High-rise Evacuation Evaluation Database (HEED): Methodologies Used in the Elicitation and Storage of Human Factors Data

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Presented by Project Director

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Content

- Background – 9/11, project HEED
- Research Questions
- HEED Partners
- Interview Protocols
- Research Instruments
- Data Analysis and Database Development
- Early Results
- Concluding Comments

Acknowledgement

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Pre 911 Evacuation Issues

- For the past 30 years researchers have attempted to piece together information gleaned from a collection of relatively small-scale evacuation drills and observations from poorly documented incidents to address such fundamental questions as :
  - What are the key factors that influence the evacuation dynamics of medium to high-rise buildings?
  - How does the local organisational culture and physical environment within the building influence evacuation?
  - How do people react to the various situational cues and which cues are the most influential in driving people from normal office to evacuation activities?
  - What factors influence route selection and what design factors influence the evacuation efficiency of the selected route?
  - How does presence of the disabled influence the evacuation dynamic?

… and then …

More Issues

- Evacuation of WTC complex on 9/11 represents one of the largest full-scale building evacuations in modern times
- Arising from this incident are an additional set of questions for designers of High Rise buildings:
  - How confident are we that occupants will comply with evacuation procedures, namely phased evacuation and defend in place?
  - What does this mean for the way we design staircase capacity, the evacuation of disabled, building evacuation procedures, response of first responders, command and control setup, etc.
  - How does building height and population density influence evacuation?
  - How does fatigue influence the evacuation dynamic?
  - Can existing elevators provide useful additional evacuation capacity?
  - Is it viable to have several evacuation policies operating within a building dependent on the nature of the (fire) incident?

And yet more issues!

- The evacuation modelling community also have a range of challenging questions to address:
  - What response time distribution should be used?
  - What criteria should be used to represent exit route selection?
  - How should merging flows be represented?
    - How do occupants entering the stairs merge with the flow on the stairs?
    - Who has priority, and what factors influence this priority?
    - This will have a profound effect on the outcome of the evacuation, it may delay the evacuation for some and speed up the evacuation for others – what is the process?
  - How common are groups and what impact do groups have on the evacuation dynamic?

Why Study Real Emergencies?

- Difficult/impossible/unethical to reproduce appropriate physical and behavioural environments within ‘lab’ based studies and so unlikely to unravel complexities of e.g.
  - Group behaviour, Deference behaviour.

- Answers to these questions are held by those who actually experience real evacuation at first hand.

- Essential to be able to reliably tap into this rich vein of knowledge and experience.

Project HEED

- 3+ year study funded by EPSRC (approx £1.5 m) commenced in Sept 2004
- Aim is to conduct up to 1000 face to face interviews with survivors of WTC 1 and 2
- Information extracted from interviews will be used to create a relational database of human experience during the WTC evacuation
- Database is known as HEED: High-rise Evacuation Evaluation Database and will be available to all bona fide researchers
- Information gained from project HEED is intended to:
  - inform building regulations and
  - assist in the development and application of evacuation models..

HEED Team

- Universities of Greenwich (Lead by Prof Galea), Ulster (Professor Jim Shields, Dr Karen Boyce) and Liverpool (Prof Canter).

- 6 experienced researchers from psychology, social science
  - Louise Summerfield (interview team leader)
  - Kirsty Martin (Interviewer)
  - Rachel Day (interviewer)
  - Lynn Hulse (interviewer)
  - Melissa Marselle (interviewer)
  - Paul Greenall (interviewer)

- Database developer - Asim Siddiqui

- Transcribers

RESEARCH QUESTIONS

HEED Research Questions

- Cue recognition and response:

  Engineering Assumption: Arbitrary values for response times e.g. 0 to 2 minutes.
  - What is a representative range of occupant response times?
  - Is there a link between response times and factors such as; proximity of incident, risk perception and group membership.
- Group formation and Group dynamics:

  Engineering Assumption: occupants evacuate as individuals.
  - Do groups form? Under what conditions? How large?
  - What factors lead to group dissolution?
  - What role do groups play in decision making?
- Fatigue:

  Engineering Assumption: Impact of fatigue ignored or treated in a crude or arbitrary manner.
  - Was fatigue an issue in the WTC evacuation?
  - Did it exert an influence on the overall evacuation and if so, in what way?
  - To what extent did people have to stop for a rest, and if so, where, for how long, and with whom?
  - How was this related to their state of health/fitness?

HEED Research Questions

- Travel speeds on Stairs:

  Engineering assumption: Historic data relating to stair speeds appropriate for today. BDAG and NIST studies suggest speeds in WTC evacuation significantly lower.
  - What was the speed of people on the stairs and what contributed to it?
  - How was the travel speed related to crowd densities? Stair geometry? Population demographics? Risk Perception? Group Dynamics? Fatigue?
- Perception of risk:

  This is an area which has been little explored in the fire literature.
  - How did occupants perceive risk?
  - What level of risk was perceived by occupants? How did this vary with time and in space?
  - How did the perceived risk influence decisions and behaviour?
- Merging flows and deference behaviours:

  Engineers do not have a clear understanding of how floor flows merges with stair flows.
  - Do people on stairs defer to people entering the staircase?
  - Do floor and stair occupants take turns and allow a one-for-one merging/filtering?
  - Does one flow win out over the other for long periods of time?
  - How does this depend on crowd density and risk perception?

HEED Research Questions

- Exit route selection:

  The key to understanding movement in an emergency is to discover why people choose a particular route.
  - Was their exit route pre-planned? Was it the closest? Familiar? Used in fire drill?
  - What were the reasons behind some participants choosing to evacuate by elevator?

- Experience and training:

  What influence did prior experience /training / evacuation procedures have on the evacuation dynamic?

- Management and organisational structure:

  In what ways did the social and organisational structure of an organisation influence evacuation behaviour?

- Conditions during egress:

  How did the changing physical environment influence the evacuation process?

INTERVIEW PROTOCOLS

INTERVIEW PROTOCOLS

- Data collection process in three components:
  - Questionnaire. Prior to interview, participant completes a web based questionnaire. Provides key demographic and factual information e.g. gender, location at time of attack, level of evacuation training, etc.
  - Free-flow interview. Participant is invited to recount, uninterrupted and unprompted, their story from when they entered the WTC complex to when they exited.
  - Semi-structured interview. Participant is again taken back to when they entered the WTC complex but are now asked a series of probing questions. Various instruments are used during this process to aid data collection.
    - Unlike other studies this is NOT A QUESTIONNAIRE BASED STUDY!

INTERVIEW EXPERIENCE

- There was some concern that the interview process may be stressful for the participants and that participants would be reluctant to tell their stories or unable to recall their experiences.
- This has ***not*** been our experience thus far.
- Interviews take between 1.5 – 2.0 hours.
- Participants were found to be:
  - keen to be involved,
  - displayed little hesitation in the desire to recount their stories,
  - experienced little difficulties in recalling accounts and
  - experienced no major emotional difficulties in recounting their experiences.

Recruitment (to date)

- Invitation letters and emails sent to 3,064 persons, present in WTC 1 and 2, on our behalf by New York DOHMH (Dec 05, Mar 07) – 287 people registered interest, response rate of 9.3%
- Senior personnel in companies with over 40 persons asked to distribute information
- Invitations through survivor groups (eg Skyscraper Safety Campaign)
- Individuals named in “102 Minutes” sent invitation letters
- Articles in church bulletins
- Local NY media coverage (TV, Radio, newspapers)
- 417 persons registered, 271 have been interviewed

RESEARCH INSTRUMENTS

Risk Perception

- Wish to determine:
  - How occupants perceived risk,
  - what level of risk was perceived by occupants,
  - how did this vary with time and in space,
  - how did the perceived risk influence decisions and behaviour?

- Administered on (up to) 4 occasions:
  - *Time 1*: when participant noticed something unusual,
  - *Time 2*: when participant was deciding to evacuate
  - *Time 3:* when participant knew WTC2 had been hit (if applicable)
  - *Time 4*: when participant knew WTC 2 had collapsed (if applicable)

Risk Perception

- General question on how at risk they felt at the time
  - seven point scale, 1 no risk – 7 very high risk

- Series of statements related to different risk attributes which have been identified from psychometric risk perception studies
  - Rated *strongly disagree* to *strongly agree*
  - Information available
  - Hazard
  - Immediacy of hazard
  - Extent of impact – self, others
  - Control

		Strongly Disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
I was able to obtain information about what was happening at the time.		1	2	3	4	5	6	7
Others in my building were able to prevent themselves being killed at the time.	2	1	2	3	4	5	6	7
I thought I would understand what was happening to the Twin Towers as time went on.	3	1	2	3	4	5	6	7
Others in my building were able to obtain information about what was happening at the time.	4	1	2	3	4	5	6	7
I had control over whether I would suffer injuries at that time.	5	1	2	3	4	5	6	7
I felt others in my building would be injured if they stayed in the building.	6	1	2	3	4	5	6	7
I felt there would be fatal consequences for others in my tower if they stayed in building.	7	1	2	3	4	5	6	7
I thought I would die if I stayed in the building.	8	1	2	3	4	5	6	7
I felt others in my building would find out what was happening as time went on.	9	1	2	3	4	5	6	7
Others in my building were able to protect themselves from injury at that time.	10	1	2	3	4	5	6	7
At the time, I had control over whether I would die.	11	1	2	3	4	5	6	7
Others in my building could prevent themselves from being killed in the near future.	12	1	2	3	4	5	6	7
I thought there was an immediate risk of injury for others in my building.	13	1	2	3	4	5	6	7
I had control over whether I would suffer injuries in the near future.	14	1	2	3	4	5	6	7
I thought others in my building had died at the time.	15	1	2	3	4	5	6	7
I would be able to obtain information about what was happening as time went on.	16	1	2	3	4	5	6	7
I had control over whether I would die in the near future.	17	1	2	3	4	5	6	7
I felt there would be fatal consequences for myself at the time.	18	1	2	3	4	5	6	7
Others in my building would be able to protect themselves from injury in the near future.	19	1	2	3	4	5	6	7
I felt there was an immediate risk of injury to myself.	20	1	2	3	4	5	6	7
I thought I would be injured if I stayed in the building.	21	1	2	3	4	5	6	7
I felt I had good information about what was happening at the time.	22	1	2	3	4	5	6	7
I thought others in my building knew what had happened to the Twin Towers at that time.	23	1	2	3	4	5	6	7
Others in my building were able to obtain information about what was happening in the near future.	24	1	2	3	4	5	6	7

Crowd Density

- Participants were asked to assess the crowd density using buildingEXODUS generated 3D animations based on Fruin's levels of service.
- Animations introduced whenever the participant described:
  - entering or exiting a stairwell,
  - crowding on the stairs.

Blue: Approximately Fruin C 1p/m^2

Orange: Approximately Fruin F 3p/m^2

DATA ANALYSIS AND DATABASE DEVELOPMENT

Data Collection and Analysis Process

- Pilot Study to test interview protocols and initial data analysis.
  - 6 week interview session in NY
  - Interview protocols and research instruments refined,
  - Data processed:
    - Evacuation phases identified
    - Three level “Experience Hierarchy” suggested
    - Initial data base categories defined
- Three additional interview campaigns completed and interviews transcribed.
- Content analysis procedures for processing interviews developed.
- Data base categories expanded based on new data.
- IRR undertaken by IT
- IT undertake content analysis of interviews
- Data entered into database
- Analysis of data in database – yet to be completed

Data Processing

- For each participant the following activities must be undertaken.
  - IT undertake approx 2 hour face to face interview – 4 hours.
  - Digital recording of interview transcribed by audio typist, transcript can be 30 pages long – 1-1.5 days.
  - Transcripts edited by IT – 1-3 days.
  - IT code transcripts – 1- 2.5 days.
  - Data entered into HEED database - 1-4 hours.

Content Analysis of Transcripts

- Analysis of pilot study data suggested that there were at least 7 distinct PHASES in the evacuation process.
- Evacuation behaviour of occupants is therefore categorised as belonging to one of each of these phases.
- This concept is used to structure information within the HEED database

1. Pre-Recognition phase
   - Starts from the time the participant enters WTC and covers activities prior to the point that something unusual happens

2. Recognition Phase
   - Starts from the time the participant realised something unusual was happening and ends just before they make an active response such as getting up from their desk, making a telephone call.

Evacuation Phases

3. Response Phase
   - Starts when participant undertakes an active behaviour such as moving away from their desk, making a telephone call, communicating with colleagues and ends just before the participant starts to enter the staircase/elevator.
   - includes behaviours such as moving around their location and preparing to evacuate, for example collecting belongings, investigating, etc.

4. Horizontal Evacuation Phase
   - covers participant's evacuation during horizontal movement.
   - this includes movement from location to exit stairwell or elevator, movement along transfer corridors, movement on floors, for example exiting the stairwell (which would be leaving vertical evacuation) to search for quicker exit route.
   - the horizontal phase ends when the participant is no longer moving horizontally and resumes vertical evacuation.

Evacuation Phases

5. Vertical Evacuation Phase
   - Covers participant's vertical movement on or in a stairwell / elevator / escalator.
   - begins when the individual enters an egress route (stairwell, elevator, escalator) and ends when the participant exits the stairwell / elevator / escalator.

6. Evacuation Interruption
   - This phase begins when the participant suspends or ceases their evacuation and ends when the participant resumes their evacuation, e.g. those in WTC2 who returned to their office following the announcement, those participants who suspend their evacuation due to the need to rest, communicate or rescue others.

7. Exit Phase
   - The time from the point the participant leaves the stairs/elevator and arrives in the lobby or concourse area to their exit from the WTC.

Content Analysis of Transcripts

- A content analysis of a small sub set of participants' accounts indicated that WTC evacuations comprised a rich variety of experiences
  - observations and interpretations of events, cognitions and actions.
- Method developed to :
  - assist in the systematic coding of experience data from transcripts
  - as a logical structure for the data base.
- Three level Experience hierarchy was suggested consisting of:
  - Experience Category (6): Action, Sensory, State, Cognition, Dialogue, Risk Perception
  - Experience Type (50): Each category has a range of experience types:
    e.g. Action → Receive Assistance
  - Experience (647): Each type has a range of experiences:
    e.g. Action → Received Assistance → Carried by others.
- Experience dictionary refined and expanded in an iterative manner as more accounts were examined.
- As part of the Experience Hierarchy over 700 codes and associated code definitions were developed to uniquely categorise each experience.

Content Analysis of Transcripts

- **Level 1 Category: Action.** The act or process of doing/receiving something physically active.
  - **Level 2 Types:** Consists of 13 Experience Types, e.g. assistance given/received, collect/distribute item, deference/preference behaviour.
  - **Level 3 Experience:** Consists of 94 Experiences, e.g. 'Carried by others' associated with Experience Type 'Assistance received'.

- **Level 1 Category: Sensory.** Information gained through the four senses; see, hear, feel and smell.
  - **Level 2 Types:** Consists of 14 Experience Types, e.g. environmental condition - smelt, saw other/s emotional state, saw sign.
  - **Level 3 Experience:** Consists of 185 Experiences, e.g. 'Burning/Smoke' associated with Experience Type 'Environmental condition – smelt'.

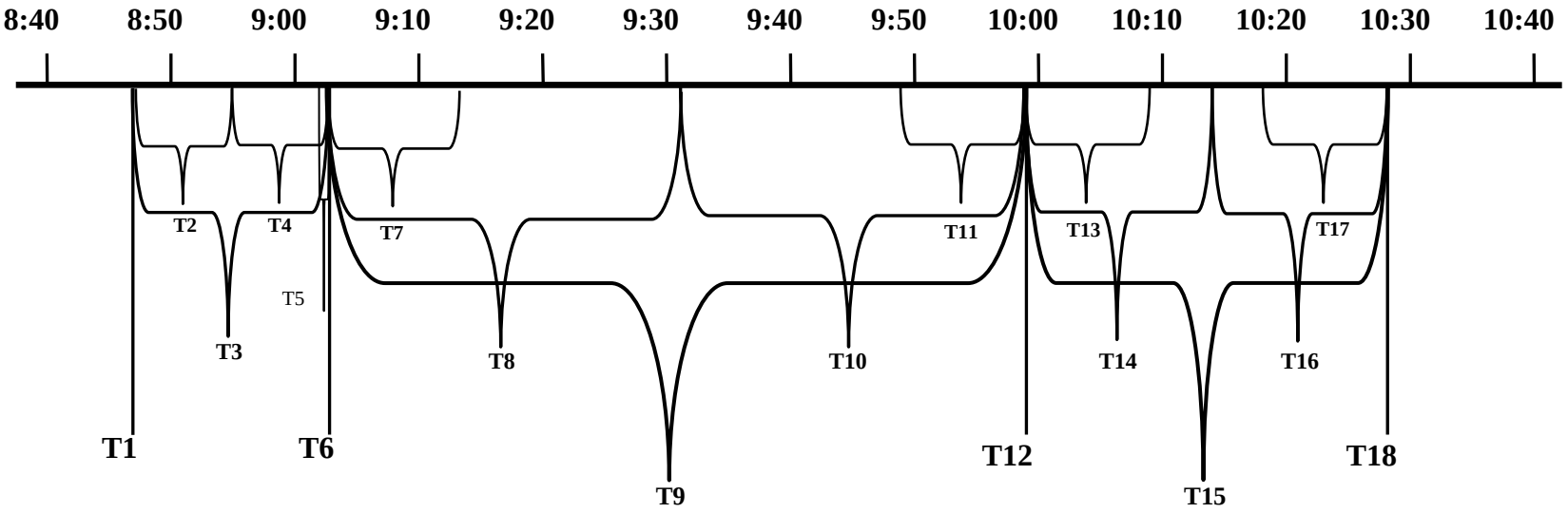
Content Analysis of Transcripts

- Contextual information is also required to clarify the detail of the experience.
  - where, when, and why the experiences occurred,
  - who the participant interacted with during the experience and how,
  - whether the experiences occurred while the participant was part of a group or acting alone,
  - estimated Fruin crowd density experienced/observed.

- Time estimates extremely important for estimating average travel speeds and response times.
- Time at which an experience occurred is represented within HEED in several ways.
  - Actual time if explicitly provided,
  - Estimated time based on proximity to key global times provided by participant during semi-structured interview
  - Time interval estimated by the research team based on the evidence provided within the transcript.

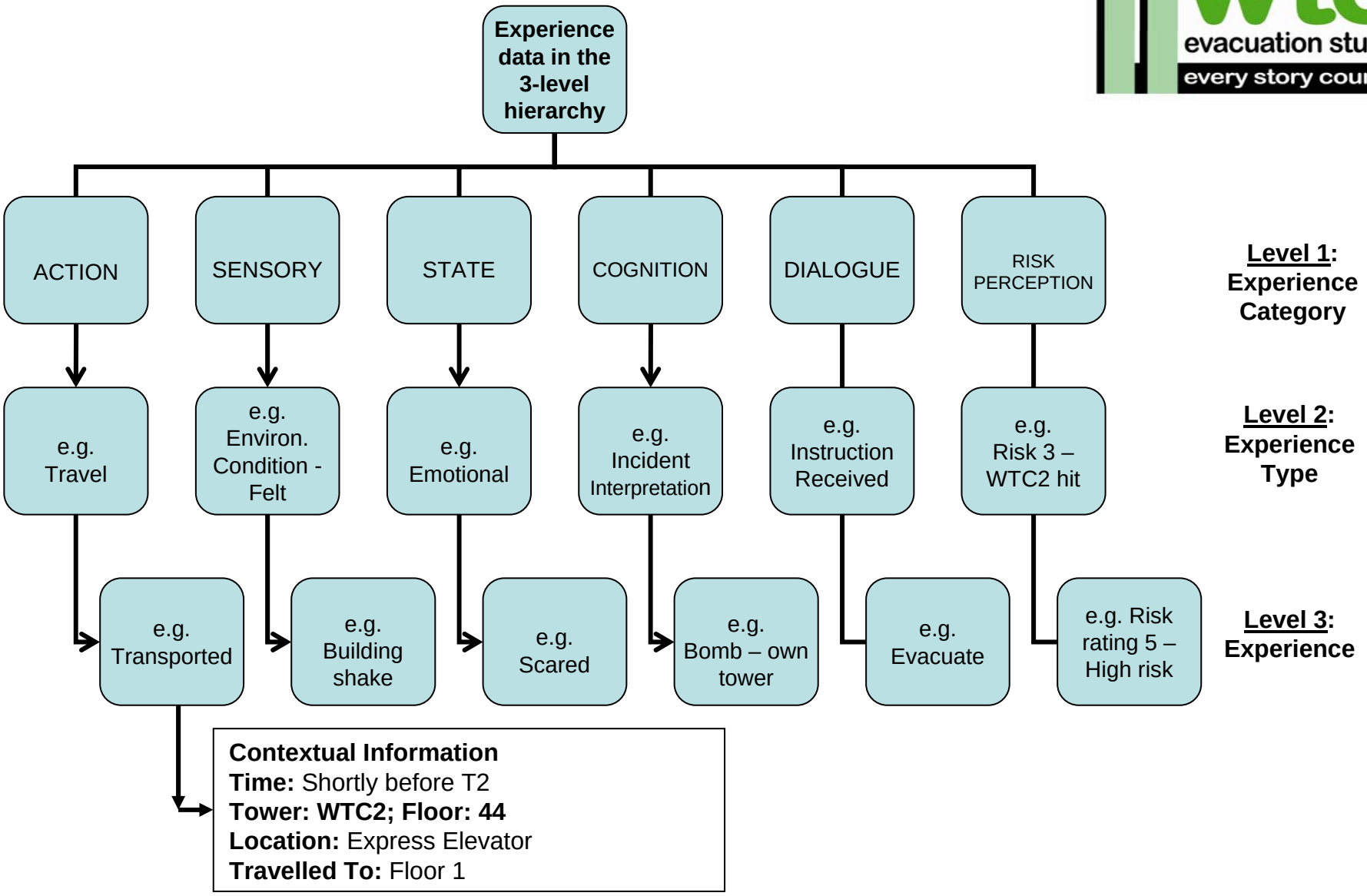
Content Analysis of Transcripts

- 18 time sub-intervals have been defined around the four known global event times:
  - Impact into WTC1 at 8:47am (T1),
  - Impact into WTC2 at 9:03am (T6),
  - Collapse of WTC2 at 9:59am (T12)
  - Collapse of WTC1 at 10:28am (T18).



– Estimating the time an event occurs involves assessment of evidence provided in interview transcript and identification of most appropriate time sub-interval.

Content Analysis of Transcripts



Content Analysis of Transcripts

- Before “experience” can be coded it must first be identified.
  - Behaviour Patterns are identified within the text.
  - These are chunks of text which contain experience and corresponding contextual data.
  - BPs can have several mutually exclusive experience categories attached.

- The following chunk of text represents a BP:
  - “I worked in WTC1 floor 64. Almost immediately after WTC1 was hit, I ran into stairwell A.”
  - BP contains Experience data and Contextual data.

- This data is coded as follows:
  - EXPERIENCE:
    - Level 1: Experience Category: ‘Action’
    - Level 2: Experience Type: ‘Travel’
    - Level 3: Experience: ‘Run’
  - CONTEXTUAL DATA:
    - Start location: WTC1 floor 64,
    - Stair used: Stairwell A
    - Time: Estimated to be Sub-interval (T2) i.e. “nearer T1 than T6”

Database Development

- Database stores:
  - factual data from the pre interview questionnaire,
  - the actual interview transcripts
  - risk perception measures,
  - organisational measures,
  - fruin density data
  - coded results from the analysis of the free flow and semi-structured interviews.

- Data analysis and database development are parallel processes

HEED Database

Identified BP to be coded

in the staircase started going down in a more orderly fashion which was about 15 minutes later, after we got out to the staircase. From about the 11th floor, 10th floor down, we were really able to evacuate. The problem was around those floors 10, 9, 8 the staircases were filled with water and walking down them was a little slippery but as long, but if you could hold onto the banister and I was able to make it down fairly quick. I worked in WTC1 floor 19. Almost immediately after WTC1 was hit, I ran into stairwell A. I saw debris, I saw – again, remember I thought a garbage truck exploded because of the amount of paper that was coming down – I saw these two wheels by the corner, the north west corner of Tower 1. North *east* corner of Tower 1. I see this double tyre thing and then [lowers voice] I see a portion of a leg. I see a headless, armless torso and the reason I recognised this was on Sunday my son played baseball in a league in Suffolk County; 06:30 on a Sunday morning somebody was run over on the highway and was run over repeatedly; [getting progressively louder] when we, and 06:30 on a Sunday morning traffic was backed up for miles, like "What's going on here? It's not construction or anything." I am driving. I can't see. I kind of take a glance where all the police cars had made a perimeter around this body. I thought it was a dead deer to be honest with you but the area was not deer country. And my son had come over my side, the van that we were in he came over, and he looked and he said, "Dad, that's not a deer. That's a dead body" and then I took another glance and through the rear view mirror whoever this was, you couldn't tell what color of skin they had, whether they were male or female or anything. So I realised that what I was looking at was a torso. Again, a leg and then as I was… I didn't wander either as I was walking out. And that's when I saw the second tower people jumping out and [lowers voice again] I think I counted 3 or 4 people jumping and my first thought was "What kind of desperate state are these people in when they are jumping out?" And then they were jumping off of Tower 2. "What's going on here?". You know the voyeur in us, not understanding the consequences later on. [Whispers] I watched one body hit the ground it was not uh… [Stops whispering] I wish I had never seen that because I see… That's one of my regrets through the whole thing is "Why did you bother to watch that man?" and I know it was a man. I think it was a man. [Whispers] Hit the ground. [Stops whispering] But at that point when I got out of the exit over the bridge it was 09:25. So from 08:48 and I was only on the 19th floor till 09:25, that's how long it took us to get out of the building. Fair?

I1: Yes.

P: Ok.

END OF FREE FLOW (00:16:17)

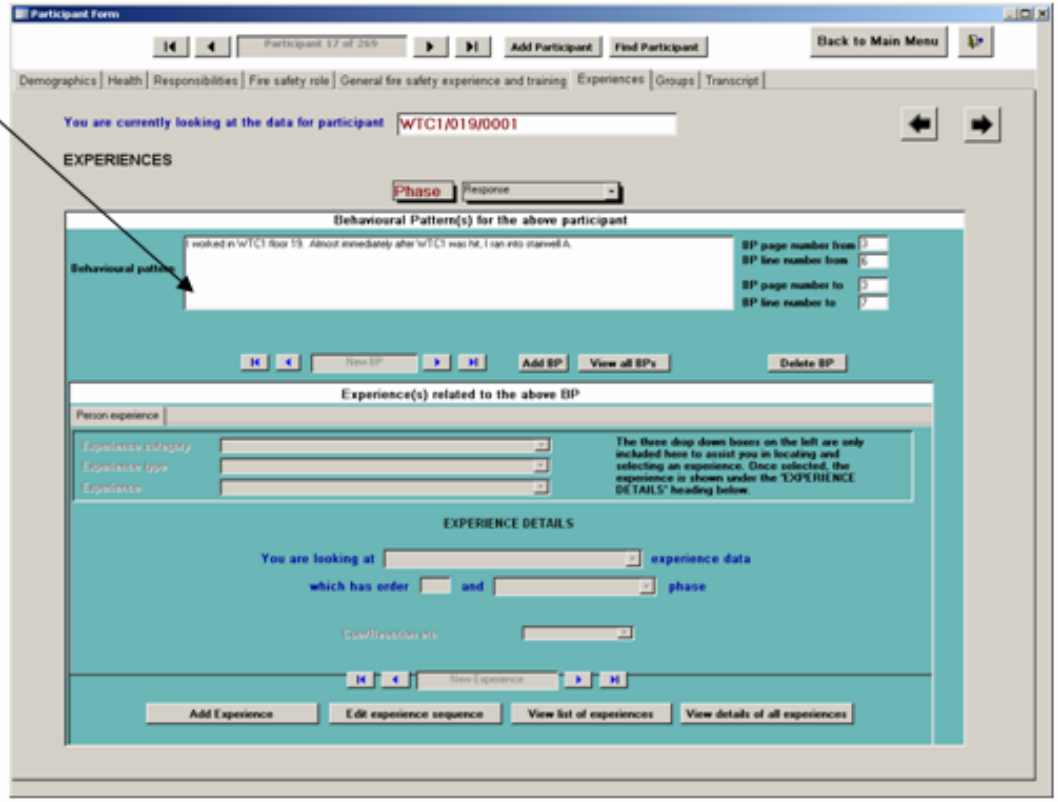
I1: Thank you for going through that.

P: Alright. Is there anything else I need to tell you?

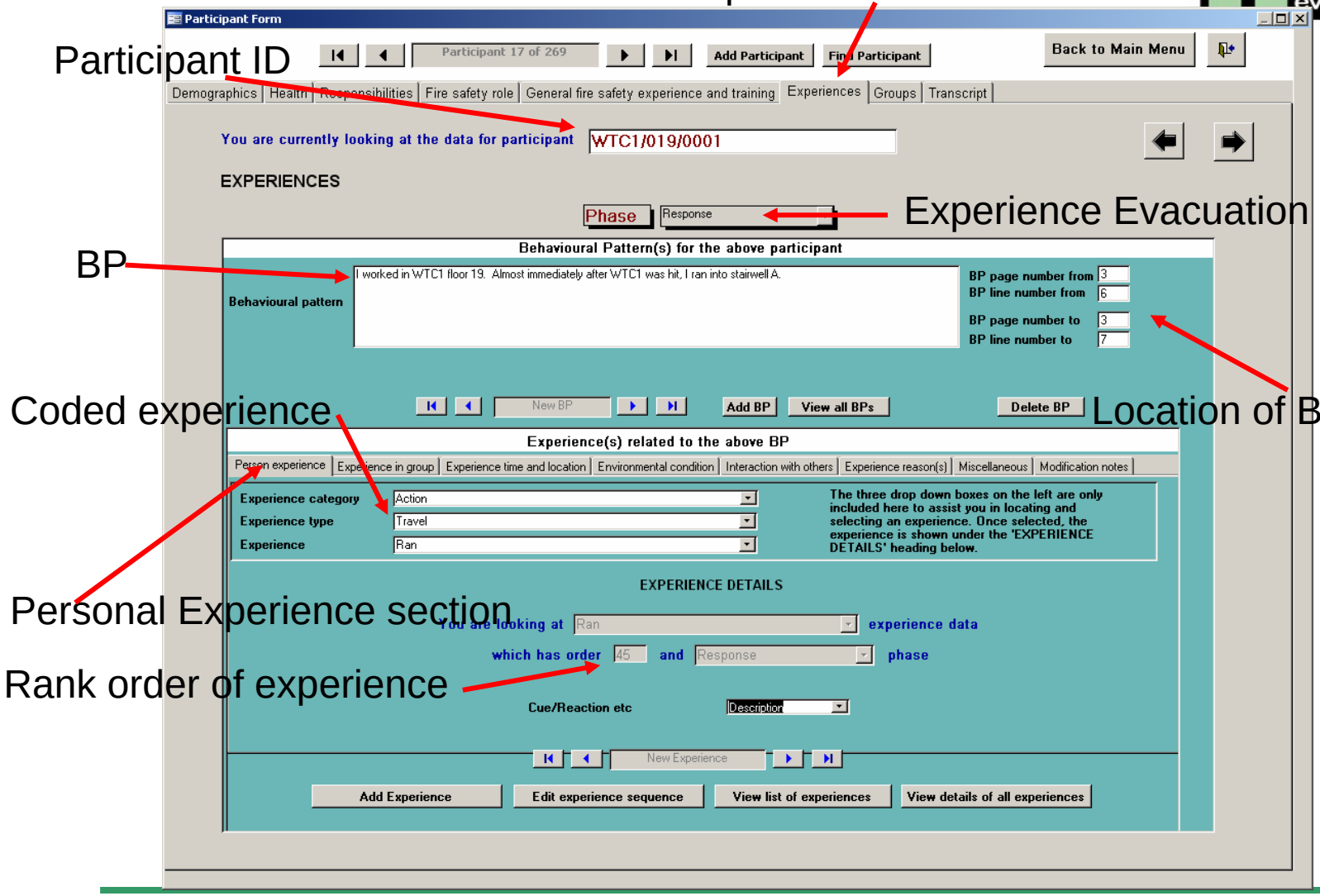
START OF SEMI-STRUCTURED (00:16:22)

I1: Well what happens is I2 and I, we'll go back through this step by step so the opportunity is, if there is anything that comes back to you that you feel you've missed out we'll come back to that. [Pause] Ok so if we start back. You said you got into work roughly around about…

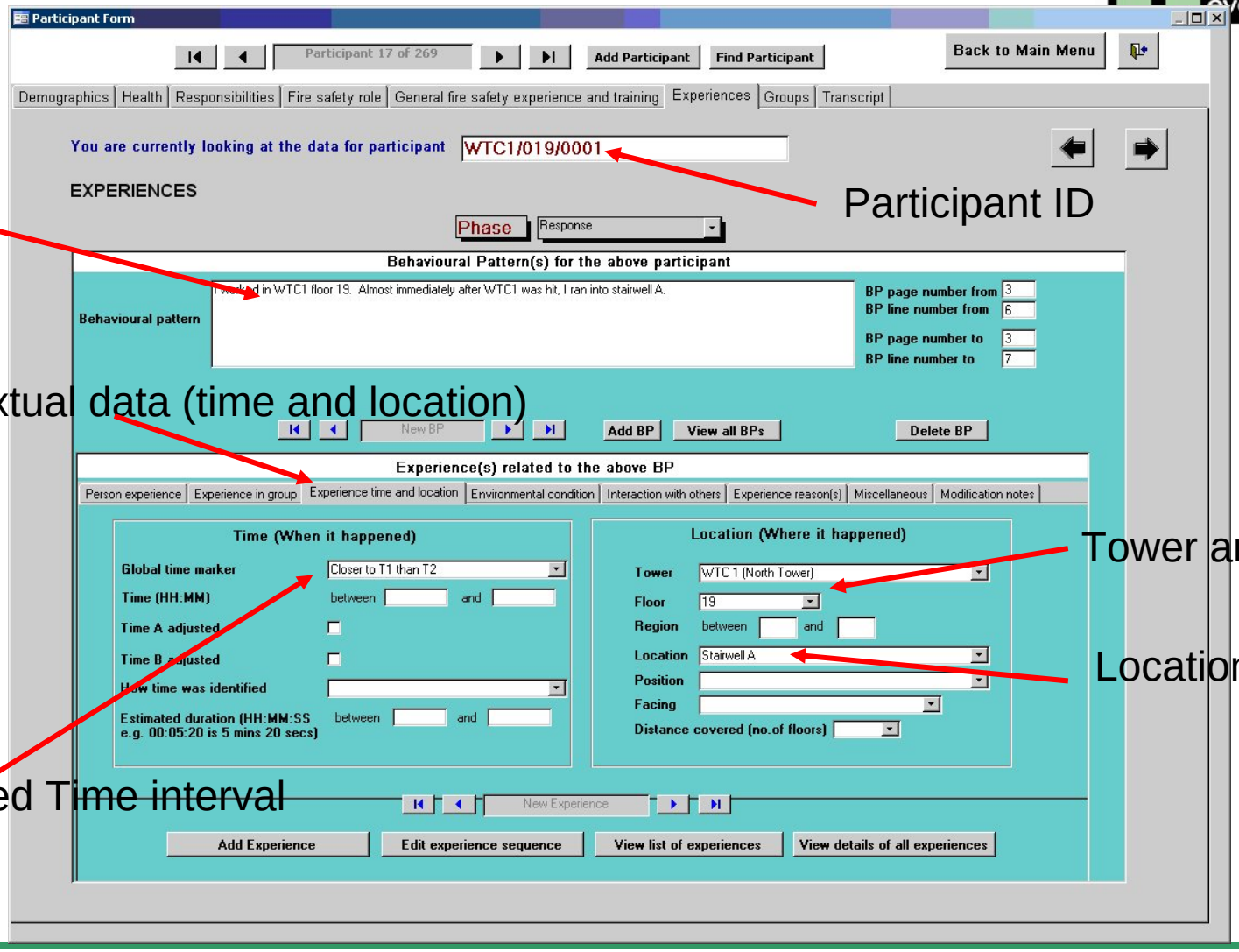
P: 07:00.



Coding Experience



Coding Contextual data



BP

Participant ID

Contextual data (time and location)

Tower and Floor

Location

Estimated Time interval

Transcript Extract

- Participant: WTC1/060/0001 on 60th floor describes descent down Stairway C:
  - I: Ok. When you yourself entered onto the stairs, were there other people coming down at that point?
  - P: No.
  - …….
  - I: So basically you were able just to step into, enter the stairs and follow the…
  - P: Boom. No problem. Gone. First five floors, there was no one coming in. So we were able to run down the first five floors, not a soul in the stairwell, until we got down to about 55 when all of a sudden it came to a halt.".
  - P: That's where congestion came in, about 55.
- When participant entered Stair C 60th floor, staircase was clear. At around floor 55 congestion encountered travel speed greatly reduced.
  - I1: More than that, ok. [Continues onto next Fruin]
  - P: Yes.
  - I1: Ok, that one is Orange. I'm just going to, as I say, go through them all.
  - P: Sure. [Views remaining Fruins] No, Orange is definitely the right one, definitely not Purple! [Laughs]
- At around the 55th floor congestion encountered, described as 'orange' i.e. Fruin Level F, approximately 3 people/m^2.
  - I1: Okay, so that's Orange. And so when it got congested, did you say this was because other people were coming into the stairs?
  - P: Yes, other people were coming in as well as already in the stairwell from whatever floor they had come from.
  - I1: Right. And what happened? How did they come into the stairs? Were people making way to let them in or were they…
  - P: Yeah, it was generally an organised, civil exodus. There weren't… there was no pushing, no shouting, no panic. So, when people were coming in the stairs, it was just like you were getting on the subway; one next, one next, and it was pretty organised.
  - I1: And how did that affect the travel speed?
  - P: It slowed down dramatically.
- Higher density on stairs caused by large numbers of people from the lower floors entering the staircase. Stair flow deferred to floor flow allowing people from the floors to enter stairs. Merging process appears equally shared between the floor and stair flows which greatly reduces the speed of the stair flow.

Transcript Extract Continued

- I1: ….. Can we just go to the fire fighters for a moment? Were there many of them coming up the stairs?
- P: About 20.
- I1: And were they all grouped together, or spread out?
- P: Yeah, grouped together. They were all grouped together. They all came on their right. They instructed us, “Make a hole, step to your right, let the firemen through”. They came up and then the same thing happened on the way down, “Make a hole, injured coming down, everyone step to their right and let the other side open for injured”.
- I1: Did that mean that you had to stop?
- P: Stop.
- I1: Ok, so you stopped completely.
- P: We stopped completely while they were passing. And as soon as they went past, then you went back out and filled the stairwell and continued the progress down.
- I1: How long would you say you were stopped for in these periods?
- P: Two minutes. No, you know what, that’s not true. One minute. It was about, less than or…a minute. I mean I can’t say for sure, but it wasn’t two minutes. One minute.” (page 13, lines 1-31)

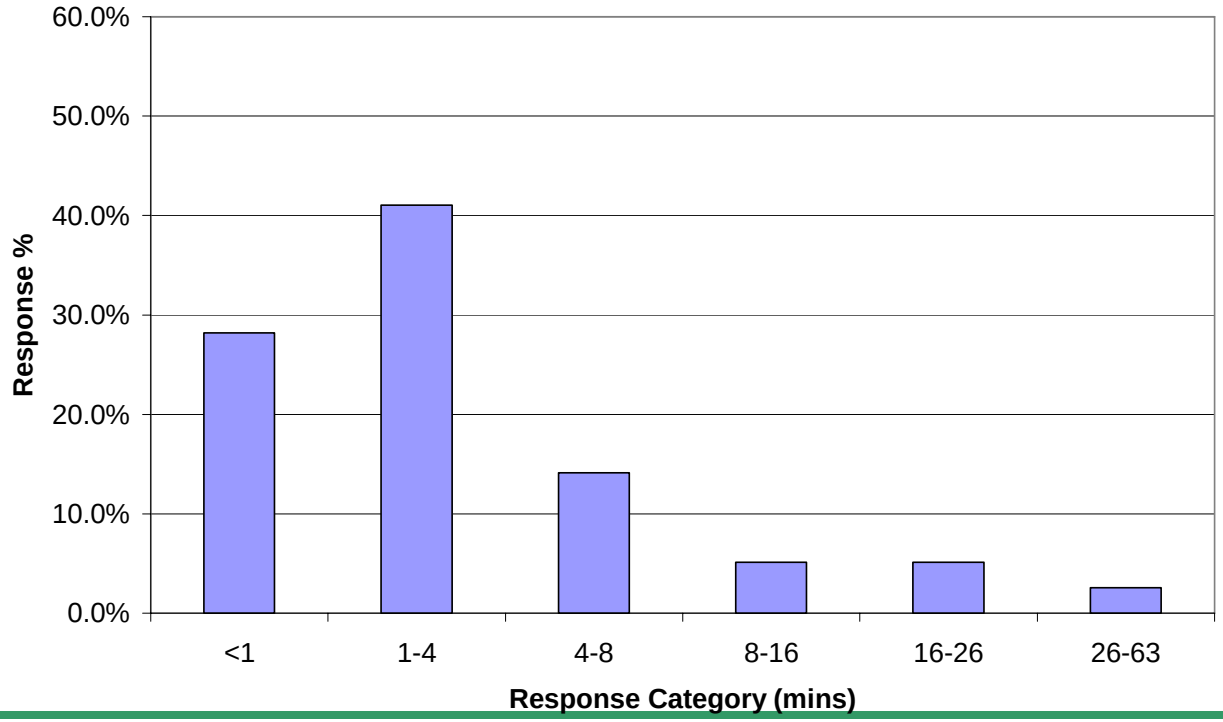
- Fire fighters ascending WTC1 on Stair C in a group of 20.
- Fire fighters instruct evacuees to form a single line to their (evacuees’) right.
- When the evacuees stepped to the right they effectively stopped until fire fighters passed
- After plug of fire fighters pass, evacuees resumed their downwards motion, two abreast.

WTC 1 Response time analysis

- HEED evacuation modelling team analysed WTC1 transcripts to determine occupant response time.
- 138 interviews of WTC1 survivors conducted.
- Reliable estimates of response time extracted from 78 interviews.
- Process of estimating response time involved reading the interview transcript and from the evidence provided suggest which time sub-interval best captured the response time of the evacuee.
- If the evacuee actually provided their own estimate of the response time this was used rather than the estimated time interval.
- Where decisions could not be made due to insufficient information being available a time interval was not recorded and so no response time would be determined for that individual.
- Each time entry was determined by two analysts, any differences in interpretation were discussed and a final ruling made.

WTC 1 Response time analysis

- Start of response time taken as impact into WTC 1.
- End of response time taken as first decisive motion towards stairs.
- Response time distribution has classic Log-normal shape, but note that intervals are non-uniform
- Almost 70% of population react within 4 minutes.

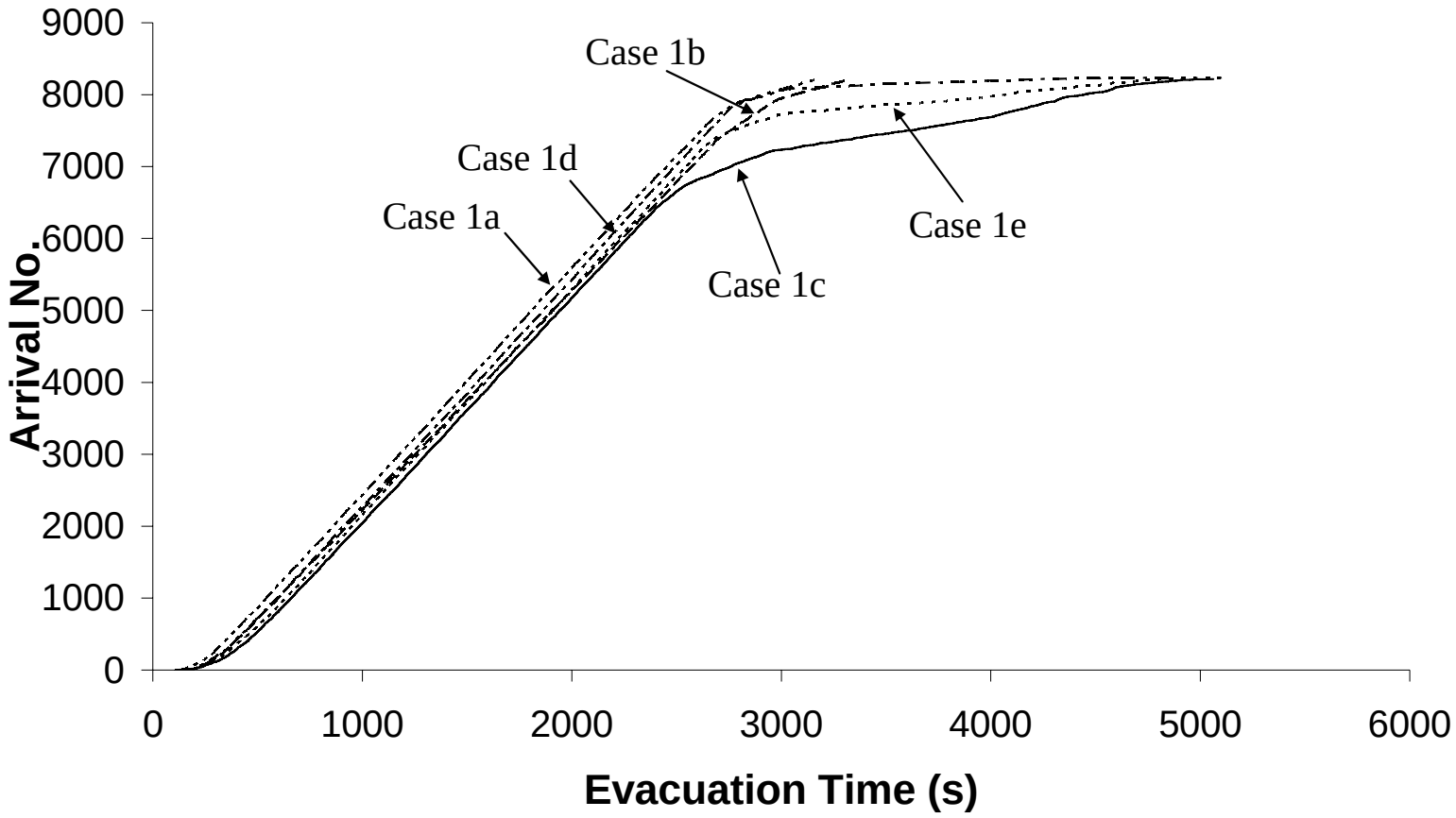


WTC 1 Response time analysis

Response Time Distribution	Average Total Evacuation Time (8239)	98 % evacuated (8074)	90 % evacuated (7415)
1a Instant response time	0h 53m 04s	0h 49m 47s	0h 43m 10s
1b Engineering response times (0-2 min)	0h 55m 31s	0h 52m 02s	0h 45m 00s
1d Interview response times	1h 20m 47s	0h 50m 39s	0h 43m 54s

- Approximating the actual response time distribution by an instant or arbitrarily short distribution may generate a reasonable approximation of the evacuation time for 90% of the building population.
- However, it is likely to fail to realistically represent the final phases of the evacuation, in particular the evacuation of long responders, thereby generating unrealistic estimations of likely total evacuation time.
- It is therefore essential to introduce a reasonable representation of likely tails into response time distributions used in engineering analyse of high-rise building evacuation.

WTC 1 Response time analysis



Concluding Comments

- WTC evacuation provides an opportunity to probe into and understand the very nature of evacuation dynamics
- With this improved understanding, contribute to the design of safer, more evacuation efficient, yet highly functional, high rise buildings.
- Work on project HEED continues to populate the database and commence the preliminary analysis of the data.
- When completed HEED database will be available on-line.
- Latest developments in project HEED can be found on our web site at www.wtc-evacuation.com.

HEED PARTNERS

HEED Partners

- The logistics of undertaking a project of this type and magnitude should not be underestimated.
- In order to successfully conduct the HEED project it was essential to seek project co-sponsors and facilitators in NY.
- John Jay College of Criminal Justice:
  - vehicle by which project HEED obtained US Ethical Review or IRB.
  - have provided the project with a base for the team to work from including phone line with voice mail, a postal address and facilities to conduct interviews.
- September Space, Poly University, Pace University, tenant companies
  - have provided the team with conveniently located office space to conduct interviews.

HEED Partners

- WTC Survivor Network + Skyscraper Safety Campaign:
  - Project HEED has received support from two citizen groups associated with 911. Both organisations fully support project HEED and have assisted the project by making the project known to their members and exerting their influence in our cause.

- The New York City Department of Buildings:
  - Has responsibility for the building code of NYC formally endorsed the project.

- Fire Department of New York City:
  - Have a strong interest in project HEED and its proposed outcomes and have formally endorsed the project

- New York City Department of Health:
  - Provided access to the DOHMH Registry, a unique listing of some 90,000 people who were affected by the WTC collapse.
  - Includes approximately 3,500 people who evacuated the towers, speak English and have given consent to take part in WTC related studies other than the NYHD study.

HEED Partners Cont.

- Church leaders:
  - Diocese of New York supported the project by publishing information regarding project HEED in their church media.

- Brown Lloyd James
  - Provided public relations support within NY and generated media interest.

- Virgin Atlantic:
  - Provided generous assistance with airfares.