	18.9	9A	LL2	30.4	6H	UL1	41.2	7K	LR2	22.3
183	11A	LL2	22.4	5E	LL2	39.6	8A	UL1	32.2	8H	LR2	15.0
184	5J	LR2	27.9	7J	LL2	30.8	9K	UL1	29.1	5H	LR2	28.6

13.1.2. Raw evacuation times - Day 2, 01 February 2003

- Video footage was time coded from the command “Evacuate, evacuate, evacuate!” Exits were made available 10.7 seconds later.
- Seat numbers in blue correspond to the lower deck and seat numbers in red correspond to the upper deck.

Volunteer Number	Trial 1			Trial 2			Trial 3			Trial 4		
	Seat	Exit	Time	Seat	Exit	Time	Seat	Exit	Time	Seat	Exit	Time
1	6G	LR2	42.1	7K	UL1	29.5	11A	LL2	15.5	5D	LL2	27.5
2	9C	LL2	19.0	2D	UL1	13.6	8J	LR2	15.9	11H	LR2	15.7
3	4D	LL2	44.1	5E	UL1	20.7	5C	LR2	28.5	10D	LL2	14.4
4	2J	LR2	53.9	3K	UL1	23.7	6B	LL2	28.6	6F	LR2	27.5
5	3G	LR2	45.1	2F	UR1	23.3	7A	LL2	17.1	11B	LL2	15.3
6	9B	LL2	20.9	10H	UR1	54.9	13C	LL2	20.2	9H	LR2	14.5
7	4A	LL2	37.8	4H	UR1	14.8	10B	LL2	13.0	10E	LL2	12.9
8	8C	LL2	19.7	2B	UL1	15.8	12K	LR2	19.1	10J	LR2	13.3
9	7C	LL2	31.1	5A	UL1	22.6	5H	LR2	26.6	7H	LR2	23.6
10	1G	LR2	56.0	5D	UL1	18.0	6E	LL2	22.2	6C	LL2	26.3
11	7B	LL2	34.9	9C	UL1	31.1	12G	LR2	14.8	13J	LR2	21.8
12	1E	LR2	55.4	3F	UR1	31.6	5F	LR2	24.2	13H	LR2	18.3
13	4J	LR2	44.6	6G	UR1	32.3	11K	LR2	15.9	12F	LL2	22.2
14	1F	LR2	57.7	10C	UL1	52.8	8A	LL2	16.5	9C	LL2	14.7
15	4F	LR2	44.0	2A	UL1	14.7	12A	LL2	21.1	11C	LL2	14.7
16	2E	LL2	53.1	3C	UL1	17.4	11D	LL2	16.3	5B	LR2	29.1
17	5A	LL2	35.6	7D	UR1	73.0	10G	LR2	13.1	10F	LR2	13.4
18	6C	LR2	30.0	1D	UR1	29.3	10D	LL2	13.3	13F	LR2	23.7
19	3F	LR2	51.8	5H	UR1	29.3	7C	LL2	24.2	13K	LR2	22.4
20	3D	LL2	45.7	9B	UL1	64.3	13B	LR2	18.9	14B	LL2	16.8
21	10B	LL2	28.3	7G	UR1	34.9	7H	LR2	26.0	11J	LR2	15.9
22	2C	LL2	49.2	3B	UL1	20.0	11F	LR2	16.9	5H	LR2	28.3
23	6A	LL2	33.2	1H	UR1	14.1	12J	LR2	18.4	7G	LR2	20.7
24	3J	LR2	48.7	3G	UR1	18.8	7G	LR2	25.3	6K	LR2	22.5
25	1H	LR2	57.4	1C	UL1	14.0	9C	LL2	15.9	13B	LL2	20.4
26	5C	LL2	41.4	4A	UL1	19.5	13A	LL2	21.5	10K	LR2	14.4

27	6K	LR2	36.1	4B	UL1	18.9	13G	LR2	16.3	5F	LR2	24.2
28	7G	LR2	16.8	6E	UL1	18.2	13D	LL2	17.4	8K	LR2	17.2
29	10K	LR2	30.5	10B	UL1	28.4	6H	LR2	27.8	13G	LR2	20.8
30	4K	LR2	47.9	8C	UL1	68.9	9K	LR2	20.1	6D	LL2	24.1
31	9J	LL2	26.4	8H	UL1	29.0	11E	LL2	16.8	5C	LL2	27.0
32	1B	LR2	52.6	4K	UR1	23.8	12D	LL2	14.2	5A	LR2	25.9
33	4G	LR2	58.9	5J	UL1	30.4	9H	LR2	13.9	12C	LL2	17.4
34	7H	LR2	33.1	6B	UL1	24.5	11G	LR2	15.5	7A	LL2	18.0
35	10H	LR2	17.9	6A	UL1	24.9	5B	LL2	27.5	9J	LR2	15.1
36	9A	LL2	21.3	2C	UL1	15.2	10K	LR2	13.2	13A	LL2	22.6
37	5G	LR2	50.7	1E	UR1	21.8	13F	LR2	20.9	12A	LL2	21.1
38	3K	LR2	46.0	10A	UL1	27.2	13H	LR2	23.6	7F	LR2	21.4
39	3A	LL2	44.9	2H	UR1	16.7	5J	LR2	25.0	12B	LL2	18.2
40	10J	LR2	18.9	5K	UR1	38.0	7D	LL2	23.5	6B	LL2	25.1
41	4B	LL2	45.3	5C	UL1	29.2	12F	LR2	15.6	7J	LR2	19.7
42	5H	LR2	39.4	3H	UR1	18.3	14B	LL2	23.1	8A	LL2	15.8
43	8H	LR2	34.5	4D	UL1	16.5	12H	LR2	18.0	7D	LL2	19.8
44	7A	LL2	31.6	5G	UL1	26.9	8C	LL2	14.0	13E	LL2	23.6
45	1D	LL2	55.9	6D	UR1	30.5	10A	LL2	12.7	9K	LR2	15.2
46	3H	LR2	51.2	7C	UL1	33.0	8H	LR2	14.7	7B	LR2	22.8
47	2H	LL2	56.7	8K	UL1	32.6	11C	LL2	13.6	12E	LL2	16.3
48	5J	LR2	40.8	4F	UL1	26.4	5E	LL2	26.2	10G	LR2	14.0
49	2F	LR2	46.9	3D	UR1	27.2	10J	LR2	12.7	7K	LR2	18.0
50	2D	LL2	54.6	5B	UL1	22.0	10F	LR2	13.7	6A	LL2	22.4
51	2B	LL2	46.6	3E	UL1	16.7	5A	LL2	25.3	9B	LL2	15.4
52	9K	LL2	27.7	9H	UL1	19.5	12B	LL2	18.3	5G	LL2	28.5
53	5K	LR2	38.7	7H	UL1	60.1	7B	LL2	19.9	11E	LL2	16.4
54	6D	LL2	47.6	9J	UL1	33.8	7E	LL2	20.7	14J	LR2	24.5
55	8K	LR2	35.6	6C	UR1	39.9	14J	LR2	23.0	6H	LR2	26.5
56	6F	LR2	38.0	4C	UL1	15.9	13K	LR2	21.6	7E	LR2	19.0
57	6B	LL2	34.3	1F	UR1	15.9	6C	LL2	27.0	12G	LR2	19.4
58	7K	LR2	37.4	7B	UL1	35.1	5K	LR2	20.7	8J	LR2	16.5
59	10C	LL2	32.1	2E	UL1	14.7	14A	LL2	23.1	11K	LR2	19.0

60	4E	LL2	41.9	7F	UL1	33.5	11H	LR2	14.4	8B	LL2	23.3
61	8A	LL2	29.8	3A	UL1	21.5	6K	LR2	22.1	11G	LR2	17.6
62	10A	LL2	27.1	6J	UR1	36.8	9J	LR2	15.2	11F	LR2	16.9
63	9H	LR2	29.6	7E	UL1	26.7	7J	LR2	24.0	9A	LL2	17.1
64	4C	LL2	50.3	7A	UL1	30.4	12C	LL2	23.8	12J	LR2	19.3
65	7E	LL2	36.9	1G	UR1	13.4	12E	LL2	19.2	13D	LL2	15.9
66	2A	LL2	50.9	8B	UL1	61.2	11B	LL2	15.1	12H	LR2	15.2
67	7F	LR2	34.9	8J	UR1	79.4	5D	LL2	24.5	7C	LR2	27.1
68	5B	LL2	39.0	6F	UL1	25.3	14K	LL2	22.3	6G	LL2	21.8
69	3E	LL2	48.6	2G	UR1	25.8	13J	LR2	22.1	8C	LL2	17.3
70	3C	LL2	47.8	5F	UL1	23.5	6D	LL2	24.7	12K	LR2	20.0
71	5D	LR2	49.9	4G	UR1	26.5	10E	LL2	14.6	10B	LL2	13.2
72	1C	LL2	55.1	1B	UL1	14.0	9A	LL2	18.5	8H	LR2	15.8
73	5E	LL2	40.6	7J	UL1	32.4	6G	LL2	28.0	14A	LL2	21.9
74	6J	LR2	31.4	4E	UL1	15.3	13E	LR2	19.6	5E	LL2	19.1
75	2G	LR2	53.4	2J	UR1	33.9	6A	LL2	21.8	14K	LR2	25.3
76	8B	LL2	22.9	10K	UL1	28.0	7F	LR2	18.3	10A	LL2	13.9
77	5F	LR2	41.3	3J	UR1	37.0	5G	LL2	29.1	6J	LR2	26.1
78	7J	LR2	32.2	9A	UL1	23.0	6F	LR2	27.2	11D	LL2	13.6
79	6E	LL2	39.7	4J	UR1	21.0	7K	LR2	17.1	13C	LL2	12.7
80	6H	LR2	40.0	6K	UL1	25.8	11J	LR2	15.0	6E	LL2	24.8
81	8J	LR2	27.9	10J	UL1	24.7	9B	LR2	18.8	5K	LL2	20.7
82	7D	LL2	37.4	6H	UL1	28.4	6J	LR2	22.7	12D	LL2	19.5
83	4H	LR2	42.9	8A	UL1	63.5	8K	LR2	16.4	11A	LL2	14.4
84	3B	LL2	43.1	9K	UL1	29.9	8B	LL2	15.3	5J	LR2	25.0
100[2]	1J	LR2	54.7	1J	UR1	12.8	1J	LR2	51.6	1J	UR1	14.3
101	12C	LL2	14.9	6A	UR1	62.8	1B	LL2	37.3	5E	LL2	30.5
102	6K	LR2	24.3	13G	UL1	84.4	5G	LR2	48.5	9B	LL2	20.3
103	5F	LR2	21.0	8B	UL1	41.7	1H	LR2	53.1	1C	UR1	39.0
104	5K	LR2	22.2	8H	UL1	40.3	3E	LL2	45.9	8A	LL2	23.1

[2] Volunteer 100 was a member of the Cranfield University research team, who sat on the upper deck in seat 1J for all trials. This was done to ensure protection for the cabin crew at UR1 when opening the exit.

105	10A	LL2	14.1	10J	UR1	61.7	6E	LL2	40.9	9K	LR2	30.0
106	5B	LR2	26.8	7A	UR1	44.1	7E	LL2	29.5	3H	UR1	41.8
107	12H	LR2	14.9	9C	UL1	54.5	3B	LL2	47.8	12H	UR1	27.4
108	7H	LR2	22.9	12C	UL1	66.0	3A	LL2	39.3	1D	LL2	36.7
109	12F	LR2	15.4	12A	UL1	71.8	1E	LL2	40.0	4K	UR1	24.3
110	12D	LL2	16.3	8A	UL1	44.7	8J	LR2	32.0	3E	UR1	30.6
111	6H	LR2	25.3	11B	UL1	68.2	6G	LR2	42.4	3J	UR1	37.3
112	10D	LL2	18.7	6E	UL1	58.0	2B	LR2	44.1	4D	LR2	50.6
113	11B	LL2	16.8	5E	UL1	58.7	8K	LR2	25.7	7E	LR2	41.9
114	12B	LL2	20.4	5J	UR1	66.4	2C	LL2	36.6	5C	LL2	29.2
115	9K	LR2	16.5	14K	UL1	79.1	1C	LL2	44.5	10K	LR2	21.9
116	13G	LR2	19.1	12B	UL1	76.1	6D	LL2	31.9	6H	LL2	31.7
117	9H	LR2	13.1	13H	UR1	83.4	4C	LR2	28.5	1B	UR1	37.3
118	9A	LL2	18.0	11H	UR1	67.6	7C	LR2	33.9	3C	UR1	29.4
119	11E	LL2	13.4	6H	UL1	55.8	4F	LL2	48.5	9J	LR2	36.1
120	13F	LR2	20.4	7J	UR1	46.1	9K	LR2	21.6	5F	LR2	48.2
121	13K	LR2	23.6	6C	UL1	48.1	1D	LL2	44.0	2H	UR1	16.5
122	10K	LR2	13.9	6J	UR1	49.8	7A	LL2	27.2	5J	LR2	49.6
123	13A	LL2	24.0	12F	UR1	82.1	7D	LL2	28.0	2C	LR2	41.3
124	11F	LR2	18.4	14A	UL1	78.4	6B	LL2	30.0	9C	LL2	16.4
125	7F	LR2	21.4	7K	UL1	46.0	5D	LL2	35.7	7C	LL2	18.7
126	6J	LR2	24.8	8C	UL1	56.9	4D	LR2	49.2	9A	LL2	26.6
127	7B	LL2	22.6	12H	UR1	71.0	9B	LL2	17.7	7A	LR2	23.2
128	9C	LL2	14.4	5A	UL1	43.2	8A	LL2	25.0	10B	LL2	26.0
129	12J	LR2	16.8	9K	UR1	57.8	8C	LR2	24.1	7H	LR2	45.2
130	7G	LR2	17.7	13E	UL1	77.8	7H	LR2	26.8	5G	UR1	41.0
131	13J	LR2	20.9	7C	UL1	61.5	7F	LR2	28.2	8B	LR2	25.6
132	9B	LL2	16.6	5H	UR1	75.2	2F	LL2	52.9	7G	LR2	47.4
133	6D	LL2	28.0	14B	UL1	81.5	10C	LR2	31.2	1H	UR1	14.8
134	13E	LL2	22.4	10K	UR1	81.4	4E	LR2	34.4	2B	UR1	25.5
135	10F	LR2	16.2	7B	UL1	45.6	2G	LL2	52.0	1E	UR1	23.0
136	5D	LL2	28.7	11F	UL1	62.4	7K	LR2	23.4	4H	UR1	26.5
137	5E	LL2	30.3	9H	UR1	60.3	2H	LL2	49.0	6K	LR2	40.4

138	6A	LL2	23.9	12J	UL1	64.2	5F	LR2	38.6	4G	UR1	18.5
139	7E	LL2	23.5	10G	UL1	65.1	4J	LR2	45.3	5D	LL2	39.4
140	10J	LR2	13.1	5K	UR1	49.4	10B	LL2	19.6	6C	UR1	20.6
141	14B	LL2	26.0	9A	UL1	40.8	5A	LL2	30.6	6G	UR1	44.3
142	11K	LR2	20.2	5B	UL1	53.7	8B	LL2	26.2	4C	LL2	36.3
143	11J	LR2	15.9	10F	UL1	34.3	3C	LL2	51.0	6A	UR1	44.4
144	6G	LR2	28.6	10B	UR1	79.2	5J	LR2	40.8	3G	UR1	32.7
145	6B	LL2	26.9	13D	UL1	75.4	10A	LL2	19.2	5H	UR1	32.8
146	8A	LL2	17.2	5G	UR1	54.3	6J	LR2	29.4	10C	LL2	21.5
147	13D	LL2	21.7	9J	UL1	39.3	3D	LL2	38.9	5K	LR2	34.7
148	13H	LR2	22.6	7G	UL1	52.1	10J	LR2	17.8	7F	LL2	32.6
149	12G	LR2	14.4	10D	UL1	65.7	5H	LR2	43.6	10A	LR2	26.5
150	13C	LL2	17.8	8K	UL1	44.1	7G	LR2	30.6	1F	UR1	28.9
151	7D	LL2	26.4	6K	UR1	51.5	9H	LR2	16.7	3K	UR1	39.4
152	7C	LL2	25.5	13A	UL1	70.7	4A	LL2	46.9	2F	UR1	16.0
153	6F	LR2	26.1	12D	UL1	77.5	4B	LL2	34.1	2A	LL2	39.8
154	5J	LR2	23.4	13C	UL1	72.6	6F	LR2	41.1	7B	LR2	32.6
155	11G	LR2	15.0	12K	UR1	84.8	3G	LL2	50.0	6F	LL2	41.6
156	11C	LL2	14.8	6G	UR1	71.0	9J	LR2	20.2	3A	LL2	29.8
157	8K	LR2	19.6	11D	UL1	63.3	4H	LR2	47.0	8J	LR2	17.5
158	7A	LL2	19.7	10E	UL1	31.7	6C	LL2	31.4	10H	LR2	28.1
159	9J	LR2	14.0	7E	UR1	46.8	6K	LR2	27.6	1G	UR1	18.9
160	14J	LR2	21.7	13F	UL1	76.7	1F	LR2	44.6	8H	LR2	18.6
161	12A	LL2	23.2	11E	UL1	65.5	2E	LR2	38.1	5B	UR1	20.2
162	10G	LR2	15.6	8J	UR1	62.4	4G	LR2	47.9	3D	UR1	34.2
163	8C	LL2	25.8	11G	UR1	64.9	3K	LR2	43.1	4F	UR1	35.1
164	10B	LL2	13.2	7F	UL1	47.3	8H	LR2	33.0	6B	LL2	31.2
165	7J	LR2	18.2	11C	UL1	35.7	5K	LR2	36.9	8C	LL2	17.7
166	12K	LR2	17.3	5F	UR1	67.7	3F	LL2	45.2	2J	UR1	25.8
167	6E	LL2	24.8	11J	UR1	76.6	1G	LR2	52.7	6D	LL2	34.3
168	13B	LL2	25.3	11K	UL1	74.9	3H	LR2	49.9	2D	UR1	35.9
169	11A	LL2	18.4	12E	UL1	69.7	5B	LL2	33.0	4B	LL2	33.2
170	8J	LL2	20.4	12G	UL1	65.1	2D	LR2	41.9	5A	LR2	28.7

171	5C	LL2	29.7	7H	UL1	50.2	6H	LR2	37.8	3F	UR1	42.7
172	12E	LL2	19.2	6F	UR1	52.3	5C	LL2	32.2	4E	LL2	37.4
173	8B	LL2	15.5	10A	UL1	66.7	2A	LL2	34.5	2G	UR1	22.2
174	11D	LL2	15.4	6D	UL1	55.2	2J	LR2	50.3	8K	LR2	35.0
175	11H	LR2	13.6	13B	UL1	71.2	10K	LR2	18.1	7D	LL2	18.5
176	6C	LL2	29.3	13J	UL1	75.7	6A	LL2	28.8	4J	UR1	40.8
177	14K	LR2	22.2	11A	UL1	67.5	4K	LR2	39.8	10J	LR2	21.2
178	5G	LR2	27.2	13K	UL1	73.3	10H	LL2	22.9	6E	LL2	27.2
179	10E	LL2	12.5	7D	UR1	77.0	7B	LL2	13.4	4A	UR1	17.2
180	5A	LL2	27.6	6B	UL1	46.9	9C	LL2	20.5	7J	LR2	42.6
181	14A	LL2	24.6	5C	UL1	56.4	3J	LR2	46.1	3B	UR1	31.1
182	7K	LR2	20.0	5D	UL1	59.3	9A	LL2	18.8	7K	LR2	43.7
183	8H	LL2	21.9	9B	UL1	60.5	5E	LR2	35.6	6J	UR1	45.3
184	5H	LL2	31.2	14J	UR1	86.5	7J	LR2	25.0	9H	LR2	20.4

14. APPENDIX N: UNIVERSITY OF GREENWICH QUALITATIVE NOTES (UOG)

14.1. Trial 1.1

This was a Free Choice trial. Cameras 2, 4 and 12 were used for data collection. No Camera 13 `bird's eye' view of the stairs was available Upper deck participants either used the Upper deck exit or descended the stairs. A total of 52 participants used both lanes. There was a delay of 22 seconds before participants began to make use of the stairs. Four participants voluntarily descend stairs before CC arrived. They went straight to the stairs from their seats. It is however unclear how many other participants would have freely elected to use the stairs as the CC intervened and directed participants down the stairs. It is clear from this trial that at least some passengers will elect to use the staircase if given the option. Most participants who subsequently descend stairs were re-directed to them by CC from much further back in the cabin. CC follows the line of redirected participants to the stairs. Flow down the stairs was not urgent with no dual usage, dual flow or over-taking (concepts defined in Section 4.3 of the report). The Upper landing immediately in front of the stairs was the location of many participant stair access conflicts. Participants occupying this space can choose either lane and clash with others already entering the stairs. Delay in commencing stair use and punctuated, slow flow was the result of participants initially opting for upstairs exits, only switching to the stair descent under CC instruction.

Left Lane

View from camera at base of stairs: The first participant does not appear until 34 seconds into the evacuation. He (vest 1) vaults the last five treads, launching himself from both HRs. Then he does not know which way to go and crosses-over to the right exit. A dry up of the main flow down the stairs occurs until the main flow restarts at approximately 40 seconds. Initially, ALL the main flow participants cross-over to the right exit. They only start using their nearest exit when the CC comes across and redirects them. CC only repositions to be any value to participants descending stairs after 43 seconds. Thereafter only one participant crosses over Left lane to Right exit. After CC begins to provide direction, participants start to use side HR at bottom of stairs to `swing' around to left exit. Flow was unhurried with no crowding, no over-taking, no dual flowing or close staggering. No participants grabbed the side HR with both hands to accelerate the `swing' around to left exit at the base of the stairs.

View from camera at top of stairs: Vest 1 also vaults down the stairs from the top. Participants 31 and 49 and 4 and 64 vie for stair access on the top landing. Dry ups and punctuated flow occur. Flow was unhurried with no crowding, over-taking, dual flowing or close staggering. All flow was single file.

Right Lane

View from camera at base of stairs: Only one participant used only the centre HR. He crossed over Right lane to Left exit. The first participant does not appear until 25 seconds into the evacuation. The main flow down stairs only starts at 30 seconds in and has two periods in which the flow dries-up for approximately 5 seconds. The Lower deck Right exit CC leaves AS at 29 seconds but does not position herself to be visible/audible to the participants descending the stairs until 59 seconds, when only two participants are left. Only two participants cross over from the right lane to left exit. Every participant made use of the side HR at bottom of stairs to `swing' around to right exit once main flow started after 36 seconds. Flow was unhurried with no crowding, over-taking or dual flowing or close staggering. No participants grabbed the side HR with both hands to accelerate the `swing' around to right exit at the base of the stairs. At one point many participants crossed over from the left lane to exit via the right exit. Apparently this did not impede egress from the right lane.

View from camera at top of stairs: Participant 57 catches his vest on centre HR causing him and participant 82 to dual use the stairs momentarily. Otherwise all flow down the stairs was single file and punctuated by dry-ups.

14.2. Trial 1.2

This was a Down stairs trial. Cameras 2, 4 and 12 were used for data collection. No Camera 13 `bird's eye' view of the stairs was available A total of 85 participants used both lanes. Approx 20 participants voluntarily descend the stairs before the majority of participants realised only the stairs were available, and turn away from the Upper exit queue to descend stairs, or were redirected by CC. Most participants who then descend stairs were re-directed to them by CC. It is likely that many more participants would NOT have used the stairs but for it being the only route and the exhortations of CC. Lower deck CC were absent opposite stairs (as they were at their AS) then present from 49 s. Upper deck CC verbally re-directed participants downstairs from Forward Upper cabin until only stragglers were left the stairs. After some initial congestion preventing free flow off the stairs, flow was single file with no crowding, over-taking, dual flowing or close staggering apparent.

Left lane

View from camera at base of stairs: Participants queued on stairs from 9-17 seconds due to LL2 exit congestion by lower deck participants. Nobody participant swapped the left lane for the right exit at this stage. One participant did so at 25 seconds after flow commenced. Another did soon after. At 32 s participants 116 and 141 were a close staggered pairing, as were 152 and 153 soon afterwards. Other than these 2 instances flow was single file, non-urgent, no crowding, over-taking, dual flowing or close staggering. Once main flow started after 20 seconds every participant used the side HR to swing around to the exit. While the CC was still at the AS participant 143 crosses to the right exit. A string of participants follow this until CC arrives to the point opposite the stairs, and directs participants to their nearest exit. CC exhorts participants to hasten but not did not assertively push. Participants involved in this appeared faster than when CC was at the AS but not as fast as the right lane after the other CC started shoving participants towards the exit.

View from camera at top of stairs: Indecision by Participant 129 impedes 179 from getting onto the first tread. This in turn delays participants behind him. Between 16 and 30 seconds into the trial flow is very slow. Participants step down one step at a time. Participants push up on each other but density was still one participant per tread. This is probably a knock on effect from the Base shot queue 9-17 seconds into the trial. When free flow commences it is single file, non-urgent, no crowding, over-taking, dual flowing or close staggering. Participant 101 takes a big leap round about the middle of the stairs.

Right lane

View from camera at base of stairs: The first participants cross over from the right lane to the left exit. Others follow. At 11 seconds participants 130 stops on stairs and slows up flow behind even though there was room ahead of him to keep going. This causes others behind him to stop altogether. It may have looked congested ahead of him but there was no reason to stop moving. He caused others to wait on the stairs behind him. At 22 seconds participants 110 and 159 are nearly a dual usage. Other than these 2 participants, flow was single file, non-urgent, with no crowding, over-taking, dual flowing or close staggering. CC relocates from the LLR exit AS at 39 seconds but is not visible to all participants descending stairs. She starts assertively pushing participants from base of stairs. Flow appeared to be fastest when she initially moved from the AS so that participants could hear her then again when she relocated to opposite the stairs and could be seen and heard by those on

the last few steps. Their acceleration prompted those behind to copy. They also sped up when she started to manhandle participants on the lower landing. Once the initial half a dozen participants who switched to the Left exit had evacuated, the main flow started and was characterised by side hand rail use to swing around to the right exit.

View from camera at top of stairs: Participants 129 spends several seconds on the Upper landing indecisive about whether to go exit or stairs, then which lane to use. The halt in flow at the base of the stairs causes the same at the top from about 11-16 seconds in. Flow was single file, non-urgent, no crowding, over-taking, dual flowing or close staggering. Flow appeared to speed up when the main flow started. This correlated with lower deck CC facing the stairs shouting orders and pushing participants, and lower deck CC arriving at the stairs to expedite the last few participants down the stairs.

14.3. Trial 1.3

This was an Up stairs trial. Cameras 2, 4 and 12 were used for data collection. No Camera 13 `bird's eye' view of the stairs was available A total of 114 participants used both lanes. The trial was characterised by participant procedural confusion. It should be remembered that neither crew nor participants knew which exits were available during the trials. The trial commenced with severe crowd congestion on the Lower deck landing which impinged onto the stairs, as Lower deck participants who could not find a Lower deck exit clashed with Upper deck participants flowing downstairs. Participants initially descend the stairs causing chaos at base of stairs. Correct upstairs movement was only established following the intervention of Lower deck CC. 32 participants descended or were beginning to descend the stairs before the error was corrected at 16 s and the Upper deck CC started to encourage participants upstairs. Initially he directed Upper deck participants downstairs instead of forward to Upper exit. He only realised the error when participants started to ascend stairs. After 16 s correct upstairs flow commenced and was congested throughout, mostly close staggered but with some dual flow as well. This trial achieved a high flow rate due to packed stairs at the moment participants turned to ascend and a constant supply of participants to the stairs. Without the intervention of Lower deck CC it is likely that all Upper deck participants would have descended the stairs and no Lower deck participants would have ascended the stairs.

Left lane

View from camera at base of stairs: Disorganisation until 15-16 seconds into the trial. Participants descend stairs and wait/queue on the stairs, then turn around and head back up stairs. Down stairs participants were sent upstairs. The stairs were congested throughout excluding the last 3 stragglers. At 21 s the crowd sways on the lower deck landing and first treads. There was no CC involvement at the base of the stairs. When UP stairs flow commenced it was slow and congested with many instances of close staggering and some dual usage.

View from camera at top of stairs: As per base shot. Participants 13 climbed 2 treads at a time as he is last participants with room to.

Right lane

View from camera at base of stairs: Disorganisation until 14 seconds into the trial. Participants come downstairs and wait/queue on the stairs, then turn around and head back up stairs. Down stairs participants were sent upstairs. CC arrived at base of stairs after 58 seconds. Flow was congested throughout with many instances of close staggering and some dual usage.

View from camera at top of stairs: As per base shot.

14.4. Trial 1.4

This was a Down stairs trial. Cameras 2, 4 and 12 were used for data collection. No Camera 13 `bird's eye' view of the stairs was available A total of 84 participants used both lanes. CC on the Upper deck blocks participants from descending stairs and attempted to send participants to the Upper exit. Seven participants ignore CC and descend stairs before CC allows stair descent by all remaining participants.

Left lane

View from camera at base of stairs: Up to 30 seconds into the trial 3 participants have crossed to the Right exit. At 32 seconds participants 24 and 73 dual use the last few steps. Throughout flow is unhurried and single file with only 2 or 3 incidences of close staggering. There was only one Lower deck CC who remained at AS throughout. Every participant used the side HR to swing around to the Left exit excluding the participants who crossed over and close stagger participants in the outside lane (they use centre HR).

View from camera at top of stairs: Participants 2 and 9 are the first to the stairs. Participant 2 overtakes on the inside lane causing participant 9 to wait on the first 2 treads including the landing. Then a dry up occurred, caused by Upper deck CC guarding the stairs to stop participants using them. CC then lets participants use the left lane. At 20 seconds participant 61 `freezes' on the top landing outside lane while 82 passes her. Participant 57 momentarily blocks 56 from using the top of the stairs as he ponders which lane to use. At 30 seconds participant 68 unsuccessfully attempts to overtake down the outside lane. Between 40-46 seconds there was a flow of close staggered participants. Prior to these, flow throughout was unhurried and single file.

Right lane

View from camera at base of stairs: Participants have to wait momentarily at 12 seconds due to Lower deck participants ahead of them at exit LR2. Movement is initially slow then at 18 seconds participant 52 descends stairs at crawl speed. He may have been injured or disabled. He used both handrail as a prosthetic and held other participants up behind him. By the time flow gathers momentum down the stairs there are CC either side of the right exit. At 23 seconds all Lower deck participants have evacuated. CC at the AS beckoned participants off the stairs, but they could not have seen him until they were off the stairs. But his exhortations did expedite flow. At 43 seconds participant 48 overtakes participant 47. Flow is otherwise unhurried and mostly single file, but some incidences of close staggering. Tall participants appear to have to bend forward as they reach the base of the stairs. Once flow gathers momentum every participant uses the side HR to swing around to the Right exit, including one participant using the 2 handed grip.

View from camera at top of stairs: At the commencement of the trial CC try to block the stairs. One participant disregards CC and descends the stairs. Then a dry up in flow occurs until 3 participants another 3 participants disobey CC and use the stairs. At 11 seconds CC allows stair use proper. Participant 52 is slow getting onto the stairs and participant 40 overtakes him on the outside lane. Once participant 52 gets onto the stairs he looks very slow and hesitant. Flow throughout was unhurried and single file until 25 seconds. Then a spate of incidences of close staggering occur until 29 seconds. Participants 1 (tall male) appears to vault 2 or 3 treads when flow frees up. At 35 seconds a dual flow starts until 39 seconds.

14.5. Trial 2.1

This was a Down stairs trial. Camera 13 `bird's eye' view of the stairs was used. A total of 85 participants used both lanes. A third lane is apparent in the CC space on the Upper landing and was used by over-takers. Upper deck CC blocks participants from descending the stairs. He attempts to send participants to the Upper exit. Then he changes to encouraging stair descent after a 13 s dry-up on the stairs. Eight participants ignore CC and descend stairs before CC allows stair descent by all remaining participants

Left lane

View from camera above stairs: Participants queued on stairs initially. Participants 79 overtakes at 35 s. A dual usage occurs on the stairs at 45 seconds. Half a dozen participants over-take at the top of the stairs. Considerable bunching and incidences of close staggering occur in mid stairs

Right lane

View from camera above stairs: Participants 85, 5 and 49 over-took at other participants at the top of the stairs. Some bunching and incidences of close staggering occur in mid stairs. A dual usage at occurs 45 seconds.

14.6. Trial 2.2

This was an Up stairs trial. Camera 13 `bird's eye' view of the stairs was used. Lower deck cameras 2 and 4 were also used. A total of 113 participants used both lanes. The trial was characterised by participant procedural confusion. The trial commenced with severe crowd congestion on the Lower deck landing which impinged onto the stairs, as Lower deck participants who could not find a Lower deck exit clashed with Upper deck participants flowing downstairs. Participants initially descend the stairs causing chaos at base of stairs. Upstairs movement was only established following the intervention of Lower deck CC. 30 participants descended stairs before the error was corrected at 17 s. CC arrived at the UP stairs position after 37 s when all Upper Deck participants had evacuated and correct flow from downstairs is occurring i.e. CC actions did not impact on crowd control and it was not intended that they manage the stairs anyway. Only Upstairs flow and behaviour was recorded, from point at which correct participant movement occurred i.e. largely discounting Upper deck participants who initially descended the stairs and only measuring Lower deck participants who ascended the stairs. Without the intervention of Lower deck CC it is likely that all Upper deck participants would have descended the stairs and no Lower deck participants would have ascended the stairs.

Left lane

View from camera at base of stairs: The beginning of the trial was chaotic with participants crossing each other on stairs and descending then back tracking up the stairs. Lower deck CC ordered redirection UP at 14.2 seconds. There were 3 flows into left lane (forward cabin, mid cabin and across central seats) once `correct' upstairs movement commenced, with participants overlooking the right lane. Participants barge each other on the Lower landing.

View from camera above stairs: Very bunched, staggered flow occurred including some overtaking 38-72 seconds in. Participant 136 reaches up to use the balustrade as a handrail. Dual usage at occurred at 46.3 and 56.0 seconds into the trial. Use of BOTH handrails coincided with less congestion during the main flow phase (38-72 seconds into the trial). Use of Centre or Side HR only coincided with peak congestion where flow consisted of incidences of close staggered and dual flow.

Right lane

View from camera at base of stairs: Two participants pass each other on stairs at 23 seconds, indicative of the confusions occurring. Stair access jostling also occurred.

View from camera above stairs: Bunched, closely staggered behaviour was the norm (but not as congested as the left lane) including some overtaking 42-72 seconds into the trial. Participants 162 pushes the back of participant 137 for reasons unknown. Dual flow at 43.2 to 46.0 seconds into the trial and dual usage occurred at 54.3 and 58.0 seconds into the trail. One participant cuts across another, swapping `lanes' within this right lane.

14.7. Trial 2.3

This was a Down stairs trial. Camera 13 `bird's eye' view of the stairs was used. Lower deck cameras 2 and 4 and Upper deck camera 12 were also used. A total of 85 participants used both lanes. Eleven participants voluntarily descend stairs before the majority realise only the stairs were available, or were redirected by CC, and turn away from the Upper exit queue to descend the stairs. No CC were at the top of the stairs until the last 8 participants. During the trial CC verbally re-direct participants from Forward Upper cabin to descend stairs. Without CC redirection from deep into the Upper deck stair descent would either have not occurred in the majority of instances or would have been delayed. Flow was unhurried, free flowing and single file throughout. There was no over-taking, incidences of close staggering or dual flowing. The paradoxically high flow rate achieved in Table 25 reflects a near optimal combination of free flow and little dry up in flow compared to other trials. The Upper landing again appeared important in terms of participants vying for access to the stairs.

Left lane

View from camera at base of stairs: Flow was unhurried, no crowding, over-taking or dual flowing. Most participants used side hand rail to swing around to the exit, including some participants using 2 handed holds. Half way through the trial CC moves from the AS in order to be audible/visible to participants descending the stairs. This cajoled participants into using the nearest exit off the stairs instead of the opposite further exit. SEVERAL participants crossed over from the Left Lane to the Right exit prior to this CC relocation.

View from camera at top of stairs: Flow as per base shot. Participant 121 hurdles seats in order to access the stairs, forcing another participant to give way. Dual usage occurs between participants 102 and 152 at 39 seconds into the trial.

View from camera above stairs: Dual usage between 2 participants 36 seconds into the trial. Four instances of close staggered flow occurred but otherwise flow was unhurried. Interpersonal space on the stairs was maintained.

Right lane

View from camera at base of stairs: 10-15 seconds into the trial participants had to wait/queue on stairs Every participants bar one used side handrail at bottom of stairs to swing around to right exit. Flow was unhurried with no crowding, over-taking or dual flowing. Half way through the trial CC

moves from AS across to the stairs and is audible/visible to participants descending the stairs. ZERO participants crossed over from the Right Lane to the Left exit

View from camera at top of stairs: Participant 164 overtakes 108 at top of stairs as does 144 over 154 and 126 over 168. Flow as per base shot, unhurried and fairly spacious.

View from camera above stairs: Flow was all single file with no incidences of close staggering or dual flow.

14.8. Trial 2.4

This was a Free Choice trial. Camera 13 `bird's eye' view of the stairs was used. Lower deck cameras 2 and 4 and Upper deck camera 12 were also used. Upper deck participants either used the Upper deck exit or descended the stairs. A total of 49 participants used both lanes. Thirteen participants voluntarily descend stairs before other participants start to redirect to descend stairs from Upper exit queue. These participants went straight to the stairs from their seats. Upper deck CC directed participants to descend stairs from further back. CC arrived at the stairs at 23 s and directed participants downstairs, then departed to re-direct participants downstairs from Forward Upper exit. It is unclear how many participants would have freely elected to use the stairs as the CC intervened and directed participants down the stairs. Without CC intervention many participants in all likelihood would have continued to queue for the Upper exit. It is clear from this trial that at least some passengers will elect to use the staircase if given the option. Most participants who subsequently descend stairs were re-directed to them by CC from much further back in the cabin. CC follows the line of redirected participants to the stairs. The Left lane exhausted 9 seconds before right. This was due to CC redirecting participants from the Upper Right exit queue to the stairs. Participants simply used the nearest stair lane. Dry ups occurred on both lanes due to Upper deck participants exit choice indecision. Some participants waited, pondering which route to go and others first opted for Upper Right slide then changed to stairs. This punctuated stair use. Flow was unhurried with no crowding, over-taking, dual flowing or close staggering.

Left lane

View from camera at base of stairs: Participants waited/queued at on last few steps 6-17 seconds into the trial. Every participant used the side handrail at the bottom of the stairs to swing around to the Left exit once the main flow started after 22 seconds. Dry ups occurred and flow was unhurried with no crowding, over-taking or dual flowing or incidences of close staggering. Half way through CC moved from AS across to the stairs and was audible/visible to participants descending the stairs. This did NOT expedite flow as by this point flow into Upper left lane was drying up. CC continued to encourage participants down the stairs but soon only the right lane was in use. Only 1 participant crossed over from the Left Lane to the Right exit.

View from camera at top of stairs: 2 seconds into the trial participant 160 walks straight into the centre HR causing 125 to stop momentarily. Flow was unhurried with no crowding, over-taking, dual flowing or close staggering. At 24.8 seconds into the trial Upper deck CC relocated to the other side of the Upper landing. This inhibited participant 116 from stair access for a second.

View from camera above stairs: 10 seconds into the trial a female participant stands on the stairs, due to the wait by predecessors. Flow was slow and spaced out almost throughout the trial, as reflected in Table 25. Treads between participants were visible almost throughout. Participant 148 vaulted 2 treads at a time all the way down the stairs.

Right lane

View from camera at base of stairs: Participants queued on last few treads 11-17 seconds into the trial. Every participant used the side handrail at the bottom of the stairs to swing around to the Right exit once the main flow started after 17 seconds. At least one participant used a 2 handed grip on the side rail. Dry ups occurred and flow was unhurried with no crowding, over-taking or dual flowing or incidences of close staggering. Half way through CC moved from AS across to the stairs and was audible/visible to participants descending the stairs. This appeared to expedite flow. Many participants leapt the last few steps. NO participants crossed over from the Right Lane to the Left exit.

View from camera at top of stairs: Dry ups occurred and flow was unhurried with no crowding, over-taking, dual flowing or incidences of close staggering. Most participants were redirected from Upper exit. Participants 170 and 105 vie for access on the Upper landing at 22 seconds into the trial.

View from camera above stairs: Participants 154 and 112 vaulted 2 treads at a time all the way down the stairs.

15. APPENDIX O: CABIN CREW ACTION IN RELATION TO THE STAIRS DURING THE TRIAL (UOG)

Table 1: Cabin Crew action in relation to stairs from video evidence

		LEFT LANE		RIGHT LANE	
		CABIN CREW BEHAVIOUR		CABIN CREW BEHAVIOUR	
TRIAL	PARTICIPANT MOVEMENT	UPPER DECK	LOWER DECK	UPPER DECK	LOWER DECK
Day 1 Trial 1	Free Choice (DOWN)	CC arrives at 36 s and directs participants downstairs 36 to 46 s. Leaves for forward Upper cabin at 46 s to redirect participants from Forward Upper exit. Follows re-directed participants downstairs.	Directs participants off stairs after approx 44s	No involvement	Directs participants off stairs from opposite the exit after approx 39s
Day 1 Trial 2	DOWN	No CC at stairs until last 7 participants. During evacuation CC verbally re-direct participants from Forward Upper cabin.	Directs participants off stairs after approx 44s	See `left lane'	Directs participants off stairs from opposite stairs after approx 39s
Day 1 Trial 3	UP	CC arrives at Centre HRs at 4 s. Directs participants downstairs. Realises need to change direction when participants start coming back up due to lower deck CC redirection. Then he directs participants upstairs.	CC positioned at AS directs participants upstairs throughout	See `left lane'	CC positioned adjacent to stairs directs participants upstairs after approx 58s
Day 1 Trial 4	DOWN	CC arrives at Centre HRs at 3 s. Blocks stair descent from 3 to 12 s, coaxing participants to the Upper Forward exit. From 12 s to the end he unassertively guides participants onto the stairs.	No involvement. Remains at AS throughout	2 CC follow participants from Forward Upper cabin through the aisle to the stairs	2 CC located in AS direct participants off stairs after approx 23s. CC did NOT re-locate to opposite stairs
Day 2 Trial 1	Free Choice (DOWN)	CC arrives at Centre HRs at 3 s. Blocks stair descent from 3 to 21 s, coaxing participants to the Upper Forward exit. From 21 s to the end he `in-between assertion' guided participants onto the stairs.	CC calls participants from AS ONLY. He had minimal impact	2 CC follow participants from Forward Upper cabin through the aisle to the stairs	2 CC located in AS direct participants off stairs 28-33s. From approx 33s to end, one CC directs participants from location opposite stairs
Day 2 Trial 2	UP	CC arrives at left balustrade at 37 s when all Upper deck participants have departed. Verbally directs lower deck participants upstairs until end	CC directs participants upstairs from AS. After approx 52s moves to base of stairs and unassertively guides participants to stairs	No CC	CC directs upstairs from AS after approx 28 s. Moves adjacent to stairs at 49s and assertively urges participants onto stairs.

Day 2 Trial 3	DOWN	One CC arrives at left balustrade at 42 s after verbally redirecting participants to stairs from much further back. Only 8 participants were yet to use the stairs when he arrived.	Coaxes participants from the forward then aft AS until 41 s. Then unassertively directs participants off stairs from opposite stairs	1 CC followed participants along the aisle and down the stairs from the Upper forward exit	CC directs participants off stairs from opposite stairs after approx 31s
Day 2 Trial 4	DOWN (FC)	CC arrives at left balustrade at 23 s after verbally redirecting participants to stairs from much further back. Verbally cajoles participants onto the stairs 23-29 s then moves forward to follow the line of participants down the stairs.	Coaxes participants from the forward then aft AS until 37 s. Then unassertively directs participants off stairs from opposite stairs	No CC	CC unassertively directs participants off stairs from opposite stairs after approx 31s

16. APPENDIX P : SOFREAVIA PASSENGER QUESTIONNAIRE (SOF)

Complete the following relevant sections and return it to the researcher.

Fill in the blanks and tick as applicable ☑.

Test Number (please circle as applicable) : **1 2 3 4**

Volunteer Number : ……

Seat Number : …….. ☐ Lower deck ☐ Upper deck

1. Can you rate your general feeling about the evacuation process?

Very difficult	Difficult	Easy	Very easy
☐	☐	☐	☐

2. How would you rate the interaction that you had with the cabin crew ?

Very poor	Poor	Good	Very good
☐	☐	☐	☐

3. Do you think that the interaction between the passengers and the cabin crew could be improved?

☐ NO ☐ YES

If yes, please specify how:

……

……

4. Do you think that some of the following items would facilitate (improve) the evacuation process?

☐ More information about the aircraft configuration
☐ Information about the cabin crew procedures
☐ More information about the cabin crew roles
☐ Additional Cabin crew (location : ……)
☐ Other (please specify what : ……)

5. Did you find something disturbing during the evacuation?

- ☐ Double deck (two floors) aircraft
- ☐ Stairs characteristics (please specify what:…….)
- ☐ Evacuation procedures *(presented at the beginning of the flight)*
- ☐ Lack of information from Cabin Crew(s)
- ☐ Other passengers
- ☐ Other (please specify what: …….)

6. In a real evacuation, what would have improved the evacuation process ?

- ☐ Being more familiar with the aircraft configuration
- ☐ Being more familiar with the crew
- ☐ Being more familiar with emergency evacuation procedures
- ☐ Having family members travelling with you
- ☐ Other (please specify what: …….)

7. Did you use the stairs to evacuate the aircraft ?

☐ NO ☐ YES

Please specify why you used or did not use them:

……..……

……..

If yes, can you rate your feeling about using the stairs:

Very difficult	Difficult	Easy	Very easy
☐	☐	☐	☐

8. Did you use the slide to evacuate the aircraft ?

☐ NO ☐ YES

Please specify why you used or did not use it: ……

……..…….

If Yes, can you rate your feeling about using the slide:

Very difficult	Difficult	Easy	Very easy
☐	☐	☐	☐

9. Do you think that the evacuation would have been different, if it had happened after a real flight ?

Very different	Different	About the same	Exactly the same
☐	☐	☐	☐

If different, please specify

why:……..

……

……

……

10. Anything to add concerning the session you have just experienced ?

……

……

……

Thank you for your participation

17. APPENDIX Q: SOFREAVIA INTERVIEW GUIDE (SOF)

Interview Guide

VERRES Experimentation

Sofreavia Cie

SESSION Number *(1/2/3/4):*

Position in the cabin (door) : ……..

A. According to you, what are the 3 main negative aspects of this evacuation ?

1……
……
……

2……
……
……

3……
……
……

B. And now, could you please list the 3 main positive aspects of this evacuation ?

1……
……
……

2……
……
……

3……
……
……

18. APPENDIX R: SOFREAVIA VIDEO DATA ANALYSIS (SOF)

There were 10 CCs located as follow :

- 1 CC at lower deck exits (LL1, LR1, LL2 and LR2)
- 2 CCs at each upper deck (UL1 and UR1[3])
- 2 SCs (in experimental conditions with stair crews): 1 at the bottom (Bottom SC) and 1 at the top (Top SC) of the staircase.

Day 1 video data

Day 1 - trial 1 « Free Choice » -no cabin crew at stairs (*D1.1-FC*)

Context

This test was the first one of the day so both cabin crew and passengers hadn't any massive evacuation background.

Only the UR1 exit (the only simulator exit fitted with a slide) is available on the upper deck and both doors at lower deck (LL2 and LR2) are available.

Trial development

- 6" : a first pseudo-passenger looks at the stairs and hesitates but do not use them
- 10" : two other pseudo-passengers pass next to the stairs and hesitate also but do not use them.
- 11" : the whistle announcing the availability of doors to the cabin crews.
- 22" : a pseudo-passenger, from the rear of a queue, gets down spontaneously the stairs
- 25" : first pseudo passenger arrive down stairs – No congestion
- 28" : 2 other pseudo-passengers, also from the rear of queues, follow the first one.
- 29" : Lower deck is empty. LR2 cabin crew goes to the stair to check.
- 30" : 1 pseudo-passenger running from the front right side back through the stairs (he was stuck in the UR1 queue and remembered the stairs he saw at the rear)
- 31" : the UL1 (second) CC runs behind the pseudo-passenger and gets down half the stairs to look at the situation downstairs.
- 31" : 2 pseudo-passengers seeing the movement get down the stairs behind the CC and a flow starts spontaneously towards the stairs.
- 32" : as there is no flow from the lower deck the LL2 cabin crew goes to the stairs.
- 33" : the UL1 (second) CC climbs back to the upper deck (he succeeds in passing against the installing flow)
- 34" : the UL1 (second) CC is next to the stairs (to the right at the middle of it) and calls for passengers.
- 35" : 35" LL2 cabin crew goes back to his door. There is one pseudo-passenger going down.
- 38" : LR2 cabin crew goes to the rear right aisle in front of the stairs. There is nobody at the LR2 door! There is la very low flow. The LR2 cabin crew acts as a non-door cabin crew and directs the passengers to LR2.

[3] For security purpose, the CCs located at UR1, the only exit fitted with a slide, was manned by two members of the CU research team.

- 39" : LL2 cabin crew changes and moves to the rear of his door to be nearer from the stairs (he is calling pseudo-passengers who are directed to the LR2 door by the LR cabin crew.
- 43" : LL2 goes to the stairs and acts as a non door cabin crew, directing passengers towards LL2 door.
- 44" : when flow is established LR2 cabin crew is far from the door and stuck in the aisle.
- 46" : a pseudo-passenger from the left line down the stairs goes to the LR2 following the flow when the LL2 door is free.

Day 1 - trial 2 "Going Down" - no cabin crew at stairs (*D1.2-GD-NOSC*)

Context

The cabin crews are in same positions.

The pseudo-passengers from the upper deck at first trial are now on the lower deck, so that the upper deck pseudo-passengers have no experience from the stairs.

The two upper-deck exits are unavailable and the two lower deck exits are usable.

Trial development

- 3" : a first pseudo-passenger goes down the stairs.
- 6" : the first pseudo-passenger is downstairs.
- 3.6" : two other passengers follow the first one. One pseudo-passenger is at top of the handrail and hesitates. He will take the stairs at 08"
- 9" : 13 pseudo-passengers had taken the stairs
- 11" : the whistle announcing the availability of doors to the cabin crews; 15 pseudo passengers have already taken the stairs since the evacuation order.
- 13" : the left part of the lower deck is crowded.
- 16" : the (second) CC of UL1 door starts shouting, "go down" and grab to the stairs.
- 22" : end of congestion at LL2 door.
- 30" : lower deck is evacuated.
- 32" : the LR2 cabin crew leaves the LR2 door to go to the stairs to have a look at it and return to her door.
- 37" : the LR2 Cabin crew goes to the stairs (leaves her LR2 door unmanned) and acts as a non door cabin crew.
- 41" : LL2 cabin crew goes to the rear of LL2 door to try and capture some upper deck pseudo-passengers from the stairs.
- 43" : the LL2 cabin crew goes to the stairs (leaves her LR2 door unmanned) and acts as a non door cabin crew.

Day 1 - trial 3 "Going Up" -with cabin crew at stairs (*D1.3-GUp-SC*)

Context

The cabin crews are in same positions and two additional cabin crews, the SC are placed at bottom and top of stairs. They have no experience of evacuation.

The pseudo-passengers from the upper deck at second trial are maintained at the upper deck, so that the lower deck pseudo-passengers have no experience from going up the stairs.

The two upper-deck exits are usable and the two lower deck exits are unavailable.

Trial development

- 2" : a first pseudo-passenger goes down the stairs.
- 2.5" : the flow downwards is established.
- 3" : the Bottom SC (seated at the seat next to the aisle on front LR2 door right seat row) goes to the LR2 door to support the opening of the door.
- 4.2" : the Top SC arrives at stairs. He is directing the pseudo-passengers in the stairs. One pseudo-passenger doesn't want to go down. He will go down with the flow at 4.6".
- 10" : the bottom of stairs and cross aisles are crowded.
- 11" the whistle announcing the availability of doors to the cabin crews, 20 pseudo passengers (25%) have already taken the stairs downwards since the evacuation order.
- 13" : the LR2 CC starts shouting : "exit blocked". The Bottom SC starts to manage the flow towards upstairs from the aisle right of the stairs.
- 14'" : The Bottom SC is standing against the stairs in the right aisle trying not to be sent by the crowd into the stairs.
- 15" : the flow starts to reverse (in order to go upstairs).
- 16" : the upstream flow is established.
- 15" : pseudo-passengers are turning back. The flow starts to reverse. A little panic and pushing at bottom of stairs.
- 16" : the upstream flow is established. The stairs are crowded.
- 17" : a spontaneous flow starts toward the front left aisle.
- 26" : end of stair congestion
- 29" : reverse flow from the front left aisle is established.

Day 1 - trial 4 "Going Down" - with cabin crew at stairs (*D1.4-GD-SC*)

Context

The cabin crews are in same position as in trial 3

The pseudo-passengers from the upper deck are the same as in the first trial so they already have experience from the stairs going up and going down.

The two upper-deck exits are unavailable and the two lower deck exits are usable (scenario similar to trial D1.2, but this time with SC at top and bottom of stairs).

Trial development

- 1" : a first pseudo-passenger goes down the stairs.
- 1.4" : two other passengers follow the first one.
- 2.5" : upstairs, the Top SC arrives at stairs and blocks the pseudo-passengers. The Top SC crew is facing forward. He can hardly see the front doors and has no communication with the lower deck.
- 7" : one pseudo-passenger forces the way and go down in the stairs.
- 8" : one pseudo-passenger forces the way.
- 9": one pseudo-passenger forces the way.
- 10" : one pseudo-passenger forces the way.
- 11" : the whistle announcing the availability of doors to the cabin crews – 7 pseudo-passengers (10%) have already taken the stairs since the evacuation order. The SC returns himself and directs passengers to the stairs.
- 12" : the flow is established.
- 32" : the LR2 CC goes to the stairs and the Bottom SC stays at the door. The two positions are exchanged.

Day 2 video data

Day 2 - trial 1 « Going Down » -with Cabin Crew at stairs (*D2.1-GD-SC*)

Context

This test is the first one of the second trial day. So the cabin crews have an experiment background but the passengers do not have any evacuation background.

The two upper deck exits are unavailable and both doors at lower deck (LL2 and LR2) are available.

The Top SC and the Bottom SC are posted respectively at the top and at the bottom of the stairs.

Trial development

- 1" : the Bottom SC goes to the LR2 door
- 2.2" : two pseudo passengers take the stairs downwards.
- 3" : the Top SC arrives at top of stairs
- 3.7" : an other pseudo passenger follows the first ones downwards.
- 3.7" : an other pseudo passenger follows the previous ones downwards.
- 4" : the Top SC tries to block the flow
- 4.1" : an other pseudo passenger follows the previous ones downwards.
- 5.3" : an other pseudo passenger follows the previous ones downwards.
- 5.8" : an other pseudo passenger follows the previous ones downwards.
- 6.6" : an other pseudo passenger follows the previous ones downwards. The flow is never established only individual following one each other. After the 8th one, no-one followed and the flow stopped. The other pseudo-passengers are queuing gently to the front doors.
- 11" : the whistle announcing the availability of doors to the cabin crews. 8 pseudo-passengers (10%) have already taken the stairs downstairs.
- 11.6" : the Top SC goes forward bending over the back of the seats to look at the front doors situation.
- 20.5" : 2 pseudo-passengers take the stairs by themselves.
- 21" : the Top SC returns backwards and direct the pseudo-passengers towards the stairs. He had no apparent communication with the lower deck.
- 23" : the flow is established downwards towards LR2
- 25" : the Bottom SC call passengers descending from the rear of the LR2 door. (he hold the assist handle)
- 32" : the Bottom SC goes at stairs

The Bottom SC at first goes to the LR2 door because nothing happens in his position. Then his professional background comes over and he acts as a cabin crew at door.

No passenger redirection from the cabin crew: the queuing in the aisle are connected to the stairs line.

Cabin crew at LL2 stays all the time at the front of his door (the pax flow never stopped).

Day 2 - trial 2 "Going Up" - no cabin crew at stairs (*D2.1-GUp-NOSC*)

Context

The cabin crews are in same positions but there is no SC.

The pseudo-passengers are kept at the same deck so that the lower deck pseudo passengers have no experience from the stairs.

The two upper-deck exits are available and the two lower deck exits are unusable.

Trial development

Upper deck (camera 12)

- 0.6" : a first pseudo-passenger goes down the stairs.
- 1" : an other pseudo-passengers follows the first one.
- 1.8" : an other pseudo-passenger takes the stairs downwards.
- 2" : the flow is established downwards
- 11" : the whistle announcing the availability of doors to the cabin crews – 29 pseudo-passengers (25%) have already taken the stairs downwards since the evacuation order.
- 12.3" : last pseudo-passenger enters the top of stairs. The stair is crowded and jammed.
- 13.6" : the upper deck pseudo-passengers that were in the stairs start to return themselves upwards.
- 14" : the LL2 and LR2 CCS show the rear of the lower cabin and shout "Go that way". The passengers are rushing to the rear pushing and jumping above seats
- 16.6" : the reverse flow of the upper deck pseudo passengers in the stairs is established. The flow faints because the lower deck pseudo passengers are directed elsewhere.
- 17" : the pseudo passengers of the lower deck are massed at the rear of the cabin. The crowd starts at the aisles and the front of stairs and doors area are free. Rapid and unordered crowd effect are seen inside the pseudo passengers crowd.
- 23" : first pseudo passenger from lower deck returns herself, looks at the stairs and runs up the stairs.
- 30" : the cabin crew at LR2 shouts "take the stairs"
- 31" : the cabin crew at LL2 shouts "up the stairs"
- 32" : the lower deck pseudo passengers flow is established in the stairs
- 37" : the UL1 (second) CC comes to the stairs (left side of them) to call the lower deck passengers.
- 50" The cabin crew at LL2 leaves his door area to the stairs area.

From the camera at the rear of the upper cabin, there is no obvious will from the pseudo-passengers to go on a side or the other. The pseudo-passengers climbing on the left line are going to the left part of the upper cabin and that is the same for the right.
The two lower deck crews (at LL2 and LR2) had to deal with a crowd of 113 pseudo-passengers (composed of the lower deck passengers and the passengers that went downstairs spontaneously). They were stuck at their blocked doors and had to redirect the passengers from the bottom of stairs and doors jammed area. As it was not possible to push the passengers to the front (monument and stair side + crowd pushed by front cabin crews) they redirected the passengers to the rear. There was

no cabin crew and no door at the rear (at LL3 and LR3 positions) so the crowd was jammed in the "hoop net". The pseudo passengers were very aggressive. They had no issues and the front of the aircraft was blocked by the cabin crews shouting.
After a period while nothing was happening and tension was rising, a pseudo passenger just in front of the seat row at bottom of the stairs (not overcrowded place) returned herself and saw the empty stairs. She climbed them. The LR2 cabin crew turns her head when this passenger was disappearing and started to redirect the pseudo passengers to the stairs. The flow was established with the two cabin crew at LL2 and LR2 shouting at bottom and the UL1 (second) CC calling the pseudo passengers from the top of the stairs.

Day 2 - trial 3 "Going Down" - no cabin crew at stairs (*D2.3-GD-NOSC*)

Context

The cabin crews are in same position as in trial 2.

The pseudo-passengers from the upper deck were now moved to the lower deck so that the upper deck pseudo-passengers had no experience from going down the stairs.

The two upper-deck doors were usable and the two lower deck doors are unavailable.

Trial development

- 1.2" : a first pseudo-passenger goes down the stairs.
- 3" : another pseudo-passenger goes down the stairs.
- 4.5" : another pseudo-passenger goes down the stairs.
- 5" : two other pseudo-passengers go down the stairs..
- 6" : three other pseudo-passengers go down the stairs.
- 7" : another pseudo-passenger goes down the stairs.
- 8" : two other pseudo-passengers go down the stairs.
- 11" : the whistle announcing the availability of doors to the cabin crews. 11 pseudo-passengers (13%) have already taken the stairs downwards spontaneously. The situation is steady, each passenger at a queue or in the stairs.
- 11.3" : the UL1 (second) CC starts shouting to redirect the pseudo-passengers towards the stairs.
- 13.5" : a first pseudo-passenger turns back from the front door queue towards the stairs
- 15.4" : three other pseudo-passengers go down the stairs. Flow towards the stairs is setting up slowly.
- 18" : there is a steady rather slow flow walking down the stairs (slower than with a Top SC shouting.)

Day 2 - trial 4 "Free Choice" - no cabin crew at stairs (*D2.4-FC*)

Context

The cabin crews are in same position as in trial 3

The pseudo passengers from the upper deck were the same as in the third trial so they already had experience from going down the stairs.

Only the UR1 upper-deck door (slide) is available and the two lower deck doors are usable (similar to day 1 trial 1).

Trial development

- 0.2" : first pseudo passenger goes down the stairs!
- 1" : an other pseudo-passengers follow the first one.
- 2" : two other pseudo-passengers are taking the stair down.
- 3" : two other pseudo-passengers are taking the stair down.
- 4" : two other pseudo-passengers are taking the stair down.
- 8" : one pseudo-passenger takes the stairs. All passengers are steady in queues or in the stairs.
- 11" : the whistle announcing the availability of doors to the cabin crews – 13 pseudo-passengers (15%) have already taken the stairs downwards.
- 11.8" : one pseudo-pax takes the stairs. A passenger (158) comes from the queue to look at top of stairs and goes back to the right queue.
- 17" : the flow is establishing from the left queue (left door is unavailable).
- 20" : the passenger (158) from the right queue goes down the stairs.
- 23" : the UL1 (second) CC arrives (there is only a flow from the left queue.)
- 24" : the cabin crew goes to the left of the stairs.

19. APPENDIX S: SOFREAVIA CCS INTERVIEWS (SOF)

After each trial, the VAA CCs were interviewed. They were asked to tell the 3 main negative aspects and the 3 main positive aspects of the evacuation they had just experienced.

CCs LL1 and LR1 interviews -Day 1-Negative aspects

Negative	A	B	C	D	E	F	G	H
	D1.1-FC-LL1	D1.1-FC-LR1	D1.2-GD NOSC-LL1	D1.2-GD- NOSC-LR1	D1.3-GUp-SC–LL1	D1.3-GUp-SC-LR1	D.4-GD-SC-LL1	D1.4-GD-SC-LR1
1	No clue about the stairs	Inappropriate command: "exit behind you" better than "go that way"	I did not identify available exits	No communication with crew, I could only observe and listen	Worth one: didn't guest what happened	Passenger were more confused	Hear the pax in the staircase but did not know which way	Can not say nothing about the use of the stairs
2		Position of CCs during evac has to be precised	I did not identify if stairs were used	No time to guest what is happening elsewhere	Did not ear nobody (CCs)	Did not ear CCs at all	Feel out of the story at my position (no idea of elsewhere)	Did not see the SC
3		I could only presume what was going was for LL2 and LR2						Pax always wanted to go forward and not behind

CCs LL1 and LR1 interviews -Day 1-Positive aspects

Positive	A	B	C	D	E	F	G	H
	D1.1-FC-LL1	**D1.1-FC-LR1**	**D1.2-GD NOSC-LL1**	**D1.2-GD- NOSC-LR1**	**D1.3-GUp-SC--LL1**	**D1.3-GUp-SC-LR1**	**D1.4-GD-SC-LL1**	**D1.4-GD-SC-LR1**
1	Could ear CCs of LRI and LR2 and LL2	Cabin was clear very quickly	Passenger easy to manage	Change the command: "go back to the exit, go behind you".	Passenger easy	Saw the SC directing pax to go up stairs	Constant stream of pax	At the end of the evac I saw few pax coming from stairs
2	Passenger were disciplined	To big choice to make : the only solution possible was to send people behind					Good co-ordination with LR1	Good com with LL1, better than the past trials
3	I realise the availability of other very soon							

CCs LL1 and LR1 interviews -Day 2-Negative aspects

Negative	A	B	C	D	E	F	G	H
	D2.1-GD-SC-LL1	**D2.1-GD-SC-LR1**	**D2.2-GUp-NOSC-LL1**	**D2.2-GUp-NOSC-LR1**	**D2.3-GD-NOSC-LL1**	**D2.3-GD-NOSC-LR1**	**D2.4-FC-LL1**	**D2.4-FC-LR1**
1	No communication with LL2, impossible to see him	people notified that my door was not a door	Lot of congestion	All pax came to us even if the nearest exit is backward		people learnt and did not come to me as in the past trials		Pax did not come to my door
2	No idea of what happened	No communication possible, too busy		The space is more easy in the cabin simulator (door behind, no after the galley).				Evacuation slower this time
3								

CCs LL1 and LR1 interviews -Day 2-Positive aspects

Positive	A	B	C	D	E	F	G	H
	D2.1-GD-SC-LL1	**D2.1-GD-SC-LR1**	**D2.2-GU-NOSC-LL1**	**D2.2-GU-NOSC-LR1**	**D2.3-GD-NOSC-LL1**	**D2.3-GD-NOSC-LR1**	**D2.4-FC-LL1**	**D2.4-FC-LR1**
1	Pax very responding	Ear the stairs and than know that people used it	Used the aisles to balance the flow	Pax were responding	Quick evacuation	Very quick evacuation	Knew that LL2 was available	Pax manageable, space, clear view
2		Position of stair crew is important (I was able to see him, no LL1)	Heard to go up the stairs	Saw people queuing at the stairs once the cabin was clearer	I saw LL2 encouraging pax, so I knew it was available			
3			I knew LL2 and LR2 was blocked		LL1 is easy because nobody behing you			

CCs LL2 and LR2 interviews - Day 1- Negative aspects

Negative	A	B	C	D	E	F	G	H
	D1.1-FC-LR2	**D1.1-FC-LL2**	**D1.2-GD-NOSC-LR2**	**D1.2-GD-NOSC-LL2**	**D1.3-GUp-SC-LR2**	**D1.3-GUp-SC-LL2**	**D1.4-GD-SC-LR2**	**D1.4-GD-SC-LL2**
1	Pax coming very slowly from the stairs and getting out slowly	Communication was very very difficult. LL2 CC couldn't hear other CC during evac	CCs shouting 'heads down-feet back' at different times, it was echoing.	Having to leave the door and to move to another assist place, to tell pax my door was available, because I had no SC at bottom.	**At beginning, I had no idea which way to send pax. First I sent them to LL2 by instinct but pax came back.**	**Couldn't see where to redirect pax because I didn't see other CCs (pax standing in the aisle). I sent them to opposite door (LR2) without knowing if it was available.**	Not able to see or hear other doors orto know what any CC at exit was doing.	I couldn't see where pax were coming from (back or forward cabin)
2	Passenger pushing behind LR2 CC during time of slide inflation	Location of the stairs, LL2 CC couldn't see the opposite side, had to move down the stairs to see, so left LL2 door	I moved towards bottom of stairs, so pax saw me (and not LL2 CC at beginning) and all pax coming down stairs were coming to my exit.	Couldn't see where pax where coming from (from stairs or/and from forwards & aft cabin)	**I could see a gap toward LR1, so I sent pas toward there but they came back.**	**I had to move away from my door where I couldn't see behind, (then I was unprotected) to look up in the aisle, and to try assessing the situation forward.**	Bottom SC being at my door, I wanted him to be in the aisle to enable pax to see him. It would be better to have SC would call pax and direct them, and one CC at door is enough.	There's still no way of telling what's going on at the opposite door (LR2), I have no communication, no idea of availability.
3	Nobody stood at LR2 door, LR2 CC had to move down the stairs to enable pax to see her	Pax came suddenly down the stairs which created difficulties for CC at LL2 & LR2	I can't communicate with any CC nor see any CC (before both LL2 CC and me moved to bottom stairs), no communication between CCs, no idea of LL2 availability.		More confusion among pax this time, they were not so trusty because I was sending them the wrong way.	Pax were more unsure on this test, I had a lot of eye contacts with them.		

CCs LL2 and LR2 interviews - Day 1- Positive aspects

Positive	A	B	C	D	E	F	G	H
	D1.1-FC-LR2	**D1.1-FC-LL2**	**D1.2-GD-NOSC-LR2**	**D1.2-GD-NOSC-LL2**	**D1.3-GUp-SC-LR2**	**D1.3-GUp-SC-LL2**	**D1.4-GD-SC-LR2**	**D1.4-GD-SC-LL2**
1	Lower deck pax getting out very quickly (2 by 2)	I was able to adapt the procedures (it's + because I can learn of that)	Pax steady/continuous flow, easier than in 1st trial.	It was quicker this time becaus it's practice, it's familiar. I expected having possibly pax coming down the stairs as it happened during 1st trial.	**Having the bottom SC, I was just blocking my exit and the SC was sending pax upstairs. This SC was "extra-eyes" and could see the status of LL2 exit.**	**It's definitely better to have the bottom SC because me and LR2 CC can hear him sending people up the stairs. Thanks to this SC I could sort of communicate between the 2 doors (LL2 & LR2).**	Having the bottom SC who came at my door. I wasn't pushed by pax, I was just looking for the slide and the SC was holding pax back during slide inflating.	This test, I managed my door during all evac. Pax were comin down stairs and turnin towards my exit (LL2).
2	LR2 and LL2 CC worked well (when both positionned down stairs)	Pax did exactly what they were told becaus I was shouting in a correct way	Pax didn't push me, they followed my command to wait when slide inflating.	Knowing the opposite door was open from listening to the CC at LR2 and pax movement.	**Initially bottom SC and me shouting different things. Then, I was listening to bottom SC, I just let this SC shouting because he knew where to send pax (upstairs).**	Pax did exactly what they were told to do.	It was easier this trial because my door was open and the bottom SC was with me.	Pax did as they were told. There was no hesitation, no confusion nor panic thanks to my assertiveness (my doc being open).
3	LL2 CC positionned also himself in order to drag equal people and getting pax off *****		Pax could see me (after I moved to stairs) coming down the stairs on their own, it was quicker.				Having both exits (LL2 & LR2) open, which enabled a continuous, a steady and quick flow of pax evacuating.	Pax were coming the stairs quite quickly.

D1.1-LR2 : * ***"It would have helped if we had had a person down the stairs to help directing either side"***

CCs LL2 and LR2 interviews - Day 2- Negative aspects

Nega-tive	A	B	C	D	E	F	G	H
	D2.1-GD-SC-LR2	**D2.1-GD-SC-LL2**	**D2.2-GUp-NOSC-LR2**	**D2.2-GUp-NOSC-LL2**	**D2.3-GD-NOSC-LR2**	**D2.3-GD-NOSC-LL2**	**D2.4-FC-LR2**	**D2.4-FC-LL**
1	Pax were slower & harder to motivate, they haven't any sense of urgency. I had to shout more commands.	Not being able to see other CCs, I didn't know which doors were working whereas I needed to get more pax through my open door.	**That was a nightmare ! My door was blocked and couldn't see anything, I couldn't hear, I had no idea of what other CCs were doing. I had to leave my door to try to understand what was going on (I needed something to block my door when moving to understand)**	**No bottom SC so we didn't know. There was no one else [than LL2 &LR2 CCs] to give us information as what exit was usable. We could train SC to look at the other exits for us.**	Not having another crew member with me. You need somebody visual at bottom of the stairs so pax coming down the stairs can see him and someone at the door to help them to jump. I was the first at bottom of stairs so	Not having the bottom SC pointing pax towards the door	I was on my own, I had nobody at bottom of staircase to help direct pax. I couldn't see anything LL2 CC was doing. I wasn't aware of what was going on with any other exit either.There was no communication with LL2 CC nor communication with other CCs.	Difficult to find opportunity to n across half-w through the evacuation. I c only when all lo deck pax were
2	I couldn't see if pax were coming down the stairs. I should have preferred to be situated at the assist place the opposite side of the door, seing them coming down the stairs, and not seing them round the corner [of the staircase].	Pax were trying to push me out the door when slide inflating, in real life, I would be outside the door !	**I had all the pax and they had nowhere to go.They were all running around and bumping into each other. No pax took the decision to go upstairs.**	**I first sent passengers towards opposite door but they couldn't get across, so pax were running down towards the back where there was no exit and were getting stuck.**	Not knowing what other doors were open	After having evacuated all pax on lower deck, I saw a gap in pax flow and I had to leave my door and move towards bottom of stairs to see pax coming down and get them towards the usable exit (LL2).	Difficult to hold pax back as soon as they have been released from their selt-belts. There is no way I could hold them back.	Pax going downstairs we still coming o side of the staircase, th opposite side where I was [towards LR2 e The CC at top slide was on t same side.
3	Pax were coming single file in stairs and the majority of pax going towards LR2 door, bottom SC sending them there. I have also learnt that bottom SC needs extra training, for example to send pax towards both exits (LL2 & LR2) if they are both open.	I could have done better if I had been a bit lighter, so pax could see you more and you can see more the pax.	I had to push pax to use the stairs upwards. They were very slow, it took very long time for them to get up the stairs.	**The delayed decision of sending pax upstairs, very delayed because there was no visual clues,there was no Bottom SC. ***	After my [lower deck pax] pax had gone, I had to move to see the stairs. I was the first at bottom of stairs (LL2 CC was still at his door) so pax coming downstairs saw me and came all towards my door. There was a lot of bumping into each other.	I could coordinate with LR2 door only after we move towards 10D and 10 G, where we could see each other, that both doors are open and pax coming down the stairs.	Initially, the flow of pax coming downstairs was slow. I moved towards the bottom of stairs and LL2 CC stayed first at his door and pax went all toawrds me. That's why you need 2 CCs: somebody to assist at the door and someone to be at bottom of stairs.	Difficult to get your door ass space when all are queing beh you to get of

***D2.2-LL2* :* "**4th negative thing : we *[LL2 & LR2 CCs]* dried up shouting the commands because pax couldn't move faster going upstairs, they were queuing to go upstairs but there was a lotof congestion up the stairs."

CCs LL2 and LR2 interviews - Day 2- Positive aspects

Positive	A	B	C	D	E	F	G	H
	D2.1-GD-SC-LR2	**D2.1-GD-SC-LL2**	**D2.2-GUp-NOSC-LR2**	**D2.2-GUp-NOSC-LL2**	**D2.3-GD-NOSC-LR2**	**D2.3-GD-NOSC-LL2**	**D2.4-FC-LR2**	**D2.4-FC-LL**
1	**Having the bottom SC, in order to co-ordinate with myself, to be able to see pax coming down the stairs.**	Having the botom SC helping me direct the pax towards my door, managing the flow of pax. Pax could see a CC and follow him. It's a lot better to have two CCs .	**Having the staircase. I saw stairs were clear so I sent pax towards upstairs.**	Pax followed the directions (when the decision have been made to send them upstairs) but they were worried at one point that they were going to find a door.	My door being available.	When they could see us (LL2 & LR2 CCs), pax followed directions.	My slide was working, I could use my door.	My door wa working.
2	Pax from lower deck did what they were told to do. There was a steady and constant flow.	Having my door usable.		**LR2 CC sent pax upstairs first, because pax were stuck at the rear of the cabin.**	Pax coming downstairs came to me because they could see me.	The position at bottom of stairs enabled me to see pax coming down stairs and to see down the lower deck aisles.	Pax were slow when they didn't see me. They saw me and ran to me when they saw me.	At beginning, did what they v told, they didı push during sl inflation and th came off quicl
3	We know what we are doing because of practice. We know from last week that pax can come down the stairs.	The door opposite me (LL2) being open. That helps because pax can also go out that door as well.			At the end, LL2 CC and me working as a team (both being in the aisle), LL2 CC shouting to pax coming downstairs to go towards LL2, and me shouting to go towards LR2. It worked really well, we could get out pax really quickly.			I knew from experience that would come fro directions and pax would prob come down th stairs.

Top and Bottom SC interviews-Day 1 & 2-Negative aspects

Negative	A	B	C	D	E	F
	D1.3-GUp-SC-Top	D1.3-GUp-SC-Bottom	D1.4-GD-SC-Top	D1.4-GD-SC-Bottom	D2.1-GD-SC-Top	D2.1-GD-SC-Bottom
1	There were pax at top of stairs (just after the evacuation command) so I had to push pax out of the way	**No indication of available exits. I knew that "our exit" (LR2) was blocked but couldn't view other exits to know.**	Not being able to really being aware of what exits were available or not. Not knowing the situation down the stairs.	Not knowing the overall picture of available exits	Identification of available exits:couln't see the upper deck exits, I couldn't see the crew. Because I was shouting so loudly my commands, I couldn't hear any other CC command.	When being at door station (beginning of evac), I wasn't aware of usable exits (apart for LR2).
2	**Some pax started going downstairs without CC indication (by the time I took my position at top of stairs)**	**Bottom SC couldn't communicate with other CC (only could hear)**	Because of the commands being shouted, not being aware whether or not the 2 upper deck front exits were open. I knew that UL1 & UR1 were blocked only when pax came towards me.	Communication : other CC at same level not visible, I couldn't hear them (could only hear SC at top of stairs)	Pax management: before I went at top of stairs, a lot of pax decided to go downstairs by their own.	When at door station, I couldn't communicate with other CCs so e.g. I knew upper exits blocked only because pax came down the stairs.
3	**Pax that have already gone downstairs (without any CC indication) had to come back up the stairs (because doors lower deck blocked) which surprised me. I had no way to know lower deck exits usability, only when pax came back up stairs.**	**Pax re-direction: before all pax went upstairs, pax didn't know where they wanted to go. I had to push them.**	Pax reaction:there was still some pax going down the stairs whithout any indication. This time, I stopped pax going down stairs to wait and see what was happening at upper deck exits (because UL1 & UR1 are the primarily exits to evac.)	Pax merging from bottom of stairs and aisles(so pax were pushed). Need for more space to better manage the flow.	Pax redirection: at first when pax came towards me (when UL1 & UR 1management : first a lot of pax decided by their own to go in the stairs - Keep turning to blocked), I had my back towards them.	

D1.4-SC-Top : Remark *" " I felt lost I didn't know what to do at top of stairs. I would felt more comfortable at a door because I would have know exactly what to do. At top of stairs, it's like you 're on your own and it's very difficult to see and hear whether the exits in front of you [UL1 &UR1] are usable. It's very difficult because you have at the same time to see front exits and to turn and twist to look at the stairs. It was like if I had 3 exits to manage !"*

Top and Bottom SC interviews -Day 1 & 2-Postive aspects

Positive	A	B	C	D	E	F
	D1.3-GUp-SC-Top	**D1.3-GUp-SC-Bottom**	**D1.4-GD-SC-Top**	**D1.4-GD-SC-Bottom**	**D2.1-GD-SC-Top**	**D2.1-GD-SC-Bottom**
1	**Pax listened to my commands "keep moving forward" (I shouted very loud)**	Stairs characteristics : big enough	Pax management : pax followed my commands	Stairs :big enough and handrail is good because brakes up the flow	When I knew exits UL1 & UR1 were not available (I saw pax turning around and coming towards me), I could hear CC(upper deck) commands saying "exits blocked"	Pax management good thanks to handrail
2	**Crew communication : I could hear crew shouting at upper deck exits. I also checked visually upper doors available.**	CC communication : CC were loud so I could hear "exit blocked"	Once I knew that UL1 & UR1 were blocked, I knew where directing pax so it became OK for re-directing them	I heard SC at top of stairs	I was able to see the center of the cabin (because pax were in aisles) and I saw CC only when one came into that center area to redirect pax.	Stairs characteristics : big enough, wide enough.
3		Aisles charact: wide enough (usually more narrow in normal a/c) and space between seats allowed easy routes.	Stair handrail : a natural barrier, dividing the flow very nicely. Without such a barrier, it could be more difficult and there could be more injuries.	Good visibility from assist place of LR2 to see LL1.	Pax magt: they listened to my commands and tey were divided nicely thanks to the stairs handrail	When I changed my position (rom the door position-assist place), I went behind the 2nd seat row where I could see pax coming in stairs and sometimes move to see other exits (lower deck). It was a better position to manage pax.

CCs UL1 (1) and UL1(2) interviews - Day 1- Negative aspects

Negative	A	B	C	D	E	F	G	H
	D1.1-FC-UL1-(1)	D1.1-FC-UL1-(2)	D1.2-GD NOSC-UL1-(1)	D1.2-GD NOSC-UL1-(2)	D1.3-GUp-SC-UL1-(1)	D1.3-GUp-SC-UL1-(2)	D1.4-GD-SC-UL1-(1)	D1.4-GD-SC-UL1-(2)
1	No Crew member at stairs (SC).	I could not leave my door.	They was a big big build up	They are just going slow down the stairs	passengers want to take the slide	I had no idea of what was going on in other places	Again, you can not know what is going on downstairs.	I didn't know where to send them
2	**All the passengers were waiting to go to one of the two upper exits.**	It seems very slow going down the slide	Didn't know what happened downstairs	Very aware the opposite door was also unawailable	Didn't knew what was happening downstairs		In the few first seconds passengers come towards us and expect the door to open	You don't know what is happening at the other doors
3	**No idea of what happened downstairs. I had to go downstairs to see by myself and to realise that I could redirect pax down the stairs.**	I couldn't redirect passengers	Delay before they realeased that they could go down				I couldn't communicate with stair person	Pax always wanted to go forward and not behind

CCs UL1 (1) and UL1(2) interviews - Day 1- Positive aspects

Postive	A	B	C	D	E	F	G	H
	D1.1-FC-UL1-(1)	D1.1-FC-UL1-(2)	D1.2-GD NOSC-UL1-(1)	D1.2-GD NOSC-UL1-(2)	D1.3-GUp-SC--UL1-(1)	D1.3-GUp-SC-UL1-(2)	D1.4-GD-SC-UL1-(1)	D1.4-GD-SC-UL1-(2)
1	Crew may force "physically" pax down the stairs	Passengers were compliant	Once first pax went down the stairs It speeded quite quickly	Easy to redirect them from the front exits	There was a cabin crew at top of stairs	Every body was coming up the stairs very quick	Passengers did what they were told	Just quick and easy
2	The stairs surprised me		No tripping and no falling		Evacuation was far much more controled upstairs.	Passenger management is easy	Having a crew at top of stairs	The stair was fine It was strat forward.
3	They did use the handrail		The hand rail naturally slits people up		Door and slide had an even flox		passenger management fine: "as supposed to be"	

CCs UL1 (1) and UL1(2) interviews - Day 2- Negative aspects

Negative	A	B	C	D	E	F	G	H
	D2.1-GD-SC-UL1-(1)	D2.1-GD-SC-UL1-(2)	D2.2-GUp-NOSC-UL1-(1)	D2.2-GUp-NOSC-UL1-(2)	D2.3-GD-NOSC-UL1-(1)	D2.3-GD-NOSC-UL1-(2)	D2.4-FC-UL1-(1)	D2.4-FC-UL1-(2)
1	Poor or no redirection	Passenger redirection seems a litle slow	Dangerous to push myself through the passengers flow to go the stair position	Incredibly difficult to shout with that mass of passengers	For passengers I though very confusded. Both exits blocked	You feel redundant because you can't leave the door area	Passengers don't think to look backwards to go downstairs	I had the feeling that they all wanted to go down the slide
2	We had no idea of what was going on downstairs	Use of stair slow	Longer to evacuate because not a continious flow	They wanted to take the slide	No idea of what was going on downstairs	There was a pause before the other door was blocked. We all stand there for a few seconds.	Took a long time to me to be able to get to the stairs.	Passengers don't have the initiative themselves to look for ather exits.
3		Congestion at stairs	No idea of what was happening downstairs.	No communication with other crew. Start seying them running up the stairs when we cleaned the upper deck.	Communication with crew is impossible		Didn't know what was going on downstairs	It takes a while to know what is going on downstairs

CCs UL1 (1) and UL1(2) interviews - Day 2- Positive aspects

Positive	A	B	C	D	E	F	G	H
	D2.1-GD-SC-UL1-(1)	D2.1-GD-SC-UL1-(2)	D2.2-GUp-NOSC-UL1-(1)	D2.2-GUp-NOSC-UL1-(2)	D2.3-GD-NOSC-UL1-(1)	D2.3-GD-NOSC-UL1-(2)	D2.4-FC-UL1-(1)	D2.4-FC-UL1-(2)
1	I could see the cabin crew at stairs	The passengers obbey	Easy to control the pax at doors	They were running fast towards me	Passengers obey our comand	It's good to have an extra door person to push and have them move quickly	Able to persuade people to get down the stairs	Easy for me standing at my door
2	Passengers obbeyed	Passengers didn't push	Passengers know they are coming to a safe environment when you are at top of stairs	Good to have the extra door person to go out the door area and grab people	Beneficial to stand on a seat: better view	Went quite quickly when it started	A was able to phisically redirect passengers from standing on a seat	Nice to have an extra door person to handle them up
3	I realised that the stair was available and that everyone would go down		I could see the 2 front exits propelly		Once the flow went down the stairs it was quickly and smoothly	Seems to have no congestion on the stairs	Having crew members at the bottom of stairs to encourage them	Stair easy to use when you can get them down there

20. APPENDIX T: RESULTS FROM THE SOFREAVIA PASSENGER QUESTIONNAIRE (SOF)

20.1. Crew co-ordination issue

20.1.1. Hypotheses 6 and 7

Hypothesis 6: Cabin crew at top of the staircase has an effect on the evacuation performance.

Hypothesis 7: Cabin crew at bottom of the staircase has an effect on the evacuation performance.

The relevant trials to verify those hypotheses are:

- Going Down (*GD*) trials of Day 1 & Day 2 (with and without SC): 4 sessions.
- Going Up (*GUp*) trials of Day 1 (with SC) and Going Up of Day 2 (without SC): 2 sessions

20.1.1.1. Results of the Question 1 of the passenger questionnaire "Can you rate your general feeling about the evacuation process?"

For *GD* trials, we consider only the passenger groups that were located originally on upper deck and that had to go downstairs to evacuate during *D1.2-GD-NOSC, D1.4-GD-SC, D2.1-GD-SC* and *D2.3-GD-NOSC* conditions.

For *GUp* trials, we study only the groups seated on lower deck et the beginning of the trial and having to use the stairs to go upstairs to evacuate during *D1.3-GUp-SC* and *D2.2-GUp-NOSC* sessions.

- ***Condition : Going Down (all upper deck exits blocked) with and without SC (D1)***

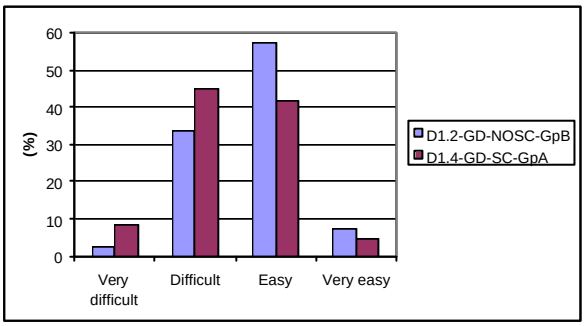


Figure 1: Can you rate your general feeling about the evacuation process?

On Day 1, pax felt easier to evacuate without SC than with SC as there is a peak of "Easy" answers for *D1.2-GD-NOSC-GpB* and a distribution split almost equally between "Difficult" (slightly more cited) and "Easy" answers for *D1.4-GD-SC-GpA*.

- ***Conditions : Going Down (all upper deck exits blocked) with and without SC (D2)***

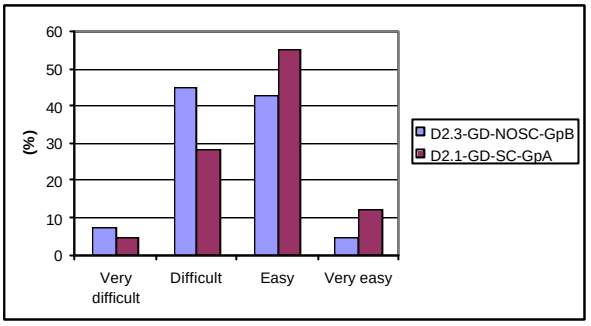


Figure 2: Can you rate your general feeling about the evacuation process?

There is a majority of «Easy» answers in condition with SC (*D2.1-GD-SC-GpA*) and an answer distribution split almost equally between «Difficult» and «Easy» in condition without SC (*D2.3-GD-NOSC-GpB*). The session with SC was the 1st of Day 2 and in the other sessions there was no SC.

- ***Conditions : Going Up (all lower deck exits blocked) with and without SC (D1 & D2)***

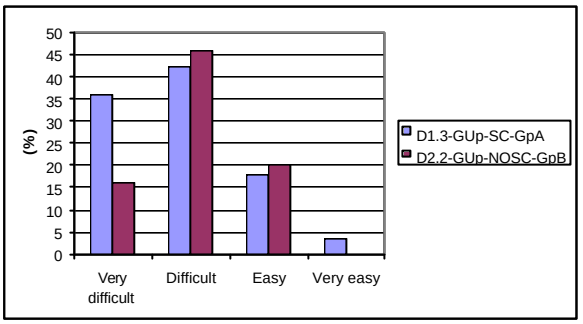


Figure 3: Can you rate your general feeling about the evacuation process?

The only possible statement from figure 3 is that on the whole, there is more passengers mentioning difficulties during the evacuation process in the *GUp* conditions (there is more "Difficult" and "Very difficult" answers with or without SC) than in the *GD* conditions.

20.1.1.2.Result of the Question 4 of the passenger questionnaire: "Do you think that some of the following items would facilitate the evacuation process?"

To find relevant data, we focused on the amount of answers mentioning "Add CCs-Location: ND" and "Add CCs-Location: at stairs".

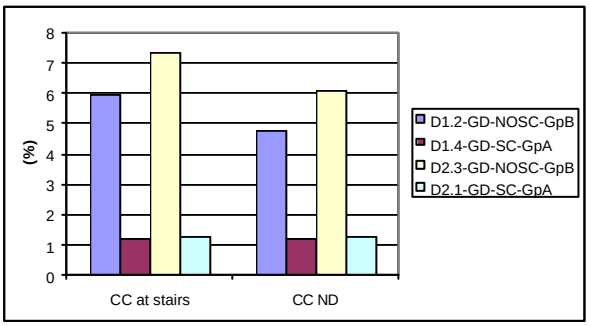


Figure 4: Do you think that some of the following items would facilitate the evacuation process? *(The overall answers distribution for Question 4 is available in paragraph 3.4)*

A need for "Additional CCs" is more mentioned during *NOSC* sessions (*D1.2-GD-NOSC and D2.1-GD-SC*). The most important peak is for the "CC at stairs" answers in *D2.3-GD-NOSC* condition.

20.1.1.3.Results of the Question 7 of the passenger questionnaire "Did you use the stairs to evacuate the aircraft? If yes, can you rate your feeling about using the stairs?"

- ***Conditions : Going Down (all exits upper deck blocked) with and without SC (D1 & D2)***

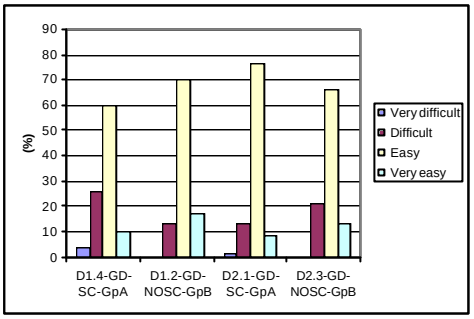


Figure 5: Did you use the stairs to evacuate the a/c? If yes, can you rate your feeling about using it?

On Day 1, the stair use is experienced as easier without SC than with SC as there is more "Easy" answers in *D1.2-GD-NOSC-GpB* condition than in *D1.4-GD-SC-GpA* one.

On Day 2, the stair use is experienced as easier with SC than without SC.

- ***Conditions : Going Up (all lower deck exits blocked) with and without SC (D1 & D2)***

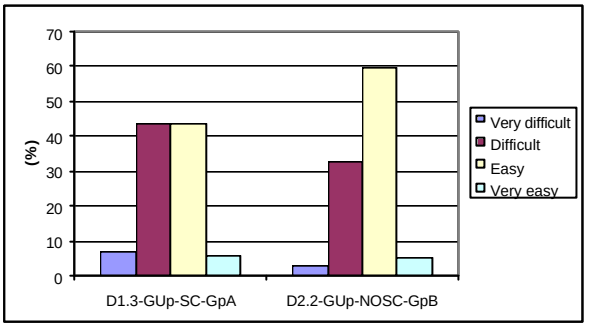


Figure 6: Did you use the stairs to evacuate the a/c? If yes, can you rate your feeling about using it?

There is more "Easy" answers in condition without SC (*D2.2-GUp-NOSC-GpB*). The passengers could have experienced SC as a hindering factor. This result confirms the assumption made for figure 1 on page 5.

20.1.2. Hypotheses 8 and 9

Hypothesis 8: Communication between the two desks has an effect on the evacuation performance.
Hypothesis 9: Crew co-ordination between the two desks has an effect on the evacuation performance

The trails could not be planned to answer directly these hypotheses. Cabin Crews communication and co-ordination strategies were at the discretion of CCs who were using their experience and usual procedures to manage the evacuation. However, video and CCs interviews data could provide some indirect elements to study these hypotheses.

20.2. Slide Upper deck effect

20.2.1. Hypothesis 10: Height of upper deck slide has an effect on flow rate.

The relevant trials to verify those hypotheses are:

- Free choice (*FC*) of Day 1 & Day 2 (without SC both days): 2 sessions
- Going Up (*GUp*) of Day 1 & Day 2: 2 sessions

20.2.1.1. Results of the Question 8 of the passenger questionnaire "Did you use the slide to evacuate the aircraft? Please specify why you used or did not use it. If yes, can you rate your feeling about using the slide? "

- ***Conditions : Free Choice (UR1, LL2 & LR2 exits open) without SC (D1 & D2)***

In *FC* trials the only available exit at upper deck was the UR1 one, fitted with the slide. Here, we consider only the passenger groups that were located originally on upper deck and could use the "slide exit", during *D1.1-FC* and *D2.4-FC* sessions.

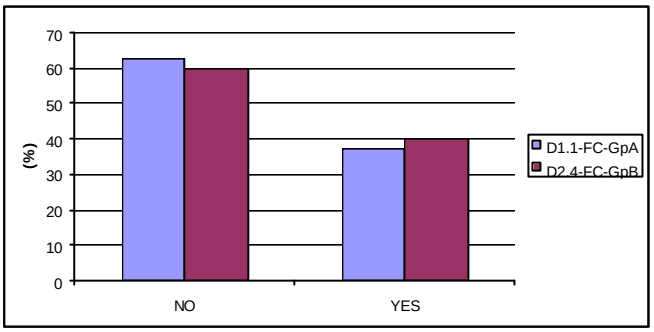


Figure 7: Did you use the slide to evacuate the aircraft?

About 60% of passengers of each group did not use the slide to evacuate, which means that they have seen in the stairs a faster exit route.

Figure 8 shows the facility of slide use given by passengers who answered "YES" in figure 7.

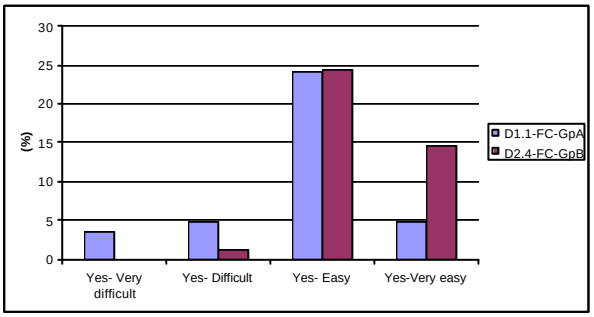


Figure 8: If yes, can you rate your feeling about using the slide?

The majority of passengers felt "Easy" to use the slide. However, almost 5% of them experienced the slide use as "Difficult" or "Very difficult". This passenger negative feeling dealing with the slide is a sufficient factor to slow the evacuation process through the UR1 exit and generate a queue to evacuate that could discourage passengers to wait for using that exit.

Figure 9 presents the detailed reasons for no using the slide given by passengers who answered "NO" in figure 7.

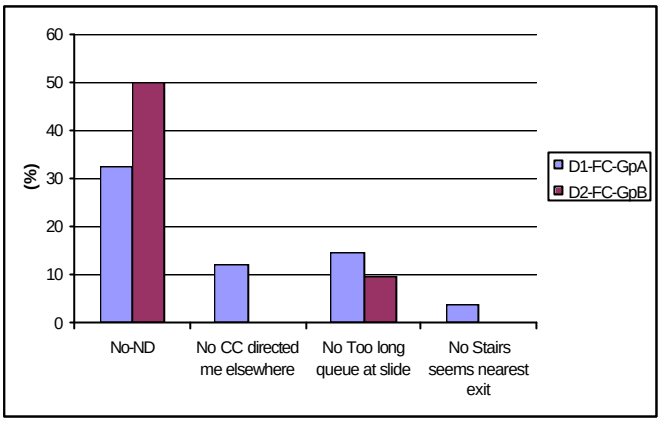


Figure 9: Please specify why you used or did not use it.

- ***Conditions : Going Up (all lower deck exits blocked) with and without SC (D1 & D2)- both passenger groups***

In *GUp* trials, both upper deck exits were available: UR1 with the slide and UL1 with a platform. Here, we study all the groups because every passenger had to evacuate via the upper deck through either the UR1 exit or the UL1 exit during *D1.3-GUp-SC* and *D2.2-GUp-NOSC* sessions.

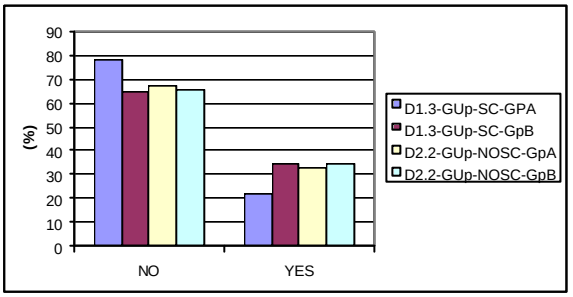


Figure 10: Did you use the slide to exit the a/c?

In *GUp* sessions, both UR1 (with the slide) and UL1 (with a platform) exits where available to evacuate the aircraft. Passengers used less the "slide exit" than the "platform exit", which means that the flow at the slide exit was slower than at the platform exit during evacuation.

Figure 11 shows the facility of slide use given by passengers who answered "YES" in figure 10.

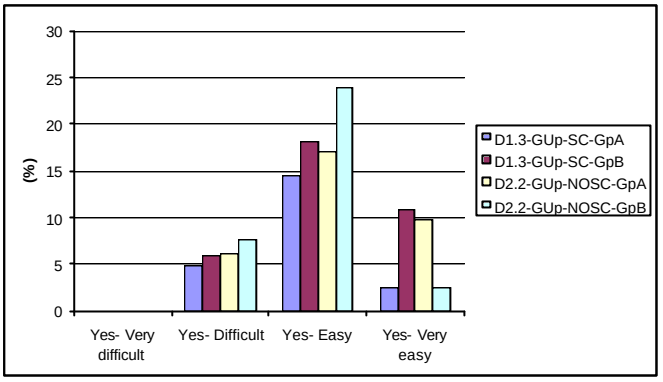


Figure 11: If yes, can you rate your feeling about using the slide?

At least 5% of passengers think it was difficult to use the slide, which could slow the evacuation flow at this exit.

Figure 12 presents the detailed reasons for no using the slide given by passengers who answered "NO" in figure 10.

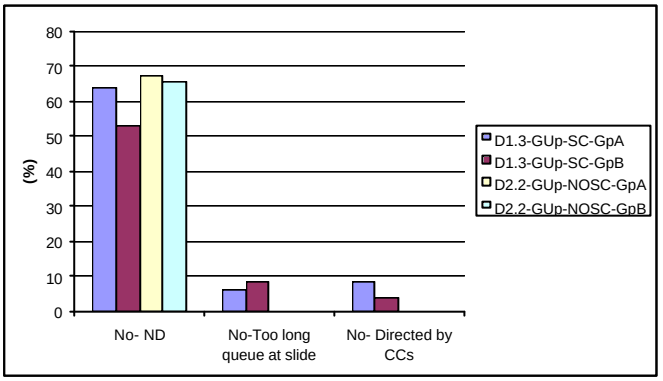


Figure 12: Please specify why you used or did not use it.

The "No-Directed by CCs" answers appears for both groups in the session with SC (*D1.3-GUp-SC-GpA* and *D1.3-GUp-SC-GpB*). The very important amount of "NO-ND" answers prevents again from analysing more the reasons for not using the slide.

21. APPENDIX U: COMMENTS FROM ETF-SNPNC OBSERVER

21.1. First day: 25th January

First trial : « Free choice »

Upper deck (UD) :Group A, UR1 available

Lower deck (LD) : Group B, LR2 and LL2 available

No crew at stairs

For this first trial, I observed the evacuation from outside, next to the upper deck slide, to have a general view. The evacuation was conducted on only one part of the slide. The participants were not trained for this exercise (as normal PAX). It was easy to notice that they were surprised by the slope of the slide.

Second trial : « Going down without crew at stairs »,

UD :Group B, no exit Available

LD :Group A, LR2 and LL2 Available

No crew at stairs

I observed from the rear of the lower deck, having a complete view of the stairs and of the two lower deck doors available.

At the very beginning of the evacuation , PAX from the upper deck were descending prior the order of the crew. They were blocked because of the flow of lower deck PAX.

Then LL2 became free of lower deck PAX, the upper deck PAX descending the stairs followed the crowd going to the right door, ignoring there was an another door on the left (in spite of the crew's shouts) This cabin crew having nobody to evacuate , left his safety post (LL2) and went near the stairs to re-conduct the PAX to his door to perform and complete the evacuation.

Third trial : « Going up with crew at stairs »

UD :Group B, UR1 and UL1 available

LD : Group A, no exit available

Two crew members at stairs

I observed from the same place (rear of the lower deck)

At the very beginning of the evacuation PAX were stuck together in front of inoperative doors.

It seems that one cabin crew is not enough to redirect the whole crowd to the upper deck and to push the PAX up in the stairs.

Fourth trial : « Going down with crew at stairs »

UD : Group A, no exit Available

LD : Group B, LR2 and LL2 available

Two crew members at stairs

I observed from the same place (rear of the lower deck)

From the lower deck, I observed that the evacuation was anticipated by the PAX from the upper deck, even though the descent was flowing freely in two distinct rows (may be due to the central handrail). Some PAX (about 10) from the right row headed towards the left door.

21.2. Second day: 1st February

This time, I decide to observe the evacuations of the four trials from the upper deck, behind and over the stairs.

First trial : « Going down with crew at stairs »

UD :Group A, no exit available

LD :Group B, LR2 and LL2 available

Two crew at stairs

Prior the arrival of the crew member at the stairs, about 10 PAX went already down.

Second trial : « Going up with crew at stairs »

UD :Group A,UR1 and UL1 Available

LD :Group B, no exit available

Two crew at stairs

About 40 PAX went down the stairs, prior the opening of the upper deck doors. Height difficulty to reverse the flow of upper deck PAX from the lower deck to the upper deck, only with the help of crew members at doors.

Third trial : « Going down without crew at stairs »

UD :Group B, no exit available

LD :Group A, LR2 and LL2 available

No crew at stairs

Same trouble for reversing the flow of PAX blocked at the upper deck doors, without help of crew member at stairs.

Fourth trial : « Free choice »

UD : Group B, UR1 available

LD : Group A, LR2 and LL2 available

No crew at stairs

About 15 PAX went down the stairs, prior to the opening of upper deck doors.

Then most of the PAX didn't dare to head toward an upper deck door or toward the stairs.

General remarks :

PAX (Group A and B) were paying attention to the safety demonstrations only the first time, they were located wherever in the lower deck or upper deck.. They were paying less attention the second time in the same area.

PAX behaved as normal passengers during an evacuation, some of them were crawling on the back of the seats to reach the door more quickly.

Lack of means of communication during evacuations.

Good behaviour of cabin crew. They were acting as safety professionals with accuracy. It was easy, for a professional cabin crew, to identify a cabin crew from the Cranfield University evacuation specialist at slide position, even if all of them were wearing the same uniform.

There is a need of cabin crew at stairs (having seats near the stairs) to perform and to improve the evacuation.

It would be interesting to identify for each trial, through which exit, each PAX (identified by a number on the T-shirt) evacuated the mock-up.

Even in the context of mere observation, is it does seem realistic to observe "free choice" as long as there are safety professionals aboard, because it is not realistic to think that those professionals would remain passive. To remain passive is in contradiction with the role of the cabin crew, unless they are to be told so but in this case the PAX would be destabilised.

"PAX is participant or "pseudo-passenger"

UD is used for upper deck

LD is used for lower deck

UR1 is used for Upper deck Right first (1) from front door…

LL2 is used for Lower deck Left second (2) from front door…