Dissertation Report

Crowd Safety in Emergencies

This report is submitted in partial fulfillment of the requirements for the BA (Honours) degree in Crowd Safety Management at Buckinghamshire New University.

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Submitted 23rd May 2016.

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Crowd Safety in Emergencies

By Stephen Laws

Acknowledgement – Wembley Stadium, England versus France International Football match, 17th November 2015. One week after Stade France terrorist attack.

Abstract

"How the psychology of crowd behaviour impacts on operational resilience."

This is a report prepared from a literature search together with research using expert theorists and practitioners. The report investigates the changing demographics and behaviours of crowds when subjected to stressful emergency situations and how this affects the operational resilience for Event Safety organisations.

This study has set out to examine the history of psychological research on crowd processes, to unpack the plethora of theory and research to understand the patterns of crowd actions and individual behaviours.

There is still a tendency to focus on early scientific theorists such as Gustave Le Bon's research (Le Bon 1895), which separates crowds from their social context. His theory assumed that crowd participation counters our normal view of psychological behaviours, revealing a primitive and uncontrolled behaviour (Reicher, 1996 Reicher and Potter, 1985). Stephen Reicher (Reicher 1982,1987) argues that 'one of the more remarkable features of traditional crowd psychology is that it has tended to constitute a theory without a referent. Rather than starting from a set of phenomena that are in need of explanation, a set of explanations were elaborated in order to underpin certain ideological presuppositions about the crowd - or at least the suppositions of gentleman observers who viewed the masses with alarm from the outside'.

Crowds should not be seen as aggressive and uncontrollable in emergency situations but with patterns and behaviours that reflect social and cultural influences. There are a number of social scientists that now support this view (Krantz, 1988, Turner and Killian 1964, Williams, 1986, Reicher, Drury, Stott, 1996, 1997, 1999), arrived at after relevant scientific research to investigate patterns of crowd behaviour to show that there are observable trends that reflect existing cultures and social identity.

Acknowledgments

Firstly, to my mentor Owen Grainger-Jones who counseled and encouraged me to embark on this journey of learning to better understand the complexities and fostered a fascination for crowd safety management. I remember an inspiring chat at Bucks New University and being introduced to Dr. Mick Upton who I got to know during my studies and came to fully appreciate the impact he has had on the industry.

To my Supervisor and Senior Lecturer Gavin Butler and Head of Department Emma Parkinson. Thank you for listening to and advising me throughout all of my studies.

To Dr. Keith Still and Dr. John Drury who inspired me during lectures and gave their time to talk to me to about their research. Your time and thoughts are immensely valued.

To my safety officer colleagues who as research participants welcomed me into their stadiums to observe and witness their safety protocols and procedures.

To all my colleagues who I have met during studies at Bucks New University many of whom I am proud to count as my friends. We have definitely been stronger together. Thank you for your support, advice and friendship.

Finally, to my family who have supported me throughout the countless hours studying and writing, especially to my dear wife Annie, whose tireless support has undoubtedly got me through!

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1. Introduction

1.1 Research Context

Ensuring that an evacuation of people from spectator events can occur safely and efficiently is an important area of consideration in any crowd safety plan. It will ensure that in emergency situations people are kept as safe as possible and undoubtedly will save lives. Every venue will have emergency signage, lighting and plans to direct people to the emergency exit that should be used during emergencies. However, when disasters happen, some of these exits might not be usable because of safety problems due to the emergency itself, incident management of threat outside the venue or because of the distribution and congestion of people within the arena, stadium or green field site. The average flow of people in such emergencies will depend on the crowd density. Therefore, if all the people follow the same exit route, or follow a route without knowing the risk of convergence ahead, they can end up being part of that convergence, adding to it, which will result in a reduction or slowing of the flow rate to a point where the exit flow will fail. For these reasons it can be shown to be a vital part of the safety plan to design evacuation contingency plans that inform people how fast and in which direction to move, based on real-time information that can respond to the distribution of the crowd at any given situation.

1.2 Research objectives

This research report examines the concepts of Crowd Science and Crowd Dynamics and the ideas that underpin the theoretical and practical disciplines of this field of crowd management. The first section looks at Crowd Science, its emergence from the psychological and sociological thinkers of the early 19th/20th century and a number of the theories that underpin it today. The second section examines Crowd Dynamics and concepts such as DIMICE, designed to ensure crowd safety at all stages of an event, but specifically in the situations where emergency evacuations occur. Third illustrating how UK legislation in the context of event safety, crowd science and dynamics governs event planning. These concepts will be applied to the Crowd Science as a concept, which first began to evolve towards the end of the 19th Century, especially in France as a response to

what Nye (Nye, 1975) called the 'social problems' of urbanisation and industrialisation.

The impact of historical events and factors that led to these emergencies will be analysed against the key theories relating to crowd behaviour.

Recommendations will be made on how to improve current levels of safety and efficiency for event day operations across a range of emergency situations.

1.3 Research Stakeholders

With the recent Hillsborough Inquest verdict ruling that the 96 victims were unlawfully killed in 1989 and the German Courts ruling that the 2010 Love Parade tragedy where 21 died, will not now go to trial, crowd safety and the actions of event organisers, safety management teams and emergency services has never been in sharper focus.

The main factors that will contribute to the ability of people to safely evacuate an open space or building will be building design, crowd psychology, the competency of crowd safety planners and management to ensure this can be tasked safely, supported by appropriately trained and competent safety stewarding staff to implement the evacuation.

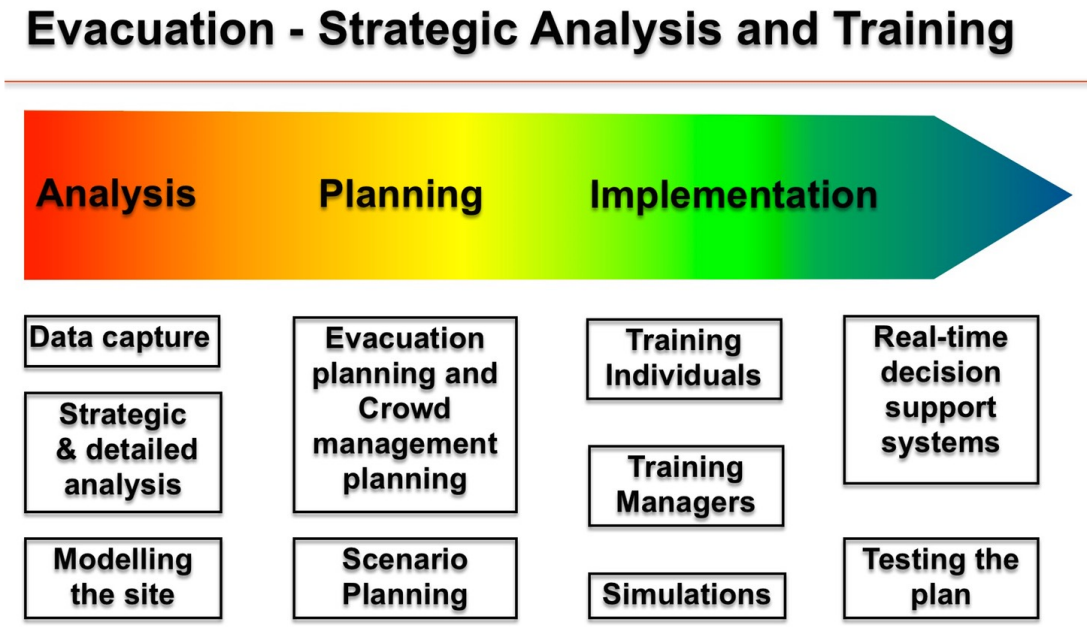


Figure 1. (Still K. 2003 – 2007)

2. Literature review

2.1 Historical view

There is a long history of examination and explanation of crowd behaviour. Early scientific study of crowds or 'crowd science' first arose in the late 19th Century Europe, specifically in France in response to urban unrest (Nye, 1975).

France's history was characterised by revolutions. After 1848 its narrow streets were redesigned into wide boulevards with one psychologist stating, '*the architecture of Paris is a monument to fear of the crowd*' (van Ginnegen, 1892). Mass participation of crowds in these revolutions was perceived as a threat to civilisation and the existing social order. Drawing on thinking prevalent post these events, 'crowd scientists' hypothesised a number of theories mostly drawn from Darwinian zoology, medical science, 'race; anthropologies and theories of hypnotism to explain the behaviour of crowds (Drury and Stott, 2011). Some ranged from Taine (1876) 'primitive emotions spread through 'contagion' to Sighele (1891) believing people were 'criminal by nature' and responsible for their actions' (Drury and Stott, 2011).

2.2 Early Crowd Science Theory

Throughout the twentieth century a number of theories on crowd behaviour were introduced into Crowd Science. These include the classic theories of Le Bon (1908), French psychologist Gustave Le Bon's 1895 best - selling book *'The Crowd'* was the first to highlight perceived negative traits that characterise crowds. He argued that crowd behaviours were pathological and abnormal with civilised behaviour being replaced by primitive savagery within the anonymity of the crowd. His (1908) Group Mind Theory is one of the classic early theories of Crowd Science. He proposed individuality is lost along with responsibility for actions, as a person becomes an anonymous member of a group. That being in groups gives these individuals a sense of power and invincibility, a 'contagion', that leads individuals to become debased resorting to primitive and savage instincts. Many of these concepts are no longer considered sustainable and indeed are seen as dangerous to rely on as an explanation of crowd behaviour (The Cabinet Office and Emergency Planning College, 2009).

Freud (1921) and others such as Game Theory (Berk,1972,74), Deindividuation Theory (Festinger, Pepitone and Newcombe, 1952), examined the relationships between people. Sigmund Freud's 1921 *'Group Psychology and the Analysis of the Ego'* drew heavily on Le Bon believing crowds instilled a feeling of total power in an individual and a loss of their conscious personality, which led them to behave in the manner they did. Freud saw crowds as two distinct entities, one short lived such as is exhibited in trends or social movements while the other long lived and organised like the church. Both kinds of masses, he argued, used the same basic mental thought processes. Convergence Theory emerged in opposition to Contagion Theory argued that crowds came together intentionally because they wanted to act in a certain manner. Individual isolation is lost through an individual's empowerment in a crowd of similar like -minded individuals help achieve that goal. (Sociological Forum, 1998)

2.3 Development of crowd science theories

Further scientific study produced theories such as - Emergent Norm Theory (Turner and Killian, 1957 & 1964), proposing that crowd members adhere to unique social norms that influence crowd behaviour. Minimal Group Paradigm (Tajfel, Billig, Bundy & Flament, 1971), Taifel conducted experiments in 1971 to discover what conditions existed for intergroup bias. He demonstrated that simple categorisation of a group was all that was needed to establish a group favouritism. Social Identity Theory (Turner, Tajfel, 1975, 1978, 1979 and 1986), where a person's sense of who they are can be based on group membership such as social class, family or a football team, being also a source of pride or self-esteem. Self Categorisation Theory (Turner, Hogg, Oakes, Reicher & Wetherall, 1982,1985 and 1987), which built on the idea of social identity and how people define themselves in terms of a group belonging. Social Identity Model of a Crowd (Reicher, Levine, 1984, 1987, 1994), which challenged the known models of de-individuation and showed that a person's idea of who they are or their 'self' is not lost and can have a full voice amongst others when in a group. Social Identity Model of Crowd Behaviour proposed by Reicher and Levine (1984, 1994) characterised people in crowds by 'in groups' and 'out groups'. A field study of the St Paul's 'riot' of April 1980 found:

1) Attacks were directed against police only with financial institutions and shops owned by outsiders attacked
2) A collective 'St Paul's 'in group' identity emerged amongst inhabitants of the area
3) That 'identity was defined in terms of black experience of the police and exploitation by financial institutions. (Reicher, N.D).

Elaborated Social Identity Model of Crowd Behaviour (EISM Reicher, Drury, Stott, 1996, 1997, 1999), developed this work, showing that policing can have an affect on the crowd, when an indiscriminate use of force fosters a redefined sense of unity in terms of the illegitimacy of and opposition to the actions of the police. Place Scripts (Donald and Canter, 1992) examined the behaviour of people in fires and other emergencies. Using data from the 1987 King's Cross Underground fire, through statements given by surviving victims showed that those who died behaved in a similar way to that of those who survived. These results showed that individual's actions were consistent to their normal scripts for use in that setting and shaped by their place related roles. The study showed that most of the victims tried to leave the station by the way that they had entered, or by their originally intended route. This modeling of behaviours in life threatening situations could assist to influence the responses to crowd management for future risk.

2.4 Crowd Dynamics

These theories represent just some of those drawn from sociology and psychology that have added to the development of Crowd Science as a subject. While theoretical approaches add an academic legitimacy to Crowd Science the practicalities of crowd movement, the critical density, safe limits, crowd density and flow rates is dealt with through the study of Crowd Dynamics.

Crowd dynamics is *'the study of the how and where crowds form and move above the critical density of more than one person per square metre. At this density there is the potential for over - crowding and personal injury'* (Still, 2011). That study also uses mathematics (people per square metre, see diagram 2 below), the psychology of human behaviour, venue design and its location as well as other factors such as contingencies impacting adversely on crowd behaviour. It deals with how and where crowds reach critical densities as a result of design or

queuing, which could result in, potential crowd crush and ultimately fatalities such as happened at Hillsborough (1989).

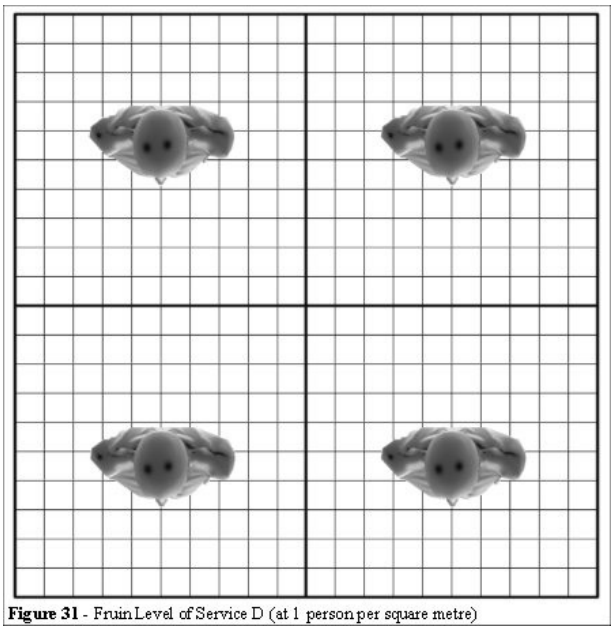


Figure 2. (Still K, 2011)

The history of events has as its timeline major incidents involving crowds and mass fatalities (Still K, 2011). In the United Kingdom Burden Park (1946), Ibrox (1971) and Hillsborough (1989) are the most notable incidents involving crowd crush fatalities.

Crowd Dynamics uses the 'DIMICE' (see diagram 3 below) model as a system for risk assessment and crowd management breaking down the major phases of crowd management into easily managed sections as to how a crowd can be managed (Still K, 1999 - 2014).

Normal	Ingress	Circulation	Egress
Design			
Information			
Management			

Emergency	Ingress	Circulation	Egress
Design			
Information			
Management			

Figure 3. DIMICE Model (Still K. 2003 - 2007)

The DIMICE model can be used to determine safety actions measured against how people behave and their collective actions observed through known examples of crowd behaviour in emergency and disorder situations.

When determining the nature of a crowd, one way to categorise is to relate to its physicality. A crowd gathers in a location, has a mass or size, a presence in that location and is made up of a collection of individuals. They can be categorized in terms of gender, age, numbers, social cohesion and location. These determine the individuals in a crowd or the “me” (Drury 2010).

2.5 Crowd Psychology

We can go beyond the “physical” and assess the “psychological” attributes of a crowd. As in Floyd Allport’s social identity (Allport 1924 Social Psychology), a crowd can have a shared social identity such that can be observed when crowds gather such as sporting events where those who support football teams will attend a stadium to watch a match.

In the paper; Come together: Two studies concerning the impact of group relations on ‘personal space’ (Novelli D, Drury J and Reicher S 2010) being a comparative study, was undertaken between the differing perception and tolerance of personal spaces in crowds. On one hand increases in crowd density where people come into closer proximity can be seen as a hindrance and less

tolerable such as shopping crowds, queues, or on public transport and can be seen as an issue to control from a public disorder aspect such as the police or security. However, when at a concert or sporting event, closer proximity is much more tolerable and accepted and from a stewarding viewpoint much easier to observe and manage. So, what are the differences?

A categorisation of social relationship can explain this phenomenon. In a shopping centre the common coming together is for a buying opportunity yet the purpose of what to buy is an individual one and may not be shared. Several different shops will be visited with varying crowd densities. There is less identification with the group and more on the individual. Compare this experience to a football crowd and the difference is immediately apparent. There is a shared social experience common to this crowd to come together for the enjoyment of watching their team play. There is an embodied experience which affects the way people will think of themselves and others. This shared social identity can be expressed in terms of a group being “in it”.

Part of the irrationalist tradition in crowd psychology is that a threat or danger, whether perceived or real causes emotion that will overwhelm reason (Cocking C, Drury J 2007).

That this can cause “mass panic” where the collective social identity breaks down, the “me” reasserts and people will start pushing and trampling to get out or away.

When examining typical mass emergency behaviour an aspect to define will be the real or perceived physical danger. Anthony R Mawson in his Social Attachment Model, (Mawson AR 2005) posits that familiar people and surroundings has a calming affect and actually reduces the “flight” response where people will be inclined to push and stampede. He stated that in fact social norms of behaviour rarely break down. According to John Turner (Turner J 1987) in his self-categorisation theory, disasters and emergencies can create a feeling of a common identity or ‘we-ness’. The behaviours manifested would be orderly, altruistic, and shared as people escape a common threat.

There have been a number of world disasters that following investigation and analysis show how this might be so.

In the 2001 Twin Towers collapse, 2983 people were killed. Research afterwards revealed that the building evacuation time varied from minutes to hours for people

to leave the buildings even when aware of the threat. People sought information to analyse before taking the decision to evacuate (Fahy and Proulx 2002). This lack of action contributed to the many fatalities more so that a mass panic. From reports many people left immediately from Tower 1, yet many more carried on with "routine" activities. In 2001 people reported evacuating from 90th floor in around 45 minutes.

Research undertaken into the July 7th London Bombings (Drury, Reicher, Scholfield, Langston and Cocking 2007) showed that there was individual fear and distress due to the emotional reactions to the explosion. However, during the evacuations people were calm and orderly and Londoners demonstrated a collective spirit, helping each other before their own interests. Despite smoke filled carriages and platforms on the underground, there was no evidence of panic, there appeared to be a shared social identity, shared goals and solidarity to helps others with an expectation that others would help too (Drury 2016).

It appears therefore that in adversity and confusion people can resist panic, maintain a social cohesion and display a high degree of resilience.

This 'collective resilience' refers to the way a shared identification allows groups (and crowds) of survivors to express solidarity and cohesion, and thereby to coordinate and draw upon collective sources of support and other practical resources, to deal with adversity (Drury 2016). A community can evolve through circumstance where a social bond develops from a shared experience in adversity.

'Mass panic' has been an influential model for understanding mass emergency behaviour. The evidence suggests that it is not scientifically useful: irrationality is an assumption, and behaviour in most emergencies is orderly and social. Lack of reaction (rather than over-reaction) to an emergency is more likely to lead to fatalities. Management has a key role to play – needs the right psychology as rationale for good practice. Also, there is a need to understand the conditions under which people behave as individuals versus psychological crowds in emergencies.

Fruin's "FIST" model describes the primary elements involved in crowd disasters (Fruin J 1993) His "FIST" analysis covers four main elements which take account of both the psychological and physiological crowd problems described (Drury, Mawson, Novelli, et al).

Fruin's model applies to: **Force – Information – Space – Time.**

This model allows for specific measurement both of the physicality within the crowd and it's psychology and might be usefully applied to the planning phases for a crowd manager in determining the contingencies to prepare for and adopt when emergency planning.

3. Methodology

3.1 Defining the crowd

A crowd can be defined by its characteristics and nature (physicality and psychology). A crowd, according to the Oxford Dictionary can be defined as “A large number of people gathered together in a disorganized way”, or “ A group of people who are linked by a common interest or activity.”(Oxford Dictionary 2016 © Oxford University Press).

‘Event safety is the task of managing the health, safety and welfare of visitors, staff and contractors at events’ (Purple Guide, 1999) which sets out the main responsibilities of safe event management as:

Creating a health and safety policy, planning to ensure the policy is put into practice, organising an effective management structure and arrangements for delivery of the policy, Monitoring health and safety performance and Auditing and reviewing performance.

So far in this report the physical and psychological crowd has been defined, early theorists of crowd behaviour examined (Le Bon, McDougall, Allport and Freud), and shown to be dangerous in the way they posit crowd behaviour as a contagion describing a crowd as a hostile destructive mass.

More contemporary works focusing on psychological responses to crowd density and the concept of mass panic were explained. This research will apply these theories to subject matter experts and case study observations, to analyse and define how a crowd can be predicted to behave in an emergency evacuation and explain how crowd safety management practices can inhibit or facilitate it.

Because it’s about relationships (between crowd and safety teams) it is a theory of the psychology of crowd *management* as much as crowd behaviour.

A key message is that safety management practices are not neutral and are not simply passive responses to the inherent ‘problem’ of the crowd.

Management practices are one half the explanation for crowd behaviour itself (Drury 2016), positive emotion within crowds can affect and reduce the feelings amongst individuals of being too crowded.

These collective emotions can assist in high crowd densities where risk is increased from reduced spaces and exerted crowd pressures to avoid injury and incident.

The research project research methods have been from three main areas:

3.2 Primary Research - A factual examination from reports into historical events was carried out, comparing a number of historical crowd emergency occurrences: Kings Crossfire 18th November 1987, Hillsborough April 15th 1989, London Bombing July 7th 2005 so as to contrast and compare the causes and lesson learnt from enquiry into these tragic incidents. These three disasters were chosen to examine and analyse the different crowd environments in the locations and variance between the emergency situations.

These were supported by a comparative observational study of three stadiums. Observations were carried out at a Northern Premier League Football Stadium, capacity 38,000; Southern Championship Football Stadium, capacity 30,500 and Premiership Rugby Stadium, capacity 10,000.

Further supported by expert and practitioner interviews of their experiences. These expert and practitioner witnesses included;

Name	Designation	Institution	Interview	Venue Study
WE1	Senior lecturer	University	yes	
WE2	Professor	University	yes	
WE3	Director of Faculty	National Training College	yes	
WE4	Safety Officer	Football Stadium	yes	yes
WE5	Deputy SO	Football Stadium	yes	yes
WE6	Safety Officer	Football Stadium		yes
WE7	Deputy SO	Football Stadium		yes
WE8	Safety Officer	Football Stadium		yes

Figure 4. List of participants

Expert participants were chosen for their detailed knowledge of and significance of published theory into crowd dynamics and crowd psychology. Invitations were confirmed by email and consent forms sent out for agreement and signature (appendix A,B).

Practitioners were chosen from a selection of venues across the UK where the researcher has a working relationship. Permission was gained through signed consent forms to participate and publish their responses.

The research approach was to test and define the factors affecting crowd behaviour in emergencies, carrying out a qualitative data collection giving a "voice" to experts in the field of crowd psychology and crowd dynamics matched with industry practitioners. Record of interviews have been included coupled with notes from observations at venues. Case study has also been used as comparative study between different venues.

The primary research reflected firsthand collection of research data and therefore carried weight as reliable and factually based. Using three separate historical events was designed to gauge commonality to crowd behaviour and crowd management preparedness.

3.3 Secondary Research – Research of journals, published books, reports from newspapers and Government publications. This has included police reports and drawn from personal experiences.

3.4 Tertiary Research – Bibliographies and Catalogues and Journals published mainly online.

3.5 Crowd Stewarding and Legislation

Crowd management can be a challenging and stressful environment and requires carefully selected stewarding personnel. Steward behaviour both from a physical and psychological level is important as an influencing factor to crowd behaviour.

Legislation, regulations advice and guidance has developed over time in response to adverse incident, tragedy and disasters and guides safety management actions in planning for risk mitigation, mostly this is achieved through the behaviours and actions of the stewarding teams.

Reference has been drawn from the following key legislation, regulation and guidance.

Legislation, Regulation or Guidance	Year
Health and Safety At Work Act	1974
The Management of Health and Safety at Work Regulations	1999
The Fire Precautions (Workplace) Regulations	1987
Safety At Sports Ground Act	1975
Fire Safety and Safety of Places of Sport Act	1987
Equality Act	2010
Guide to Safety at Sports Grounds	2007
The Event Safety Guide	1999

Figure 5. Guide to relevant legislation

3.6 Emergency Response Model

Finally, by drawing the research together will examine and define a method statement for Safety Planning, which can be applied by a Safety Manager.

This preliminary model will take account of the dynamics and psychology of crowds to provide a systematic approach to ensuring that emergency crowd movements are planned for should the situation occur.

4. Findings and Analysis

From primary research into crowd disasters, it became clear that to make sense of historical events, that expert witnesses would provide an insight and theoretical opinion of the impact of crowd behaviour in emergencies.

The expert witnesses chosen for this research represented key and leading influencers in the science of crowd behaviour. A number of venues were approached for permission to question their safety team members and also to visit and observe their emergency contingency planning and witness their simulation exercises.

This year especially has brought into sharp focus the long search for truth into tragic events such as Hillsborough and the emerging lessons still to be learnt.

A personal perspective has been brought to this analysis from experience and knowledge of emergency and crowd disorder situations. Witnessing firsthand how people react and behave during (amongst others) The Miners Dispute 1984, London Poll Tax Riots 1990, The Newbury Bypass protests 1996, and British Animal Rights Protest at Hill Grove Farm, Witney 1997.

4.1 Expert witness interviews

WE1 - A redacted interview account with an expert witness:

“The main risks identified were from the aspect of a scientific approach and what kind of factors happen. If people don’t get out in time they may die, get be injured.

A recognition by a person that they realise it is an emergency. Research shows that people don’t respond quickly enough. David Canter research in dangers in fires is a good illustrator.

What are the behaviours of the professionals working there, i.e., the management/stewards indicating how people should respond if a suspect package is found for example.

Familiar exits will be favoured over unfamiliar ones. Often people will want to go out by the route they came in.

Trust in the stewards will assist in guiding the exit flow out the nearest and appropriate exit.

Thinking of the shared identity, the “we” factor where people have a shared purpose or belonging that will help with coordinated behaviour.

Concept of mass panic is dangerous and useless. People do overreact and are influenced by behaviours of others in the crowd.

If you really believe in mass panic as the default behaviour in crowd emergencies then where does the concept of mass panic fit in?

From a stewarding point of view should you tell someone not to panic? Giving clear information about what to do to get to safety will reduce feelings of anxiety. If there is trust and cooperation then the crowd will react positively to the direction and instruction.

Research into training shows that the higher up the management structure the more training has generally been received and less likely to agree with the popular myth of mass panic and crowd behaviour. The more training staff at the crowd safety stewarding level have, the better they will be at recognising and implementing the good behaviours talked about. If you really believe that mass panic exists in crowds' behaviour, and people become irrational in crowds, then you shouldn't talk to them as they won't be listening and will only react to be pushed around!

Research and study has identified in and out groups.

What are the norms of behaviour in a crowd?"

WE2 - A redacted interview account with expert witness:

"As with any public gathering, the crowd dynamic is a critical factor. At 2-3 people per square metre crowd flow rates are optimal, above that density, the risks of any individual tripping/slipping or falling during egress can result in mass fatalities (https://en.wikipedia.org/wiki/Lan_Kwai_Fong) which is incorrectly described as a stampede.

Hillsborough showed altruistic behaviour (fans helping each other out) as did the evidence (Jury/Cocking) from the July 7th Bombing in London (2005). The "help others" may be a natural human reaction to disasters.

The word "panic" is misused (and overused) by the media. In dangerous situations individuals either fight or flight (adrenalin reaction). Panic, as per the current theories (Drury/Cocking et al.) would typically be a "rabbit caught in the headlights" type of reaction – where individuals cannot process the information from the environment and "do nothing".

In general, the design, information and management of egress needs to be an integrated approach to safe egress. Initially, travel distance, complexity of route,

egress capacity, the holistic analysis of the geometry is essential. But this has little safe value if the alerting system is sub-standard. Getting people to start to move, then to move in the right direction, is essential and that would fall into a management overview of the egress process.

The building codes are, in general, all fire based. So, we need a radical rethink to the entire egress process. For example, an alarm may tell you to leave the building, if heeded, but does not tell you where the threat is located during a suspect device evacuation.

The integration of design, information and management systems for evacuation for total evacuation, directed evacuation, phased evacuation, stay-put (external threat – we need to keep people inside) and “invacuation” (moving people off the streets and into buildings) are the five possible strategies for crowd safety. Each has its own environmental considerations.

WE3 - An interview with the expert witness:

Has completed a lot of research into Crowd behaviour with Government agencies and Universities. Believes main risks in crowd evacuation is one of crushing and the decisions now to decide to evacuate or “invacuate”.

Crowds may not respond to the crowd control trying to be employed. In his work giving the crowd accurate and relevant information assists in the acting in a way you will want. He referenced the Boston Marathon and when the explosion happened people were observed in quite a rational way. Although the media described a panic in the crowd but the videos showed people acting quite rationally.

Sime’s research demonstrated this behaviour. The Concordia Ferry sinking further supports this rationale behaviour and social identity where initially people were getting in the lifeboats and leaving but some were returning to help others out as the boat started to tilt unexpectantly causing difficulties to people’s egress.

Although crowds can behave rationally, he does believe people can panic when faced with extreme danger, which in its classic explanation may last for a short time.

Gave a clear definition of in and out groups and social identity when people face a shared risk, event or danger.

When faced with risk or danger the police and stewards become part of the in group as they share, the same dangers and can be seen as helping to get away from the threat.

The interviewee mentioned work on the Commonwealth Games and the temporary structures construction. Work on the design periods is key for the construction and safety of structures to take account of emergency exits, exit widths and space to avoid obstruction to help egress from venues.

Interviewee believes that the level of training for Safety Officers at level 4 is now being overtaken by higher level training at level 5 by courses run by Keith Still and Andy Hollinson. Believes that the 6th edition of Green Guide should acknowledge this development in training and levels of knowledge into Crowd safety in terms of dynamics and psychology.

WE4 – An interview with a Safety Officer:

Identified that not involved on a live mass evacuation but has knowledge of and experience from previous emergency services employment.

Recent changes have involved “invacuation” as well as evacuation.

Has concerns around congestion and has a “RAG” system to alert management to issues. Used during the Rugby World Cup.

Main risks of overcrowding and crowd flows. Particularly the ingress of people (reentering a danger zone) when evacuation taking place.

Crowd behaviour observable will be people “rubber necking” and taking videos to post on social media, some will freeze and not know what to do or where to go. Others will want to hold back or return to areas of danger to assist people.

Has not observed “mass panic”. Has seen mass behaviour at football matches amongst fans, with a common objective.

Believes there is a shared identity to help each other.

There is a risk of complacency to the level of training and whether staff are competent. Making sure that informal networking and formal reading to improve awareness of industry guidance. Having clear development plans to training and personal development plan.

WE5 – An interview with a deputy safety officer:

The interviewee firstly commented that the police had made significant changes to training and attitudes towards crowd behaviour when faced with potential disorder, moving away from the premise an anti-social minority seeking to exploit

the mindlessness of an ordinary people in the mass (1998 John Wiley & Sons, Ltd). Present day approaches identify crowd in terms of:

1. The leaders
2. The hard-core activists
3. The bulk of the crowd

Crowd risks can be triggered by a lack of communication and miscommunication, crowd perception about what is happening. With a lack of clear communication, the crowd will react on their own initiative. Interviewee supported the concept of crowd panic. That giving clear information about what was happening would limit or prevent panic.

Believes in the concept of shared identity. That people in crowds will band together to overcome obstacles such as a locked gate preventing escape.

Put forward key building design concepts of open spaces and multiple access and egress points. Maintenance of exits was vital to ensure safety. We should widely share our experiences of near misses. Considers that Safety Officer training should include more theory and practice to prepare and respond to emergency situations. More live testing of procedures should take place.

Key elements of crowd management are Command, Control, Communication and Coordination.

WE6&7 – Joint interview with Safety Officer and Deputy (Appendix K) outlines a professional discussion of preparations for emergency evacuations at the venue.

WE8 – Interview with Safety Officer (Appendix L) outlines a professional discussion for stewarding responses to emergency crowd evacuations.

4.2 Venue Observations

Venue1-Championship Football Stadium 16th January 2016 – met Safety Officer **WE4**

Venue2-Premiership Rugby Stadium 9th April 2016 met Safety Officer **WE8**

Venue3-Premier League Football Stadium 16th April 2016 – met Safety Officer and Deputy Safety Officer **WE6** and **WE7**.

An observation at each venue recorded the venue preparedness for an emergency situation (Appendix D). Each venue's results were compared in a table (Appendix E).

Observed good practice

It is not surprising that each venue scored well for their documented contingency planning and ensuring that there were sufficient stewards on duty at the venues for the safety of spectators (Green Guide 2006). Safety Management and supervisors gave good briefing to their staff and staff had a friendly and welcoming attitude to both home and visiting fans.

Venue 1 has a continual professional training program for stewards and ensured that both internal and agency staff receive the same level of training from a single training provider. The Safety Officer and Deputy have clear lines of responsibility for contingency planning and assessment of risk.

Venue 2 utilises a team of volunteers almost exclusively for their stewarding response. They carry our regular evacuation drills and have completed a simulated evacuation drill from one stand during a live event. Some stewards were unclear of their role and responsibilities and did not contribute to the evacuation drill. Otherwise, the drill went well and the stand was cleared without incident. The fans behaviour was calm and cooperative.

Venue 3 again has a well drilled and trained stewarding staff. There is a police presence at every home match. An established training regime is in place delivered through one training provider. All stewards are “in house”. No agency stewards are employed. Simulated evacuation action drills are carried out regularly and are unannounced to the staff. All staff know their roles and carry out their designated immediate action drills.

There was evidence of social cohesion and identity between crowd safety stewards and the fans. At all three venues the stewards seemed to be relaxed about sharing conversations with the crowd, talking about the football or rugby match and displaying good customer service.

4.3 Examination of historical events

On 18th November 1987 a fire swept through the Underground Station at Kings Cross killing 31 people (Fennell F 1988). The fire was reported to have started in a machine room under an escalator connecting the Piccadilly Line to the main station. The fire started during the evening rush hour when the station was at full capacity. Investigators stated that the most probable cause of the fire was from a

discarded match, most probably from a passenger who discarded a still alight match, which dropped down the sides of the moving staircase. Smoking had been banned in all undergrounds since 1984.

Staff were strongly criticised in the public enquiry for their attitude towards the risk of fire. Staff were described as complacent as a major fire which had caused death had not occurred before. There had been little or no training for staff in dealing with fires and evacuation.

The publication of the report led to senior management resignations and the introduction of new fire safety regulations, namely The Fire precautions (Sub surface Railway Stations) Regulations 1989. Staff emergency training was improved and the wooden escalators were progressively removed and replaced.

“On 15 April 1989 over 50,000 men, women and children travelled by train, coach and car to Hillsborough Stadium, home of Sheffield Wednesday Football Club, to watch an FA Cup Semi-Final between Liverpool and Nottingham Forest. It was a sunny, warm, spring day and one of the high points of the English football season” (The Report of the Hillsborough Independent Panel 2012).

In the buildup to the match the turnstiles at Leppings Lane could not cope with the volume of fans arriving and congestion occurred.

It became apparent in the following enquiry that the stadium failed to meet minimum safety requirements set out in the Safety of Sports Ground Act 1975 and the Guide to Safety at Sports Grounds (Green Guide 1976).

The turnstile counters whilst they counted the numbers entering the ground, no account was made of where the crowd was distributed once inside the stadium.

In Lord Chief Justice Taylor’s report (Taylor 1990) he stated that out of 54,000 stadium capacity over 24,000 had been channeled through the turnstiles feeding the North Stand, the West Stand and Leppings Lane Terrace.

There was a policing and stewarding mindset predominately focused on crowd disorder. A new and inexperienced senior police match day commander made the decision to open the exit gates at Leppings Lane to relieve congestion outside, failing to recognise the consequences and further failed to ensure that the central tunnel leading to Pens 3 and 4, was sealed off. The subsequent severe overcrowding in the central pens at the Leppings Lane terraces led to death of 96 fans.

Management responsibilities and roles within senor police ranks was unclear and

hampered by poor communication.

Fencing between the standing area and pitch side and fencing separating sections of the terrace into pens prevented the movement of overcrowded space into the relatively un-crowded areas to the side outwards from the central pens.

On 7th July 2005, four suicide bombers brought terror to London (The Guardian 2015). As a result of these terrorist attacks 52 people lost their lives and 700 people were injured. We have already heard of mass panic behaviour in emergencies. During a normal rush hour, 4 suicide bombers in crowded underground carriages detonated improvised explosives. In these circumstances did people panic? Well no, interviews of survivors of that day (Cocking and Drury 2009) revealed that despite the fear and danger people faced, cooperation and helping each other was common.

4.4 Typology of Crowds

Crowds form for many different reasons; Sporting events, airports, demonstrations, film premieres, Rock Festivals to name a few. A paper by Berlonghi (Belonghi 1995) identified eleven types of crowd. These can include:

- A spectator crowd – i.e., a crowd watching an event that they have come to the location to see, or that they happen to discover once there.
- A demonstrator crowd – i.e., a crowd, often with a recognised leader, organised for a specific reason or event, to picket, demonstrate, march, or chant.
- A dense or suffocating crowd i.e. a crowd in which people's movement rapidly decreases – to the point of impossibility, due to high crowd density, with people being swept along and compressed. Resulting in serious injuries and fatalities from suffocation.
- A violent crowd – i.e., a crowd attacking, terrorising, or rioting with no consideration for the law or the rights of other people.
- An escaping crowd – i.e., a crowd attempting to escape from real or perceived danger or life-threatening situations, including people involved in organised evacuations, or chaotic pushing and shoving by a panicking mob.

(Understanding Crowd Behaviours 2009)

The characteristics of these crowds will vary dependent on their "type" (Appendix M). By categorising the crowd type, a crowd safety manager will be able to use the likelihood of predicted behaviour to determine the responses and actions required to manage these crowds in an emergency situation.

4.5 PESTLE Analysis

The below PESTLE analysis has been used as a framework to show the external factors, which affect operational resilience for event organisations.

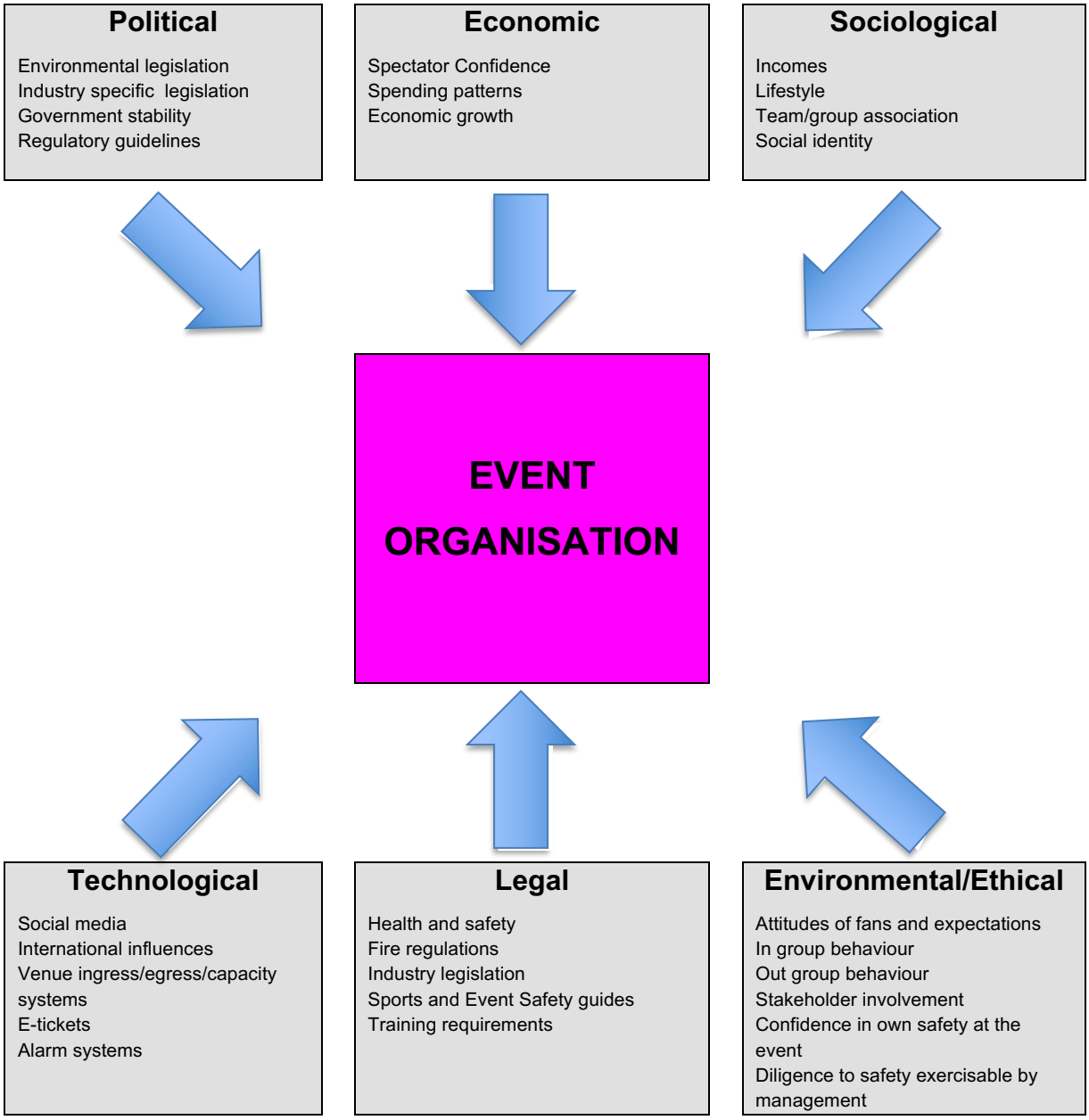


Figure 6. PESTLE analysis

5. Conclusions

What can we learn? Expert witness testimony together with practitioner accounts has been examined against a background of past known Crowd Disasters.

Analysis of the findings from these historical disasters and current opinion from both scientific analysts/theorists and practitioners is revealing.

It has been argued that there are some myths surrounding the behaviours of crowds in relation to panic (**WE1**, **WE2**) and the changing awareness and attitude towards crowds by Police management from 1989 and the Hillsborough disaster to present thinking regarding the attitude and response by Police to crowd disorder and their behaviours in emergencies (**WE5**).

Crowds can behave in an orderly and predictably calm manner when faced with an emergency incident of life-threatening magnitude.

This has been most recently shown in the evacuation of Old Trafford Stadium on 15th May 2016 following a suspect device being found in a toilet (Daily Mail May 2016). A reported 55,000 fans were directed out of the stadium who remained calm, followed instructions and worked with the stewards and police ensuring a safe evacuation was quickly completed.

Clear instructions and information about the nature of the emergency are key (**WE1**, **WE5)**.

Crowds can behave with social cohesion and identity (Turner J 1987).

Crowds can react adversely to the perceived illegitimacy of authority (EISM Reicher, Drury, Stott, 1996, 1997, 1999).

In and out groups form and exist in crowds (**WE3**) and can form together with stewards and even the police as agencies who can help get away from danger to safety.

The PESTLE analysis demonstrates the complexity of influences on the success or failure of emergency planning and will help a crowd manager identify the factors to consider and the appropriate information needed to make the correct and informed decisions.

This analysis has been further developed to establish a framework to define management actions. This is illustrated as an Emergency Response model.

5.1 Emergency Response Model

A key element to this research was to determine how to utlilise the theory identified and opinion to benefit the safety manager when constructing an emergency plan. Key response agencies in any emergency response plan will include:

- ✓ Emergency support services
- ✓ Private sector security/event agencies
- ✓ Local Authorities
- ✓ National Government

An integrated emergency management system will link these resources through:

- ✓ Planning
- ✓ Direction
- ✓ Coordination
- ✓ Clearly defined roles and functions

(FEMA 2006).

Phases of an incident and management actions will include:

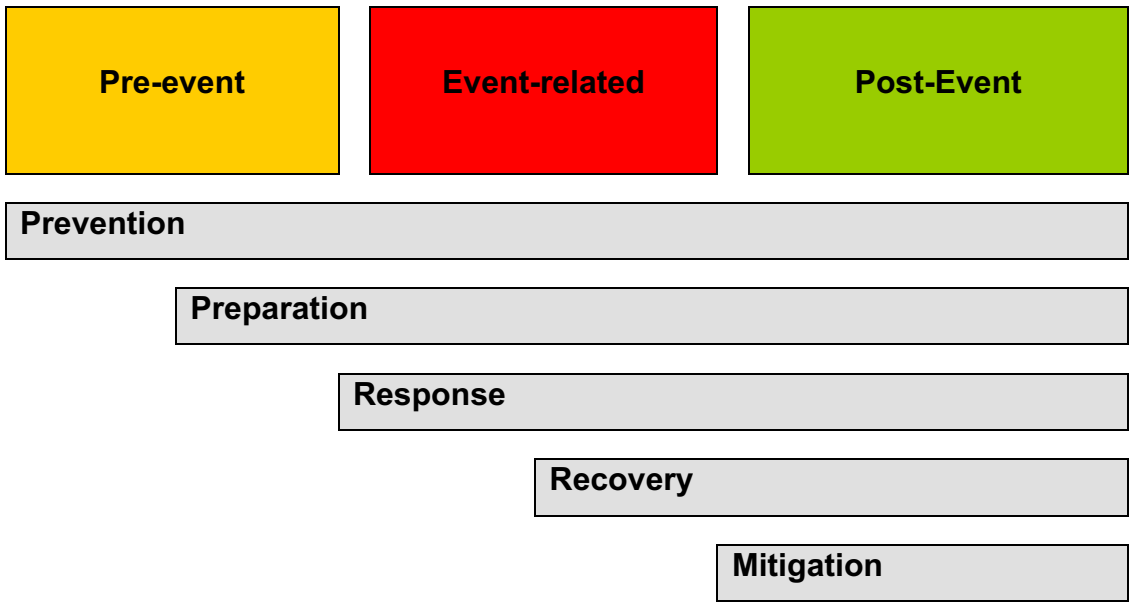


Figure 7 (FEMA 2006)

Prevention

What actions have been taken to reduce the likelihood of an incident occurring and measures to take in the event of an incident to halt its progression. Applying sound advice, guidance and intelligence reports to the event and a range of activities including counter measures.

Preparation

The ‘tick list’ of critical actions to create and sustain an operational capability to protect against and respond to emergency situations. Continual assessment of risk and control measures.

Response

Direct actions employed at an incident, short term immediate action drills designed to prevent and limit the risk to and loss of life. Injury and damage to property.

Recovery

A restoration phase where a coordinated return to normal is managed. Services are reestablished and the venue returns to a state of operational capacity.

Mitigation

Lessening the impact of the emergency event for people and the organisations involved. A focus on social welfare post incident (Working with Disaster 1993) has shown to be important to allow those traumatised by events return to a new normal state.

5.2 Preliminary model:

The elements described can be brought together to outline a preliminary model, shown in figure 8, which can provide the basis of a methodology and assessment of actions to consider for emergency crowd behaviour planning.

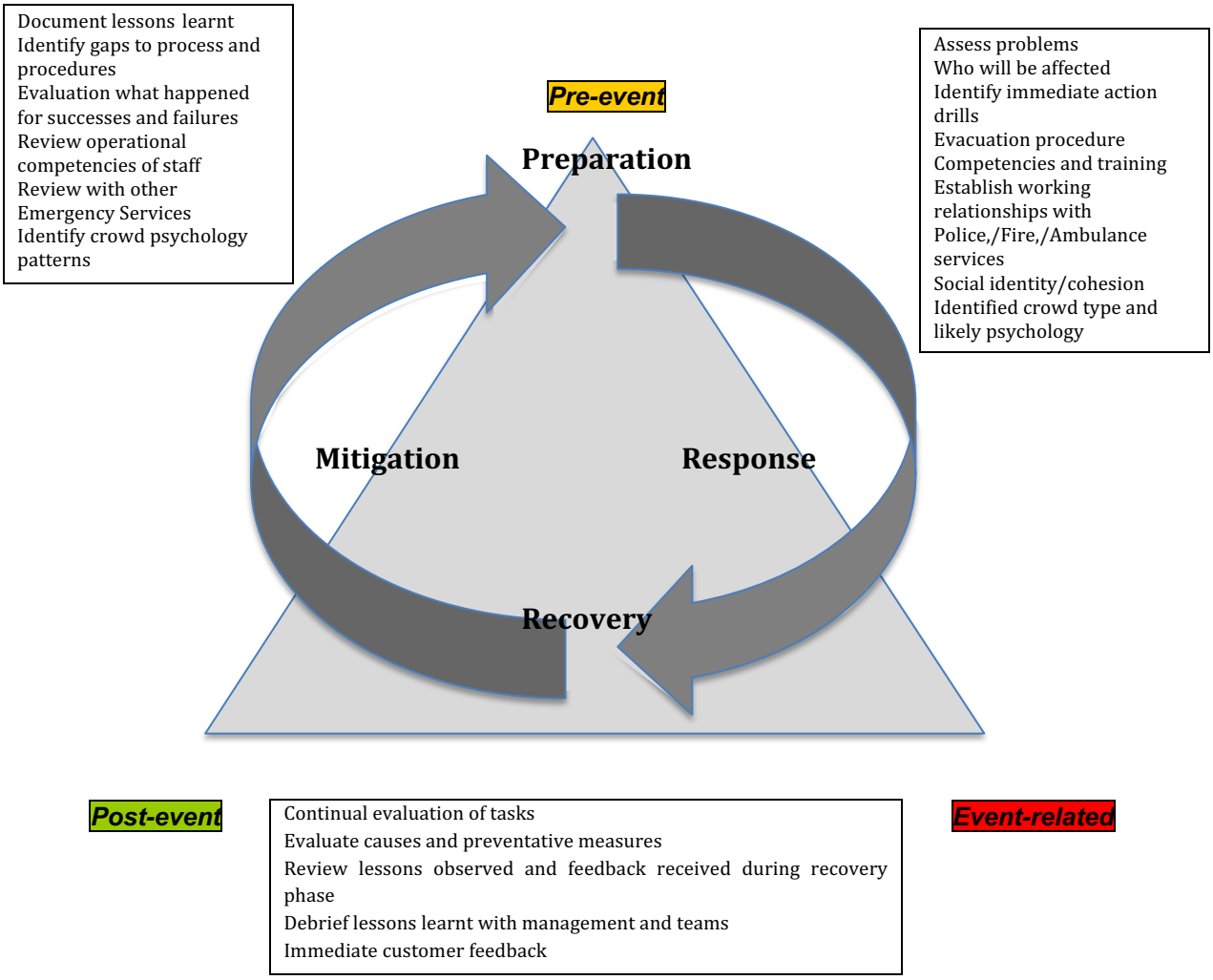


Figure 8 - **Emergency Response Model** (original concept adapted from Phased Emergency Management model FEMA 2006)

5.3 Synthesis

The myths surrounding crowds has been discussed and exposed. Crowds are not mindless panic-stricken mobs when faced with emergencies but are frequently shown by recent events to be an orderly group who listens to and follow direction. Pulling the theories from review of literature together with opinion from experts and practitioners has allowed a determination of a model to assist the crowd

manager to determine the appropriate steps to take to ensure the safety of the public in an emergency.

6. Recommendations for future research

The recommendations made are to show the direction and type of research that could be undertaken for mass crowd evacuation studies. The aim is to develop and improve on the initial findings and conclusions drawn.

Further work is recommended to:

1. Study and research into decision making before, during and post an incident through study of live testing of venues emergency procedures.
2. Examination of near misses and recommendations for a system of information sharing.
3. Developing best practices into training at all levels of safety management at events.
4. Undertake a study of management and assessment of new risks, emerging from terrorist threats.

Stephen Laws FdA CertEd

23rd May 2016

Word count (8107)

Appendix A

List of highlighted crowd disasters since 1980's

Year	Location	Event	Fatalities /injuries
1985	Bradford City	Stadium Fire	56
1985	Heysel	Football match wall collapse	39
1987	**Kings Cross**	**Fire in Underground**	**31/100**
1988	Katmandu	Hailstorm at Stadium crowd crush at locked gates	93
1989	**Hillsborough**	**Crush in Stadium Pens**	**96/144**
1991	Orkney, SA	Crowd Riots at Stadium	40/50
1994	Liaoning	Nightclub Fire	234
1996	Guatemarla City	Crowd stampede	83/180
1998	Gothenburg	Nightclub Fire	63/200
2000	Harare	World Cup Qualifier Stampede after Police fired tear gas into crowd	12/
2000	Mexico City	Night Club Fire	20/27
2000	Sao Januario	Stadium Fire and crowd crush	0/200
2005	**London**	**Bombings in Underground**	**52/700**
2010	Duisburg	Festival Crush in tunnel	21/652

Author note: this is not a complete list. Incidents have been highlighted as significant for their incident type.

Appendix B

RESEARCH CONSENT FORM

Name of Researcher(s) *(to be completed by the researcher)*
Steve Laws
Title of study *(to be completed by the researcher)*
Managing Crowds in emergencies; how the psychology of crowd behaviour impacts on operational resilience.
Name of Interviewee *(to be completed by the interviewee)*

Please read and complete this form carefully. If you are willing to participate in this study, ring the appropriate responses and sign and date the declaration at the end. If you do not understand anything and would like more information, please ask.

The information you provide will be used in a dissertation towards a BA (Hons) in Crowd Safety Management.

- All information is entirely anonymous and cannot be traced back to an individual through any part of their response.

- The survey data will be used only for statistical analysis as part of the research project. There is no other intended use.

- The demographic information (gender, age) is used to identify how opinions differ. You have the option not to answer these questions.

- The information about job roles, specific events or companies is useful to identify differences in opinions, best/worst practice. You have the option not to answer these questions.

- I have had the research satisfactorily explained to me in verbal and / or written form by the researcher. **YES / NO**
- I understand that the research will involve: a video interview of set prepared questions lasting approximately 45 mins. **YES / NO**
- I understand that I may withdraw from this study at any time without having to give an explanation. **YES / NO**
- I understand that all information about me will be treated in strict confidence and that I will not be named in any written work arising from this study. **YES / NO**
- I understand that any audiotape material of me will be used solely for research purposes and will be destroyed on completion of your research. **YES / NO**
- I understand that you will be discussing the progress of your research with others at Bucks New University **YES / NO**

I freely give my consent to participate in this research study and have been given a copy of this form for my own information.

Signature:……..Date: ……

Appendix C

Questions for Emergency Evacuation research.

Research title: Managing Crowds in emergencies; how the psychology of crowd behaviour impacts on operational resilience.

Research Context

The safety and security of spectators at events requires consideration on a wide range of contributory factors, calculations, risk assessments and methodologies.

Concerns over the ability of transport systems to cope at peak times for arrival and departure, large numbers of people on foot and the impact this will have in emergency scenarios must all be considered and responded to.

The Olympic Business Continuity plan, for example covered all venues across the event timeline of the Olympics and Paralympics from 8th February to 9th September 2012. Responding to 9 million Spectators, a 200,000 Olympic workforce including volunteers with every day like hosting 10 World Cup Finals. It was estimated that 80% of spectators would use Rail transport with an estimated 800,000 travellers expected to use public transport on the busiest days. Over the period of the games, 20 million trips were made by spectators (First Protocol Event Management Ltd February 2012).

This research will test the hypothesis that crowds in an emergency situation whether that be in an evacuation event from the venue or developing crowd situations such as overcrowding, surges or crowd crush, modify their individual traits to identify with the crowd.

Early theorists such as Le Bon's Contagion Theory (Gustave Le Bon 1885) will be applied to how crowds behave in terms of an individual's state of mind when in a crowd. Examination of whether crowds display a hypnotic influence on each other as people come together with a "collective mind". Does the individual abandon personal responsibility, surrendering to the collective "contagion" of the crowd?

This research will test further the Convergence Theory as applied to crowd psychology being that the behaviour of the crowd takes on a focus and form based on the input of the individuals who make up the group. Also, examination of convergence of ideological and practical factors which leads security teams treating crowds in emergencies or disorder as a homogeneous whole will be tested. It is argued that such action can often play an important role in escalating (if not initiating) collective adverse behaviour or conflict and is also a key component of social change in crowd contexts (1998 John Wiley & Sons, Ltd). Later and current theory such Ralf Turner and Lewis Killian's (1972) Emergent norm theory where new behavioural norms can develop in crowds responding to situational crisis, Reicher and Drury (2010) examination of the relationship between the "physical" and "psychological" and the shared social identity that made collective behaviour possible. Alexander E. Berlonghi

(1993) stated in his paper – Understanding and planning for different spectator crowds; "Those involved in crowd management and crowd control cannot be excused from the significant responsibility of providing the public with the highest standard of safety and security that is both possible and feasible. In Keith Still's Crowd Risk Analysis workshop's (2016) at Bucks New University he described Crowd modelling as having four key elements - **Space, Time, Direction** and **Flow**.

A relationship between variables

Crowd behaviour in an emergency evacuation or crowd behaviour in a public disorder event can be viewed from a crowd management perspective (event safety team) and from an enforcement perspective (law enforcement).

Safety event teams will support their management approach through knowledge of and reference to crowd theory which explains behaviour entirely as a relationship between people within the crowd and internal to the crowd itself. Public Order trained Police officers perceive crowd dynamics as involving an anti-social minority seeking to exploit the mindlessness of an ordinary people in the mass. Consequently, all crowds are seen as potentially dangerous and, in situations of actual conflict, all crowd members are seen as equally dangerous (1998 John Wiley & Sons, Ltd).

Q1. What are the risks attached to a mass crowd evacuation?

Q2. How do crowds behave when faced with danger such as natural disasters or terrorist attacks?

Q3. Does 'mass panic' occur and if so, how what factors might limit or prevent it?

Q4. Does a shared social identity occur in disasters and emergencies?

Q5. How might the design, construction and maintenance of building be changed or improved to facilitate improvements of evacuations?

Q6. What training and guidance can be provided to the event industry and safety officials to improve the preparation and response to emergency evacuations?

Q7. How can crowds be motivated to leave in an emergency evacuation?

Q8. Can a mass crowd evacuation be managed and controlled? What are the key factors?

Appendix D

Venue Observation record – Emergency responses to crowd situations

This is a 4-page pro forma.

Venue		**Date**	
Aim of observation			
Length of observation			

Preparation- has the venue Safety Officer:

Contingency Planning:	**Yes/No**	**Comments**
Prepared a written contingency plan for Emergency evacuation procedures?		
Taken into account all health & safety issues?		
Ensured there were enough stewards in attendance to support an evacuation?		
Does the contingency plan(s) show: aim/objectives/desirable outcomes?		

Simulation Exercise Delivery

Did the Safety team:	Yes/No	Comments
Deliver an effective briefing, covering main objectives and contingency plan?		
Establish and maintain good working relationships with supervisors/staff		
Demonstrate knowledge of the desired safety outcomes?		
Take into account different emergency situations that may cause an evacuation or part evacuation?		
Use a range of tactics?		
Communicate appropriately and effectively?		
Manage the simulation appropriately and effectively, e.g., dealing with disruption and ambiguity?		
Appear confident and professional?		
Take into account crowd dynamics, psychology, equality, differentiation and diversity?		

Monitoring

Did the safety team:	Yes/No	Comments
Ask questions and involve their teams where appropriate?		
Give positive feedback where relevant?		
Debrief and summarise the outcomes?		
Achieve their aim/objective/ outcomes?		
Ensure that venue returned to normal operations afterwards?		
Complete relevant records?		
Identify opportunities for staff at all levels to provide feedback?		
Evaluate their performance?		
Ask questions and involve their teams where appropriate?		

Give examples of good practice and where effective safety measures took place:

Overall feedback:

Observer name: ---------- **Date:** ----------

Observer Signature: ----------

Appendix E

Outcome of venue observations

Venue	1	2	3
Prepared a written contingency plan for Emergency evacuation procedures?	✓	✓	✓
Taken into account all health & safety issues?	✓	✓	✓
Ensured there were enough stewards in attendance to support an evacuation?	✓	✓	✓
Does the contingency plan(s) show: aim/objectives/desirable outcomes?	✓	✓	✓
Deliver an effective briefing, covering main objectives and contingency plan?	✓	✓	✓
Establish and maintain good working relationships with supervisors/staff	✓	✓	✓
Demonstrate knowledge of the desired safety outcomes?	✓	✓	✓
Take into account different emergency situations that may cause an evacuation or part evacuation?	✓	✓	✓
Use a range of tactics?	✓	✓	✓
Communicate appropriately and effectively?	✓	✓	✓
Manage the simulation appropriately and effectively, e.g., dealing with disruption and ambiguity?	✓	✓	✓
Appear confident and professional?	✓	✓	✓
Take into account crowd dynamics, psychology, equality, differentiation and diversity?	Ⓟ	Ⓟ	Ⓟ
Ask questions and involve their teams where appropriate?	✓	✓	✓
Give positive feedback where relevant?	✓	✓	✓
Debrief and summarise the outcomes?	✓	✓	✓
Achieve their aim/objective/ outcomes?	✓	✓	✓
Ensure that venue returned to normal operations afterwards?	✓	✓	✓
Complete relevant records?	✓	✓	✓
Identify opportunities for staff at all levels to provide feedback?	✓	✓	✓
Evaluate their performance?	✓	✓	✓
Ask questions and involve their teams where appropriate?	✓	✓	✓
Ⓟ = partially met ✓ = fully met			

Appendix F

Steve Laws - Questions for Emergency Evacuation research.
Respondent – WE1 8th April 2016.

A redacted interview account with an expert witness, University Lecturer and researcher occurred on 8th April 2016, answering questions and sent in advance of the interview.

"The main risks identified were from the aspect of a scientific approach and what kind of factors happen. If people don't get out in time they may die, get be injured.

A recognition by a person that they realise it is an emergency. Research shows that people don't respond quickly enough. David Canter research in dangers in fires is a good illustrator. How people respond to alarms. Most people think it is a test and lots of venues practice a lot! So, what are the social signals? What is other people's behaviour in these situations. If others don't take it seriously, others will see it as not serious. This can go the other way if you see others rushing out of the exits when the alarm sounds it will prompt others to do the same.

What are the behaviours of the professionals working there, i.e., the management/stewards indicating how people should respond if a suspect package is found for example.

Good to try to work on a relationship that build trust and understanding with your customers from the management/stewarding teams. Best done before the event so people understand and trust the announcements being made by the promoters/management.

Familiar exits will be favoured over unfamiliar ones. Often people will want to go out by the route they came in.

Trust in the stewards will assist in guiding the exit flow out the nearest and appropriate exit.

Thinking of the shared identity, the "we" factor where people have a shared purpose or belonging that will help with coordinated behaviour.

Concept of mass panic is dangerous and useless. People do overreact and are influenced by behaviours of others in the crowd. How do you judge from a behaviour point of view that someone is overreacting?

For example, what is panic buying? Is this behaviour of over reacting and dysfunctional? If you see your neighbour going out to buy all the water in a shortage would prompt you to do the same or it will run out! So, the label of mass panic is misleading and dangerous.

If you really believe in mass panic as the default behaviour in crowd emergencies then where does the concept of mass panic fit in?

From a stewarding point of view should you tell someone not to panic? If someone is feeling anxious or you think there is a danger, telling them not to be anxious will not stop them feeling that way. They might feel they are in even more danger. Giving clear information

about what to do to get to safety will reduce this feeling. So, an impact factor for professionals is to consider giving more information to crowds about what is going on and what to do to get to safety. This will depend on the relationship between the official and the individuals in the crowd. If there is trust and cooperation then the crowd will react positively to the direction and instruction.

Research into training shows that the higher up the management structure the more training has generally been received and less likely to agree with the popular myth of mass panic and crowd behaviour. The more training staff at the crowd safety stewarding level have, the better they will be at recognising and implementing the good behaviours talked about. If you really believe that mass panic exists in crowds' behaviour, and people become irrational in crowds, then you shouldn't talk to them as they won't be listening and will only react to be pushed around!

Research and study has identified in and out groups.

What are the norms of behaviour in a crowd?"

Appendix G

Steve Laws - Questions for Emergency Evacuation research.
Respondent – WE2 16th April 2016.

Q1. What are the risks attached to a mass crowd evacuation?
As with any public gathering, the crowd dynamic is a critical factor. Density (measured by people per square metre) above 5 people per square metre significantly increases the risk of a trip, slip and fall resulting in trampling injury/fatalitiy, specifically when the crowd is on the move. A moving crowd has an upper limit for crowd flow. At 2-3 people per square metre crowd flow rates are optimal, above that density, the risks of any individual tripping/slipping or falling during egress can result in mass fatalities (https://en.wikipedia.org/wiki/Lan_Kwai_Fong) which is incorrectly described as a stampede.

Q2. How do crowds behave when faced with danger such as natural disasters or terrorist attacks?
Hillsborough showed altruistic behaviour (fans helping each other out) as did the evidence (Jury/Cocking) from the July 7th Bombing in London (2005). The "help others" may be a natural human reaction to disasters.

Q3. Does 'mass panic' occur and if so, how what factors might limit or prevent it?
The word "panic" is misused (and overused) by the media. In dangerous situations individuals either fight or flight (adrenalin reaction). Running away from a threat is not "panic". Crowds can become "over reactive" (ie: run away because other are running away) but this is (again) a natural reaction. Panic, as per the current theories (Drury/Cocking et al.) would typically be a "rabbit caught in the headlights" type of reaction – where individuals cannot process the information from the environment and "do nothing".

Q4. Does a shared social identity occur in disasters and emergencies?
According to Drury et. Al. yes and I would agree (although this is not my area of expertise).

Q5. How might the design, construction and maintenance of building be changed or improved to facilitate improvements of evacuations?
That is a huge topic for discussion. In general, the design, information and management of egress needs to be an integrated approach to safe egress. Initially, travel distance, complexity of route, egress capacity, the holistic analysis of the geometry is essential. But this has little safe value if the alerting system is sub-standard. Getting people to start to move, then to move in the right direction, is essential and that would fall into a management overview of the egress process.
Q6. What training and guidance can be provided to the event industry and safety officials to improve the preparation and response to emergency evacuations

The building codes are, in general, all fire based. So, we need a radical rethink to the entire egress process. For example, an alarm may tell you to leave the building, if heeded, but does not tell you where the threat is located during a suspect device evacuation.

Q7. How can crowds be motivated to leave in an emergency evacuation?
There have been several experiments with different types of alarm (Sime, Proux) highlighted in their Tyne and Wear platform evacuations, that people respond faster to human intervention rather than automated alarm systems.

Q8. Can a mass crowd evacuation be managed and controlled? What are the key

factors?
Yes. The integration of design, information and management systems for evacuation for total evacuation, directed evacuation, phased evacuation, stay-put (external threat – we need to keep people inside) and invacuation (moving people off the streets and into buildings) are the five possible strategies for crowd safety. Each has its own environmental considerations.

Appendix H

Steve Laws – Questions for Emergency Evacuation Research

WE3 May 12th 2016.

https://www.dropbox.com/home?preview=Interview+with+WE3+120516.aac

Appendix I

Steve Laws – Questions for Emergency Evacuation Research

WE4 May 19th 2016.

https://www.dropbox.com/home?preview=Interview+with+WE4+190516..aac

Appendix J

Steve Laws – Questions for Emergency Evacuation Research

WE5 May 16th 2016.

A relationship between variables

Crowd behaviour in an emergency evacuation or crowd behaviour in a public disorder event can be viewed from a crowd management perspective (event safety team) and from an enforcement perspective (law enforcement).

Safety event teams will support their management approach through knowledge of and reference to crowd theory which explains behaviour entirely as a relationship between people within the crowd and internal to the crowd itself. Public Order trained Police officers perceive crowd dynamics as involving an anti-social minority seeking to exploit the mindlessness of an ordinary people in the mass. Consequently, all crowds are seen as potentially dangerous and, in situations of actual conflict, all crowd members are seen as equally dangerous (1998 John Wiley & Sons, Ltd).

Hi Steve,

Just before I answer the questions, can I comment on the above paragraph of 'relationship between variables?

I don't think that the police any longer perceive crowd dynamics as simply to be an anti-social minority seeking to exploit the mindlessness of an ordinary people in the mass. I think they moved away from this assumption made in 1998 John Wiley & Sons, Ltd a long while ago.

They follow a disorder model which identifies some of the key elements and potential triggers but don't assume that everyone is a crowd during disorder is equally dangerous. I think I can speak from experience (though out of TVP for 7 years I did continue to deliver the operational Sgt's and Insp' courses where we did a module on public order). Public order has long since incorporated public safety and disorder as separate aspects. In fact, they now call their commanders (in TVP and Hampshire) POPS accredited. Public Order and Public Safety Commanders.

There are so many things that come into play. For instance, during the larger national protests at Hillgrove Farm we recognised that there were three distinct though sometimes overlapping elements to the crowd.

1. The leaders
2. The hard-core activists

3. The bulk of the crowd

Each element needed the other to be at its most effective. The leaders (though they always portrayed a model of having no leaders) had extensive links and shared a common purpose with the activists but were (in most circumstances) totally separate.

The hard-core activists needed the timing and opportunity and cover provided by the bulk of the crowd to bring elements into play. Sometimes it was to cause a distraction for them to conduct direct and aggressive action, other times to operate within the crowd to provide them cover and protection and at other times attempts to get them to act as one.

We rapidly learnt to use this to our advantage. We knew they had a timed window of opportunity to conduct the direct action (which was one of the only things that was successful for them), largely because many of the demonstrators had travelled a long way on coaches and would have to leave by a certain time. Not least, this was due to coach drivers' hours, and simply because they needed to get home in good time.

We learnt to recognise the different elements, to engage with, to observe and at times disrupt or seek to have direct influence on one element to (our) benefit. It was effective.

I can think of very few instances now where police assume all the elements the crowd can or will all become aggressive. It's not to say it can't happen for several reasons, I just don't think that's the police' start point at all. That's why they particularly target certain influencing elements and individuals, both for intelligence gathering and for executive action. I accept that things such as the met kettling may appear as if they make assumptions, but I still think that they did that recognising the collective behaviour of the majority needed blocking and containing to the unfair and potentially unlawful disregard for the smaller element of the crowd that would not necessarily have engaged in disorder.

So, I think the above statement and assumption is outdated and probably needs a bit of careful thought. You've got me on my soap box so I'll need to stop! I love debating crowd dynamics and crowd psychology…

To answer your questions:

1. What are the risks attached to a mass crowd evacuation?

There are several risks. I think the main one is management and control, with the obvious concern of associated risk to public safety. I also think that there is an inherent risk of the crowd not acting as expected and of them taking their own initiative consciously or otherwise.

These risks and concerns can be triggered by several factors. These may be:

- As a result of a lack of communication and coordination by the organiser or person(s) responsible for safety
- Due to the crowd perception of what is occurring and those taking a contrary action / direction than planned

- Crowd communicating or miscommunicating by receiving information from other sources (such as social media or live 24/7 news feed)

Overall, public safety and the risk of crushing or panic induced crowd behaviours causing serious injury or death on a large scale are a major concern and consideration (consequence of the behaviours)

2. How do crowds behave when faced with danger such as natural disasters or terrorist attacks?

Without immediate and clear communication and direction it is inevitable that crowds will take their own initiative. Even where there is clear communication and direction, they may still take the initiative. The sense of urgent self-preservation 'fight or flight' behaviour will take over. They are most likely to seek to move away from areas of danger that they can see and hear rather than to take a logical or considered approach to their safe escape or exit. Increasingly, all our perceptions in this area may be changing as (in the case of terrorist attacks) people are gradually being educated through observing attacks across the world that they will now more often involve more than one direction / method of attack.

Whilst this leaves a dilemma for them, they're natural reaction and behaviour, unless faced with other information or facts in a manner that they can process quickly, will mean they have little choice but to trust their immediate instincts on what they can hear and see. They will inevitably follow others, not necessarily for good or thoughtful reason, and will often assume that others know something they do not and will rarely stop their 'following' behaviour to challenge it.

In a natural disaster, or one where the immediate danger appears to have passed, I believe people will act with more rationale and potentially in a calmer way. In a terrorist attack, I think they will act far more spontaneously and much less likely to look to authority for information and direction. I think this is largely due to the uncertainty in ongoing terrorist related incidents. Once the incident appears to have concluded they will act far more rationally with greater thought.

There are of course lots of examples of people taking the lead or helping others and in effect 'stepping up'. Sometimes this is due to the vacuum of poor leadership and direction but often just because of the inherent human behaviour of wanting to help others.

3. Does 'mass panic' occur and if so, how what factors might limit or prevent it?

It can occur. It doesn't always. It can be triggered. If triggered it is difficult to stop. You can limit it by supplying immediate appropriate information. This will normally limit the reaction. Information is key to limiting or preventing panic. Whilst information is key, it must be relevant and the crowd has to be able to associate with it. Pre-recorded repetitive information will rapidly lose any positive effect. Information should be live. It is best provided by conversing as this provides greater reassurance (e.g., through a PA or direct on

the ground) rather than through information boards. It should be re-iterated by those on the ground. A lack of knowledge, presence and strength on the ground undermines this. People are far less likely to panic if they can't see immediate or imminent danger. They are best re-assured and 'calmed' where they can see obvious and immediate exit into areas of safety, whether completely out of a venue or area of danger or into a safe area normally incorporating and visually providing a sense of space rather than confinement. Good visual sight lines and plenty of exits combined with a moving crowd where people feel they are making progress to safety will limit the trigger of panic. Crowds will de-fault to the same or familiar routes. Any block to this route, particularly where there is no immediate and obvious alternative (normally within sight) can be a trigger. Good signage to alternative routes can make a difference.

This would tend to concur with Professor Keith Still's thoughts on space, time, direction and flow.

4. Does a shared social identity occur in disasters and emergencies?

I think it does. I haven't read Reicher and Drury (2010). I probably should but I believe that the physical and psychological aspects and influences draw together. People develop a common purpose. Faced with locked gates in an emergency, they will work together to attempt to break them down. Similarly, in disorder I have seen this many times, people faced with control measures such as a fence line, coming together as a collective to act as one with a united common purpose. This is often outside and beyond their social inhibitors, regardless that they wouldn't normally act like that.

Similarly in emergencies and disasters, coming together to act as one in physical difficulties and developing social cohesion is common. I think you only have to look at Japan's ability to influence this when preparing and preserving lives against the dangers of earthquakes. A good example is teaching children in classrooms to all get under the tables or desks together etc.

5. How might the design, construction and maintenance of building be changed or improved to facilitate improvements of evacuations?

I think there are some basics. In design, key to this is the ability to provide space or even create the perception of openness rather than confinement. For example, note the difference in how you perceive a basement area against an open concourse of the same dimensions. This should be considered in the design stage.

Multiple access and egress points. The more the better, evenly interspersed so that by perception you know that if one exit is blocked or choked if you move in any direction, you will automatically come to another(?) Providing more than sufficient depth and width for aisles, vomitories and gangways when designing and constructing will make a difference. A small increase in dimension can make a much greater difference to perception – the scaling is not relative.

With regard to maintenance, all exits should be kept clear and made available. These should include those exits that are not necessarily emergency exits (e.g., back entrances of bars).

6. What training and guidance can be provided to the event industry and safety officials to improve the preparation and response to emergency evacuations.

We should be able to have access to shared experiences of previous disasters or near misses. The more current the better. Crowd modelling successes for larger events. Challenges faced by others in event management. I believe this could be provided by web access.

I personally found the Level IV SO qualification interesting and thought provoking but thought it could have focused more on the on the above aspects within this question. I would change it to incorporate this. I also feel that there are some soft options around to achieve this qualification which will undermine the core aspect of what it was probably intended for. You can't beat exposure and experience.

We struggle to do live testing and suitable drills on evacuation. I understand that it is commercially and socially unacceptable to perform live evacuation drills (though we did when I was in Abu Dhabi preparing for the Grand Prix there). I still think we should do more 'stand up' drills and I have incorporated those into our match day experiences at the Stadium, where we prepare for full evacuation by staffing all final exit points and test the command, control and communications aspects (a bit of an eye opener at first). I think we should have greater access to crowd modelling examples and our safety certification should consider this at both design and management stages of stadia and venues. I am a believer in the DIM ICE model and have incorporated it into Event Management Plans and used it to influence change at the Stadium.

7. How can crowds be motivated to leave in an emergency evacuation?

They should be provided with clear accurate timely information which identifies the danger or reason. This will (in most circumstances) appeal to their rationale mind rather than the emotional one. In other words, they will need less persuasion if they understand the reason behind it.

If possible, any messages should be given out direct rather than pre-recorded. If possible, then stewards, security, hosts and all venue representatives should be giving the same informed message. Whilst this is challenging, it is essential to get the buy in from the bulk of the crowd.

Any activities should be halted and withdrawn. Care needs to be taken when considering a partial evacuation as this can significantly alter a crowd's perception.

8. Can a mass crowd evacuation be managed and controlled? What are the key factors?

Yes, it can. More easily where there is limited immediate danger and where the emergency is contained (as against a marauding terrorist).

Key to the management and control is:

Command / Control / Communication / Coordination.

I don't think that any of these four elements will be a surprise as they are well tried and tested in crisis management. Extremely challenging in event management though!

Hope some of this helps Steve – regards – WE5.

Appendix K

Steve Laws – Professional discussion for Emergency Evacuation Research WE6&7 April 16th 2016.

The day started early with a meeting between the safety officers and the researcher to read and review the contingency plans for the stadium to prepare for and manage an emergency evacuation. Since the Stade France attack the plans had been reviewed and added to, to include an "invacuation" onto the pitch should an incident occur outside the footprint of the stadium.

It was intended today to carry out a simulated 'live' evacuation drill. This would involve the immediate action drill to be undertaken by the stewarding team but would not involve an actual evacuation of the stands. The code word 'Operation (actual code word removed) would be announced over the public announcement tannoy which would trigger the immediate action drills for each supervisor and their team.

Just after the second half restart the automatic tannoy announcement was triggered from the control room. The researcher was allowed into the control room to observe the exercise taking place and the outcomes. The crowd attendance on the day was 36,000+ with 42 exits in use for emergency egress of the crowd, each with a standard exit width of 2m.

Calculations made on the day between the safety officers and the researcher showed that up to 8 exits could be out of use as an egress point and still have enough exits to egress the crowd safely in an emergency evacuation. This would represent a complete stand that would be "invacuated" pitch side and exited via alternative routes.

The exercise was commenced and the immediate action drills monitored and reported on by Supervisors. All stewards completed all necessary actions and only 3 exits failed to show their "open" status following the stewards repositioning to the gates and opening them. This was checked via the computer monitoring system and maintenance and whilst slow to indicated, did show their status after 90 seconds.

The safety officers whilst concerned about this failure to indicate the doors being open, they have a backup communication plan by confirming with each steward tasked with that gate to report back to their supervisor who them radioed in to control room with a status update.

Once all reports were in and reviewed all clear was announced over the tannoy and all stewards returned to their original posts. When questioned by the researcher about the frequency of this exercise, it was explained that this exercise was carried out several times during the season to ensure safety of the fans.

Appendix L

Steve Laws – Professional discussion during venue observation for Emergency Evacuation Research - WE8 April 9th 2016.

Professional discussion undertaken on 9th April 2016. The Safety Officer showed the researcher around the stadium and described the Stewarding and security provision for match days. The stadium hosts a Premiership Rugby Team with a capacity of 10,000. The steward briefing was attended with 40 stewards who are mainly volunteers.

"I have developed a system here around the use of volunteers for all general crowd stewarding except for response and licensed areas. I have found the group to be highly professional and committed to a high standard of customer service. Furthermore, the fans, both home and visitors respond very well to their presence and friendly approach. They are uniformed in blue and not the more usually yellow high viz jackets. This borrows from the concept adopted at the London Olympics and again lessens the adversarial ethos often seen at other sporting venues where the fans are often in conflict with the stewards. This is a rare and minimal occurrence here.

As you can see, we have a very open plan here with the stands and we allow fans to stand close to the pitch at the home end. Fans can buy tickets for this area and it is barriered and stewarded.

We have had a full 'live' simulation of a stand evacuation that was observed by (WE1) who came down from university to see the outcomes. This was to test the time it took to empty the stand in real time and how the crowd movement and flows could be managed and controlled. It was predicted that the crowd would empty from the stand in 2 minutes. In fact, it took less than this. The area into which the evacuated crowd flowed is a large open walkway. There were no identified pinch points where the flow slowed because of congestion. The crowd behaved in a calm and orderly manner and did not know it was an emergency drill. Only one stand was evacuated. The start to the exercise occurred just before the half time whistle so that the crowd did not feel aggrieved about missing the playing action but assured that the stand was full.

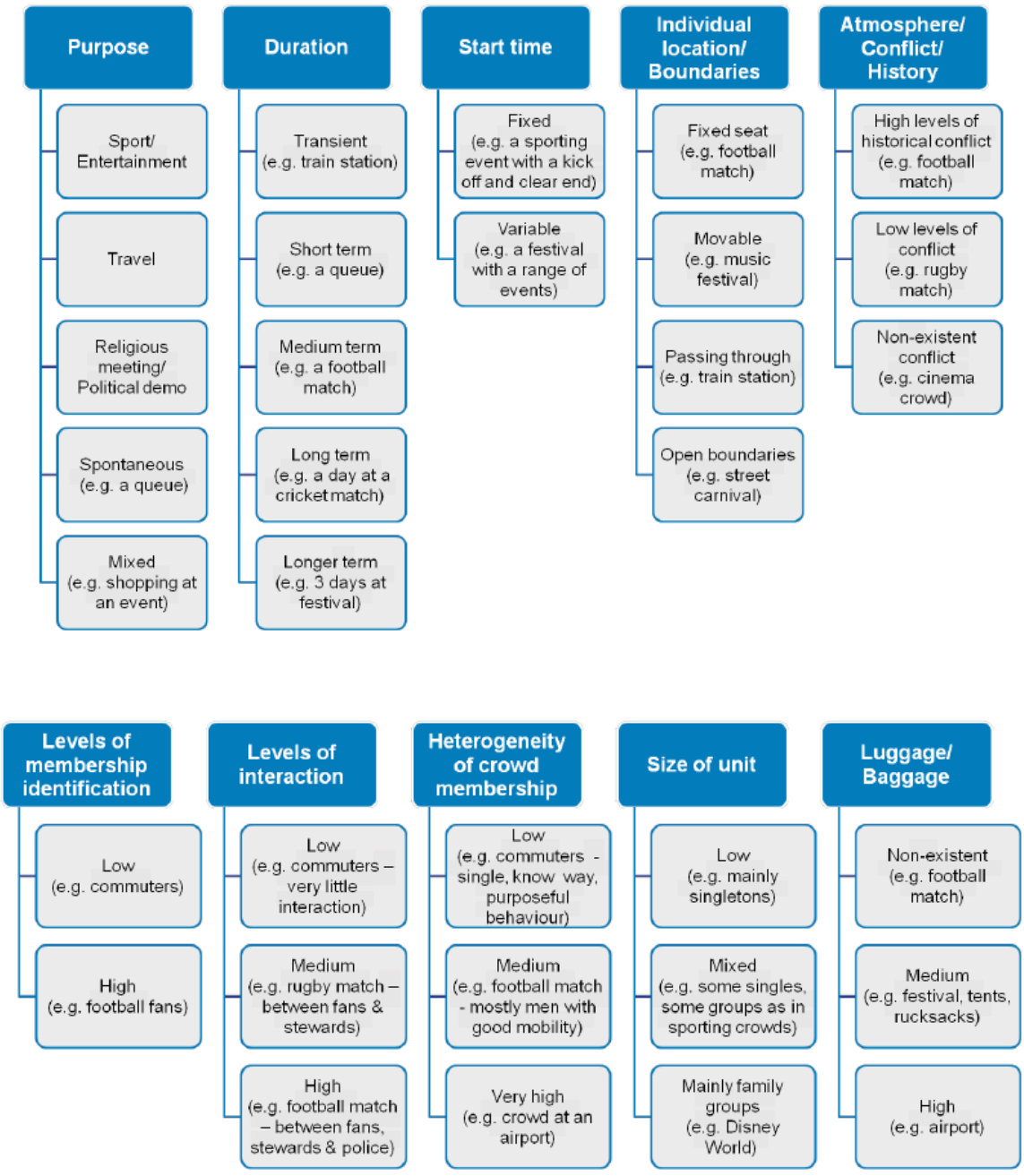
The police and local authority were also represented to observe.

During debrief from supervisors an interesting behaviour was reported on and discussed. In preparation for the live simulation, neither supervisors nor stewards were informed it was going to take place. Supervisors from the stand reported that two stewards had "froze" and didn't know what to do. They walked away and did not participate further. When spoken to they explained that they felt anxious and didn't know what they should be doing. Therefore felt it better to withdraw than be in the way.

This was interesting as we haven't asked are stewards how they felt about carrying out evacuation procedures' before. We will debrief this to all our stewards and have incorporated into our training delivery with our training provider.

Appendix M

Typology of Crowds



Understanding Crowd Behaviours 2009.

Appendix N

Research Plan (timeline):

This schedule for the research project is to focus management of 'study time' effectively.

Week	TOPIC
1	Research crowd theory (2nd November 2015)
2	Research crowd theory
3	Research crowd theory
4	Research crowd theory
5	Discuss project with supervisor/mentor
6	Identify specific stakeholders to focus research findings for
7	Identify specific stakeholders to focus research findings for
8	Review historical emergency evacuation events and adverse incidents
9	Review historical emergency evacuation events and adverse incidents
10	Review historical emergency evacuation events and adverse incidents
11	Survey/interview stakeholders
12	Survey/interview stakeholders
13	Survey/interview stakeholders
14	Discuss project progress with supervisor/mentor
15	Analyse surveys

16	Analyse surveys
17	Analyse surveys
18	Development and interpretation of research
19	Development and interpretation of research
20	Development and interpretation of research
21	Discuss project progress with supervisor/mentor
22	Write up of project
23	Write up of project
24	Write up of project
25	Write up of project
26	Write up of project
27	Submit final project (9th May 2016)

Appendix O

Project Support – Supervisor contact record

Details of contact time	Context	Contact made
6th October 2015 Face to Face	Study lecture for research project. Tutorial to discuss dissertation subject.	Gavin Butler
3rd November 2015 Email acknowledgement	Submission of project proposal	Gavin Butler
18th November 2015 Face to face	Project proposal debrief and discussion before embarking on the main project study timeline. Agreement on project as a whole and methodology. Ethics of research methods discussed.	Gavin Butler
10th February 2016 Face to face	Tutorial catch up for project progression. Review of research methods and literacy review.	Gavin Butler
28th April 2016 Skype call	Reviewed progress and discussed issues around achieving target submission date due to outstanding research subject interviews,	Gavin Butler
2nd May 2016 Email	Submission of draft to Supervisor for feedback	Gavin Butler
4th May 2016 Face to face Email	Tutorial to determine suitable completion date. Submission of extension request to BLU.	Gavin Butler
9th May 2016 Email	Two-week extension granted. New submission date 23rd May at 1400 hrs.	Gavin Butler Emma Parkinson

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End of report.