The User Experience of Crowds

By

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Doctoral Thesis

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Glossary

Comfort: 'a state of physical ease and freedom from pain or constraint,' Oxford University Press, 2010).

Complete observer observations: the researcher's role is purely to observe the situation and those within the situation (Bryman, 2004).

Complete participant observations: the researcher's role is to participate within the situation, and take notes on the experience of being in that situation (Bryman, 2004).

Crowd user: individuals that make up the composition of those within a crowd, including those attending an event, or waiting at a train station.

Crowding: is the negative experience of being in a crowd resulting from inadequate space, "it is not the amount of space available to the individual per se but the distance between individuals that determines the degree of stress arising from a particular situation" (Worchel & Teddie, 1976).

Crowd deliverers: those individuals involved in the management of aspect within a crowd, including public and private security, those responsible for setting up and maintaining equipment, and ground staff.

Crowd organisers: those individuals and organisations involved in the planning of crowd situations and events, including designers and architects, public and private security, and events managers.

Crowd situation: different events and areas in which crowds were observed (including: spectator events, tourism, celebratory event, conferences, exhibitions and commercial events, participatory race events, demonstrations and riots, and transportation hubs).

Crowd type: different aspects involved within a crowd situation, including the eleven crowd types identified by Berlonghi (1995) (ambulatory crowd, disability or limited movement crowd, cohesive or spectator crowd, expressive or revellous crowd,

participatory crowd, aggressive or hostile crowd, demonstrator crowd, escaping or trampling crowd, dense or suffocating crowd, rushing or looting crowd, violent crowd).

Density: 'the quantity of people or objects (or both), in a given space' (Drintewater & Gudjonsson, 1989).

Mass gathering: "more than a specified number of persons (which may be as few as 1000 persons) at a specific location for a specific purpose (a social function, large public event or sports competition) for a defined period of time" (World Health Organisation, 2008).

Performance: 'a task or operation seen in terms of how successfully it is performed' (Oxford University Press, 2010).

Physical crowd: a group of individuals who occupy the same space (Challenger et al., 2010).

Police commander:

   Gold commander: in overall control of the organisations resources at the event, and are often not onsite but at a distant control room, and formulate the strategy for dealing with the event and crowd management.

   Silver commander: senior member of the organisation at the scene, in charge of all their resources. They decide how to utilise these resources to achieve the strategic aims of the Gold commander; they determine the tactics used.

   Bronze commander: directly controls the organisations resources and will be found with their staff working on the scene.

Psychological crowd: a group of people who share a social identity (Challenger et al., 2010).

Reliability: 'the consistency of a measure of a concept' (Bryman, 2004).

Safety: 'the condition of being protected from or unlikely to cause danger, risk, or injury' (Oxford University Press, 2010).

Satisfaction: 'the fulfilment of one's wishes, expectations, or needs, or the pleasure derived from this,' (Oxford University Press, 2010).

Validity: refers to the issue of whether an indicator (or set of indicators) that is devised to gauge a concept really measures that concept' (Bryman, 2004).

Abstract

This thesis is concerned with the user experience of crowds, incorporating issues of comfort, satisfaction, safety and performance within a given crowd situation. Factors that influence the organisation and monitoring of crowd events will be considered.

A comprehensive review of the literature revealed that crowd safety, pedestrian flow modeling, public order policing and hooliganism prevention, has received the greatest attention with previous research on crowds. Whereas crowd performance, comfort and satisfaction has received less attention, particularly within spectator events (sporting and music for example).

Original research undertaken for this doctoral thesis involved a series of studies: user focus groups, stakeholder interviews, and observational research within event security and organisation. Following on from these investigations, the findings have been integrated with a tool to assist crowd organisers and deliverers during the planning of crowd events, and accompanying user feedback interviews following use of the tool. The overarching aim of the research within this thesis was to explore the complex issues that contribute to the user experience of being in a crowd, and how this might be improved.

The crowd user focus groups revealed differences in factors affecting crowd satisfaction, varying according to age and user expectations. Greater differences existed between crowd users, than across crowd situations, highlighting the importance of identifying expected crowd members when planning individual events. Additionally, venue design, organisation, safety and security concerns were found to highly affect crowd satisfaction, irrespective of group differences or crowd situations, showing the importance of these issues when considering crowd satisfaction for all crowd events, for any crowd members.

Stakeholder interviews examining crowds from another perspective suggested that overall safety was a high priority due to legal obligations, in order to protect venue reputation. Whereas, comfort and satisfaction received less attention within the organisation of crowd events due to budget considerations, and a lack of concern as to the importance of such issues. Moreover, communication and management systems were sometimes inadequate to ensure compliance with internal procedures.

In addition a lack of usable guidance was seen to be available to those responsible for organising crowd situations.

Eleven themes were summarised from the data, placed in order of frequency of references to the issues: health and safety, public order, communication, physical environment, public relations, crowd movement, event capacity, facilities, satisfaction, comfort, and crowd characteristics. Results were in line with the weighting of the issues within the literature, with health and safety receiving the most attention, and comfort and satisfaction less attention. These results were used to form the basis of observational checklists for event observations across various crowd situations. Event observations took two forms: observing the role of public and private security, and observing crowd events from the user perspective.

Observations within public and private security identified seven general themes: communication, anticipating crowd reaction, information, storage, training, role confusion, financial considerations and professionalism. Findings questioned the clarity of the differing roles of public and private security, and understanding of these differences. Also the increasing use of private over public security within crowd event security, and the differing levels of training and experience within public and private security were identified.

Event observations identified fifteen common themes drawn from the data analysis: communication, public order, comfort, facilities, queuing systems, transportation, crowd movement, design, satisfaction, health and safety, public relations, event capacity, time constraints, encumbrances, and cultural differences. Key issues included the layout of the event venue together with the movement and monitoring of crowd users, as well as the availability of facilities in order to reduce competition between crowd users, together with possible links to maintaining public order and reducing anti-social behaviour during crowd events.

Findings from the focus groups, interviews, and observations were then combined (to enhance the robustness of the findings), and developed into the Crowd Satisfaction Assessment Tool (CSAT) prototype, a practical tool for event organisers to use during the planning of crowd events. In order to assess 'proof of concept' of the CSAT, potential users (event organisers) were recruited to use the CSAT during the planning of an event they were involved in organising. Semi-structured feedback interviews were then undertaken, to gain insight into the content, usefulness, and usability of the CSAT. Separately human factors researchers were recruited to review the CSAT, providing feedback on the layout and usability of the tool.

Feedback interviews suggested the CSAT was a useful concept, aiding communication, and providing organisers with a systematic and methodical structure for planning ahead, prioritising ideas, and highlighting areas of concern. The CSAT was described as being clear and easy to follow, with clear aims, and clear instructions for completion, and was felt to aid communication between the various stakeholders involved in the organisation and management of an event, allowing information to be recorded, stored and shared between stakeholders, with the aim of preventing the loss of crucial information.

The thesis concludes with a summary model of the factors that influence crowd satisfaction within crowd events of various descriptions. Key elements of this are the anticipation, facilities, and planning considered before an event, influences and monitoring during an event and reflection after an event.

The relevance and impact of this research is to assist the planning of crowd events, with the overall aim of improving participant satisfaction during crowd events. From a business perspective the issue is important with competition between events, the desire to encourage return to events, and to increase profit for organisers. From an ergonomics perspective, there is the imperative of improving the performance of crowd organisers and the experience of crowd users.

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"If you can't fly, then run,

if you can't run, then walk,

if you can't walk, then crawl,

but whatever you do,

you have to keep moving forward.."

~ Martin Luther King Jr.

Publications

Kendrick, V.L., Haslam, R.A., and Waterson, P.E. (2013). Crowd satisfaction at sporting events. *Contemporary Ergonomics and Human Factors*, Proceedings of the international conference on Ergonomics & Human Factors 2013, Cambridge, UK, 15-18 April 2013, pp. 236 – 241.

Kendrick, V.L., Haslam, R.A., and Waterson, P.E. (2012). The relationship between public and private security during crowd events. *Institute for Ergonomics and Human Factors 3rd Doctoral Consortium*, Loughborough University, United Kingdom.

Kendrick, V.L., Haslam, R.A., & Waterson, P.E. (2012). Planning crowd events to achieve high participant satisfaction. *Work: A Journal of Prevention, Assessment and Rehabilitation,* 41(1), 3223-3226.

Kendrick, V.L. & Haslam, R.A. (2011). Planning crowd events to achieve high participant satisfaction. *Institute for Ergonomics and Human Factors 2nd Doctoral Consortium,* Brunel University, United Kingdom.

Kendrick, V.L., & Haslam, R.A. (2010). The user experience of crowds - A human factors challenge. *Proceedings of* the *Human Factors and Ergonomics Society Annual Meeting*, San Francisco, USA, 27th September - 1st October, 3, 2000-2004.

Chapter 1

1. Introduction

Gatherings of people (hereafter referred to as crowds) are an everyday experience and it is surprising that research concerning the overall crowd experience has received only limited attention within the literature. In modern life crowds form part of the human experience, taking a varied form encompassing many experiences. On a daily basis individuals are faced with crowd situations, such as the commute to work at transportation hubs including stations, as well as during retail environments (such as the weekly supermarket trip), during social activities such as at public houses and restaurants and entertainment events including music festivals, football matches, theme parks and museums. Crowd situations include those entered willingly (including concerts and festival events), and those unavoidable crowd situations (including the commute to work for example). Large crowds with individuals in close proximity can often yield negative experiences for the crowd user, however, in certain situations the crowd also adds to a positive user experience (the chanting atmosphere experienced at a sold out football event for example). Such issues form the basis of the research within this thesis, exploring the factors that impact on the user experience within a crowd, and what issues contribute to enhancing the positive experience of being in a crowd situation

Issues surrounding the user experience of crowds have existed for many years, as far back as Roman times when large venues were developed to entertain mass gatherings; a clear interest in crowd experience can be identified. The design of amphitheatres such as the coliseum in Rome, present one of the earliest examples of considerations given to the crowd user experience (Langston et al., 2006). Crowd dynamic considerations including the egress of crowd users were evident, with open archways into, and out of the stadium, allowing for quick access and evacuation from the venue (Figure 1). The Coliseum in Rome for example, was designed with 80 routes for the fast entry and exit of crowd users (Langston et al., 2006).
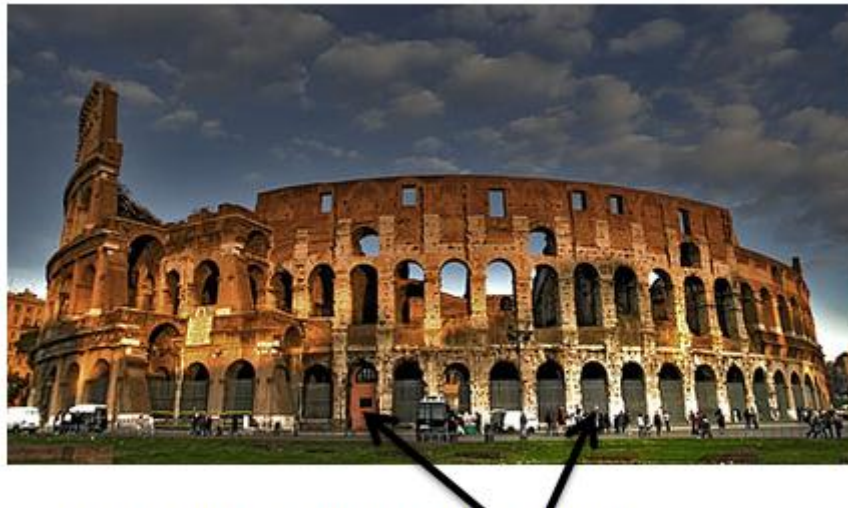
Ingress and egress points for quick evacuation

Figure 1 Coliseum in Rome showing early crowd experience considerations

The organisation of crowds is also evident within nature, within swarm behaviour and the self-organisation of animals and humans due to 'social forces'. For example schools of fish and herds of animals will gather together in certain forms due to 'self-organisation' (Fisher, 2009). Similarly, gatherings of people will spontaneously form 'lanes' as they walk along a crowded street (Fisher, 2009). Understanding how to organise and deliver crowd situations in order to enhance the crowd user experience and the experience of the collective crowd is where the research within this thesis is focused.

Research attention to crowd user experience has global applications, with the requirement for research and understanding surrounding the behaviour and experience of gatherings of humans becoming progressively important due to the increasing world population. Cross-cultural variations in crowding tolerances and personal space preferences are likely to become increasingly important issues for consideration with the increasingly multidisciplinary events and conferences around the world.

Whilst there is a breadth of literature examining crowd safety (Zhen, Mao & Yuan, 2008); pedestrian flow modeling (Smith et al., 2009); public order policing (Reicher et al., 2004; Drury & Stott, 2011); and hooliganism prevention (Stott et al., 2008), there is little attention given to crowd performance, comfort, and satisfaction (Berlonghi, 1995; Lee & Hughes, 2007; Zhang et al., 2007; Johnson, 2008; Ryan, Shuo & Huan, 2010). Therefore research is required to determine what is currently

being provided during crowd events of various descriptions, to assess whether the situation could be improved for the crowd user.

Research to date has covered the bio-medical, environmental, psycho-social and physiological perspectives of crowd experience. However, there has been limited consideration given to crowd experience from a human factors perspective, to assess the systems perspective of crowd events. Thus, research in this thesis will explore crowd user experience (comfort, safety, satisfaction and performance); to develop a holistic perspective of the issues that interact within a crowd event and indicate issues that impact the user experience of crowds. This approach to the assessment of crowd user experience aims to determine how the event can be improved for crowd organisers, deliverers, and end users of the crowd event.

1.1 Overall aims

The aims of the research within this thesis were to:

1. Determine the factors that contribute to and influence the user experience of crowds, issues affecting comfort, satisfaction, safety and performance.
2. Understand the role of stakeholders in the organisation and delivery of crowd events.
3. Identify aspects of crowd events that contribute to a positive user experience, and areas of crowd event organisation that could be improved.
4. Develop a prototype guidance tool to assist event organisers during the planning of crowd events.

In order to meet the above aims, five studies have been undertaken encompassing: user focus groups, stakeholder interviews, security observations (complete observer), event observations (complete participant), and finally the development of a tool to assist the organisation of crowd situations, with an assessment of the proof of concept and usability of the tool.

1.2 Ethical approval

All research described in this thesis complied with the requirements of the Loughborough University Ethical Advisory Committee.

1.3 Structure of this thesis

The research presented within this thesis takes the form of five separate phases of research, with an outline of the research presented in Figure 2.
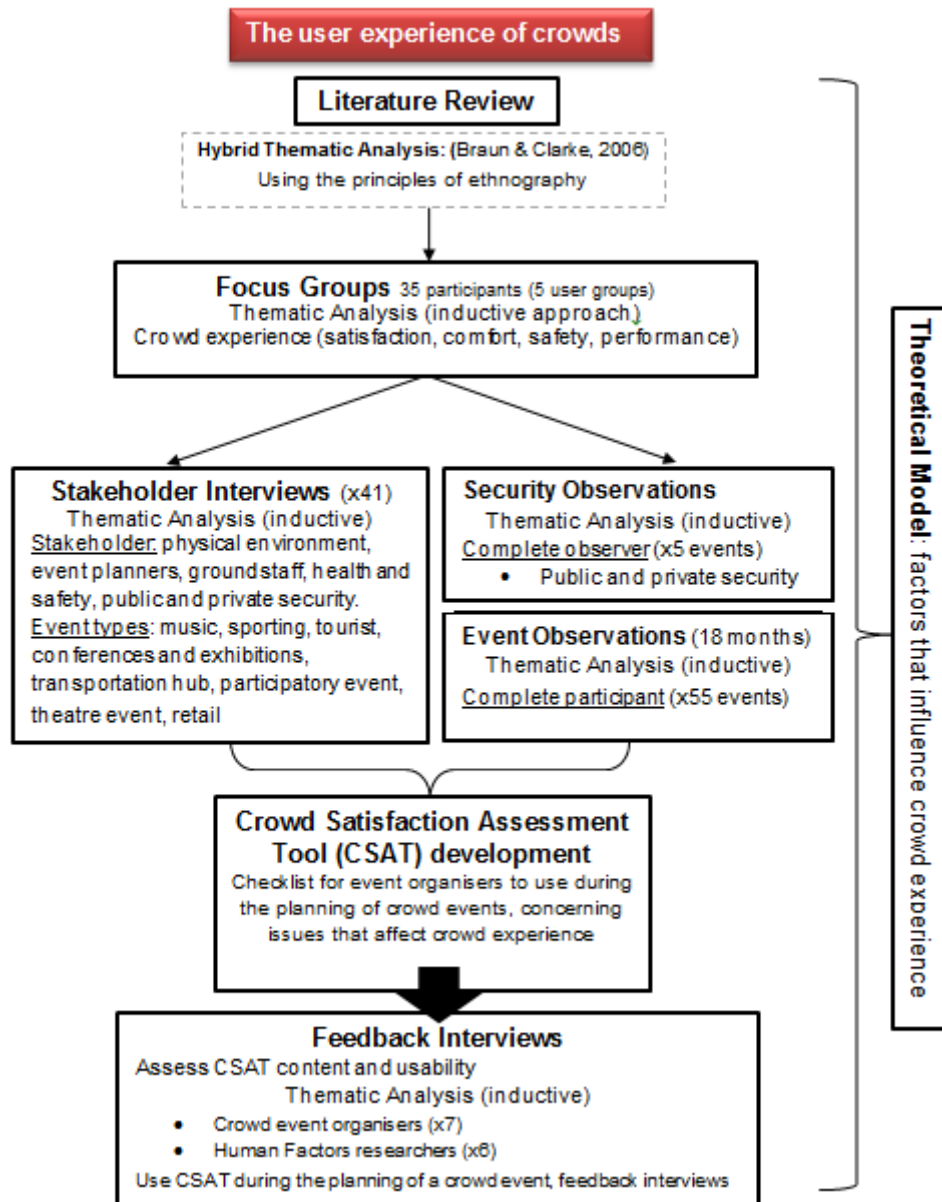
Figure 2 Outline of the research process

Phase 1: of the research process involved a comprehensive review of the literature surrounding crowds and crowd experience (satisfaction, comfort, safety and satisfaction) (Chapter 2). Chapter 3 provides a review of the methods used across the thesis, and justification for the methods selected to meet the aims of the

research. Alternative methods that were considered but not selected for use will also be discussed. The final part of phase 1 involved an exploratory study of the user experience of crowds, using focus groups within different user groups to establish issues that crowd users believe to be influential to their satisfaction within a crowd situation (Chapter 4). These user focus groups considered different crowd situations including: retail environments, religious events, transportation environments, tourism crowds and spectator events. The findings from phase 1 of the research process were then used to form the basis of the research within phase 2 (Figure 2).

Phase 2: Stakeholder interview schedules were developed from the findings of phase 1 of the research. Phase 2 then involved interviews with stakeholders involved in different aspect of crowd situations, including: music, sporting, open days, conferences and exhibitions, graduations, and participatory race events. Stakeholders were drawn from different areas of crowd organisation: physical environment, event planning, ground staff, health and safety, public security, and private security.

Phase 3: explored the organisation and user experience of crowds further, using event observations. Findings from phases 1 and 2 were used to develop observational checklists. Security observations were then conducted using complete observer methods (Chapter 6), along with event observations using complete participant methods (Chapter 7). Event observations were conducted over an 18 month period, with various event types, including: music, sporting, university open days, conferences and exhibitions, graduations, and participatory race events. The findings from phases 1 to 3 of the research process were then integrated with the development of a practical tool, and summary model of the issues influencing the user experience of crowds (phases 4 and 5).

Phase 4: involved the development of a prototype Crowd Satisfaction Assessment Tool (CSAT) (Chapter 8). The CSAT aimed to aid the organisation and delivery of crowd events, considering issues that impact the user experience of crowds.

Phase 5: examined the 'proof of concept' of the CSAT, through feedback interviews with event organisers and deliverers, as well as evaluation by human factors researchers (Chapter 8). Finally an overall discussion of the research conducted within this thesis is presented, with accompanying implications and recommendations for future research (Chapter 9).

Chapter 2

2. Literature review

2.1 Summary

This chapter provides a review of published literature concerning the user experience of crowds, addressing user comfort, safety, satisfaction and performance. Attention is given to definitions of crowds and crowding; along with crowd density, mood and satisfaction; health, safety and wellbeing; guidance for planning crowd events; and finally theories and models to explain crowd behaviour.

2.1.1 Literature search strategy

The literature search strategy aimed to identify all relevant literature within the area of crowd comfort, safety, satisfaction and performance. The following databases and catalogues were used to conduct the literature search:

- Science direct
- Web of Science, Web of Knowledge
- Scirus
- Google Scholar
- Pub Med
- Loughborough University online Library Catalogue

Key search terms were used within the databases and catalogues to develop a comprehensive review of the literature, the key terms used within the literature search were as follows:

- Crowd AND Mass gathering
- Crowd event AND Crowd situation
- Crowd behaviour AND Crowd mood
- Crowd experience AND Comfort AND Satisfaction AND Performance
- Crowd management AND Crowd control
- Crowd science
- Pedestrian flow modelling AND Wayfinding
- Safety AND Crowd disasters AND Hooliganism prevention

The literature search identified core research areas related to crowd user experience (comfort, satisfaction, safety and performance) including:

- Event management
  - Festival organisation
  - Sport management
  - Tourist satisfaction
  - Visitor loyalty
- Police and security research
  - Keeping the peace
  - Hooliganism prevention
  - Crowd management and crowd control
- Ergonomics, applied ergonomics
  - Safety
  - Systems perspective
- Social sciences
  - Crowd science
- Transportation
  - Pedestrian Flow Modelling

Additionally, searches were carried out on the Health and Safety Executive (HSE) website to assess the safety guidance currently available in the UK, as well as 'Google' searches to identify grey literature and event guidance documents. Throughout the research process literature searches were continually updated to identify new research. A background to the research and definitions of the key terms will now be described based on the literature review.

2.1.2 Background

In 1975 Altman suggested that research into crowds would increase over the next decade due to:

'*a burgeoning world population..*'

and possible:

'*interpersonal stresses that accrue from too much contact with too many people..*'

More recent literature has suggested that crowd events are one of the fastest growing tourism businesses, prompting researchers to further explore the motivations of visitors to crowd events (Lee et al., 2004). However, despite Altmans predictions crowd research remains surprisingly underdeveloped.

The research that has been carried out concerning factors affecting the crowd experience, includes: satisfaction of individuals in crowds (Baum & Greenberg, 1975; Altman, 1975; Schmidt & Keating, 1979; Machleit, Eroglu & Mantel, 2000); performance of desired or necessary tasks (Klein & Harris, 1979); individual personality (Worchel & Teddie, 1976; Spacapan & Cohen, 1983); psychological reactions to a given crowd situation (Worchel & Yohai, 1979); prior expectations and experiences (Baum & Greenberg, 1975; Webb & Worchel, 1993) gender (Rustemli, 1992; Ozdemir, 2008) and culture (Pons, Laroche & Mourali, 2006; Pons & Laroche, 2007). Analysis has also focused on the contribution of different crowds to individual experience of stress (Cox et al., 2006) and personal space preferences (Hasse & Markey, 1973; Hayduk, 1983; Sinha & Sinha, 1991; Rustemli et al., 1992; Kaya & Erkip, 1999; Gerin-Lajoie, Richards & McFadyen, 2005; Evans & Wener, 2007; Martinez, 2009). Moreover, studies have considered a range of different crowd types, including: sporting events (Zhang, Liu, Wu & Zhao, 2007; Johnson, 2008); retail environments (Machleit et al., 2000; Ozdemir, 2008; Whiting & Nakos, 2008); religious pilgrimages (Hughes, 2002; 2003); restaurants (Tse, Sin & Yim, 2002; Yildirim & Akalin-Baskaya, 2007; Robson, 2008); and music festivals (Janchar, Samaddar & Milzman, 2000). However, these investigations have tended to be uni-dimensional, focusing on single variables or particular crowd situations. The absence of research examining the combined contribution of factors to the overall crowd experience represents a gap in our knowledge. Research within this thesis will therefore aim to contribute towards gaining a holistic understanding of the organisation of crowd situations.

2.2 Defining a crowd

A review of the psychological factors affecting the behaviour of crowds within the psychosocial domain showed a distinct lack of concrete definitions relating to what constitutes a crowd and aspects of crowd behaviour (Zeitz, Tan & Zeitz, 2009). The interchangeable use of the terms 'crowd', 'mass gathering', 'crowd behaviour', 'crowd type', 'crowd management', and 'crowd mood', with no universal agreed

definition makes analysis of crowd literature complex (refer to the Glossary for full definitions).

Within the dictionary a crowd is described as:

> *'A large number of persons gathered so closely together as to press upon or impede each other; a throng, a dense multitude.'* (Oxford University Press, 2010)

As well as:

> *'A mass of spectators; an audience.'* (Oxford University Press, 2010)

For the purpose of this thesis a crowd is taken to be any instance or situation during which users congregate for a shared purpose, from commuters within transportation hubs to spectators within entertainment venues for example. The density of the crowd is determined by the availability of space between crowd users as opposed to the total number of users. A crowd has both physical (space available) and psychological (social identity) aspects, and can contribute towards both positive (functional) and negative (dysfunctional) experiences for the user. With feelings of crowding resulting from the negative experience of being in a crowd, while positive feelings within a crowd contribute towards user comfort, safety, satisfaction and performance.

A mass gathering has been defined by the World Health Organisation (WHO) as a gathering of:

> "*more than a specified number of persons (which may be as few as 1000 persons) at a specific location for a specific purpose (a social function, large public event or sports competition) for a defined period of time*" (WHO, 2008).

Density with respect to crowds has been described as:

> *'the quantity of people or objects (or both), in a given space'* (Drintewater & Gudjonsson, 1989).

Crowds are influenced by a variety of factors (described below using definitions most relevant to the aims of the research within this thesis), including:

- **Safety**
  - The security of both individuals and the collective crowd

- o Dictionary definition: '*The condition of being protected from or unlikely to cause danger, risk, or injury*' (Oxford University Press, 2010)

- **Performance**
  - o The ability of the individual and collective to perform necessary or desired tasks within the crowd
  - o Dictionary definition: '*a task or operation seen in terms of how successfully it is performed*' (Oxford University Press, 2010)

- **Satisfaction**
  - o How content individuals are in different types of crowds, and factors affecting the contentment of the collective
  - o Dictionary definition: "*the fulfilment of one's wishes, expectations, or needs, or the pleasure derived from this,*" (Oxford University Press, 2010)

- **Comfort**
  - o Dictionary definition: '*a state of physical ease and freedom from pain or constraint,*' Oxford University Press, 2010)

Research conducted by the Cabinet Office to understand crowd behaviours highlighted the important distinction between a physical crowd and a psychological crowd (Challenger et al., 2010):

- Physical crowd: a group of individuals who occupy the same space
- Psychological crowd: a group of people who share a social identity

The two definitions are not mutually exclusive, and can occur within the same crowd situation (research into social identity will be discussed further, see Theories of crowd behaviour, page 36). However, it is the physical crowd that will be the focus of the research within this thesis. Such research also stressed the importance of distinguishing between different crowd types during the planning of crowd situations and venues. However, little attention has been given to providing definitions of different types of crowds from which to do this. In 1995, Berlonghi provided a definitive guide to understanding and planning for different spectator crowds, emphasising the importance of clear differentiation between crowd types. Eleven different crowd types were proposed (Table 1), with Berlonghi (1995) suggesting that failure to differentiate between different crowd types during the planning of crowd events, could contribute to ineffective management of the crowd. Moreover,

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subsequent research is required to establish characteristics of different types of crowd, and issues affecting satisfaction within different crowd types.

Table 1 Types of crowds classification (Berlonghi, 1995)

Type of crowd	Description
Ambulatory crowd	People walking in and out of a venue, to and from parking areas or walking to use restroom or concession facilities.
Disability or limited movement crowd	People that in some way are limited or restricted in their movement. Their level or lack of ability to walk, see, hear or speak may require more planning than is provided for all other spectators.
Cohesive or spectator crowd	People watching the activities of an event or at the scene of an accident. Its primary character is the fact that people are interested in watching something specific that they came to see.
Expressive or revellous crowd	Involved in some sort of an emotional release which can include cheering, movement in unison, celebrating, dancing, chanting or singing.
Participatory crowd	Crowd of people involved in the actual activities of an event. Sometimes these people may be professional performers or athletes. At other times the people attending the event are participating in an actual sport, such as a marathon. Children may go up onto a stage at the invitation of professional performers.
Aggressive or hostile crowd	Becoming verbally aggressive towards or disregarding the instructions of ticket takers, ushers or security personnel. This crowd can get threateningly rowdy and open to lawlessness.
Demonstrator crowd	Organised to some degree by some established leadership and whose actions may include picketing, marching, chanting or demonstrating at a particular location for a specific purpose.
Escaping or trampling crowd	Attempting to escape from danger either of an actual or imagined threat to life. This includes a crowd involved in an organised evacuation procedure and a panic mob pushing and shoving with no order whatsoever.
Dense or suffocating crowd	Individual physical movement is rapidly becoming less likely or impossible due to the density of the crowd. People are attempting to move, but they are either swept along with the movement of the crowd or are falling on top of each other. The results of this compression of people are fatalities and serious injuries due to suffocation.
Rushing or looting crowd	Principal purpose is to obtain, acquire or steal something. This includes rushing to get the most preferred seats, autographs or actually stealing property. This very often results in fatalities, serious injuries and considerable property damage.
Violent crowd	Attacking, terrorising and rioting with complete disregard for laws and the rights of others.

Berlonghi's (1995) typology of crowds was also implemented by Australia Emergency Management (1999; P 79) to define crowd types at mass gatherings (Zeitz et al. 2009). However, classification of crowd types has received relatively little attention in the study of crowds. Crowd literature has a strong focus towards safety and crowd simulation, with a lack of clear definitions of crowd types. Moreover on close review of the definitions, one might expect more than 11 different types of crowd within different crowd situations. Moreover, the literature can be criticised as it was not evidence based. Despite this, (Berlonghi, 1995) definitions have been used within crowd planning literature in the United Kingdom and Australia.

2.2.1 Crowding

Research within this thesis will attempt to identify issues that impact crowd user experience, and explore how to prevent the negative experience of crowding within a crowd situation.

2.2.1.1 *Psychological dimensions of crowding*

Almost forty years ago, Stokols (1972) suggested that density was a physical condition and crowding a psychological state. Stokols argued that the negative psychological experience of crowding results from interactions between environmental characteristics and personal factors, and not from high spatial density alone. Moreover, in 1976, Worchel and Teddie proposed:

"*it is not the amount of space available to the individual per se but the distance between individuals that determines the degree of stress arising from a particular situation*".

Thus, in the model proposed by Worchel and Teddie (1976), inappropriate closeness rather than high density, was the necessary condition for an undesirable sense of crowding. However this is not always the case and measures can be introduced to increase the level of control for crowd users. Therefore research within this thesis will aim to establish issues that affect the user experience of crowds in order to increase control of the user.

Rustemli (1992) suggested that for high density to produce crowding effects, spatial limitation must be the distinct feature of an environment. When confronted with inadequate space, a person has a reduced level of control over the situation and experiences stress and arousal that could lead to feelings of being crowded. Furthermore, Webb and Worchel (1993) suggested that high density could induce cognitive overload (Esser, 1973); impose behavioural constraints (Schopler & Stockdale, 1977); evoke feelings of uncontrollability over one's environment (Rodin, Solomon & Metcalf, 1978) and frustrate the goal of privacy (Altman & Chemers, 1980), all of which could impact the experience of crowdedness. However, Freedman (1975) had already claimed that:

> *"virtually all of the active researchers began with the impression that crowding, defined here as physical density, is basically harmful to people"*

Such definitions conform to the belief that crowding is the negative feeling users experience when in a high density crowd situation. Therefore an absence of negative feelings within a crowd situation would lead to no crowding.

From a social psychology perspective Worchel and Yohai (1979) widened the discussion, suggesting that several variables are associated with cognitive responses to crowding, including desires for privacy, density, territoriality, and control. Therefore further research is required to determine issues that affect the user within a crowd situation, as well as the individual perception of crowding.

2.2.1.2   *Perceived crowding*

Perceived crowding has been described as a consequence of physical, social, and personal factors that:

> *"sensitise the individual to actual or potential problems arising from scarce space"* (Stokols, 1972*)*

An environment is perceived as crowded when the density ("the quantity of people or things in a given area or space", Oxford University Press, 2010), obstructs the performance and goal achievement of the individual. Density is therefore a precursor for crowding (Eroglu & Machleit, 1990; Sundstorm, 1978). Thus, an

individual will experience perceived crowding when the space available fails to meet their individual space requirements (Stokols, 1972). Each individual will observe the same environment with a different level of perceived crowding depending on their personal preferences and standards. Whiting and Nakos (2008) summaries the relationship between density and crowding, suggesting: "density is an objective measure while crowding is subjective to the individual and the environment". Consequently, a high density situation may not result in the negative and stressful crowding outcome, but instead create a positive outcome. Such positive outcomes of high density environments are referred to as functional density (Eroglu & Harrell, 1986).

2.2.2 The Positive Impact of Crowds on Satisfaction

Research into the positive impact of crowds on satisfaction has predominantly focused on the negative impact of high density on the shopping experience. Previous research has shown the positive impact of crowds for businesses (Foxall & Goldsmith, 1994; Anderson et al., 1998). More recently, Yildirim et al. (2007) identified distinctions in researching the effects of crowding on human health and behaviour. Primarily that crowding and close inter-personal distances increase stimulation, which may not be undesirable in all situations. Therefore further research is required to assess the situation in which crowds have a positive impact on satisfaction.

2.2.3 Functional density

The concept of functional density was introduced to conceptualise the positive outcomes of a high density situation (concentrating on the retail environment) (Eroglu & Harrell, 1986). Research suggested that depending on the individual, outcomes of density can be positive (functional), or negative (dysfunctional), with high density negative outcomes resulting in the experience of crowding (Figure 3). Thus, high density situations may not always result in the experience of crowding if the level of density is seen as functional. For example, one individual might tolerate an extremely high density crowd whilst watching a music concert, as that individual perceives the high density situation to aid enjoyment of the performance, and is therefore functional. Whereas, another individual attending the same concert might feel that the density level is too high, interfering with their enjoyment of the performance, and therefore causing dysfunctional outcomes and the experience of crowding. Moreover, Eroglu and Harrell (1986) also suggested that a number of

factors may moderate the relationship between density and satisfaction. In 2008 Whiting and Nakos, examined the impact of cultural tolerance, and situational context, on the density-satisfaction relationship. Figure 3 shows the model produced by Whiting and Nakos (2008) to explain the relationship between density and satisfaction. The model also shows the potential influence of factors such as 'cultural tolerance' and 'situational context' in moderating the relationship between density and satisfaction. The issue of cross-cultural variation in crowd tolerance will be visited later in the literature review (Cross-cultural variation, page 19).
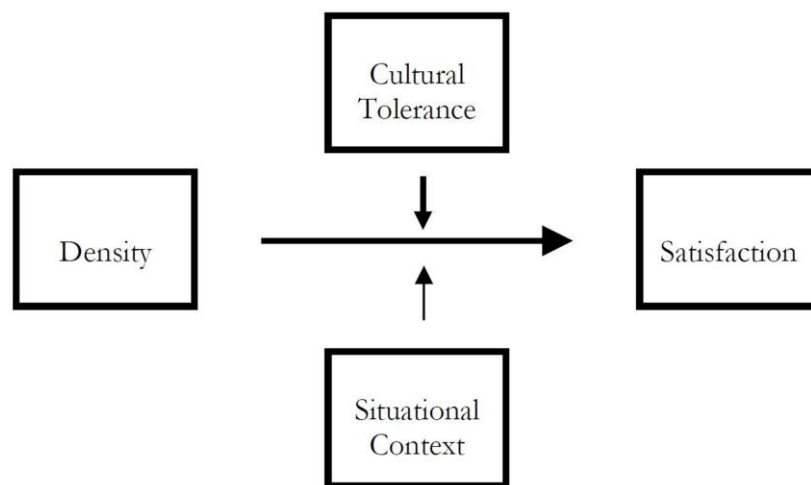
Figure 3 Density Satisfaction Model (taken from: Whiting and Nakos, 2008)

2.2.4 Arousal theory

Arousal theory the relationship between crowding and density, explaining the potential functional (positive) and dysfunctional (negative) outcomes of crowding (Evans & Lepore, 1992). Arousal theory suggests that arousal has a:

> *"curvilinear effect on individuals with high and low levels of arousal leading to negative results and medium arousal leading to positive results"* (Hebb, 1972; Singh, 1998).

In accordance with Seyle (1956) both low and high levels of a stressor can be dysfunctional, whereas medium levels can functional. The relationship forms an inverted U known as the Yerkes-Dodson Law (Figure 4).

Mowen et al. (2003) provide further support for a functional relationship between density and satisfaction in research within a festival environment. Low density festival events might be construed as reflecting a poorly organised, unpopular festival or unpopular artists. Furthermore, in 2008 Whiting and Nakos compared the effects of high, medium and low density environments, under different situational contexts (including individuals waiting in line, and individuals at a baseball game). Findings supported the suggestion that medium density situations have the potential to produce positive outcomes instead of negative outcomes. Whiting and Nakos (2008) also examined the influence of culture, in moderating the relationship between density and satisfaction. Findings suggest that culture can contribute to the perceived positive and negative effects of density on satisfaction. An important consideration is the international expansion of crowd events (retailing in particular) as well as many other crowd situations.
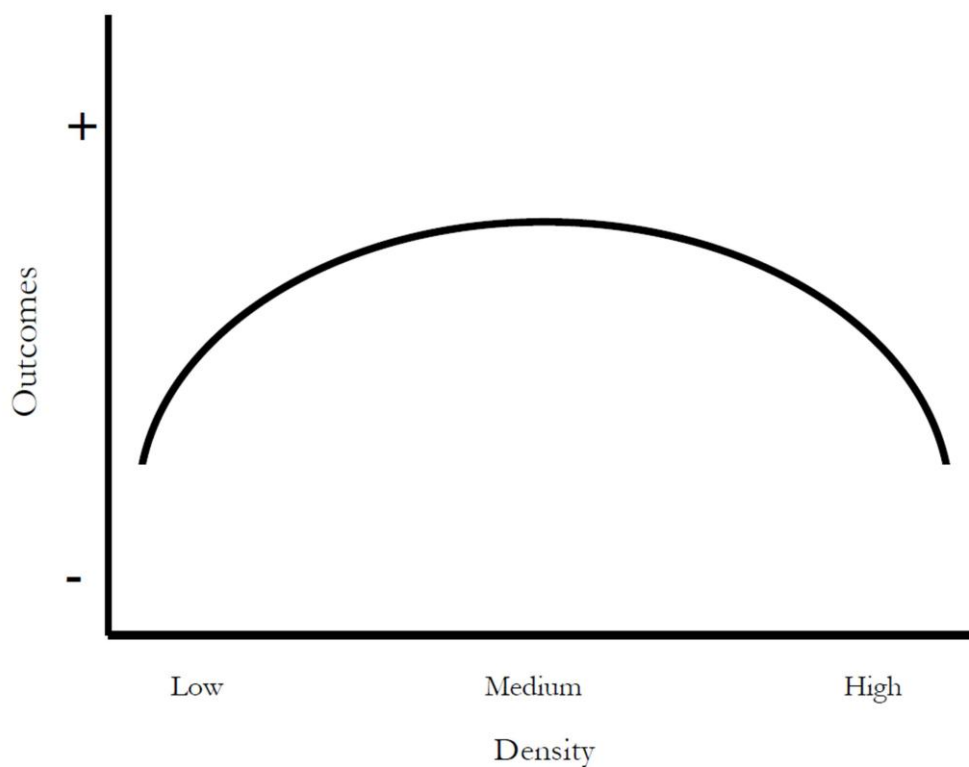
Figure 4 Relationship of Density to Outcomes (taken from: Whiting and Nakos, 2008)

2.2.5 Comfort and stress

Comfort has been described as a moderating factor in the perception of a situation as crowded, and the ultimate experience of crowding and stress (Cox et al., 2006). Thus research within this thesis aimed to explore issues that improve the comfort

and satisfaction experienced within crowd situations, with the aim of therefore reducing the feelings of crowding, and the stress experienced. Previous research focused on crowd situations within the transportation industry, while this research will expand to look at crowd situations of various descriptions including music and sporting events, retail, transportation and demonstration crowd situations for example (Mohd et al., 2012; Cox et al., 2006).

2.3　Crowd mood

In a recent literature review, Zeitz et al. (2009) proposed that crowd behaviour often involves a "seed", followed by the engagement of other crowd members. Through understanding both elements, crowd behaviour can be manipulated to an extent. The "seed" refers to the individual or group of individuals taking a certain action (for example, initiating a Mexican wave), and to "engage" refers to the resultant crowd behaviour (for example, a Mexican wave flowing around the stadium crowd). Such behaviour requires individuals to alter their normal behaviour, adhering to their shared sense of identity established in the crowd. Problems can arise in crowd situations when opposing groups have different seeds (for example, opposing sports teams). Similarly, Berlonghi (1995) stressed the importance of not managing a spectator crowd as if it were one reality, suggesting that there may be smaller crowds within the whole that may need to be simultaneously managed.

In 2005, Zeit et al., developed a simple guide to measure crowd mood, classified as either: passive, active, or energetic (Table 2). Analysis of such classifications found that crowd mood had a strong impact on medical workload during crowd events, suggesting the importance of considering crowd mood when planning crowd situations. Furthermore, Zeitz et al. 2009 suggested that crowd mood and behaviour are:

'*complex phenomena influenced by social conditions, spectator personalities, and the dynamism and situational changes* of the environment'

(Slepicka, 1995)

Table 2 Crowd mood classifications (Berlonghi, 1995)

Mood Descriptor	Crowd Descriptor
Passive	Little or no: • talking • physical movements • physical contact • audience participation Cooperative
Active	Moderate degree of: • talking • physical movements • physical contact • audience participation Cooperative
Energetic	Considerable degree of: • talking • physical movements • physical contact • audience participation May be episodes of violence

2.3.1 Crowd catalysts

Berlonghi (1995) referred to a number of issues that can affect the mood of the crowd as crowd catalysts. Such issues can cause a controlled crowd to become out of control (Table 3). However, such crowd catalysts were focused on the safety and security of crowd members and events. The role and contribution of such factors to the satisfaction of crowd members was not considered, and could contribute to the safety and security, and overall success of the crowd event.

Table 3 Crowd catalysts (Berlonghi, 1995)

Crowd Catalyst	Description
Operational circumstances	Lack of parking, no-show of performers, cancellations, sold out event
Event activities	Special effects (smoke, lasers, fireworks), music, loud noises, video replays
Performer's actions	Sexual and violent gestures or comments, dare-devil or macho challenges, performer invitations
Spectator factors	Consuming alcohol, rushing for seating, overnight waiting, crowd cheering, crowd activities (the wave, playing with inflated balls), throwing objects
Security or police factors	Use of excessive or unreasonable force, altercations or arguments with spectators, provocations, abuse of authority
Social factors	Racial tension, nationalism, long standing rivalries, gang activities, rioting
Weather factors	Heat, humidity, rain or hail, lack of ventilation
Natural disasters	Earthquakes, tornadoes, avalanches, floods
Man-made disasters	Toxic chemicals, structural failures

Berlonghi's (1995) research indicates that the mood of a crowd influences the behaviour of the crowd, turning a crowd that is in control to one that has become out of control. Therefore, such research would suggest that maintaining the positive mood of the crowd, in turn maintains the control level of the crowd, reducing the potential for antisocial behaviour within the crowd. If that is in fact the case, then providing (and maintaining) a positive crowd experience (and hence a positive crowd mood [to quote Berlonghi's (1995) wording], will contribute to maintaining control within the crowd during an event. Therefore enhancing the crowd experience (comfort, safety, satisfaction and performance), has a potential positive impact for the event organiser and other security stakeholders within an event, as well as crowd users. Moreover, if heat and a lack of ventilation do indeed contribute to reducing crowd mood (as suggested by Berlonghi, 1995), which then contributes to a crowd getting out of control, event organisers might begin to appreciate the need to provide adequate ventilation and thermal comfort not only from a safety perspective, but also from a user experience perspective, and subsequently crowd control and security perspective.

2.3.2 Cross-cultural variation

The importance of culture on the density-satisfaction relationship is increasing with the globalisation and multicultural participation. Research has suggested a relationship between culture, and the experience of crowding (Kim et al., 2010; Whiting and Nakos, 2008; Kim and Park, 2007; Wu and Luan, 2007; Pons and Laroche, 2007; Pons et al., 2006). The literature suggests that Western (Individualistic cultures) and Eastern (Collectivist cultures), differ in their tolerance for high density situations. Current research has focused on the experience of crowding in retail situations, comparing the behaviours of individuals in America (Western), and the Middle-East, and China (Eastern). Such research can be criticised for stereotyping all individuals within such countries as belonging to one culture (either Eastern or Western). Individualism is valued more in Western cultures, whereas collectivism is valued more in Eastern cultures. Previous research has suggested that Western cultures (including Northern European and Caucasian North American cultures) (Evans et al., 2000), prefer lower levels of contact, and larger interpersonal distances, compared to collectivist cultures (including Asian, Mediterranean, and Latin American cultures) (Remland, Jones, & Brinkman, 1995). Niu and Stemberg (2001), suggest that in Western societies emphasis is placed on discovering and expressing oneself and perusing personal differences from others.

Whereas, Eastern societies stress the importance of being part of a larger community, in which individual behaviour is secondary to the larger society.

In 2006, Pons et al., conducted research assessing differences in consumer reactions to crowded retail settings in the Middle East (Lebanese students), and North America (Canadian students). Research aimed to further understanding of the psychological components of density, and the issues affecting crowding across different cultural backgrounds. Participants were required to read a short story about a crowded disco situation, and imagine themselves in the situation. Questionnaires were then completed incorporating measurements of: personality; territoriality; privacy; freedom of movement; perceived number of people; and affective evaluation. Findings indicated that Canadian students perceived situations to be denser than their Lebanese counterparts (perceiving a higher number of people, and less freedom of movement). However, Pons et al. (2006) suggested potential endemic and geographical account of the differing tolerance of high-density situations, as opposed to cultural explanations. Canada has more space available, for the number of people, when compared against Lebanon. The research emphasises the importance of considering cultural differences when dealing with crowding issues.

Additionally, in 2007, Pons and Laroche provided further evidence to support the relationship between culture and perceived crowdedness. Findings showed that consumers may analyse and react to crowded situations differently depending on their cultural origin. Moreover, research indicates the central role of expectations in crowd assessment.

Kim et al. (2010) provided further insight into the effects of cultural differences (between China and America) in the perception of crowding, and customer attribution within a restaurant environment. Such research proposed a model encapsulating the relationship between human and spatial crowdedness, perceived crowdedness, and customer attributions (Figure 5). Such research indicates cultural differences on three types of crowdedness and affective evaluation. Firstly, Chinese customers were more likely to judge crowdedness by spatial factors, for example the arrangement of tables in a restaurant. Conversely, American customers tended to judge crowdedness on human factors such as the number of people in a given area. Results support the argument for the overall heightened perception to crowdedness in Western over Eastern cultures. Moreover, Chinese customers were more likely to

attribute crowdedness to higher quality food and service in a restaurant environment, than their American counterparts. American customers viewed crowdedness as representing a lower quality of food and reputation, in line with previous research (Kim and Park, 2007; Forsythe, Kim, & Peter. 1999).
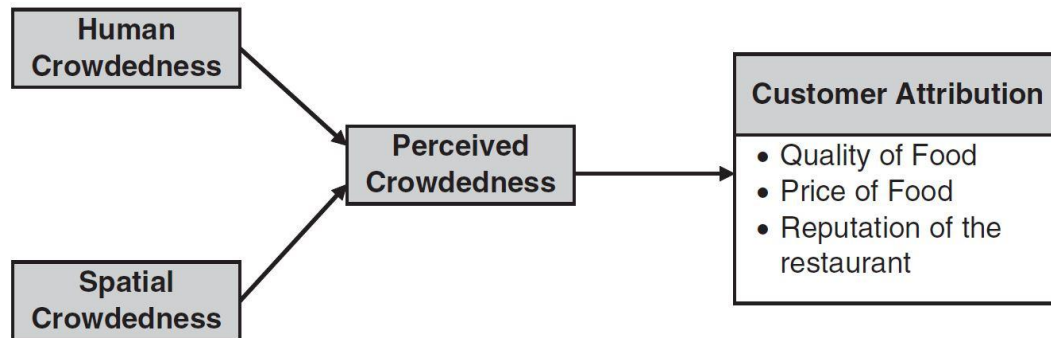
Figure 5 Effect of perceived crowdedness on consumer attributions (taken from: Kim et al., 2010)

2.4 Crowd satisfaction

Satisfaction has been described as:

'*an emotional response to experiences'* (Del Bosque & Martin, 2008)

As well as:

"the summary psychological state resulting when emotion surrounding disconfirmed expectations is coupled with the consumers' prior feelings about the consumption experience" (Oliver, 1981, p.27)

In 1994 Anderson described overall satisfaction as:

"an overall evaluation based on the total purchase and consumption experience with a good or service over time" (Anderson et al. 1994, p.54)

With Spreng et al. (1996), suggesting that overall satisfaction has two key elements including attribute satisfaction and information satisfaction. Attribute satisfaction being:

> *"the consumer's subjective satisfaction judgement resulting from observations of attribute performance"* (Spreng et al. (1996, p.17)

While information satisfaction is described as a:

> *"..subjective satisfaction judgement of the information used in choosing a product"* (Spreng et al. (1996, p.18)

The above definitions were presented as most relevant to the aims of the research within this thesis. Previous research has analysed the satisfaction of French ice hockey spectators, with particular interest in the contribution of sporting event service attributes to spectator satisfaction (Bodet & Bernache-Assollant, 2009). During which satisfaction was measured using a questionnaire design. Satisfaction has also been measured using a Likert scale design (Taplin, 2013), as well as measuring overall in comparisons to user expectations (Crompton & Love, 1995).

The measurement of satisfaction is prominent within marketing, tourism and management literature, as satisfied users are viewed as loyal visitors to an event, whereas dissatisfied visitors are unlikely to return to an event in the future (Taplin, 2013). The study of tourist satisfaction is a critical issue not only for academics, but for event organisers, with life satisfaction related to the individual's satisfaction with health, work, family, and leisure (Del Bosque & Martin, 2008). Moreover, satisfaction with tourist experiences contributes significantly to life satisfaction (Neal et al., 1999), which is one of the central concepts of individual well-being (Del Bosque & Martin, 2008). Therefore if satisfaction is an antecedent of loyalty, establishing methods of enhancing satisfaction should in turn increase consumer loyalty to the event. Research within this thesis will explore factors that influence the satisfaction of crowd users within crowd events of various descriptions. Such information can be applied to enhance the satisfaction of crowd users.

2.4.1 Satisfaction in festival events

Festival satisfaction is a rapidly growing area of research due to the potential positive economic impact of festivals for all stakeholders, with the benefits they provide (Yoon et al., 2010). Festival events are a rapidly growing industry, with the past decade seeing enormous growth in terms of their number, variety, and popularity (Yoon et al. 2010; Gursoy et al., 2004; Thrane, 2002; Crompton & McKay,

1997; Getz, 1991, 1997). Growth in the number of festivals held in the UK, and around the world over the past few years emphasises the economic interest in the area. However, academic research (particularly within the area of human factors), has yet to match the sudden growth.

Considerable research surrounds the economic impacts of festivals (Thrane, 2002; Formica & Murrmann, 1998), the public's motivations in attending festivals (Lee et al., 2008; Yoon et al., 2010; Nicholson & Pearce, 2001; Crompton & McKay, 1997; 1998), and perceived value post-visitation (Yoon et al., 2010). With a fast developing research focus within consumer behaviour, marketing and increasing the economic benefits for stakeholders. As well as the emergence of 'event tourism' developed in the tourism industry and research community a few decades ago, with more recent developments within 'event management' (Getz, 2008). However, limited research considers crowd user satisfaction and how the comfort, satisfaction, performance and experience of the event can be enhanced for the user. Research within this thesis will therefore explore the issues further to gain a more holistic understanding of the crowd experience.

2.4.1.1 Crowd user loyalty

The term 'festivalscape' has been defined as '*the general atmosphere experienced by festival patrons'* (Lee et al., 2007). Lee et al (2007) suggested seven issues that have the potential to impact consumer satisfaction: programme content, staff service, facilities, food, souvenirs, convenience, and information availability. Research indentified a number of issues including three key issues (programme content, facilities, and food) that act as precursors of festival satisfaction. Such issues were researched further to determine how to improve visitor loyalty with festival events (Yoon et al., 2010).

Research conducted during the Punggi Ginseng festival in South Korea focused on the loyalty of consumers to return to an event in the future. Using a total of 444 questionnaires, based on a seven point likert scale design measuring satisfaction (1 = strongly disagree, 4 = neutral, and 7 = strongly agree), Yoon et al. (2010) considered festival quality, value, satisfaction and loyalty. Quality dimensions comprised, informational services, programme, souvenirs, food, and facilities, with all except 'informational services', positively related to festival value. Moreover, as

festival value was considered a starting point in affecting loyalty via satisfaction: programme, souvenirs, food, and facilities are considered major contributors to festival loyalty. Food and souvenirs were also found to impact festival value and thus loyalty. As well as the facilities available within the festival, supporting previous research (Lee et al., 2007). Facilities including parking, rest areas, and toilets are prominent in visitor complaints, and the research indicates that increasing the number of facilities available, and also the availability of trained personnel, and regular cleaning, improves quality and performance, and thus consumer satisfaction. Additionally, findings indicate that the festival programme is the dominant factor in establishing the ultimate festival value, and subsequent user satisfaction. However, the findings that food and souvenirs are of value to crowd user loyalty is of particular interest to the research within this thesis.

Yoon et al. (2010) suggest that through understanding post-visitation festival experience, organisers can efficiently and effectively create a more appealing event. Such findings will aid repeat visitation; increase understanding of the quality dimensions geared to the target market; monitor value and satisfaction to revise the marketing mix accordingly and; consequently increase repeat visitation or loyalty. However, the research is limited in the focus on one festival event (the Punggi Ginseng festival in South Korea), and therefore generalising the findings is problematic. The research focuses on marketing and management issues within festival organisation, and does not consider the user issues to understand satisfaction.

2.5   Crowd health and safety

Issues surrounding the health and safety of a crowd have considerable weighting within the literature. Firstly information surrounding crowd disasters will be presented, followed by an evaluation of drug and alcohol abuse within crowd situations. The presence of slips, trips and falls within crowd situations will then be discussed.

2.5.1 Crowd disasters

In his report on the Hillsborough Disaster, Lord Justice Taylor stated that in the context of events, '*safety transcends all other issues*' (Home Office, 2006). Moreover, the potential loss of life when crowd disasters occur and the mass media

attention for such disasters has contributed to the predominance of crowd safety, over crowd experience research.

Every year around the world a number of crowd disasters occur, with some of the largest including:

- Roskilde – Denmark (rock concert) in 2000: 9 fatalities and 26 people injured
- Hillsborough - UK (football) in 1989: 96 fatalities
- Mecca - Saudi Arabia (religious gathering) in 1990: 1426 fatalities
- Ikea - Saudi Arabia (shopping) in 2004: 3 fatalities

With most recent disasters including:

- Pukkelpop festival - Belgium (music festival) 2011: 3 fatalities when a stadium collapsed due to poor weather, mud, high winds
- Love Parade – German (music festival) 2010: 21 fatalities, 500 injuries

Other UK wide crowd disasters include:

- Kings Cross underground fire (1987): 31 fatalities
- Bradford City football stadium fire (1985): 56 fatalities, 265 injuries.

Such mass disasters and large-scale fatalities have resulted in a reactive approach to the improvement of crowd safety within events of various descriptions, with alterations introduced after the accidents have occurred. Moreover, considerable focus has been applied to the development of crowd safety guidance documents, for the planning of crowd events (The Green Guide, 2008; The Purple Guide HSE, 1999). Additionally, the behaviour of the crowd can exacerbate other incidents leading to greater loss of life, for example crowd crushes during evacuation from a fire within an event. Consequently, most guidance focuses of the safety of the crowd, as opposed to the crowd experience (comfort, safety, satisfaction and performance). For example the socio-technical systems approach to crowd disasters (Challenger & Clegg, 2011), framework and underlying principles to help understand crowd-related disasters.

2.5.2 Slips, trips and falls (STF)

The Health and Safety at Work Act (1974) states that employers must ensure their employees and anyone else who could be affected by their work (such as visitors, members of the public, patients for example), are kept safe from harm and that their

health is not affected. Also many other hazards have to be considered to ensure crowd users and other stakeholders do not slip, trip or fall (STF) within a crowd situation. A number of reported STF hazards within crowd situations are highlighted within Table 4. Between the years 2010-11 a total of 68 people were reported to slip on a wet surface within a number of crowd situations (libraries, museums, sports activities and entertainment activities). While a total of 24 people tripped over an uneven surface (Table 4). However, figures within Table 4 should be viewed with caution as non-fatal injuries are often underreported to the HSE, and therefore the real number of STF within crowd situations is likely to be considerably higher. The figures in Table 4 provide a breakdown of the different STF injuries that are prominent within crowd situations, however the figures are extremely low and show limitations in underreporting as so few injuries are serious enough to get reported.

Table 4 Slips trips and falls reported within crowd situations from 2010-11 (taken frrom: HSE, 2011)

		Libraries, archives, museums and other cultural activities	Sports activities and amusement and recreation activities	Creative, arts and entertainme nt activities	Total
Slips, trips and falls on the same level	Slipped on wet surface (water and other liquids) or other substance (grease, oil, food)	12	52	4	68
	Slipped on dry surface (ceramic tiles, polished floors, smooth surface) or dry products/item on the surface	6	18	0	24
	Tripped over obstruction (furniture, small items, work materials, boxes, waste)	14	25	2	41
	Tripped over uneven floor surface (cavity, channel, drain, manhole)	8	16	0	24
	Slipped, tripped or fell on the same level in another way not specified above. (Include lost footing on kerb stone/steps or on raised thresholds)	12	61	5	78
	Slipped, tripped or fell on the same level - unknown way	1	12	0	13
Total number of injuries		53	182	11	193

Research indicates higher levels of falls with older adults compared to younger adults, particularly with regard to falls on escalators, where older adults are twice as likely to fall (Howland et al., 2012). Previous research involving the analysis of 194 escalator-related falls at Taipei Metro Rapid Transit stations found that accidents on escalators were predominantly due to distraction, loss of balance, and not holding handrails while riding (Chi et al., 2005). Additionally, Howland et al., (2012) found that increased use of large passenger carry baggage within airports might contribute to accidents on escalators, due in part to the narrow steps seen on escalators, with users placing luggage on the step above or below the one on which they are riding. Such issues could be important within other transportation hubs, including train stations. Moreover, research within the USA suggests that older adults (over 75 years) have greater escalator-fall rates than those 65–74 years within the USA specifically (O'Neill, 1991). Due in part to the reduced balance and strength with increasing age (Howland et al., 2012). Therefore STF are a key issue for consideration during the planning of crowd situations, with particular reference to older crowd users.

2.5.3 Drugs and alcohol

Research has identified the negative effect of alcohol on human mood, mental acuity and physical dexterity (Wertheimer, 2000). Wertheimer (2000) therefore suggested that alcohol should be banned from crowd events to reduce the associated anti-social behaviour within the crowd. Moreover, the Sporting Events Control of Alcohol Act (1985) in the United Kingdom supports the advantage of banning alcohol from railway stations due to the risk to passenger and staff safety. However, the act also showed the impractical reality of implementing such a measure. In 2002 Gonzalez-Palacio showed the levels of health and safety incidents that occur on Network Rail trains and stations as a result of alcohol. Railway Safety records indicate an average of:

- 7.0 events per year are attributed to passenger falls or injuries when boarding a moving train under the influence of alcohol
- 11.6 events per year are due to passenger falls from the platform and being struck by a train when under the influence of alcohol
- 28.5 events per year are due to passenger falls from platform onto track (no train present) under the influence of alcohol

Such figures suggest potential benefits to passenger health and safety through banning alcohol in train stations and on carriages (Gonzalez-Palacio, 2002).

However figures again appear to be surprisingly low due to the underreporting of such incidents and injuries.

2.6 Crowd security

During the 1980s a number of violent riots in the Netherlands led to a new approach to crowd policing focusing on crowd 'management' techniques, instead of crowd 'control' tactics. Crowd management techniques were intended to illicit a more proactive role of the authorities when monitoring crowd behaviour (Adang, 2002; Sime, 1999). Crowd management has been described as the method of facilitating the safe movement and presence of crowd users in specific areas where a short-term event is going to take place, for example sporting and music events, or transportation hubs (airports, train and underground stations). One example being the sale of tickets and ticket collection, seating, car parking, noise control, communications within the crowd situation (Marana et al., 1998; Berlonghi, 1995). On the other hand crowd 'control' describes situations where people *'start an unwanted behaviour or have got out of control'.* Such behaviours frequently require urgent measures in order to restore the normal order. Crowd management is therefore more a proactive description, while crowd control is a reactive approach to the maintenance of crowd behaviour (Marana et al., 1998; Berlonghi, 1995). Research surrounding public and private security has fed into the application of academic research into security training programmes, recommending crowd management techniques be adopted over reactive crowd control techniques.

In 1995 Berlonghi highlighted a number of issues that affect the mood of the crowd, one of which being the police and security:

> *'use of excessive or unreasonable force, altercations, or arguments with spectators, provocations, and abuse of authority..'*

However, relatively little research assesses the relationship between the police and private security, and the impact that can have on crowd mood, and crowd behaviour. Within event security and crowd management substantial research has focused on public order policing (Stott et al., 2012) and hooliganism prevention (Stott et al., 2008). Yet the relationship between crowd satisfaction and resultant crowd behaviour, and antisocial behaviour is relatively underdeveloped (Challenger & Clegg, 2011). Moreover, the relationship between public and private security when

managing crowd behaviour, and the impact this relationship has on crowd user satisfaction have received limited attention (Challenger & Clegg, 2011). As well as the development of evidence based practices for the police and security (Hoggett & Stott, 2012). With a distinct lack of attention to the relationship between the police and private security (Ryan et al., 2010).

2.7   Guidance documents for planning crowd events

Considerable guidance is currently available concerning the planning and organisation of crowd events, focusing primarily on health and safety within crowd events. Guidance includes national legislation from the Health and Safety Executive concerning crowd safety specifically (The Green Guide, 2008; Home Office, 2006, HSE, 2000), industry specific guidance (Rail Safety and Standards Board, 2003) as well as local authority guidance (North West Leicestershire District Council, 2010; The Green Guide, 2008; The Purple Guide HSE, 1999). However, guidance is increasingly encompassing the welfare of the crowd also (Challenger et al., 2010, 2010b; Rowe and Ancliffe, 2008, The Purple Guide HSE, 1999). Though little research is evidence based, taking a largely practical perspective, and falling into the category of '*grey literature'* within industry (discussed further below).

2.7.1 Health, safety and wellbeing guidance

The HSE (2012a) provide free information online surrounding the '*Guidance on running crowd events'*, providing links to additional HSE resources (HSE, 2000; The Green Guide, 2008). One of the resources being Literature produced by the good practice safety guide for small and sporting events taking place on the highway, roads, and public areas (Home Office, 2006). The document was developed by the Home Office in 2006 to be used in conjunction with other guidance available in the field. The HSE crowd management website also reveals clear issues for consideration by various stakeholders involved in event organisation (event organisers, venue owners, and volunteers for example). However, guidance is from a predominantly health and safety background, with less emphasis on the welfare and satisfaction of the crowd.

Guidance documents include generic crowd event guidance, as well as more event specific information. For example, The Purple Guide HSE (1999) focuses on the

health safety and welfare of crowd users within music and similar events. Whereas, The Green Guide (2008) focuses on event safety at sporting grounds specifically. Such guidance provides specialised information to meet the requirements of the different crowd event types. However, guidance can be criticised as it lacks usability, with large documents that would take large amounts of time for stakeholders to read and become familiar with. Moreover, there is no clear indicator to determine what information has been covered within the event planning.

2.7.2 Grey literature

Guidance documents currently available for planning and organising crowd events include: The Green Guide (2008) (for sports stadium); Purple guide (music events); Cabinet office (Challenger et al. 2010); local authority guidance (North West Leicestershire District Council). As well as crowd event guidance produced for the rail industry specifically (Rail Safety and Standards Board, 2003). Guidance documents appear to have a safety focus, with less attention given to the wellbeing of the crowd, particularly with regard to the comfort and satisfaction of crowd users. The HSE website has information and guidance for planning crowd events (HSE, 2012). However the model can be criticised as it is not evidence based, and therefore exploratory research is required to determine whether such information is being used within crowd event planning by stakeholders.

Aside from the health and safety guidance available, considerable 'grey literature' is available focusing on specific guidance for specific crowd situations, and often produced by local authorities and event organisers. However the information is not always evidence based, or presented systematically. Other relevant guidance includes Transport for London's guidance for pedestrian comfort (Transport for London, 2010) with information that could be applied to events organisation. The guide appears more usable than crowd event documentation, showing clear and simple steps (with accompanying images) for assessing the comfort levels of various pedestrian flows. However, the accessibility of such guidance to crowd event stakeholders is somewhat unclear.

2.8   Monitoring crowd density

A number of different methods have been developed for monitoring crowd capacity and pedestrian flow (The Purple Guide HSE, 1999; HSE, 2000), including:

- Electronic counting systems
- Hand counters
- Turnstiles
- Computer systems with sensors
- CCTV
- Fixed cameras
- Personnel 'on the ground'

Monitoring the crowd allows organisers to detect problem areas to enhance the early detection of crowd problems and assess the effectiveness of crowd control procedures that are already in place, the effects of the built environment on crowd user movement, and the development of long-term actions for maintaining crowd safety (The Purple Guide HSE, 1999; HSE, 2000). However, such methods appear to focus on the safety of crowd users, with limited consideration of user comfort within different crowd situations, and densities.

Monitoring crowd density and the capacity of a venue are important issues across crowd situations. A number of techniques have been developed to assess the density of the crowd environment (Marana et al., 1998; Sheng-Fuu et al., 2001; Ihaddadene & Djeraba, 2008; Liqin et al., 2009). Texture analysis for example, was developed to explore the automatic estimation of crowds (Marana et al., 1998), using images of areas with different crowd densities to show different texture patterns. Such methods are advantageous when estimating the density of an area containing few crowd users (Davies et al., 1995). However larger densities of crowds do not appear to show as distinguished texture, resulting in impaired density estimations. One method that has seen successful application within the transportation industry has been the crowd density management chart (RSSB, 2004). However the extent to which the technique is applied by stakeholders in practice is unclear.

The use of CCTV for monitoring crowd events to detect problem areas, and potential situations within the crowd was introduced following the Hillsborough disaster of 1989, and is still heavily used according to the literature (RSSB, 2004). Considerable research has been carried out within the transportation industry, developing integrated approaches to managing crowd behaviour, one example being the crowd density management chart developed by the Rail Safety and Standards Board (RSSB, 2004). The chart shows four clear levels of increasing density, with each level describing easily identifiable features within a crowd, in

order to determine the density of the crowd environment. From level one indicating '*all body visible: no crowd issues'*, through to level four indicating '*only head visible: crowding unacceptable'* (Figure 6). This involves real-time monitoring of crowds, with the main aim being for train station operators to predict changes in crowd conditions from behaviours and densities displayed throughout the train station for example.

The crowd density management chart is used extensively within the transportation industry, where CCTV monitoring is the predominant method of monitoring crowd behaviour. However, effective use of the chart requires additional training in order to identify potential problem areas within a crowd, as well as abnormal behaviours that could lead to crowding issues within the crowd. Identifying such issues can prevent negative outcomes such as bottlenecks, and pedestrian injuries. The literature indicates that crowd experience research within the transportation industry is more advanced than other crowd situations (music and sporting for example) in implementing crowd density monitoring techniques. Thus research should aim to expand the considerations and increasing importance placed on crowd comfort and satisfaction within the transportation industry, to other crowd situations.

Research into the monitoring of crowd users within a crowd situation gives rise to a number of criticisms, including how stakeholders determine a safe number of crowd users within a given area. Following that, how do organisers and deliverers of crowd events prevent a sudden rush into one area of an event? Future research could therefore focus on improving the systems used to monitor crowd capacities within crowd events, with the aim of preventing bottlenecks, and discomfort for crowd users. Research in this thesis will seek to determine the methods currently used by stakeholders to monitor crowd density, as well as how effective stakeholders consider these methods.
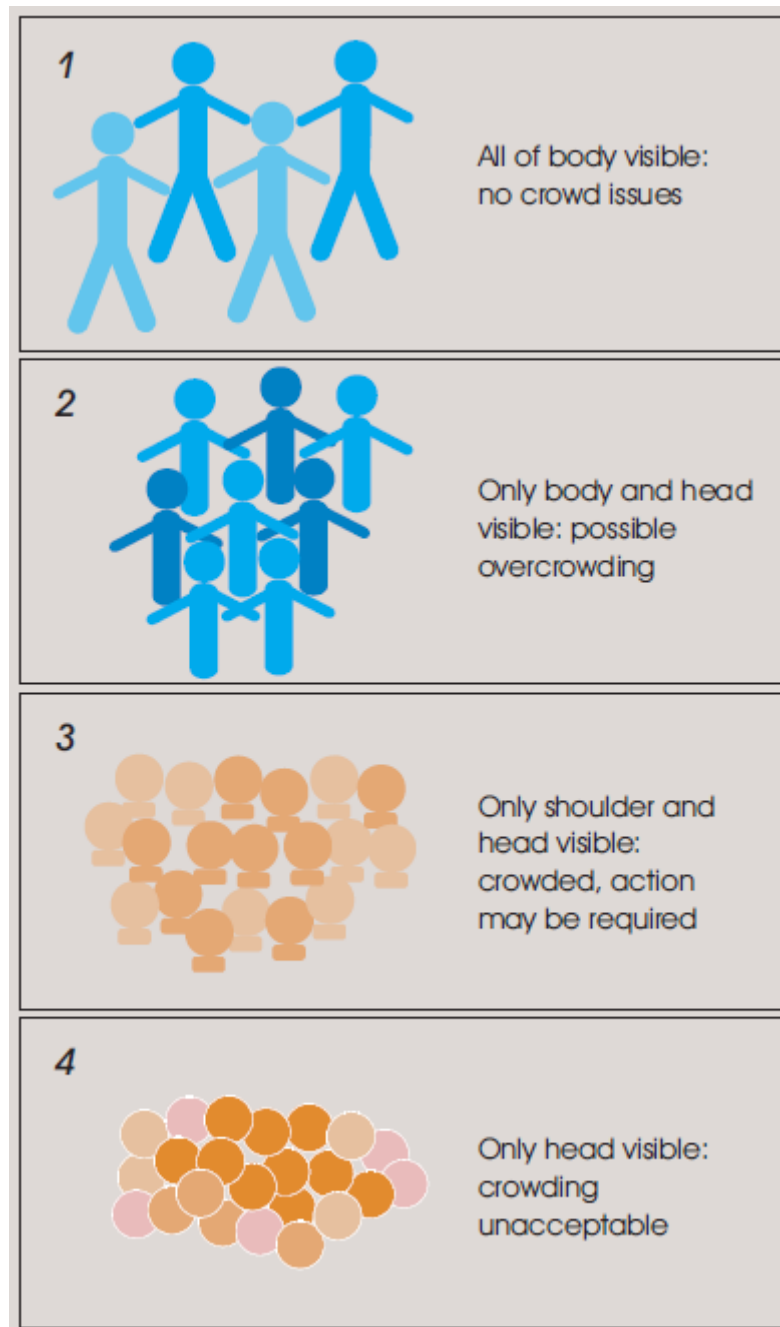
Figure 6 Crowd density management chart (Rail Safety and Standards Board, 2004)

2.8.1 Crowd simulation technologies

As well as the use of CCTV methods that require stakeholders to use their own judgement to determine the level of density, more sophisticated technologies have been employed, including pedestrian flow modelling software. However, to what extent the software provide more accurate assessments of crowd density and safety are unclear. According to The Purple Guide HSE (1999):

'*crowd modelling is the process by which the specification of the crowd movement system can be defined and used to inform or test the design and operation of any venue, facility or event, for example circulation paths, concourses, stairs and escalators, emergency exits and entry gates*'.

Extensive research considers Crowd Modelling and Simulation Technologies, across different crowd situations (Borrmann, Kneidl, Köster, Ruzika, & Thiemann, 2012; Gotoh, Harada, & Andoh, 2012; Parisi, Gilman, & Moldovan, 2009; Seyfried, Steffen, & Lippert, 2006; A. Smith et al., 2009; Zhang, Liu, Wu, & Zhao, 2007)). However, the extent to which such methods are applied during the organisation of crowd events and crowd situations remains unclear.

Monitoring crowd capacity and the use of pedestrian flow modelling software (Zhou et al., 2010), suggests:

"*For the modelling of pedestrian dynamics we treat persons as self-driven objects moving in a continuous space. On the basis of a modified social force model we qualitatively analyse the influence of various approaches for the interaction between the pedestrians on the resulting velocity–density relation.*." (Seyfried et al., 2006; Smith et al., 2009)

Substantial attention has been given to pedestrian flow modelling within the literature (Seyfried et al., 2006; Smith et al., 2009; Parisi et al., 2009; Qiu & Hu, 2010). As seen during a critical review of pedestrian behaviour models (Papadimitriou et al., 2009) indicate that advances in pedestrian modelling software over recent years (primarily multi-agent simulation systems) were based on artificial intelligence concepts, within which:

'*Pedestrians are treated as fully autonomous entities with cognitive and often learning capabilities*'.

Such findings also support research into crowd safety, stressing the importance of the layout of facilities within an event, and the contribution towards crowd disasters, when '*clusters of people becom(ing) trapped*' (Sime, 1999), as a result of poor layout of facilities and subsequent bottlenecks.

Pedestrian Flow Modelling software is used substantially within the transportation industry (Wang et al., 2013; Papadimitriou et al., 2009; Velastin et al., 2006). The Social Force Model (SFM) by Parisi et al., (2009) for example suggests the differing flow of various crowd users, including older users, young children, and disabled users during panic situations, showing that different crowd users move differently despite each experiencing panic during a crowd emergency situation. However additional attention is required to determine individual differences in tolerance for crowd situations, and the implementation of individual differences into pedestrian flow modelling software, as research appears to provide limited attention to the issue to date.

2.9 Wayfinding

Wayfinding is described as: '*the process used to orient and navigate'* (Lynch, 1999), with signage and wayfinding involved in ensuring crowd users locate correct areas of an event. The issue marks an important aspect of crowd organisation that might contribute towards crowd satisfaction and the user experience of crowds. Research suggests that wayfinding and signage are not considered sufficiently during the design process (Dogu & Erkip, 2000; Sime, 1999). As a result crowd venues may have insufficient signage to enable wayfinding of all crowd users, and remedial signage could be too expensive for events with a small budget. In 2000, Dogu & Erkip found that signage systems were insufficient when analysing wayfinding behaviours in a shopping mall in Turkey. Better signage solutions were required to enable users to locate specific shops or facilities for example. Such research suggests that current signage is insufficient to enable crowd users to find their way. Moreover, integrating academic research into the organisation of crowd events is important in order to employ the tactics that are known to improve wayfinding (O'Neill, 1991).

Research also shows that as floor plan complexity increases, wayfinding decreases (O'Neill, 1991). Wayfinding difficulties are associated with frustration on the user, and negative appreciation of the physical setting, as well as the cooperation itself and the services offered in that setting (Sime, 1999; Passini et al. 1996). Thus, stakeholders would benefit from investing time and resources to improving wayfinding, in order to enhance user satisfaction at their event. Research suggests that wayfinding should be addressed through architectural design, as well as interior

design and sign systems (Sime, 1999; Passini et al., 1996). The ability to navigate a venue is described in the literature as 'legibility' by Lynch (1992). Thus crowd event organisers must aim to provide additional cues that ensure crowd users find their way, and reduce frustrations experienced. Lynch {1992} suggested that a venue with lower legibility will require greater attention to wayfinding strategies in order to provide an event venue that is usable and satisfying for the crowd user. The legibility of key architectural elements within a venue (for example the entrances) cannot be altered, but there are other aspects of an event that could be altered to improve user wayfinding. Such findings stress the importance of ensuring that wayfinding is considered during venue design stages, in order to maximise wayfinding for crowd users. Research with this thesis will aim to involve designers and architects to gain in-depth insights into the current situation.

Research from the transportation industry highlights inappropriate, ineffective as well as excessive information have many consequences for pedestrian flow within crowds. Dixon (2002) suggested that ineffective signage and customer information can contribute towards crowd congestion, such as bottlenecks of passengers while standing to read inappropriately positioned information. Also people moving against the flow of traffic to retrace their steps, and re-confirm directional information. Furthermore, information can impair crowds during already established periods of congestion, and passengers are unable to find exit route information and therefore unable to make suitable or quick decisions about appropriate routes to take (Dixon, 2002). Such delays can cause increased frustrations within crowd situations.

2.10 Theories of crowd behaviour

The Social Identity Theory established by Le Bon (Le Bon, 1968, 1982; Nye, 1975) suggests humans may adopt uncharacteristically aggressive behaviours within a crowd environment. However such insight provides a somewhat outdated view, and is increasingly being replaced in recent years by Crowd Science and theories such as the Elaborated Social Identity Model (ESIM) and the 'Procedural Justice Theory' (PJT). Such theories suggest that the crowd will only show aggressive behaviours due to individual crowd users within the crowd behaving aggressively. Aggressive behaviours are therefore not believed to be due to the alteration of individual behaviour when the individual becomes part of a crowd, as previously suggested by Allport (1962):

"The individual in the crowd behaves just as he would behave alone, only more so" (Allport, 1962)

A number of theories of crowd behaviour have been proposed: the Elaborated Social Identity Model of Crowd Behaviour (ESIM) and its self-fulfilling prophecy (Reicher, 2004; Reicher, 2007); and the Procedural Justice Theory (PJT) (Jackson et al., 2012) will be discussed in more detail.

The ESIM concerns the police use of force, perceived legitimacy and consequential 'self-regulation' in crowds. Similarly, the PJT focuses on the idea of 'normative compliance', suggesting that people will conform to the law because they perceive a moral, ethical and ideological obligation to do so (Stott et al., 2011; Jackson et al., 2012; Hough et al., 2010). The PJT suggests that when public and private security forces use discretionary force that is considered 'fair', antisocial behaviour can be reduced (Stott et al., 2012, Hough et al., 2010; Jackson et al., 2012; Sunshine & Tyler, 2003). One reason behind this is that people will confer 'legitimacy' on the police, and are more inclined to 'trust' the authorities and to 'self-regulate'. 'Self-regulation' concerns issues such as crowd users obeying the police and complying with the law.

The ESIM and self-fulfilling prophecy suggest that an informed understanding of crowd psychology can be used to enhance policing methods that focus on promoting reconciliation rather than conflict. (Reicher et al., 2007). Reicher et al., (2007) suggests that if the police believe that all crowd members are potentially dangerous then they will:

a) treat all crowd members in the same way, creating unity between the crowd, against the police

b) react to violence displayed by few crowd members by imposing restraints on all crowd members, increasing the likelihood of uniting the crowd in opposition to the police

c) increase the influence of those advocating conflict in the crowd, undermining self-policing amongst crowd members

The ESIM has been implemented into public order policing through research into 'keeping the peace' (Rosander & Guva, 2012; Stott et al., 2012). Moreover the introduction of 'knowledge based public order policing' and the psychology of crowd

behaviour demonstrate the application of theories of crowd behaviour into the progression of public order policing (Reicher et al., 2007). Research within this thesis will reflect on the extent to which academic research has been applied within public and private crowd security. Also insight into public and private security regarding the issue of crowd behaviour, and the presence of antisocial behaviour within crowd situations.

2.11 Models of crowd behaviour

A number of models have been developed to explain crowd behaviour and safety including: the FIST (force, information, space and time) model of crowd safety; the systems integration perspective; and the sociotechnical systems perspective. Each of which will be discussed further below.

2.11.1   The Force, Information, Space and Time model

The FIST model (Force, Information, Space and Time) shows the crowd user in relation to their environment, and was developed to provide an understanding of the causes of crowd disasters, as a means of prevention and possible mitigation of an on-going crowd incident (Fruin, 1993) (Figure 7). The FIST model (Fruin, 1993), considers the issues of force, information, space, and time. 'Force' considers the pushing behaviour of crowd users and the force with which crowd user's impact during high density crowd situations, with the majority of crowd deaths caused by compressive asphyxia opposed to trampling (Fruin, 1993). Secondly 'information', referring to communication within and between crowd users and other stakeholders (including staff) within a crowd event. Also, 'space' involving the flow of pedestrians, including bottlenecks, obstructions to the path, and the layout of the event itself. Finally, 'time' and the differences in crowd numbers and flow of pedestrians at different times of the day, or points in time during an event, including ingress and egress. Fruins (1993) simple model aims to help stakeholders consider the issues that impact the crowd, and provides a diagram that can be applied easily into practice crowd event organisation by various stakeholders (Figure 7). However the model can be criticised as it may oversimplify the complex issues surrounding safety within crowd events. Therefore other more complex models of crowd safety have been developed (Rasmussen, 1997).

INFORMATION
- static/dynamic/audible
- comm/PA/rumours/
- sights & sounds
- personnel actions

pushing

impact of surges

domino effect

flow paths

FORCE

entry/exit

traffic management
e.g. 1-way system

access routes   weather

bottlenecks

circulation routes

SPACE

standing & seating areas

obstructions

temporary structures

maintenance

location of facilities/retail

configuration, capacity & traffic processing capability

projected occupancy

practical working capacity of each area

TIME
variations over time

arrival/departure pattern (trains & people)

effect of other transport facilities

effect of delays

Consider how to manage the FIST elements

Consider the effect of the crowd management strategy on FIST

Figure 7 The FIST Model of the crowd in relation to their environment (Fruin, 1993)

2.11.2   Systems integration perspective

In 2008, Rowe and Ancliffe developed guidance involving an integrated approach to designing for crowds, using the principles of systems integration. Rowe and Ancliffe (2008) suggested that a number of factors were not taken sufficiently into account during the design phase of the crowd development process of a crowd event or event venue. Guidance from Rowe and Ancliffe (2008) was based on a socio-technical system model, used to describe a total system of a crowd situation (for

example a railway station), and the issues to consider within each aspect of the systems integration process. Through adopting a systems approach, Rowe and Ancliffe (2008) suggest that designers traditionally concentrate on the environment section of the system integration model (Figure 8) (the building for example) and technology (signage for example) elements of the model. Whereas the operators involved in the crowd situation itself tend to be involved with the 'process' and 'people' elements of the model. Therefore discrepancies between the designers and the operators can contribute to difficulties for crowd users. Rowe and Ancliffe (2008) therefore stress the importance of considering each of the four aspects (technology, people, process, and environment) of the systems integration diagram, during the planning of crowd events, viewing the model '*as one integrated whole'* through a systems integration process. Thus, for the design of a crowd situation or crowd event to work well, all the elements of the total system must integrate effectively.

Guidance has focused on specific crowd situations (music and sporting events for example) individually (The Green Guide, 2008; The Purple Guide HSE, 1999). However, research from Rowe and Ancliffe (2008) developed a best practice guide that might indicate the extent to which a guidance document could be adapted to encompass a number of different crowd situations effectively (Rowe & Ancliffe, 2008). Such guidance focuses on crowd situations within transportation hubs, but might be applied to other crowd situations; with suggested applications to concert venues, and sporting stadia.

Technology

lifts, escalators, PA, CCTV, alarms, signage, telephones, radio, information systems, mimics, control panels...

People

behaviour (individual, group and organisation), anthropometrics, volume, gender, age, speed, impairments, language, culture, role (eg parent), mental workload, human reliability...

Process

crowd management/control marshalling, monitoring, security, evacuation, incident handling, safety, emergencies, communication, signalling, working reference manual, training...

Environment

building, space, heating, lighting, humidity, air quality, surfaces, reverberation, obstructions, floor surfaces, steps/ramps, water, power, ventilation, layout...

System integration

Figure 8 System integration diagram (taken from: Rowe and Ancliffe, 2008)

Building on the Rowe and Ancliffes (2008) work recent research has adopted a socio-technical systems perspective to explain crowd behaviour (Challenger & Clegg, 2011a; Clegg, 2000; Davis et al., 2013).

2.11.3   Socio-technical systems perspective

A number of models of crowd behaviour have been proposed, including most recently the socio-technical systems model (Davis et al., 2013) to evaluate the management of crowd events. Davies et al. (2013) developed a framework for socio-technical systems analysis that was then applied to the analysis of crowds, from a safety viewpoint. The model aims to provide a '*structured and systematic way of analysing a variety of complex systems, problems, and events'* (Davies et al. 2013). Designed predictive use before the event the model is used to determine possible problems and areas for improvement, as well as after the event to evaluate and understand what happened.

The suggestion is made that *'any complex organisational system can be represented in the form of a hexagon'* (Figure 9). The model indicates six core issues to consider within a crowd event system: goals, people, buildings and infrastructure, technology, culture, and processes and procedures. In order to analyse the crowd disaster, issues within each of the six areas must be considered. However the theoretical model can be criticised as the conclusions do not appear to be evidence based, with an absence of empirical research to support the model. Moreover, the model identifies gaps regarding the issues that influence crowd user experience (comfort, satisfaction, safety and performance), from a welfare perspective as opposed to a safety perspective solely.
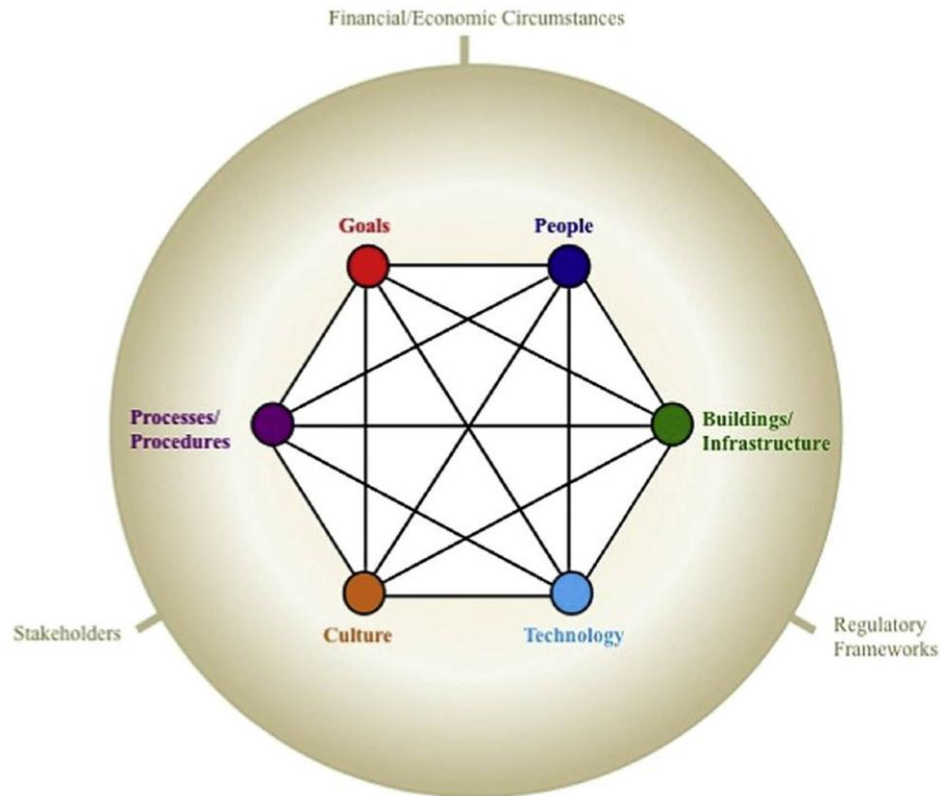
Figure 9 Socio-technical systems thinking (Davies et al. 2013)

The socio-technical systems perspective had previously been used to analyse crowd disasters including the Hillsborough football stadium disaster (1989), (Figure 10). The model highlights contributory factors leading to the disasters, including '*lack of communication with the crowds'* and 'l*ack of coordination across event locations*' (processes), '*lack of leadership'* (people), '*inappropriate layout of event environments'* (buildings), and '*overreliance on technology'* (technology). Each issue was one of a number of the contributory factors leading to the Hillsborough disaster of 1989 (Challenger and Clegg, 2011; Davies et al. 2013). Thus research within this thesis will aim to gain empirical evidence of the issues that impact crowd user experience (comfort, safety, satisfaction and performance) in order to develop evidence based theoretical model. Adopting a holistic view of the issues that influence crowd events and stakeholders involved in crowd organisation.
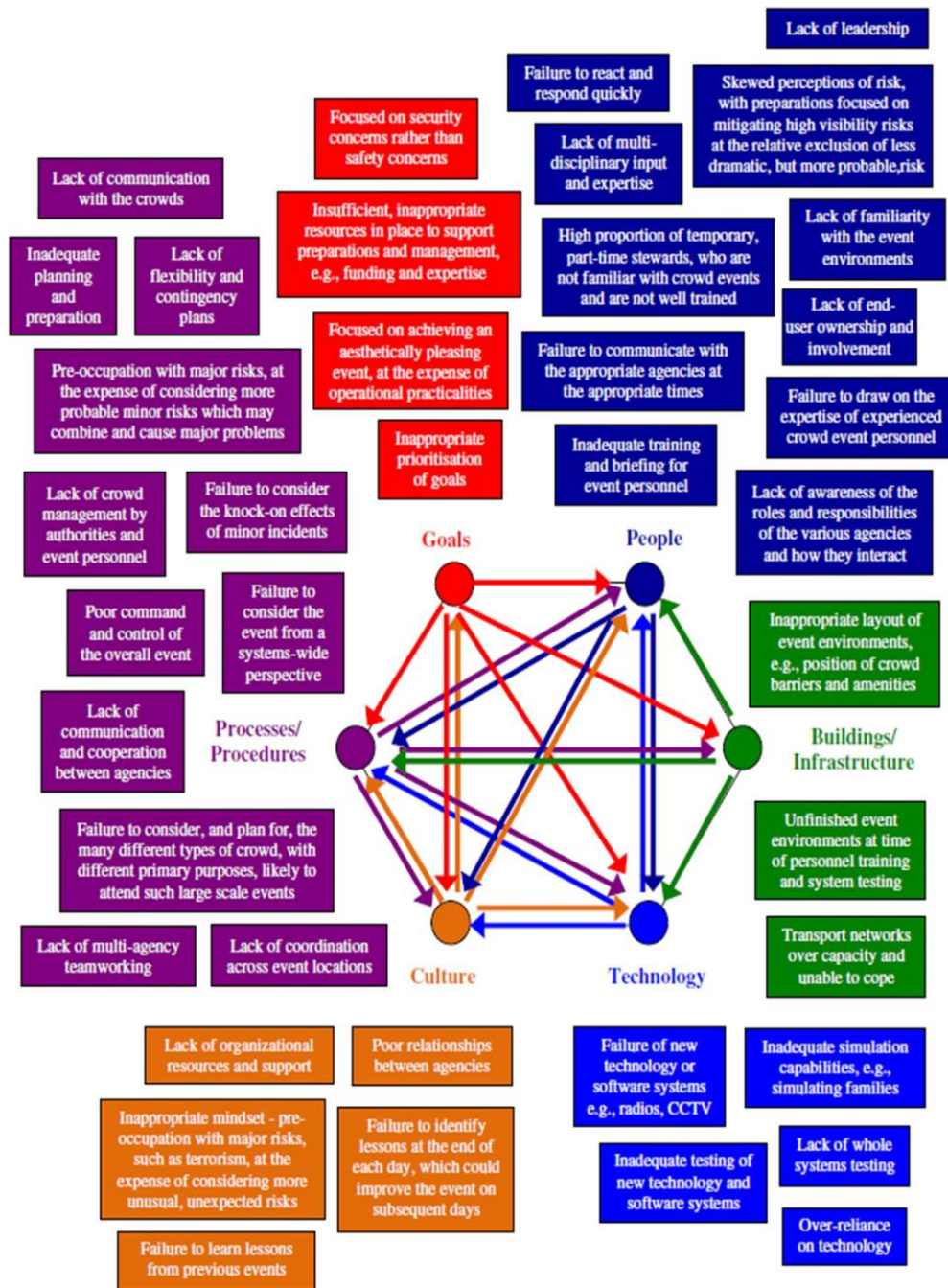
Figure 10 The Hillsborough football stadium disaster from a systems perspective (Challenger and Clegg, 2011; In Davies et al. 2013)

2.12 Event design and crowd user experience

Although previous research suggests difficulties in predicting crowd behaviours due to the irrational and erratic behaviour of individuals in a crowd, research supports the argument that human behaviour is generally motivated by goals (Valach et al., 2002; Lee & Hughes, 2007). Thus, the behaviour of crowd users is often rational and predictable at the collective level. Consequently, further research into factors contributing to overall crowd experience is required, in order to understand the interaction of the variables and how the combination of issues affects crowd user experience. Recent research has developed the area of crowd event design and crowd user experience. Principally the work of Brown and Hutton (2013) in which event design was described as:

> *'The creation, conceptual development and staging of an event using event design principles and techniques to capture and engage the audience with a positive meaningful experience.'* (Brown, 2012)

Clear communication was labelled as central to the positive experience of the user within a crowd event. Brown and Hutton (2013) also identified the influence of issues of user motivations and predispositions, suggesting that:

> *'By understanding the motivations, the behaviours and the predispositions the audience brings to the event, and how event design principles and techniques can be applied to influence audience behaviour in real time, the event designer is able to more successfully create and stage the event experience to meet the aims and objectives of the event'* (Brown and Hutton, 2013).

Brown and Hutton (2013) argue that further research is required in this relatively underdeveloped area to progress understanding surrounding crowd experience (comfort, safety, satisfaction and performance). Brown and Hutton (2013) also suggested that real time data collection will be beneficial in exploring the user experience of crowds, and developing areas of improvements for the design of events and situations. Thus, use of the principles of ethnography to investigate the user experience of crowds will aim to add to and enhance the literature surrounding event design, user experience, and crowd satisfaction, in a relatively underdeveloped field (Methodology).

2.13 Conclusion

A review of the literature showed that research regarding health and safety, as well as pedestrian flow modelling within crowd events appeared more frequently than research focusing on the welfare and enjoyment of crowd users.

Research has focused on understanding the theory of crowds and the prevention of crowd disasters, with substantial guidance documents available including The Green Guide (2008) and The Purple Guise (HSE, 1999). However less attention has focused on the usability of safety guidance, and understanding the importance of wellbeing and enjoyment within a crowd situation. Furthermore, the potential positive impact of crowds on user satisfaction and understanding the relationship between stress and crowd mood remains an underdeveloped topic.

Despite the link between reduced crowding and improved user satisfaction, and the potential improvement on crowd mood has been suggested in the literature, limited research is available on the extent to which these issues are applied during the organisation and planning of crowd events. This supports the importance of furthering knowledge and understanding surrounding crowd user experience (comfort, safety, satisfaction and performance).

Further research, aiming to increase the understanding of factors affecting individual experience and satisfaction within a crowd, and to minimize risks for crowd users is therefore required. Key areas for further research include: defining a crowd, safety issues, the usability of guidance documents, monitoring crowd density, and models of crowd behaviour, each of which will be discussed below.

2.13.1   Defining a crowd

There appeared to be a lack of clear definitions available for different crowd types within the literature. Berlonghi (1995) defined 11 different types of crowd as: ambulatory crowd, disability or limited movement crowd, cohesive or spectator crowd, expressive or revellous crowd, participatory crowd, aggressive or hostile crowd, demonstrator crowd, escaping or trampling crowd, dense or suffocating crowd, rushing or looting crowd, and violent crowd. However further research is required to expand on the definitions. Research within this thesis will therefore use the crowd definitions established by Berlonghi, whilst concentrating on expanding understanding surrounding defining a crowd.

2.13.2 Safety

Research focusing on crowd safety appeared more frequently than crowd user experience and welfare research. The safety of the crowd is paramount due to the potential loss of life when a crowd disaster occurs, and the media attention and emotional impact of crowd disasters, leading to substantial research in the area. However, there is a gap in knowledge concerning factors affecting the wellbeing and enjoyment of the crowd, as well as how to facilitate them in practice.

2.13.3 Guidance

A lack of evidence based guidance for planning crowd events is also apparent, with guidance that does exist mostly in the form of grey literature on the planning of crowd events. Two core guidance documents were The Green Guide (2008) for planning stadium events (primarily sporting events), and The Purple Guide HSE (1999) for planning music events. Other guidance documents included transportation specific wayfinding and pedestrian flow documents and local authority guidance, as well as safety specific documents from the HSE. Knowledge of how guidance documents that crowd stakeholders (event organisers and security officers for example) are using during the planning of crowd events could usefully be improved, as well as the development of more usable and evidence based guidance for stakeholders. Research within this thesis will therefore aim to develop a usable tool to assist the planning of crowd events, focusing on the wellbeing and enjoyment of crowd events.

2.13.4 Pedestrian Flow Modelling

Within the literature there has been a body of research focusing on pedestrian flow modelling software and crowd simulation techniques. However, further research is required to determine the extent to which such tools are applied within crowd event planning and efficacy, as well as the impact on user comfort and satisfaction.

2.13.5 Models of crowd behaviour

To date models of crowd events and crowd behaviour focus on safety issues primarily, with gaps in knowledge and understanding surrounding user experience, wellbeing and enjoyment within crowd situations. There appears to be a lack of a holistic model of crowd behaviour, user experience and crowd event planning. Therefore the research within this thesis will focus on capturing the issues that

impact the user experience of crowds from a human factors perspective, with the aim of developing a summary model of the issues that influence the user experience of crowds. Research will therefore aim to gain in-depth insight from crowd users and event stakeholders, with the aim of providing a summary diagram of the issues that impact crowd user wellbeing, including crowd comfort, safety, satisfaction and performance. The research within this thesis will help develop understanding surrounding the potential link between increased comfort and reduced stress within crowd situations, highlighting an area of benefit for crowd users and other stakeholders within crowd situations.

2.13.6 Final comments

Having reviewed the literature concerning the user experience of crowds (comfort, safety, satisfaction and performance), including defining a crowd, crowd mood, theories of crowd behaviour, guidance used within crowd events, measures of monitoring crowd density, wayfinding, and theories and models of crowd behaviour. The next chapter will discuss the methodologies that were used within this research that will comprise this thesis, before presenting each of the studies conducted throughout the research process.

Chapter 3

3. Methodology

3.1 Summary

This chapter will describe a number of research methods relevant to the aims of the research in this thesis, highlighting the methods selected, and reasons for those selections. Firstly qualitative research methods will be described, along with an assessment of their strengths and limitations. A description of each of the methods that were used within the thesis will be provided (focus groups, interviews, and observations), followed by an outline of a number of alternative research methods that were considered but not used. Finally an explanation of the sampling methods used, and a description of the data analysis conducted within the thesis will be provided.

3.2 Qualitative research

When conducting qualitative research there are a number of inherent strengths and weaknesses which need to be acknowledged (Table 5). Primarily, there is the increased depth and detail obtained in qualitative analysis, allowing for greater insight. Although fewer participants can be involved in the research the findings aim to gain further knowledge and detail surrounding a topic area, rather than quantifying the contribution of specific issues to an outcome.

Qualitative research has been described as:

> *'attempting to understand the unique interactions in a particular situation. The purpose of understanding is not necessarily to predict what might occur, but rather to understand in depth the characteristics of the situation and the meaning brought by participants and what is happening to them at the moment.'* (Patton, 1990)

Qualitative researchers do not attempt to generalise findings to a specific population (which is however an important aim of quantitative research). But instead aim to

understand and interpret what is going on, and can be of use depending on the research aims (Patton, 1990).

Within this thesis qualitative research methods were adopted as they meet a number of core research aims. To date there have been limited theories to explain the user experience of crowds from a satisfaction, comfort and performance perspective specifically, therefore no hypotheses have been advanced put forward to guide the research. Additionally qualitative research methods allowed for the exploration of the research area to find patterns in the form of themes, categories, concepts and typologies that emerged (Guba & Lincoln, 1994). However, as shown by Guba & Lincoln (1994), when utilising qualitative research methods one must acknowledge that the research is:

> *'interested in 'multiple realities' or multiple interpretations and not just one conception of reality or one interpretation.'*

Moreover from a naturalistic perspective one:

> *'must physically go to the people, location, setting or site (or the "field") in order to observe, interview or collect documents (or artefacts). You (the researcher) immerse yourself in the situation and you do not manipulate the situation, but rather watch naturally occurring events and not controlling them'* (Guba & Lincoln, 1994).

Table 5 Qualitative research: strengths and weaknesses (taken from: Guba & Lincoln, 1981)

Strengths of Qualitative Research	Weaknesses of Qualitative Research
• Depth and detail- offers more in-depth detail than a standardised questionnaire	• Fewer people studied usually
	• Less easily generalised as a result
• Openness-can generate new theories and recognize phenomena ignored by most or all previous researchers and literature	• Difficult to aggregate data and make systematic comparisons
	• Dependent upon researcher's personal attributes and skills (though it is also true with quantitative research but not easily detected)
• Helps people see the world view of those studies-*their* categories, rather than imposing categories; simulates their experience of the world	
	• Participation in the setting can change the social situation (although not participating can change the social situation as well)
• Attempts to avoid pre-judgments (although some recent researchers	

Strengths of Qualitative Research	Weaknesses of Qualitative Research
disagree because "we always make judgments, but just don't admit it"; • Judgement is made about the choice of one location or group • The goal is to try to capture what is happening without being judgmental • The research tries to represent subjects from their perspectives so the reader can see their views.	

3.3   Methods within this thesis

Research within this thesis has drawn on the principles of ethnography, focusing on the '*sociology of meaning through close field observation of socio-cultural phenomena*' (Bryman, 2004). It has also deployed aspects of grounded theory, as the '*theory is developed from the data, rather than the other way around*', developing an inductive approach to understanding the crowd experience. The research methodology involved a triangulation approach, including qualitative methods using the principles of ethnography: user focus groups, semi-structured stakeholder interviews, and event observations (complete participant and complete observer). Each of which will now be explained further, followed by an explanation of the alternative methods considered within this thesis.

3.3.1   User focus groups (study 1)

Focus groups were used as a first exploration of the issues that impact the user experience of crowds, to study the user experience of crowds, as they are useful in gathering several views about the same topic, particularly where there is little current knowledge about a subject (Powell & Single, 1996). Moreover, Kitzinger (1996) suggests that focus groups examine what and how people think, why they think in particular ways and their understandings and priorities in a given area. User focus groups developed from previous research that has tended to focus on experimental techniques, which vary considerably with regard to ecological and external validity. Approaches have included: the presentation of photographs (Eroglu & Machleit, 1990; Ozdemir, 2008), video recordings (Smith et al., 2009), or slides (Eroglu & Machleit, 1990; Hui & Bateson, 1991) of different crowd environments, accompanied by written crowd scenarios read to participants in order

to imagine being in the situation under investigation (Pons et al., 2006). Research within this thesis therefore attempted to further investigate the use of photography in analysing crowd experiences, and the compatibility with focus group analysis.

The study used focus groups as a way of gaining in depth insight and knowledge of the experience of being in a crowd. Using focus groups enabled ideas to be discussed as a group, allowing for the follow up of interesting responses, and underlying motives. Focus groups also enabled the collection of detailed information regarding the attitudes, opinions and experiences of crowd users, though still allowing individual participant discretion as to how much information they wished to reveal. In order to elicit personal information concerning individual experience of being in a crowd situation, generating rich and detailed qualitative data (Haslam et al., 2003). Moreover, focus groups have been suggested as a useful starting point within the preliminary stages of research, to identify and conceptualise variables for further analysis using other qualitative methods (Kreuger and Casey, 2000). Research within this thesis therefore used focus groups for the initial exploratory research starting point. Further to that, interviews and observations were used to further investigate the issues that emerged from user focus group data analysis.

3.3.2 Stakeholder interviews (studies 2 and 5)

Interviews were selected as a method to further examine the issues that arose during the analysis of user focus groups, along with other issues that became apparent in the literature and during the interview process. Interviews have been used extensively within qualitative research and research into crowd safety and satisfaction specifically (Drury et al., 2009; Drury & Stott, 2011; Hoggett & Stott, 2010; Hoggett & Stott, 2012; Haslam et al., 2005; Whiting, 2008), offering flexibility in questioning, as well as opportunity to probe for further detail and gain further understanding (Bryman, 2004). However interviews are an expensive approach to implement (as they are time-consuming to conduct and analyse), one key advantage in using interviews is that the technique is familiar to the interviewee, and therefore helps to gain detailed data in response to questioning (Stanton & Young, 1999). Additionally, face-to-face interviews can aid rapport between the interviewer and the interviewee, and encourage the interviewee to provide in-depth honest answers to the questions asked.

Semi-structured interviews were used to allow the interviewer to alter the order of the questions (within the interview schedule) depending on the different stakeholder groups. This also enabled the interviewer to probe further questions when interesting issues arose during the interview. Following a semi-structured interview technique ensures that the questions are flexible to the interviewee, but maintains the consistency and thoroughness of the interview questioning (Stanton & Young, 1999). Questions asked within semi-structured interviews often have a more general frame of reference than seen in structured interviews. This allows the different perspectives and specialisms of the different stakeholders to be covered within each of the interviews. Finally, the researcher had previous experience conducting interviews within human factors fieldwork, enhancing the quality of the interviews conducted (Stanton et al., 2000).

3.3.3 Limitations of interview and focus group data

Interviews and focus groups are important for gaining in-depth information from the crowd users and stakeholders involved in the organisation, security, and planning of crowd events. However, there are a number of limitations that arise from such methodologies. One disadvantage with using interviews to gather data is the self-report data gathered, which can differ with the individual interviewees ability to describe their own experiences. Bryman (2004) identify a number of limitations when using focus groups and interview methods to obtain qualitative data, including:

- Problem of meaning
- Problem of omission
- Problem of memory
- Social desirability
- Question threat
- Interviewer characteristics
- Gap between stated and actual behaviour

'Problem of meaning' suggests that each user and stakeholder might interpret the questions asked differently, for example key terms within the questions might be understood differently across interviewees (Bryman, 2004). Additionally, 'problem of omission' indicates that during interviews and focus groups interviewees might inadvertently omit key words within the question, and therefore answer only part of the question. Such issues require attention from the interviewer, in order to probe

further for the area of the question that has been omitted, to determine perhaps why the question was avoided, or forgotten.

'Problem of memory' suggest that interviewees might not accurately remember behaviours, and may therefore recall inaccurate behaviours of themselves or those around them. One key issue within focus groups and interviews is the potential 'social desirability' of the data obtained from the interviewees. Interviewees might intentionally manipulate their responses in order to sound more socially desirable to the interviewer. Also, when conducting focus groups and interviews various questions can appear threatening, and may discourage interviewees from answering honestly, if at all. Bryman (2004) also suggests that 'interviewer characteristics' might influence the response of the interviewee. Additionally, Bryman (2004) suggests that there is often a 'gap between stated and actual behaviour', such discrepancies might be intentional, or may be due to unrealistic beliefs of the interviewee as to how they might behave given the question asked. Thus, it is important to gain insight through observing the behaviour of users and stakeholders directly, in order to minimise the limitations regarding focus group and interview data. Therefore in order to gain further understanding of crowd event organisation from both the stakeholder perspective and how the user experiences being in a crowd, observational data were considered most appropriate.

3.3.4 Observations (studies 3 and 4)

Within qualitative research observations are used to gather impressions of the surrounding world through all relevant human senses. Observational research methods have been used within human factors research as well as crowd safety and satisfaction research specifically (Biggs et al., 2013; Rosander & Guva, 2012; Melrose et al., 2011; Hoggett & Stott, 2010; Stott et al., 2007).Observations allow behaviour to be observed directly, reducing the potential inaccuracies when participants talk about their behaviour and their thoughts (during interviews and focus groups for example). The data can be recorded either directly by field notes or indirectly using visual and audio equipment, to enhance the accurate collection of data (Gold, 1958).

Observational methods were also used in conjunction with stakeholder interviews, to further examine the issues raised within the initial user focus groups, and other

issues that became apparent during stakeholder interviews. As stakeholder interviews and observational data were analysed iteratively and conducted simultaneously, this allowed for the continuous examination of new issues that arose during the fieldwork. However, there are a number of disadvantages in using observational methods to gather data, firstly observations concentrate on directly observable behaviour and cannot always identify reasons for and the intentions behind particular behaviours (Bryman, 2004; Galton et al. 1980). Also, observations can fail to account for the context in which the observation took place when attempting to understand the behaviours that have been observed (Bryman, 2004; Delamont and Hamilton, 1984). Observational data has a number of limitations particularly when used as the sole method of data collection, however when used in collaboration with other research methods (focus groups and interviews for example), the observational data can support research findings, and reduce the limitations of qualitative data (Bryman, 2004). However, observational data is often time consuming to collect and analyse.

Sinclair (1995) described subjective methods as methods that contain *'any method that draws its data from the psychological contents of people's heads'*. He recommended collecting data with at least two different, independent methods to enhance the validity of the findings. Therefore, focus groups, interviews (stakeholder and feedback), and observations (complete participant and complete observer) were used during this thesis, in line with Sinclairs (1995) recommendation that three subjective methods should be used including: questionnaires, observations, interviews and critical incident techniques.

3.3.5 Using the principles of ethnography

Research within this thesis will adopt observational methods that use the principles of ethnography, within complete observer and complete participant observations. The word 'ethnography', comes from the words '*to write'* about '*people'*, with its roots in anthropometry the methodology was originally developed to study different cultures. Traditionally researchers went into a community for a long period of time, immersed themselves fully in the community, and subsequently wrote about their experience of the culture (Bryman, 2004). However the principles of ethnography now have a more diverse use, across many different research sectors (Webb & Worchel, 1993; Ball & Ormerod, 2000; Sayago & Blat, 2010; Walker et al., 2010), including human factors (Hignett & Wilson, 2004). More recently ethnography has

been used increasingly within Human Factors research within the design and safety of medical device for example (Lang et al., 2013; Sharples et al., 2012; Shah et al., 2009; Martin et al., 2008). The methodology has received considerable attention from the pharmaceutical industry, researching safety and design requirements in medical device for different user groups, and using the principles of ethnography to explore innovative design ideas for future product. However, research using the principles of ethnography to investigate crowd behaviour is less apparent, particularly from a human factors perspective.

The principles of ethnography therefore enabled the researcher to enter a number of different events over a number of months to explore the user experience of crowds, from the crowd user (researcher) perspective. The researcher observed a number of crowd events, experiencing the event as the crowd user. Using the principles of ethnography allowed the researcher to talk to other crowd users within the event, as well as other stakeholders (including security officers on the ground) to gain further information on particular issues within the event. Using the principles of ethnography aimed to gain direct data on the organisation of crowd events from the user perspective, across a number of different crowd types. As the same researcher will conduct each complete participant and complete observer observation, consistency of the data will be maintained. A number of complete observer observations will also be conducted within public and private security, to observe different crowd events from the security perspective, observing the crowd from a different perspective. However, ethnography has a number of cognitive biases, and was therefore used in conjunction with other qualitative methods (including focus groups and interviews).

3.4 Alternative methodologies

Alternative methodologies that were considered for assessing the user experience of crowds (safety, comfort, satisfaction and performance), including questionnaires, diary studies, photographic documentation, smart phone applications (Global Positioning System), a number of physiological responses and Hierarchical Task Analysis (HTA), each of which will be discussed further.

3.4.1 Questionnaires

An alternative research approach could have been to use questionnaires to assess the user perspective within crowd events, as questionnaires offer large amounts of data from large samples, relatively inexpensively (Wilson & Corlett, 2005). However questionnaires would not have allowed for the in-depth insights gained through interviews and event observations. Event observations allowed for a large number of events to be observed over a large time period, with data analysed iteratively before the subsequent observations were conducted. Questionnaires would not have allowed for the continuous iterative analysis of data, as quantitative questionnaire data must be analysed on completion of all data gathering. Furthermore, as relatively limited literature is available concerning the human factors perspectives of crowd user experience, event observations allowed for an exploratory approach to the user experience of crowds. However, questionnaires might have allowed for the perspectives of different user groups during a crowd event (older users, adolescents, parents of young children for example). Instead focus groups were used as an initial starting point to gain insight into a number of crowd user groups. While event observations were used subsequently to gather data over a wide spread of different crowd event types.

3.4.2 Diary studies

Diary studies would have been a beneficial method for documenting the behaviour of crowd event stakeholders (event organisers, security officers, and ground stewards for example) over a number of weeks before an event to highlight the consideration given to different issues during the organisation and planning of an event. However, achieving buy-in from an appropriate number of event stakeholders might have been difficult, as proceeding an event stakeholders are often extremely busy. Moreover, diaries were not seen as the most appropriate methodology as they would have involved participants completing a diary entry at points throughout an event which may not have been practical for all stakeholders. Also, from a crowd user perspective had crowd users been involved in diary studies it would have been financially costly to arrange for a sufficient number of users to attend a number of different events and complete diary entries during the event. Therefore diary studies were not chosen for the research within this thesis.

3.4.3 Photograph documentation

Photographic documentation of crowd situations involves the positioning of cameras in specific locations across a crowd situation, for example at different locations within a train station. Still images are then taken at intervals throughout the data gathering period, before being analysed to assess the crowd behaviour, pedestrian flow, and the layout of the venue for example. Recent research used photographic evidence to assess and document crowding levels on the Half Dome cable route within Yosemite National Park (Pettebone et al, 2013). The method involved using repeat photography on 13 randomly selected days over a 3 month period, with 20 minutes in-between each shot, capturing a total of 21 photographs per day, and 266 photographs in total. Methods within this thesis also used photographic and video data to capture the crowd user experience during crowd events (using the principles of ethnography). However, the methods used by Pettebone et al (2013) would not have been appropriate to meet the research aims within this thesis. Using cameras across fixed locations within a crowd event could be used to determine specific issues surrounding crowd user behaviour, and the interaction with the layout of the event. Moreover, such methods would be advantageous for the assessment of issues such as the effectiveness of specific signage strategies within an event. However, in order to gain more in-depth detail into the contribution of signage, layout and wayfinding (for example) upon the user experience, event observations were thought to gather greater detail over a wider range of user issues.

3.4.4 Mobile ethnographic approach

The mobile ethnographic approach involves the use of smart phone technology, and applications to gain data from users. The methodology has been used to investigate audience behaviour and motivation at festivals, aiming to gain data on crowd user behaviour and movement within events. One example being the use of Global Positioning System (GPS) technology, used to explore user experience within a crowd event (Glass et al., 2007). Research involved recording the real time movement of the crowd, whilst at the same time asking crowd users to record their experience within the crowd situation and the intensity of their experience through a smart phone application (Brown, 2010). The application contained a Likert scale, text, vision and voice recordings, as well as a GPS tracing system to monitor the movement of the individual crowd user [as seen during the MyServiceFellow (2012) for example]. However GPS technology was not deemed appropriate to meet the aims of the research within this thesis as using smart phone applications would not

gather the depth of information required for this exploratory research. The area is likely to see increasing use with the growing availability and use of smart phones.

3.4.5 Physiological responses

Alternative methods of assessing crowd experience have looked at arousal levels, and the physiological response of the body within crowd situations, using galvanic skin responses, respiration and heart rate measurements. Such methods aimed to determine how event design can affect crowd user behaviour within different crowd situations (Duncan, 2009). Physiological responses were reported and logged using GPS tracking and bio-medical data collection, with the aim of improving the risk analysis and management of events. Data were compared against real-time data surrounding the number of adverse health and safety incidents within each event; to identify the exact location and environmental conditions experienced (Hutton et al., 2011). Moreover, Brown and Hutton (2013) suggested that real-time data collection from audiences can be more beneficial than theoretical analysis of the crowd experience in providing insights into the effective design and management of planned events. However, measurements of the physiological response of the body to different crowd situations was not considered the most appropriate method to meet the aims of this research, as there are a number of limitations to the method. Physiological responses of the body shows the body's reaction to a situation, but in order to determine how a user feels within a given environment (their level of comfort) requires verbal communication and qualitative measurements. Physiological thresholds might indicate that a user is experiencing stress or discomfort, but without asking the user how they believe they feel the measurement may not be providing useful information to meet the aims of this research.

3.4.6 Hierarchical Task Analysis (HTA)

Hierarchical Task Analysis (HTA) is a general framework for examining tasks and providing a method of modelling behaviour, receiving considerable support and practical application (Kirwan & Ainsworth, 1992). Within the method a 'task' refers to the human behaviour and the system goals for which people are employed (Shepherd, 1998). The method was developed in the 1960s and is now a widely used human factors tool, within areas such as error analysis for example (Annett & Duncan, 1967). HTA is a:

> *'strategy for examining tasks, aimed at refining performance criteria, focusing on constituent skills, understanding task contexts and generating useful hypotheses for overcoming performance problems'* (Shepherd, 1998).

The method is another alternative that could have been used to assess the user experience of crowds, *'breaking down the task under analysis into a hierarchy of goals, operations and plans'* (Stanton & Young, 1999).

Although HTA provides rapid execution, and can easily be applied to different research areas, there are a number of disadvantages that led to the use of alternative methods within this thesis instead. Firstly, little research has focused on crowd wellbeing (comfort and satisfaction) and therefore the research within this thesis was exploratory in nature. HTA might be more useful when assessing one specific type of crowd, or crowd situation, or for establishing details of the layout of an event, and possible design solutions for improving the design of a specific event.

HTA is useful in gaining insight into increasingly complex systems, and would therefore be useful in monitoring the effective output of the complex human system seen within a crowd (Shepherd, 1998). The method offers further detail to the analysis of a task and would therefore provide beneficial research following from the research within this thesis, in order to assess the user experience of crowds and monitor aspects of a crowd that contribute to the positive and negative experiences of the user in more detail. However, within the scope of this thesis, the aim was to explore the user experience of crowds in order to gain information on the issues that impact the user, and issues that stakeholders consider during the planning of crowd events. As there is a limited scope of research currently available in the area, more exploratory research methods were selected (focus groups, interviews, and observations).

3.5   Reliability and validity

Qualitative research methods have received negative attention from some researchers concerned about the rigour of the approaches, and therefore further consideration must be given to enhancing the reliability and validity of the research (Long & Johnson, 2000). Focus groups, interviews and observations have been suggested to yield low reliability and validity (Stanton & Young, 1999; Stanton,

2004). However a number of measures were taken whilst conducting the research within this thesis to improve the reliability and validity of the data gathered.

Reliability within research (often referred to as 'dependability' within qualitative research) has been described as:

> *'The consistency of a measure of a concept'*
>
> (Bryman, 2004)

> *'The consistency or stability of a measure, such as the degree to which a method will perform the same on separate occasions, for the same person (intra-analyst reliability) and for different people (inter-analyst reliability)'*
>
> (Stanton & Young, 1999)

Validity within research (often referred to as 'credibility' within qualitative research) has been described as:

> *'Validity refers to the issue of whether an indicator (or set of indicators) that is devised to gauge a concept really measures that concept'*
>
> (Bryman, 2004)

> *'The accuracy of a measure to measure what it is supposed to measure'*
>
> (Stanton & Young, 1999)

A number of measures were taken within the data collection for this thesis to enhance both the reliability and validity of the data collected and the methods used, including peer reviewing, consistent use of the same research, analysis of the data by two researchers, triangulation of data, and sample data saturation (each of which will be discussed further below).

3.5.1 Peer reviewing

One method used to improve the rigour of the data collected during this thesis was to gain peer reviews of the work (Robson, 1993; Long & Johnson, 2000). Robson (1993) suggest that presenting research findings within peer review settings encourages the researcher to continually search for new perspectives on the issues

raised. Therefore, during the collection and analysis of data within this thesis the findings were presented at a number of national and international peer reviewed conferences, adding different insights to the research (see Publications).

3.5.2 Consistent researcher

The same interviewer was used throughout each of the interviews within this thesis to enhance the consistency of the questioning between different focus groups and interviews. As well as the consistency of field notes recorded during event observations. This also improved the rigour of the data collected.

3.5.3 Analysis of the data by two researchers

The researcher leading the data collection was also responsible for coding and analysing the data. This meant that the researcher was close to the data, and analysed the data iteratively, keeping thorough annotations on the transcripts as and when new and interesting issues became apparent. However, a second researcher also reviewed the coding of the transcripts from focus groups, interviews, and observational filed notes, to enhance the reliability of the data. Review of the coding structure by a second researcher aimed to reduce bias that the primary researcher might bring to the analysis of the data.

3.5.4 Triangulation

Triangulation is a process of collecting data using a number of research methods (focus groups, interviews and event observations for example) to develop the overall findings, through considering different methods of assessing the same research aims (Long & Johnson, 2000). The aim of triangulation was therefore to reduce the disadvantages within each of the individual methodologies, and improve the rigour of the data collection, therefore increasing confidence in the resultant conclusions drawn from the data.

3.6   Data collection

The aim of qualitative research is not to obtain a representative sample via random selection (as in quantitative sampling) but to seek information from specific groups and sub-groups within a population (Hancock, 1998).

3.6.1 Purposive sampling (non-probability sampling)

Purposive sampling is a form of non-probability sampling, focusing on the strategic sampling of individuals, places and events with certain research goals in mind (Bryman, 2004). Unlike probability sampling (such as random sampling) that focuses on obtaining a representative sample of participants in order to generalise the sample to the population; purposive sampling seeks to involve individuals who are most appropriate for the research aims (Bryman, 2004). Moreover, probability sampling was not used, as it would have been difficult to map a population from which to develop a random sample (Bryman, 2004).

Patton (1990) argues that:

> *'The logic and power of purposive sampling lies in selecting information-rich cases for study in depth'* (Patton, 1990).

However, due to the non-probability nature of purposive sampling, findings cannot be generalised across a population.

3.6.2 Theoretical sampling

Theoretical sampling is a form of purposive sampling involving the iterative thematic analysis of interview transcripts to determine the required sample to be interviewed, in an on-going process. Glaser & Strauss (1967) suggests that:

> *'Theoretical sampling is done in order to discover categories and their properties and to suggest the interrelationships into theory. Statistical sampling is done to obtain accurate evidence on distributions of people among categories to be used in the descriptions and verifications'* (Glaser & Strauss, 1967 – page 62)

In ethnographic research it is not just the variety of people, who are sampled, but also the places and contexts (Bryman, 2004). There must be sufficient variety in the sample of individuals involved in the research, sampled in a strategic way to ensure those individuals sampled are relevant to the research questions (Bryman, 2004). Strauss and Corbin (1998), define theoretical sampling as:

> *'Data gathering driven by concepts derived from the evolving theory and based on the concept of "making comparisons", whose purpose is to go to places, people, or events that will maximise opportunities to discover variations among concepts and to densify categories in terms of their properties and dimensions'* (Strauss & Corbin, 1998 - page 201).

Within grounded theory, theoretical sampling involves sampling in terms of what is relevant to, and meaningful for the theory under establishment, the sample is developed to test emerging theoretical ideas (grounded theory). Sampling of individuals is systematic, a wide range of relevant individuals are contacted to allow sufficient attention for each issue of interest within the research question to be investigated (Bryman, 2004).

3.6.3 Data saturation

The method of establishing the sample size was determined by data saturation. Data saturation aims to stop sampling new participants (focus groups, interviews, and events observations) once no new issues become apparent within the data, aiming to improve the rigour of the data. Guest et al., (2006) describe reaching data saturation as, the point in the data when new information produces little or no change in the codebook (Guest et al., 2006). Therefore when no new information is being gathered from the sample, recruitment ceases.

3.6.3.1   Theoretical saturation (sample size)

Within theoretical sampling sample size is based on theoretical saturation of the data (Bryman, 2004). Interview transcripts are therefore analysed iteratively, with saturation determined by the requirement for revision of the codes during thematic data analysis (Bryman, 2004 - page 462). Recruitment ceases once it becomes apparent that no novel material and insights are emerging from the data following thematic interview data analysis. Further support for using data saturation as a means to establish sample size comes from Morse (1995), suggesting that "saturation is the key to excellent qualitative work," yet also suggest that 'there are no publicised guidelines or tests of adequacy for estimating the sample size required to reach saturation' (Guest et al., 2006).

The scope of the research aims impact the sample size, with a narrow scope (see Development of the Crowd Satisfaction Assessment Tool Chapter 8) often requiring a smaller sample size to reach '*data saturation'* (Bryman, 2004). While research with a wider scope, and more comparisons to be made (sStakeholder interviews Chapter 5) requiring a larger sample size to reach 'data saturation' (Bryman, 2004).

Theoretical saturation is reached when successive interviews and observations form the basis for the creation of a theme, as well as confirming its importance. At that point there is no need to continue with data collection in relation to that particular theme. Moreover, Straus and Corbin (1998) suggest that theoretical saturation is reached when: a) novel themes no longer emerge from interview data analysis; b) themes that have emerged from data analysis are well developed; and c) relationships between themes within the data are well-established and validated (Bryman, 2004 – page 416).

In 2006, Guest et al., conducted analysis of data gained from previous research looking into health care in Africa. Research reviewed the codes from 60 of the interviews to determine at which point in the interview process the data became saturated. Findings indicated that data saturation was reached when just 12 interviews had been conducted, at which point no new themes were emerging from the data, and each theme had been validated by supporting interviews. Such research proposes that once saturation is reached (at whatever sample size that might be), any additional sampling is redundant, with time and resources unnecessary. However, contradictory research suggests that data saturation cannot be reached until 20-30 (Warren, 2002 - page 99); or even anything less than 60 transcripts (Gerson & Horowitz, 2002 - page 223) have been thematically analysed.

3.7   Ethical approval

The research described in this thesis complied with the requirements of the Loughborough University Ethical Advisory Committee. All participants were provided information about the study and informed consent was obtained. During all event observations an information sheet was carried with the researcher, to inform crowd users and other stakeholders of the study being conducted should they ask (Appendix G).

3.8 Conclusions

This chapter described a number of research methods relevant to the aims of the research in this thesis: focus groups, interviews, and observational data collection, (along with other methods that were considered but not selected for data collection within this thesis). The following chapters will discuss the five studies conducted using the methods described in this chapter, beginning with user focus groups for the initial exploration of the user experience of crowds.

Chapter 4

4. User focus groups investigating experiences across diverse crowd situations

4.1 Summary

This chapter describes the findings from focus groups conducted with crowd users to obtain information on the personal experiences of groups of individuals across different crowd situations. User focus groups considered different crowd situations including: retail environments, religious events, transportation environments, tourism crowds and spectator events. Human factors considerations of user safety, performance, comfort and satisfaction, for different types of crowd involvement and different groups of users were considered. Photographs were presented to focus groups in order to elicit discussion surrounding how individuals might feel within such crowd environments.

The findings inform our understanding of how users experience crowd situations, and factors that impact the user experience of crowds. Issues including: design and organisation, stress, safety and security, motivation, mood, environmental factors, movement, goal prevention, preconceptions, behaviour, avoidance, space available, distractions, control, encumbrances, company, atmosphere, individual factors, communication.

Research within this chapter aimed to contribute towards a holistic understanding of the user experience of crowds, as well as identifying generic aspects and factors that are situation specific. This study aimed to contribute towards an environmental framework encapsulating the user experience of crowds. Insight into factors affecting crowd experience, as revealed in this study, are relevant to individual crowd members and those responsible for generating gatherings. Performance, satisfaction and wellbeing in such situations should be a concern for those involved and the organisers, managers and promoters of crowd gatherings. Achieving a positive, high-quality crowd experience for both is desirable to the overall success of a crowd. Moreover, increased knowledge of crowd behaviour could ultimately reduce injuries and fatalities encountered at mass gatherings. A more systemic

approach to understanding crowds should contribute to the avoidance of such incidents. Future research will explore findings further (using interviews and observations approaches), aiming to develop a more complete model of the factors contributing to crowd experience, their interaction and relative importance.

4.1.1 Background

As outlined within the literature review substantial research has been undertaken concerning specific factors affecting the crowd experience including: satisfaction, performance, personality, prior expectations and experiences, gender and cultural tolerance. Studies have considered a range of different crowd types including: sporting events, retail environments, religious pilgrimages, restaurants and music festivals. However, these investigations have tended to be uni-dimensional, focusing on single variables or particular crowd situations. The absence of research examining the combined contribution of factors to the overall crowd experience represents a gap in our knowledge. This chapter therefore considers the factors affecting crowd satisfaction of different groups of individuals, across diverse crowd situations.

The research is looking at the relationship between two factors: different groups of individuals, and different crowd situations, to understand the similarities and differences between factors affecting each group. Previous research has yet to utilise focus groups in the study of crowd behaviour, and the relationship between density and satisfaction. Focus groups will therefore help gain in-depth understanding of the reasoning behind individual and collective crowd behaviours, and emotions within a crowd, further knowledge into the relationship between density and satisfaction (Langford & McDonagh, 2003). Further justification for the methodology can be found in methodology section (Methodology chapter).

4.1.2 An overview of the research process

This chapter describes phase one of the research process, the outline of the thesis highlights where the study fits into the rest of the thesis (Figure 11).
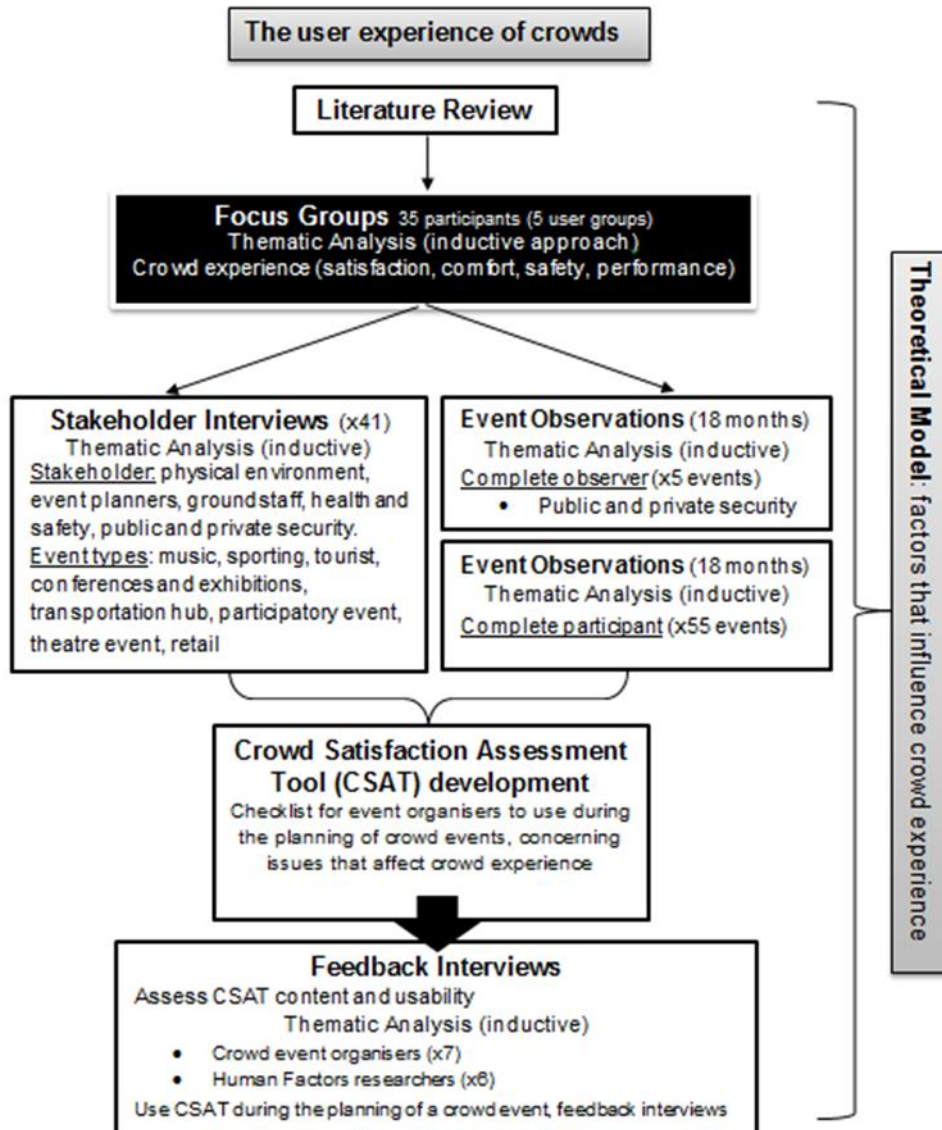
Figure 11 Outline of the research process

4.1.3 Aims and objectives

The aims of the study presented in this chapter were to:

1. Identify factors affecting individual and collective satisfaction across diverse crowd situations.

2. Establish issues affecting the safety, satisfaction, and performance of different groups of individuals within a given crowd situation.

3. Determine generic issues affecting individual satisfaction within a crowd, and factors that are situation specific.

In order to explore the above aims, crowd users from the different user groups were recruited and observed. The focus group schedule was based on findings from the literature review (Chapter 2). Issues were observed and recorded within each interview to assess the factors that are considered to influence the user experience of crowds (comfort, satisfaction, safety and performance).

4.2 Methodology

4.2.1 Design

Focus groups were selected as the most appropriate method to meet the aims of this study, as a way of gaining in depth insight and knowledge of the experience of being in a crowd. Using focus groups enabled ideas to be discussed as a group, allowing for the follow up of interesting responses, and underlying motives. Focus groups also allowed the collection of detailed information regarding the attitudes, opinions and experiences of crowd users, though still allowing individual participant discretion as to how much information they wish to reveal. In order to elicit personal information concerning individual experience of being in a crowd situation, generating rich and detailed qualitative data (Haslam et al., 2003).

4.2.2 Sampling

Sampling was on a structured convenience basis, with participants from the chosen sample groups most likely to be able to provide useful insights into the problem under investigation (Patton, 2002). Five different user groups were determined based on the potential user requirements within crowd situations.

Rationale for the selection of the five crowd situations (retail, transport, religious, tourism, and spectator) was based on the literature surrounding crowds. Considerable research has focused on issues within retail (Grewal et al., 2009; Eroglu et al., 2005a; Eroglu et al., 2005b), transport (Kim et al., 2013; Mohd et al., 2012), religious (Ghaznawi, 2007; Ahmed et al., 2006), tourism (Wang et al., 2013; Gursoy et al., 2004), and spectator (Bouchet et al., 2011; Melrose et al., 2011) crowd situations. Crowd situations were also selected to incorporate the following crowd types defined by Berlonghi (1995): ambulatory (walking), spectator (watching an activity or event), expressive (emotional release, shouting and chanting),

participatory (involved in actual activity or event), and limited movement (restricted movement) within the crowd situations.

Each focus group consisted of between six and eight individuals, with the same facilitator conducting each digitally recorded focus group (lasting approximately 90 minutes). Participants in this study were recruited using a range of methods, over a period of three months. Emails were distributed to each of the five target focus groups: students at University, international students at University, young professionals (25-35 years), parents of primary school children, healthy adults (35-65 years), and older adults (over 65 years).

The five user groups were selected to represent individuals from across society, accounting for a wide range of different age groups, personality types, dynamics, and socioeconomic status. University educated individuals and non-university educated individuals were recruited to account for differing educational backgrounds. Recruitment was predominantly taken from individuals residing in Leicestershire and surrounding areas.

4.2.3 Procedure

A schedule was devised for the focus groups, and piloted with an initial group, and subsequently modified to form the final schedule (Morgan, 1997; Appendix A). Topics were provided by the researcher who acted as 'facilitator' for the groups discussions, ensuring all topics were covered, and encouraging all participants to share and discuss their own personal experiences with the group (Haslam et al., 2003). Having agreed to participate, participants were briefed verbally about the nature of the research and supplied with written information, additionally written informed consent was obtained from all participants (Appendix B). Participants were informed of their right to withdraw from the research at any point.

Prior to attending the focus group, each participant was asked to consider an example of when they have been in a crowd and had a good experience, and why they feel that might have been, and an example of when they have been in a crowd and not had a positive experience, and why that might have been? Experiences were then shared between the groups at the beginning of the focus group, in order to instigate thoughts surrounding being in a crowd, acting as an initial icebreaker.

Focus groups used photographs of different crowd situations (Appendix C for an example of photos used), to target and prompt discussions within the groups (Appendix A for facilitator prompt sheet, part of the focus group schedule). Crowd situations were based on the literature and included:

- Retail
- Religious
- Spectator
- Tourism
- Transport

Photographs were clustered into the five different crowd situations (with three photographs for each), and printed in colour, onto A4 paper for each participant. The selection of photographs were agreed between two researchers (prior to the focus group), and aimed to represent the diverse crowd situations under investigation. The presentation order of the crowd types was different for each focus group to prevent any order effects between the focus groups. Participants then systematically discussed each photograph, considering issues that they believed would affect their satisfaction within such a crowd situation. Such an approach permits respondents to comment on issues from their own perspective, within a group.

4.2.4 Analysis

The qualitative analysis of the focus group data was conducted following hybrid thematic analysis of Braun and Clarke (2006) (Chapter 3). Focus groups were recorded digitally (once permission was gained from participants) and subsequently transcribed verbatim. Data were then analysed using Nvivo 9.0 software to explore, code and analyse data systematically (Hignett & Wilson, 2004). Preliminary analysis involved reading through the scripts to familiarise and determine recurrent themes, identifying key emergent themes.

Development of qualitative analysis involved hybrid thematic analysis of focus group data, with data driven codes developed, and the identification of emergent overarching themes in line with the original objectives of the study (Bryman, 2004b). Braun and Clarke (2006) describe six stages of conducting thematic analysis of a transcript:

1. Becoming familiar with the data.
2. Generating initial codes.

3.   Searching for themes.

4.   Reviewing themes.

5.   Defining and naming themes.

6.   Producing the report.

Data were analysed on a sentence by sentence basis, to ensure all issues were reviewed, and descriptive codes developed to highlight the issues reported. During the course of analysis, the codes were reviewed and revised as key categories emerged from the data. Key themes and alterations were then identified, with Braun and Clarke (2006) describing:

> *'A theme captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set.'*

Texts were often coded within more than one theme, and reliability was enhanced through the systematic review of the data by two independent researchers.

4.3   Results

4.3.1 Descriptive statistics

A total of 35 participants were involved (Table 6). The age of participants ranged from 21-71 years (mean 39.5 years; standard deviation 17.0 years), with 15 males and 20 females.

Table 6 User focus group data

Focus Groups	Number of participants	Age range (lowest - highest)	Mean Age	Standard Deviation
International students	6	22-27	25.0	1.7
Young professionals	8	25-34	27.1	3.2
Parents of young children	6	21-32	27.3	3.9
Healthy adults	8	40-55	47.3	4.3
Older adults	7	65-71	67.7	2.4
TOTAL	35	21-71	39.5	17.0

Findings in Table 6 identifies differences in the number of references made to issues during focus groups. Table 2 reveals differences between crowd user groups when discussing crowd satisfaction (Table 7). Findings are displayed in order of the number of references made to the issues raised during each of the five focus groups. Those issues discussed most frequently are presented first, through to those less frequently mentioned issues. Focus group data were coded and analysed to assess the differences between the different user groups (international students, young professionals, parents of young children, healthy adults, and older adults); as well as differences discussed with regard to the different crowd situations (retail, religious, spectator, tourism, and transportation). This showed limited differences in the issues discussed across the user groups, and fewer differences between the crowd situations. Therefore presentation of findings will focus on the issues raised across the user groups.

Table 7 Issues that influence crowd user satisfaction (frequency of reference during focus groups)

	Total Number of References	Focus Groups (Number of References)				
		International students	Young professionals	Parents of young children	Healthy adults	Older adults
Design and organisation (sectioned areas, clear exit routes, seating, pedestrian flow system, view, toilet facilities)	157	23	24	38	40	32
Motivation (incentive to remain in the crowd, shared or enjoyable purpose, time constraints, financial motivation)	134	25	30	21	32	25
Stress (anxiety, frustration, vulnerability, intimidation and claustrophobia)	116	16	22	22	33	21
Safety and Security (protection, slips, trips and fall hazards, trampling risk, violence)	104	17	17	24	29	17
Mood (manners, boredom, hostility, excitement, anticipation)	75	13	20	16	15	10
Environmental factors (weather, heat, vision, noise, pollution, odours)	74	16	13	19	21	5
Movement (ability to move to required destination, disorientation, fear of losing people)	54	10	9	17	14	7
Goal prevention (conflicting goals, prevention of goal achievement, competition between crowd member)	64	13	10	14	17	10
Preconceptions (prior experience and expectations, cultural norms, stereotypes)	46	8	5	6	10	17
Behaviour (inappropriate, antisocial, pushing behaviours)	44	7	7	13	14	4
Avoidance (of a crowd, or unavoidable experience of a crowd)	37	10	7	10	6	6
Space available (personal space)	32	8	6	5	7	6
Distraction (unfamiliar surroundings, factors that distract from the crowd situation)	32	4	6	8	7	7
Control (feelings of uncontrollability, confusion)	23	6	0	2	4	11
Encumbrances (manoeuvring trolleys, wheelchairs, push chairs, strollers, large bags, suitcases)	21	3	4	6	4	4
Company (accompaniment of friends, or feeling lonely in a crowd)	20	9	11	0	0	0
Atmosphere (positive and negative ambience)	19	4	4	3	5	3
Individual factors (physical height, age)	18	3	0	6	4	5
Communication (information availability and language barriers)	10	3	0	3	0	2

4.3.2 Crowd user groups

Results will now be outlined for crowd user groups (international students, young professionals, parents of primary school children, healthy adults, and older adults). Table 7 indicates the number of references made to the issues affecting crowd satisfaction across crowd user groups. Each issue will be discussed systematically, in order of frequency of reference, with the most prominent discussed first. Similarities and differences between the five individual groups will be shown. Firstly, similarities between issues affecting crowd satisfaction across individual groups, followed by indication of the differences in factors affecting crowd satisfaction across individual groups.

4.3.3 Overall findings

A number of issues were revealed as important to crowd satisfaction across each of the crowd user groups, including goal prevention, stress and anxiety caused when crowds prevent individuals from achieving their goals, and being able to find the way (movement) when in a crowd environment. Moreover, all crowd user groups discussed the desire to avoid crowded situations if the purpose of the crowd was not essential and could be avoided. Additionally the lack of space available within a crowded environment, and the importance of clear communication were expressed by all groups as being important to crowd satisfaction. Crowds were also seen to enhance satisfaction levels across crowd user groups, in terms of adding a positive atmosphere to certain events. Distractions such as new surroundings were seen to improve crowd satisfaction, taking attention away from the negative emotions experienced during high-density situations. Each of the issues will be discussed further below.

4.3.4 Issues that influence crowd user satisfaction

4.3.4.1 *Design and organisation*

Design and organisation of crowd venues incorporated the sectioned areas, clear exit routes, seating, pedestrian flow system, view, and the arrangement of toilet

facilities. The crowd venues were found to be of paramount concern, affecting the satisfaction of crowd users. As highlighted by participant 7:

"The one good thing with supermarkets is that they have the signs up at the top to tell you where things are. So even if it's crowded and you don't know where something is, you can look up and find where to go." (Healthy adults, female aged 46 years)

The availability of clear exit routes was also seen to be influential to the overall crowd satisfaction. Moreover, the presence of a one-way, or contra-flow system was seen as important to the satisfaction experienced within a crowd. The design and organisation of crowd venues was mentioned as important during retail, spectator, and tourism crowds in particular. For example participant 24 said:

"When an area is divided and it is segregated, so that you can't have like thousands of people pushing on you. You might just have hundreds. So it's really the organisation of an event." (Healthy adults - religious crowd, male age 51 years)

Moreover, participant 1 suggested that organisation is important during transport crowd situations:

"On the underground they have signs to say 'keep to the right', so that everyone should flow, and allow people to get past if they need to get through the crowds quickly. And the signs are usually pretty helpful and easy to follow." (International students - transport crowds, male aged 24 years)

4.3.4.2   Stress and anxiety

Stress and anxiety within a crowd were issues raised across all user groups, with issues surrounding frustration, claustrophobia, vulnerability, and intimidation within a crowd situation. Maintaining patience was a key concern, together with anxiety experienced during a crowd situation. For example participant 3 suggested:

"It is still very frustrating if you have got on the train and it is really crowded! Or if you're at the back and were the first there but end up being the last one to get on.. that is even more frustrating." (International students, female aged 26 years).

And participant 34 stated:

"Feeling a bit threatened and exposed I suppose.. because it's not what you're used to," (Older adults, female aged 69 years).

Stress, including frustration, anxiety, claustrophobia and vulnerability appear to have a stronger impact on crowd satisfaction during retail crowding, when compared with the other crowd types investigated. Participant 21 explained:

"See that would frustrate me.. if it was crowded, and you knew where your stuff was, but you couldn't get to it!" (Healthy adults - retail crowding, male aged 40 years)

Furthermore, participant 32 stressed:
"But again it's just the waiting isn't it? The queuing, the waiting, and the frustration of getting what you want to get. And waiting for people to get out of the way." (Older adults, female aged 68 years)

4.3.4.3   Safety and security

Safety emerged as an important issue affecting crowd satisfaction of all groups involved, with issues of protection; slips, trips and fall hazards; trampling risks; and violence discussed. General safety concerns, possible trip and trampling hazards, and fears of being trapped, were all factors that were noted as important to crowd satisfaction. Including participant 27:

"But you just.. you would just feel like you were being pushed along on a wave wouldn't you..? And if anything happened.. if somebody stumbled over or something you'd.. phh.. not a hope have you..?" (Healthy adults, female aged 47 years).

Security appeared to be discussed more frequently with increasing age. For example participant 9 suggested:

"Going back to this thing with people in yellow jackets (security guards).. obviously like you wouldn't have them there.. but just having anyone there.. who was a steward or a policeman.. it does make you feel kind of a bit more reassured and a bit less vulnerable too." (Young professionals, male aged 26 years)

Moreover participant 33 suggested:

"Now they've got to put more security on him (Cliff Richard concert) haven't they if they do that.. because there's always going to be some silly person." (Older adults, female aged 65 years).

Additionally, the presence of security guards was seen to become more important with increasing age. For example participant 29 suggested:

"I think you do feel a bit more secure when there are security guards around." (Older adults, female, aged 65).

Safety and Security: Safety was found to be important to crowd satisfaction in all crowd situations, with no clear differences between the contributions of safety to overall crowd satisfaction across different crowd situations. However, religious events appeared to ignite the strongest safety concern, with transport receiving the least concern for safety in the photographs discussed.

The maintenance and presence of security was seen to be important across all crowd situations investigated. With regard to spectator crowding, participant 15 stated:

"Yeah, I think I'm more nervous of my belongings.. like I just think of the dodgy teenagers that are going round at those things.. Because it is just really crowded and people are pushing past you anyway, so you wouldn't know if someone took something from you." (Parents of young children, female aged 25 years)

4.3.4.4   Motivation to attend a crowd situation

Motivation was raised as an issue affecting satisfaction within a crowd, including issues surrounding: the incentive to remain in the crowd, shared or enjoyable purpose for attending a crowd, time constraints, and financial motivation. Issues of individual desire to be at a crowded event or venue, and the enjoyable purpose of the event, appeared to be important to crowd satisfaction across the different user groups involved, with no strong differences between groups. For example participant 17 suggested:

> *"Yeah it would be a nice thing to go to wouldn't it.. if there wasn't a crowd.. but if there was you'd just get on with it because you wanted to be there to see what you wanted to see."* (Parents of young children, female aged 30 years).

As well as participant 24:

> *"Because they're there for a religious purpose they obviously feel really strongly about it.. and it's like they've got a real desire to be there. And a real need to be there.. so they're obviously happy to be in that crowd."* (Healthy adults, male aged 51 years)

Furthermore, having a strong motivational pull towards a particular event was described as a factor that might affect crowd satisfaction across most groups except those aged 65 years and over (older adults). For example participant 8 suggested:

> *"But you've waited your entire life to go there for that.. and it is dangerous.. but then.. every reason why you're there outweighs the fact that you might get crushed."* (Young professional, male aged 26 years).

Motivation appeared to be important to crowd user satisfaction during retail, religious, spectator and tourism crowd environments. However, the contribution of motivation to overall crowd satisfaction was possibly lower when participants were discussing transport crowds. For example participant 7 suggested:

> *"So I guess like we have said before, crowds seem more bearable when all the crowd are there for one shared purpose, whatever that purpose might be."* (Young professionals - spectator crowds, male aged 27 years)

Furthermore, participant 3 stated:

> *"But I mean you are not there to walk along, you are there to enjoy it. So the main aim there is not to go from one side to the other, it is to enjoy it!"* (Parents of young children - spectator crowds, female aged 26 years)

Such factors appear to increase the crowd satisfaction experienced.

Time constraints and rushing during a crowd were found to impact on crowd satisfaction strongly during transport crowds, compared to retail, religious, spectator and tourism crowds. For example participant 3 said:

> *"And you have only a few seconds really to get the next train, and then if you miss it you have to wait for the next one. And I mean the doors don't stay open for long. Then everyone has to come off, and then everyone gets in, and it's frustrating."* (International students - transport crowds, female aged 26 years)

4.3.4.5   *Mood within the crowd*

The contribution of mood to crowd satisfaction was referred to more when discussing retail crowds, compared to all other crowd situations investigated. Issues included manners, boredom, hostility, and excitement experienced within crowd situations.

4.3.4.6   *Environmental comfort*

Issues surrounding environmental comfort, including weather, heat, noise, pollution, odours, and disrupted vision, were referred to as affecting crowd satisfaction across all crowd situations. However, such issues were discussed less during religious crowd events, than other crowd situations.

Environmental factors were referred to more by individuals below 65 years. Thermal comfort, heat, weather and odours, were not mentioned as influencing levels of crowd satisfaction for individuals over 65 years, but were seen to be important to parents of young children, and healthy adults in particular. For example participant 23 revealed:

> *"I had a bad experience shopping in Nottingham city centre near to Christmas! There were just people everywhere... and it was really cold outside, so you've got your coat and scarf on, and then when you go into the shops its really hot and its horrible."* (Healthy adults, male aged 47 years)

4.3.4.7 Movement within a crowd situation

Movement within a crowd situation, and the ability to get to where you are required to be, including fear of losing people, and disorientation were expressed as very important to crowd satisfaction within a retail crowd environments, compared to other crowd types investigated. Participant 2 suggested:

> *"But then if you are holding hands with the other person then it is impossible to get through a busy crowd".* (International students - retail crowds, female aged 22 years)

Additionally, participant 18 revealed:

> *"I wouldn't like that if I was with **child**, because I would be panicking that somebody would snatch him away, and get through the crowd really quickly. Or I would be scared that he would run off, cos as soon as you blink in a busy crowd then you wouldn't see him."* (Parents of young children - retail crowding, female aged 32 years)

4.3.4.8 Goal prevention

Crowds that prevent the achievement of individual goals were seen to reduce crowd satisfaction experienced in retail crowding more than in any other crowd type investigated. Issues surrounding conflicting goals, prevention of goal achievement,

and competition between crowd members were identified. For example participant 9 showed:

>*"If you can't get to look at the thing that you want to look at.. cos there's somebody else in front of you.. and you're kind of waiting for them but they're being really slooooowww!"* (Young professionals - Retail crowding, male aged 26 years)

4.3.4.9   Preconceptions and expectations

Preconceptions were referred to more when discussing crowd satisfaction within religious events, compared to other crowd situations investigated. Previous experience and prior expectations, and cultural norms were all seen as very important when considering the crowd satisfaction at a religious event. Including participant 3:

>*"But also you'd have the expectation that there was going to be a lot of people there.. so it's not going to be a surprise."* (International students, female aged 26 years).

4.3.4.10   Inappropriate and antisocial behaviours

Inappropriate *behaviours* and people pushing into each other emerged as a problem affecting crowd satisfaction. The experience of individuals pushing into each other appeared to be discussed more with increasing age, as shown by participant 30:
>*"It's not good when you're being surged forward in a crowd, pushing and shoving."* (Older adults, female aged 70 years).

4.3.4.11   Avoidance of crowds

Individuals involved suggested that they would be inclined to avoid transport crowds in order to prevent encountering such crowd situations. Whereas spectator crowd

events were less likely to be avoided. For example, when considering spectator crowds, participant 1 suggested:

> *"I think I would probably just turn up.. see it.. and then go.. I wouldn't want to hang around for too long in that crowd.. Standing around or whatever."* (International students, male aged 24 years)

However, a number of individuals stressed that transport crowds for example cannot always be avoided, including participant 4:

> *"If you're going to be using the underground then you kind of have to go in there, you don't have much choice."* (International students, female aged 24 years)

4.3.4.12   *Personal space available*

Space availability appeared to be more important to crowd satisfaction when experiencing transport crowds, in comparison to retail, tourism, spectator, or religious crowds. Such issues included the importance of maintaining personal space during crowd situations. Participant 20 suggested that during transport crowds:

> *"Yeah, there's like no personal space or anything."* (Parents of young children, male aged 28 years)

4.3.4.13   *Distractions*

Distractions that take an individual's attention away from the crowd situation were seen to be important in tourism crowds. Issues included unfamiliar surroundings, factors that distract from the crowd situation. However, such issues were not mentioned when discussing spectator crowd events. Participant 27 suggested that when involved in tourism crowds:

"Even if it's crowded, you're somewhere different and there are things to look at, so you don't get so frustrated…. even if you're not going as fast as you want to, you can sort of look around. And take a break from the crowd, and see something nice that takes your mind of it." (Healthy adults, female aged 47 years)

4.3.4.14   Encumbrances

Encumbrances such as trolleys, wheelchairs, pushchairs, and suitcase appeared strongly affect crowd satisfaction during retail crowds. For example, participant 6 suggested:

"Especially with the trolleys and stuff it's just difficult to get through there, so you sort of think, why won't everyone just cooperate?" (International students, male aged 25 years)

Similarly, participant 16 revealed:

"And also, if you were in a pushchair with **child** then you just wouldn't be able to get through a dense crowd would you? You'd just be ramming people's feet wouldn't you?" (Parents of young children, female aged 21 years)

4.3.4.15   Company within a crowd

Company was mentioned as a factor affecting the crowd satisfaction of international students and young professionals only. Such groups felt that being accompanied by friends increased crowd satisfaction, including participant 6:

"Generally I like to be in a crowd with people that I know.. so like close friends and things like that.." (International students, male aged 25 years)

Moreover, feelings of loneliness when alone in a crowd were mentioned as affecting crowd satisfaction for international students and young professionals, for example participant 9:

> *"When you're alone in the crowd it can be daunting."* (Young professionals, male aged 26 years)

4.3.5 Differences between individual groups

Differences between the factors affecting crowd satisfaction will now be presented, across the five crowd user groups. Findings from each group of individuals (international students, young professionals, parents of primary school children, healthy adults and older adults) will now be discussed systematically, showing key differences regarding factors important to crowd satisfaction.

4.3.5.1 *International students*

Environmental factors: Weather conditions appeared to be a very important environmental factor influencing the satisfaction of international students in a crowd. Participant 2 stressed that:

> *"From an environmental point of view if the weather's nice, everyone's sort of walking slowly, whereas if it's raining then everyone is going to be walking faster to get out of the rain. And rushing around and just like bumping into you and it's just going to be more of an unpleasant experience."* (International students, female aged 22).

4.3.5.2 *Young professionals*

Mood: Manners appeared to be influential to crowd mood and crowd satisfaction, across all the age groups concerned. Individual mood appeared to be very important

to the level of crowd satisfaction experienced by young professionals. For example participant 14 said:

> *"It depends what mood you're in.. If you want to dawdle and look then it's fine. But if you know there is something in there that you want to get.. something specific that you want to go for.. then yeah it's not fun."* (Young professionals, female aged 24 years).

4.3.5.3   Parents of young children

Design and organisation: A child friendly environment was a top priority for parents of young children, when in a crowd situation, and was mentioned as influencing crowd satisfaction by individuals 65 years and over. However, such factors were not mentioned by the other individual groups involved.

Mood: The negative impact of boredom on crowd satisfaction appeared to be more important to parents of young children, than in any other group.

Encumbrances were referred to in relation to crowd satisfaction of parents of young children more than any other user group. The navigation of pushchairs through a crowd of people, or through supermarket aisle appeared to cause frustration, including participant 15:

> *"If you had a pushchair then you definitely wouldn't be able to get through crowded street,"* (Parents of young children, female aged 25 years).

4.3.5.4   Healthy adults

Security and Mood: Violence and excitement were only mentioned as issues affecting crowd satisfaction by healthy adults including participant 25:

> *"In a crowded pub if somebody did lose it for whatever reason, there are plenty of things that they could use as a weapon if they wanted to."* (Healthy adults, male aged 47 years)

4.3.5.5   Older adults

Design and organisation: The availability of toilet facilities, and seating were identified as influential to crowd satisfaction levels for individuals over 65 years only, with no reference to such issue within any other age groups. For example, participant 30 stated that:

> *"You see if you're in the middle of there and you want to go to the toilet."* (Older adults, female aged 70 years).

Additionally participant 33 revealed that:

> *"Well it's like sort of in the theatre isn't it.. or at a pop concert or something… if you've got your designated seat in a crowd, then it's ok. But it's when you're standing up in a crowd, and you've got less control haven't you of the situation."* (Older adults, female, aged 65 years).

Environmental factors: Within the 65 years and over age group, view and noise were important to the satisfaction experienced in a crowd. For example participant 32 suggested that:

> *"It's when you can't see any outside, isn't it.. that's the thing.. The panicky feeling."* (Older adults, female aged 68 years).

Additionally, participant 29 revealed that:

> *"before the match had even started he said it was really noisy, you know, because of the crowds.. and the noise, you know, and he couldn't stand it!"* (Older adults, female aged 65).

Preconceptions: Older adults appeared to value their preconceptions of crowds as contributing highly to overall crowd satisfaction experienced, compared to all other age groups involved. Including the contribution of previous experience in crowd situations, and prior expectations of the crowd attended. For example, participant 35 suggested:

> *"It's because, if you're doing it every day it wouldn't bother you at all."* (Older adults, female, aged 66).

Moreover, participant 30 suggested:

"I mean that situation, in a busy supermarket you weren't familiar with, you'd be less happy than if it was your usual supermarket that you went to every week wouldn't you? You're familiar with it." (Older adults, female aged 70 years).

However, other individuals did mention the contribution of previous experience and expectations, including participant 5 who revealed:

"Plus you expect a crowd in certain situations.. you don't expect to be there on your own." (International students, male aged 27 years)

Control: Level of control available during crowd situations was important to older individuals, but was not mentioned by any other age group involved. For example participant 35 suggested:

"Well if you've got your designated seat in a crowd then it's ok.. but it's when you're standing up in a crowd, and you've got less control haven't you, of the situation." (Older adults, female aged 66 years)

Individual factors such as age and height were not seen to be a priority to the crowd satisfaction of individuals across the different groups. However, age was mentioned as an important factor affecting crowd satisfaction of those over 65 years only, with individuals experiencing growing dissatisfaction with being in a crowd, with increasing age. For example, participant 32 suggested:

"I also think that younger people can cope with crowds better than older people.. I do." (Older adults, female aged 68 years)

And participant 30:

"I think younger ones.. like at university.. they wouldn't get so frustrated in a busy crowd would they?" (Older adults, female aged 70 years)

4.4 Discussion

This section provides a summary of the key findings from the focus group research, carried out with groups of individuals from: international students at university, young professionals, and parents of primary school children, healthy adults, and older adults. Each group of individuals discussed issues believed to affect satisfaction within different crowd situations including: retail, religious, spectator;

tourism and transport crowds. The section subsequently discusses the relevance and implications of the work, and indicates limitations to consider when viewing the findings.

4.4.1 Summary of key findings

The aim of this initial exploratory study was to collect information on the experiences of individuals and collective groups, across diverse crowd situations, to gain an understanding of the interactions people have within crowd situations. Focus groups examined issues affecting the safety, satisfaction, and performance, of different groups of individuals within a given crowd situation. Such findings aimed to establish contributory factors to the overall user experience of crowds, moving towards a more holistic understanding, with 19 themes drawn from the data:

1. *Design and organisation* (sectioned areas, clear exit routes, seating, pedestrian flow system, view, toilet facilities).
2. *Stress* (anxiety, frustration, claustrophobia, vulnerability, intimidation).
3. *Safety and security* (protection, slip, trip and fall hazards, trampling risks, violence).
4. *Motivation* (incentive to remain in the crowd, shared or enjoyable purpose, time constraints, financial motivation).
5. *Mood* (manners, boredom, hostility, excitement).
6. *Environmental factors* (weather, heat, vision, noise, pollution, odours).
7. *Movement* (ability to move to required destination, disorientation, fear of losing people).
8. *Goal prevention* (conflicting goals, prevention of goal achievement, competition between crowd members).
9. *Preconceptions* (prior experience and expectations, cultural norms, stereotypes).
10. *Behaviour* (inappropriate, antisocial, pushing).
11. *Avoidance* (of crowds, unavoidable crowds).
12. *Space available* (personal space).
13. *Distractions* (unfamiliar surroundings, factors that distract from the crowd situation).
14. *Control* (feelings of uncontrollability, confusion).
15. *Encumbrances* (manoeuvring trolleys, wheelchairs, push chairs, strollers, large bags, suitcases).

16. *Company* (accompaniment of friends or feelings of loneliness in a crowd).
17. *Atmosphere* (positive and negative ambience).
18. *Individual factors* (physical height, age).
19. *Communication* (information available, language).

The focus groups revealed greater differences between groups of individuals, compared to differences between different crowd situations. Particularly regarding the importance of facilities, and prior expectations and experience of older adults. Additionally, encumbrances (including extra baggage; pushchairs; young children) featured as a problem for parents of young children in particular. Thus, when such individuals form the target participation, additional emphasis must be placed on space available for manoeuvring encumbrances, to improve crowd satisfaction. Such findings support research into the importance of event organisers establishing '*knowledge of the predispositions of the audience*' (Brown & Hutton, 2013), when planning an event in order to design the optimal event experience for the user. And finally, variances in weather emerged as particularly important to international students involved.

When discussing retail crowding: levels of stress; goal prevention; mood; movement; encumbrances; and avoidance behaviours, were expressed as particularly important to crowd satisfaction compared to other crowd situations discussed. Such findings support the predominance of research into the relationship between density and satisfaction, in retail crowd situations (Ozdemir, 2008; Whiting & Nakos, 2008; Machleit et al., 2000). Additionally stress including frustration, anxiety, claustrophobia and vulnerability appeared to impair crowd satisfaction across all groups and crowd situations. However, stress appeared to be of primary concern to crowd satisfaction within retail crowding in particular.

4.4.1.1   Crowd user groups

Preconceptions: Analysis of the focus group data indicated that preconceptions of crowd situations strongly affected crowd satisfaction for participants of all ages, supporting previous research (Baum & Greenberg, 1975; Webb & Worchel, 1993). On review it was established that two individuals in the healthy adults group were members of the police force. Professional background and its influence on individual expectations and satisfaction within crowd situations might therefore explain this

group raising the issue of fears of violence within crowd situations. Members of the police force may have previous experience of dealing with violent crowd situations, affecting their perceptions of crowd satisfaction.

Control: The importance of maintaining control within a crowd, in order to sustain positive feelings, supports previous research (Rodin et al., 1978; Worchel & Yohai, 1979). In addition, based on participants in this study, concern about control was possibly more of an issue for older adults in crowd situations.

Facilities: The availability of seating and toilet facilities were particularly influential to the satisfaction of individual in the older adults group, compared to other individual groups. Such findings are intuitive, requiring little explanation, including the importance placed on toilet facilities by older individuals.

Encumbrances: featured as a problem for parents of young children in particular, suggesting that when such individuals form the target participation, additional emphasis must be placed on space available for manoeuvring encumbrances, to improve crowd satisfaction. Such findings are comprehensible, when one considers the space required for a parent of young children to walk with a pushchair, another young child walking alongside the pushchair and holding the parents hand. Add to that the baggage, including shopping bags, or products for the children, and the space required increases considerably.

Weather was mentioned as a factor influential to the crowd satisfaction of international students (studying in the United Kingdom), more than other groups of individuals involved in the research. One explanation for which being the variety and unpredictability of weather encountered in the UK, meaning that outdoor events could be subjected to ice and rain, and not be cancelled. A number of individuals involved in the 'international students at university' group, were from Greece, a country with pleasant weather compared to that of the UK. Thus, such differences might account for the importance placed on weather in the enjoyment of crowd events.

Safety emerged as an important issue affecting crowd satisfaction of all groups involved. General safety concerns, possible trip and trampling hazards, and fears of being trapped, were all factors that were noted as important to crowd satisfaction. Such findings support the predominance of research into safety in crowds.

4.4.1.2 Crowd Situations

Retail crowds: Levels of stress, goal prevention, mood, movement, and encumbrances were expressed as particularly important to crowd satisfaction within retail crowd situations, compared to other crowd types investigated. Such findings support the predominance of research into the relationship between density and satisfaction, in retail crowd situations (Ozdemir, 2008; Whiting & Nakos, 2008; Machleit et al., 2000). Findings also emphasise the importance of research into the effects of crowding on retail habits, and the potential benefits of increasing crowd satisfaction, on buyer behaviour, supporting previous research. Furthermore, retail crowding was seen to illicit avoidance, more than other crowd environments. Thus, improved retail crowd satisfaction has potential benefits from a business perspective. Factors affecting crowd satisfaction could be used by retailers to encourage a positive crowd experience, encouraging crowd members to return, and part with their money. Such incentives maintain interest in the relationship between density and satisfaction in the retail sector, from a business perspective.

Stress including frustration, anxiety, claustrophobia and vulnerability appeared to impair crowd satisfaction across all groups and crowd situations. Such findings support previous research concerning the negative effects of crowds on stress experienced, suggesting the importance of increasing crowd satisfaction from a health perspective (Cox et al., 2006; Evans & McCoy, 1998; Dion, 1999). However, the positive atmosphere generated during crowd situations was also discussed briefly within all groups and crowd situations, but with predominance for negative concerns, in line with previous research (Yildirim et al. 2007).

4.4.2 Limitations of the study

The findings in this study should be interpreted with consideration of the following limitations, inherent with focus group methodology, primarily, the subjectivity of qualitative focus group data. However, the standardised analysis, outlined by Braun and Clarke (2006), seeks to minimise the subjectivity of the data collected during such focus groups

Greater differences were present between groups of individuals, than across crowd situations discussed. This finding could be the result of the methodology used, despite substantial previous research supporting the validity of photographs to represent crowd scenarios (Eroglu & Machleit, 1990; Ozdemir, 2008). It is unclear

how far such methodologies initiate valid and reliable responses compared with actual experiences of being in a crowd. To imagine oneself within a given type of crowd environment (for example a football stadium), does not provide sensory or social information gained through actually attending an event. This is addressed by a subsequent study in this thesis using the principles of ethnography to explore complete participant event observations with crowd events (Chapter 7). Moreover, it is plausible that prior expectations and previous experiences of participating in a particular type of crowd situation might impact on the experience and satisfaction whilst in the crowd (Webb & Worchel, 1993). Thus, the following research will utilise field-based methods to elicit discussion in different crowd environments, enhancing ecological validity. Insight into factors affecting crowd experience, as revealed in this study, are relevant to individual crowd members and those responsible for generating gatherings.

The methodology could be criticised as the failure to discuss a particular issue, does not necessarily mean that such an issue would be important to a particular group, or a particular crowd situation. Although the focus group facilitator followed a standard focus group schedule for each focus group (Appendix A), in order to cover a number of issues for each crowd situation photograph, some groups did not further the discussion of given points. For example, the issue of weather conditions was prompted during a photograph of an outdoor crowd, with audience members holding umbrellas, and during the hot conditions experienced in the religious pilgrimage to the Hajj. Despite the suggestion of the issue posed to crowds in different weather conditions, the older adults group did not discuss how they felt different weather conditions would impact on their crowd satisfaction. Thus, alternative methods might be able to establish particular views on specific aspects of each crowd situation. Future research could therefore utilise field methods to evaluate how different groups of participants feel their crowd satisfaction is affected in different weather conditions.

4.4.3 Relevance and Impact

Insights into the factors impacting on crowd experience are relevant to individual crowd members and those responsible for generating gatherings. Performance, satisfaction and well-being in such situations should be a concern to the organisers, managers and promoters of crowd gatherings. Achieving a positive, high-quality crowd experience for both, is desirable to the overall success of a crowd. Moreover,

increased knowledge of crowd behaviour could ultimately reduce injuries and fatalities encountered at mass gatherings. Major international disasters include fatalities during pilgrimages to the Hajj in Saudi Arabia (Hughes, 2002; 2003), the Lantern Festival in China (Zhen et al, 2008) and the Hillsborough sports stadium in the UK (Smith, 1994). A more systemic approach to understanding crowds should contribute to the avoidance of such incidents. The following chapter (stakeholder interviews) will explore findings further, aiming to develop a more complete model of the factors contributing to crowd satisfaction, their interaction and relative importance.

4.4.4 Conclusion

Findings from focus groups showed greater differences between individual groups, than across crowd situations. Differences and priorities affected crowd satisfaction, varying with regard to age and expectations. Satisfaction was strongly affected by preconceived expectations of crowd type and density for older adults in particular. Furthermore, previous experience in different types of crowd, influenced situation awareness and performance in a crowd with increasing age. The addition of encumbrances including hand baggage or personal suitcases, or the presence of children, were found to inhibit a positive crowd experience, contributing to frustration, anxiety and other negative experiences. And finally, variances in weather emerged as influential to the overall crowd experience in outdoor situations, a factor of particular importance to international students involved.

Findings from user focus groups aimed to model contributory factors to crowd satisfaction, taking into account the interaction of a range of variables. A number of issues were shown as important irrespective of individual group or crowd situation. Such issues should be considered when organising any crowd event, in order to improve the satisfaction for all crowd members.

Chapter 5

5. Stakeholder interviews

5.1 Summary

This chapter presents findings from in depth semi-structured interviews with stakeholders involved in crowd events, including event organisers and deliverers (see Glossary), investigating the organisation, coordination and security of a variety of crowd events of various descriptions.

The previous chapter (User focus groups) explored the user experience of crowds through focus groups, and revealed differences in factors affecting crowd satisfaction that varied with regard to age and expectations (Chapter 4 and Kendrick & Haslam, 2010). Findings showed differences in the issues that influence crowd satisfaction between crowd users involved, and differences between crowd situations. Additionally, venue design, organisation, safety and security concerns were found to highly affect crowd satisfaction, showing the importance of these issues when considering crowd satisfaction for all crowd events, and crowd users. The issues then formed the basis of the study presented in this chapter involving stakeholder interviews, to determine to what extent stakeholder considerations match the priorities of crowd members.

The following chapter presents findings of research undertaken within organisations that routinely organise and host crowd events of various descriptions including: music, sporting, open days, conferences and exhibitions, graduations, and participatory race events. Stakeholders were drawn from the relevant areas of crowd events organisation, including those involved in the: physical environment, event planning, ground staff, health and safety, public security, and private security. A total of 41 interviews were undertaken over a period of 18 months. Inevitably research of this description leads to a lot of material requiring qualitative analysis of an explorative nature, into a relatively underdeveloped area, yields vast data. All of the data analysis has been included within this chapter in order to meet the aims of the study, to understand the complexity of the issues that contribute to the user

experience of crowds, and provide a full picture of the situation within crowd organisation.

Semi-structured interview findings identified issues within a number of key themes drawn from the data: health and safety, public order, communication, physical environment, public relations, crowd movement, event capacity, facilities, satisfaction, comfort and crowd characteristics. The findings informed understanding surrounding the role of different stakeholders within crowd event organisation and delivery, and will be described in further detail within this chapter.

5.1.1 Background

The research presented within this chapter focuses specifically on the stakeholder perspectives of crowd organisation. Stakeholder interviews aimed to assess the views and practices of stakeholders involved in various aspects of crowd organisation, in different crowd situations (public and private security, architecture and design, health and safety, event organisers and ground staff). Previous research has focused on the stakeholder perspectives separately, including the security perspective (Duncan, 2009), health and safety (HSE, 2012a, 2012b), pedestrian flow (Johansson, 2012), event management (Lee et al, 2008) perspectives. However research within this chapter aims to develop the holistic understanding of the crowd as a system, aiming to indicate what is currently considered as important within crowd situations and the organisation of crowd events.

To date the focus of research into crowds has been on safety and security within crowd situations (Berlonghi, 1994; RSSB, 2003, 2004 Cox et al., 2006; Home Office, 2006; Duncan, 2009; Wang et al., 2013). The focus is understandable due to the potential loss of life when crowd disasters occur, as well as the media attention in such cases. However attention is also required for the wellbeing and enjoyment of crowd users, and the experience of being in a crowd situation in order to reduce the negative experience of crowding and heighten the positive satisfaction experienced.

5.1.2 An overview of the research process

This chapter describes phase two of data collection within this research process (Figure 12). Figure 12 shows how stakeholder interviews fit into the rest of the research within this thesis.
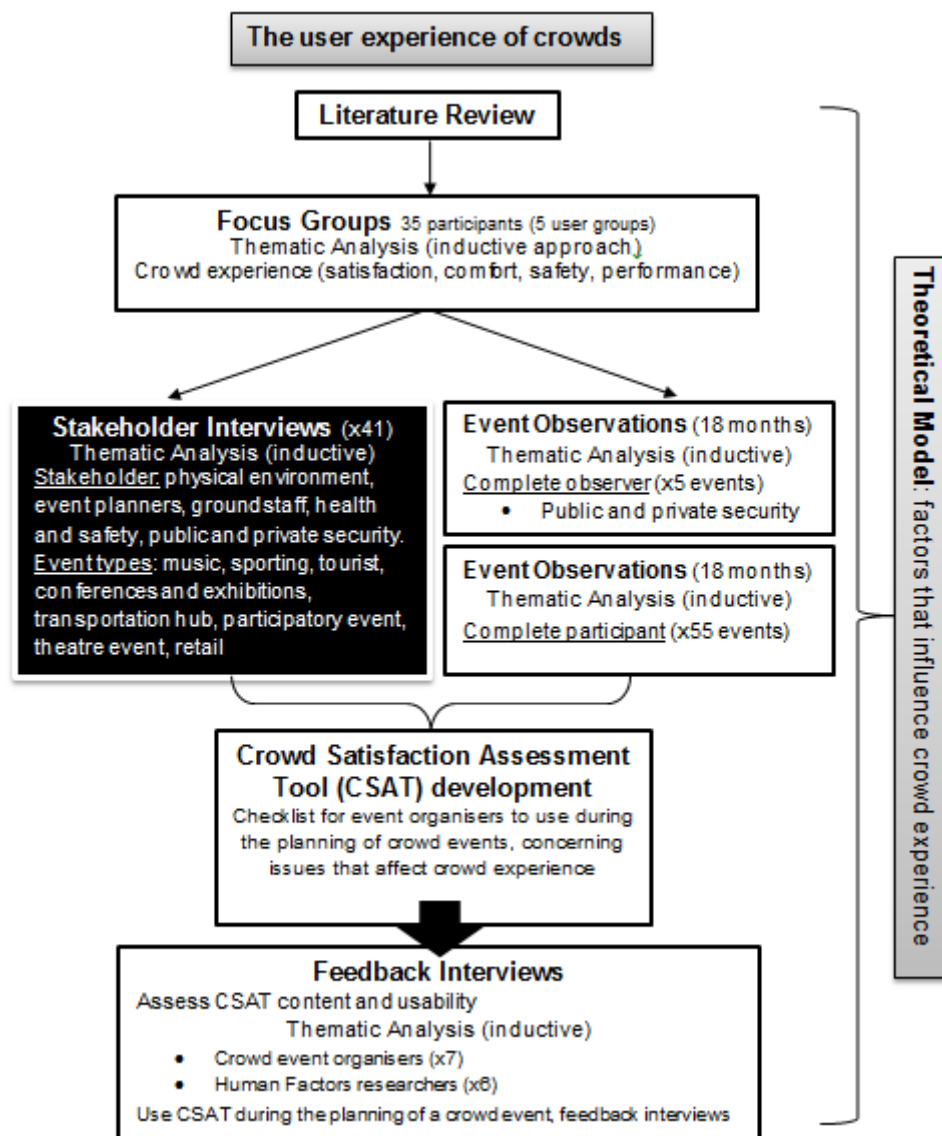
Figure 12 Overview of the research process

5.1.3 Aims and objectives

The aim of research within this chapter was to gain insight into the knowledge and reasoning of stakeholders involved in crowd organisation within events of various descriptions. Specifically, this study aimed to:

1. Identify issues considered by stakeholders during the planning and organisation of crowd situations.

2. Identify the extent to which stakeholder considerations match aspects previously identified as important to crowd user satisfaction.

3. Examine the consideration given to user experience issues of comfort, safety, satisfaction and performance by stakeholders within crowd situations.

In order to explore the above aims, stakeholders from the different stakeholder groups were recruited and interviewed. The stakeholder interview schedule was based on the findings from user focus groups (User focus groups Chapter 4). Issues were discussed with each stakeholder to assess the factors that are considered within each planning and organisation of crowd events.

5.2 Methods

5.2.1 Design

Interviews were deemed most suitable to meet the aims of this study. Semi-structured stakeholder interviews were conducted within the UK to assess the issues highlighted as important to crowd users during user focus groups. Stakeholders included public and private security officers, architects and design, health and safety experts, event organisers and ground staff involved in different crowd events.

5.2.2 Sampling

Sampling was on a structured convenience basis, with participants from the chosen sample groups most likely to be able to provide useful insights into the problem under investigation.

Initial focus group findings (User focus groups Chapter 4) provided a framework from which to base the rationale for stakeholder recruitment. Focus groups identified areas and issues to consider during stakeholder interviews. Together with a search of the literature to confirm that stakeholders represented the different aspects of event organisation, and crowd experience. Additionally Berlonghi's (1995) paper 'understanding and planning of different spectator events', was consulted to ensure stakeholders represented a variety of crowd types and situation. These included: ambulatory (walking), spectator (watching an activity or event), expressive

(emotional release, shouting, chanting), and limited movement (restricted movement) (Berlonghi, 1995)

Participants in this study were recruited using a range of methods over a period of six months, with stakeholders recruited from each area specified within stakeholder groups (physical environment, event planners, ground staff, health and safety, public security, and private security). Recruitment via email to each of the five target stakeholder areas: sporting, music, participatory race events, conference events, and transportation hubs. Stakeholders were selected to represent individuals from across a range of event types, and were selected to represent individuals across society, accounting for a wide range of different age groups. Recruitment was predominantly taken from individuals residing in Leicestershire and surrounding areas. As explained during the methodology section of this thesis (Methodology Chapter 3), sample size was established through data saturation. Therefore when no new information was identified within the analysis of interview transcripts, recruitment ceased.

5.2.3 Procedures

All interviewees were provided with an information sheet and an informed consent form was administered before questioning began. All interviewees were asked their gender, age, tenure, job title and type of employment prior to initiation of the interview.

A semi-structured interview schedule was developed, based on the framework established from initial focus group findings (User focus groups Chapter 4). Once the interview schedule was devised for the interview, it was piloted with an interviewee, and subsequently modified to form the final schedule (Appendix D and E). Having agreed to participate interviewees were briefed verbally about the nature of the research and supplied with written information, additionally written informed consent was obtained from all stakeholders.

Semi-structured interviews were used to investigate the organisation of crowd events, including: approaches and processes used in the planning for crowd situations, attitudes and beliefs regarding crowd satisfaction, comfort, safety, and performance, and commitment to each (Robson, 2011). Interviewees were drawn

from relevant stakeholder groups to achieve a structured convenience sample (Bryman, 2004). Stakeholders came from a variety of event types (sporting, music, participatory race events, conferences, and transportation) encompassing the following crowd types: ambulatory (walking), spectator (watching an activity or event), expressive (emotional release, shouting, chanting), and limited movement (restricted movement) (Berlonghi, 1995).

A standardised interview programme was developed, with the same facilitator leading each digitally recorded interview (with the knowledge and consent of participants), each lasting approximately 60-90 minutes.

5.2.4 Analysis

Interviews were recorded digitally (once permission was gained from stakeholders) and subsequently transcribed verbatim. Data were imported into the qualitative data software Nvivo 9.0 to aid the systematic storage, coding and analyse of interview transcripts (Hignett & Wilson, 2004). Preliminary analysis involved reading through the scripts to familiarise and determine recurrent themes.

Development of qualitative analysis involved hybrid thematic analysis of interview data, with data driven codes developed, and the identification of emergent overarching themes in line with the original objectives of the study (Bryman, 2004).

Interview data were analysed iteratively (after each interview the resultant information and suggestions were implemented into the subsequent interview), to determine when the data reached saturation. Once all interviews were completed data were analysed together to determine emergent themes and the overall findings, in line with the analysis described in the methodology chapter (Methodology Chapter 3).

5.2.4.1   Display of interview data

Display of the data will be structured in accordance with Hancock (1998), initially as a list of themes that emerged from the analysis of data within each interview, showing the key findings of factors that influence crowd satisfaction within crowd

events of various descriptions. Each theme will then be described, and the categories within the theme explained in subsections:

> '*in this way, the categories of data are used to construct a case that the themes are the main findings of the study*'

Moreover, quotations will be:

> '*used because they are good examples of what people have said specifically about the category being described*',

illustrating the meaning of the data, providing evidence to support reasoning for the inductive coding of data, and subsequent emergence of key themes (Braun & Clarke, 2006).

5.3 Results

A total of 41 stakeholder interviews were conducted over a 4 month period (January – April 2011). Stakeholders ranged in age from 25 to 64 years (mean = 45.5 years), with 25 males and 16 females. The composition of stakeholder professions can be found in Table 8, including those responsible for the physical environment, event planners, ground staff, health and safety professionals, public and private security involved in crowd events of various descriptions. The composition of crowd situations can be found in Table 9: spectator events (indoor and outdoor), tourism events, celebratory events, commercial events, conferences and exhibitions, participatory events and demonstrations. And finally the composition of individual stakeholder interviewed can be found in Table 10.

Table 8 Composition of stakeholder professions

Composition of stakeholders professions	Description	Number (n)
Physical environment	Developing the structure of the venue (architects, human factors engineers, pedestrian flow modelling)	5
Event planner	Communication and organisation of events, budgeting, dates (event coordinators, managers)	14
Ground staff	Employees who maintain the event (stewards, marshals, volunteers)	4
Health and safety	Individuals involved in meeting and maintaining health and safety standards before and during event.	4
Public security	Police force: maintaining public order, crowd management, and crowd control, protecting crowd users (state funded)	4
Private security	Protect crowd users during crowd events and situations (privately funded)	10
TOTAL		**41**

Table 9 Composition of crowd situations

Composition of crowd situations		Description	Number (n)
Spectator events	Outdoor	Music festival, bonfire night	20
	Indoor	Music arena, sports stadia	15
Tourism		Art gallery, museum	5
Celebratory event		Religious celebration	2
Conferences, exhibitions and commercial events		Academic conference, exhibition centre, book launches	17
Participatory race events		Marathon events	12
Demonstrations and riots		English defence league	6
Transportation hubs		Train stations, London underground	3
TOTAL			**80**

Table 10 Composition of individual stakeholders interviewed

Stakeholder profession	Interview Number	Crowd specialism	Title	Age	Sex	Role
Physical environment	3	Transportation hubs (train stations)	Pedestrian flow modelling (Multidisciplinary consultancy)	34	F	Station layout, evacuation, signage, wayfinding, modelling pedestrian flow
	4	Transportation hubs (train stations)	Human Factors Engineer (Multidisciplinary consultancy)	25	F	Assisting with the design of the London Underground, and transportation hubs, layout, signage, wayfinding
	22	Spectator events – outdoor (sporting)	Architect (Football stadium design)	46	M	Stadium design, adhering to The Green Guide (2008) to designing sports stadia, financial considerations
	25	Tourism (cinemas), Conferences and exhibitions	Architectural Assistant (Building design)	28	M	Negotiation and communication, drawings and 3D images, obtain planning permission for the proposal, obtain building regulations approval, help the client gather costs for the proposal
Event planners	1	Conferences and exhibitions	Project Manager	28	M	International Exhibitions, organising layout of stalls, signage, atmosphere, tactics for pedestrian flow
	11	Spectator events - indoor (music)	Head of an Independent Record Label (UK university)	25	F	Organising small scale music events
	16	Spectator events – indoor and outdoor (sporting)	Sports Event coordinator (UK university)	26	M	Organising sporting events of various descriptions
	27	Participatory race events (Fun Run)	Event Director	50	M	Finding commercial partners/sponsors, design of event stationery, entering entry data, monitoring and amending on-line registrations
	29	Celebratory events, Spectator events - outdoor (fireworks)	Owner of fireworks display company	48	M	Organise events
	31	Celebratory events (religious)	Event coordinator	62	F	First Holy Communion celebrations Church events, organising ticketing, photography, venue layout, and car parking
	34	Tourism (art gallery)	Visitor experience	37	F	Layout, wayfinding, atmosphere, ticketing,

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Stakeholder profession	Interview Number	Crowd specialism	Title	Age	Sex	Role
			manager (Liverpool modern art gallery)			capacity, visitor flow
	38	Participatory race events (10k race)	Event manager	47	M	Layout of route, road closures
	5	Tourism (university art exhibition)	Event organiser and professor (UK university)	42	F	Organising the annual university design show event.
	6	Conferences and exhibitions (University events)	Employer Liaison Manager	40	F	Organising University careers fairs
	8	Conferences and exhibitions	Director of change projects	64	F	Crowd events organisation (graduations, open day events)
	9	Conferences and exhibitions (University events)	Student Development & Employment Manager	59	F	International Day organisation
	12	Conferences and	Student Outreach and	36	F	Undergraduate University Open Day
	13	Conferences and exhibitions (University events)	Postgraduate Career Development coordinator	55	F	Postgraduate University Open Day Organisation
	32	Conferences and exhibitions (academic)	Conference manager	63	F	Academic conferences, booking suitable venue, liaising with delegates, signage
	33	Tourism (art gallery)	Event organiser (small-scale independent)	27	M	Venue layout, booking suitable venue
Ground Staff	2	Conference, exhibitions and commercial events (book launch)	Marketing Assistant (publishing)	26	F	Organising book launch events, and book signings
	28	Spectator events – outdoor (music)	Festival Assistant (Leeds festival)	26	F	Litter picking, maintaining signage
	30	Tourism (museum)	Museum Assistant	63	M	Miniature steam railway, maintaining queues, and ticketing
Health and safety	14	Spectator events – indoor and outdoor (music, sporting), Conference, exhibitions and commercial events, Participatory race events	Fire Safety Officer (UK University)	59	M	Capacity calculations, evacuation strategies, fire safety

Stakeholder profession	Interview Number	Crowd specialism	Title	Age	Sex	Role
	15	Spectator events – indoor and outdoor (music, sporting), Conference, exhibitions and commercial events, Participatory race events	Health & Safety Officer (UK University)	57	M	Risk assessments, maintaining departmental health and safety
	23	Spectator events – indoor and outdoor (music, sporting), Conference, exhibitions and commercial events, Participatory race events	Paramedic St John's ambulance (UK football Club)	61	F	First aid, emergency situations, public health
	26	Transportation hubs	(Health and safety standards)	60	M	Venue inspection, maintaining health and safety standards
Public Security	17	Spectator events – indoor and outdoor (music, sporting), Participatory race events, Demonstrations	Police Community Support Officer, UK police force	23	M	Working with the community, traffic management, patrols of an event, car parking
	18	Spectator events – indoor and outdoor (music, sporting), Participatory race events, Demonstrations	Chief Superintendent UK Police Constabulary (Silver commander)	44	M	Coordinate police operations, most senior officer in charge of the operations during major events (unless a gold commander is present in very high profile events)
	19	Spectator events – indoor and outdoor (music, sporting) Participatory race events, Demonstrations	Inspector UK Police Constabulary (Bronze commander)	48	M	In charge of a number of teams of officers during major events, Assists training of security stewards (football), relay information back to silver commander
	20	Spectator events – indoor and outdoor (music, sporting), Participatory race events, Demonstrations	Sergeant UK Police Constabulary	49	M	In charge of special units during major events (dog handler, search advisor), help deal with crowd, crowd issues and crowd problems
	39	Spectator events – indoor and outdoor (music, sporting), Participatory race events, Demonstrations	Inspector UK Police Constabulary (Bronze commander)	36	M	In charge of a number of teams of officers during major events, relay information back to silver commander
	40	Spectator events – indoor and outdoor (music,	Inspector UK Police Constabulary (Bronze	55	M	In charge of a number of teams of officers during major events, relay information back to

Stakeholder profession	Interview Number	Crowd specialism	Title	Age	Sex	Role
		sporting), Participatory race events, Demonstrations	commander)			silver commander
Private Security	7	Spectator events – indoor and outdoor (music, sporting), Conference, exhibitions and commercial events, Participatory race events	Security Manager (UK university)	63	M	Liaise with police and emergency services during major events
	10	Spectator events - indoor (music)	Senior Venue Department Manager (University Students Union)	43	M	Coordinate security planning before and during event, monitor behaviour during event, transfer information from the control room to security supervisors, Involved in security training,
	21	Spectator events – outdoor stadium (football)	Security trainer (UK Football Club)	64	M	Observe security from the control room, assist with control room operations, and security steward recruitment
	24	Spectator events – outdoor stadium (football)	Head steward (Leicester city football club)	62	M	Coordinate security planning and during event, transfer information from the control room to security supervisors.
	35	Spectator events – outdoor stadium (football)	Security steward (Chesterfield football club)	33	M	Maintain crowd behaviour, identify antisocial behaviour
	36	Spectator events – outdoor stadium (football)	Operations managers (Leicester city football club)	60	M	In the control room, liaising with the police, transfers information to the head stewards
	37	Spectator events – outdoor stadium (football)	Head of Security (Chesterfield Football Club)	59	M	Coordinate security planning and during event, transfer information from the control room to security supervisors
	41	Spectator events – outdoor stadium (football)	Security steward (Leicester city football club)	32	F	Maintain crowd behaviour identify antisocial behaviour

5.3.1 Presentation of findings

Findings are presented in order of the frequency of references made to the issue across stakeholder interviews (Table 11). Health and safety issues (446) comprise the largest number of references, and the crowd characteristics (66) the fewest across stakeholder interviews.

Table 11 Composition of stakeholders interviewed

Issue raised	Number of references made during stakeholder interviews
Health and Safety	446
Public Order	444
Communication	355
Physical environment	332
Public Relations	320
Crowd Movement	254
Event Capacity	213
Facilities	197
Satisfaction	140
Comfort	126
Crowd characteristics	66

Subsequently, the findings within each section are presented in order of the number of stakeholders discussing the issue during interviews.

5.3.2 Health and Safety

Health and safety emerged as a priority across stakeholder groups (Table 12), with the protection of crowd users (7, 10, 15, 18, 19, 20), the prevention of accidents (7, 10, 12, 18, 19, 30), and crowd disasters (10, 20, 26) discussed as primary concerns. Additionally, protecting venue reputation (7, 10, 15, 18, 19, 20), and legal obligations (1, 3, 8, 10, 14, 16, 25, 26, 34, 36) were also highlighted as reasons for spending time and resources on health and safety issues during crowd events.

Table 12 Summary of stakeholder findings in relation to health and safety

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
Health and Safety	Health and safety	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38	Compliance (1, 3, 8, 10, 14, 16, 25, 26, 34, 36) Reputation (7, 10, 15, 18, 19, 20) Prevention of accidents (7, 10, 12, 18, 19, 30) Prevention of crowd disasters (10, 20, 26)	Safety walk (6, 9) Common sense (13, 15, 30) Management systems
	Risk Assessment	1, 6, 7, 8, 10, 12, 14, 15, 16, 18, 20, 20, 21, 23, 26, 27, 28, 30, 34, 36, 37, 38		
	Financial burden	4, 7, 8, 9, 10, 11, 13, 14, 16, 17, 20, 22, 24, 26, 27, 30, 32, 37		
	Training	4, 6, 7, 10, 11, 12, 14, 15, 16, 16, 17, 20, 21, 26, 28, 31, 34, 35, 36	Health and safety focus (6, 10, 12, 14, 15, 16, 20, 26, 34, 35) Information gained through experience (4, 6, 7, 10, 11, 12, 14, 15, 16, 16, 17, 20, 21, 26, 28, 31, 34, 35, 36) Specialised trained units (10, 16, 18, 20, 21, 36)	Panic reduction (4, 10, 12, 14, 17, 20, 21, 23, 26, 30, 32)
	Evacuation	3, 7, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 28, 30, 31, 34		
	Fire Safety	6, 7, 9, 12, 13, 14, 15, 16, 20, 26, 27, 30, 31, 33, 35		
	Emergency	7, 8, 17, 21, 21, 22, 23, 24, 27, 28, 30, 33, 38		
	Road Safety	5, 15, 27, 27, 31, 38	Road closures (15, 27, 38) Diversions (27, 38)	

5.3.3 Compliance to health and safety

When discussing health and safety, one key issue across stakeholder interviews was compliance, the legal obligation to adhere to health and safety standards (1, 3, 8, 10, 14, 16, 25, 26, 34, 36). For example interviewee 10 suggested:

> *"I mean my job is all about compliance…. generating business is one part of it.. but the other part is compliance.. because if things go wrong.. with the industry we're in.. they can go wrong very quickly and easily.."*
>
> *Music event, Security officer (Interviewee 10)*

Additionally interview 25 said:

> *"Health and safety is highly regarded in the profession and is a serious matter as I can be held liable or the company I work for can be fined under CDM [construction design and management] regulations 2007 (that's construction design management).."*
>
> *Architect, Physical environment (Interviewee 25)*

And also interview 26:

> *"So we go out on one of the days to make sure that they are working towards compliance. So our role is to say.. are they managing their system to comply with their legal requirements.."*
>
> *Health and Safety, British Standards Institute (Interviewee 26).*

However, well defined management systems to ensure that health and safety guidance was followed were not always evident within all stakeholder interviews. Health, safety and security officers indicated that they are not always aware of events taking place, and are therefore not able to manage health and safety within the event. For example, one health and safety officer said:

> *"And sometimes I come in here and there are events going on that I have not been made aware of.."*
>
> *Health and safety officer, Fire officer (Interviewee 14)*

Although stakeholders appeared to realise that compliance to health and safety standards should not be left to trust, it appeared that it often was. However, a number of stakeholders appeared unaware that people would fail to abide by health

and safety regulations. For example interview 15 discussed the value and importance of risk assessments:

> *"Over the period that I've been here, we've built up a degree of experience, and, you're not blasé about events.. you can't be. You can't take things on trust.."*
>
> Health and Safety Officer, Health and Safety (Interviewee 15)

5.3.3.1   Financial considerations

Stakeholder interviews suggested that financial considerations, and gaining a profit from an event, were paramount to organisers and coordinators of crowd events (4, 7, 8, 9, 10, 11, 13, 14, 16, 17, 20, 22, 24, 26, 27, 30, 32, 37). As shown by interviewee 16:

> *"I mean the main problem is the (and I guess it's the same for everybody), it's being able to manage the crowd that you've got.. to the budget you've got.."*
>
> Event coordinator, Outdoor spectator event (interviewee 16)

And also interviewee 10:

> *"But obviously it's more of an interest if we don't get it right.. at this moment it's all festivals. That's where the money is.. that's where people are going.."*
>
> Music event, Security officer (Interviewee 10)

Stakeholders stressed the financial burden health and safety considerations can present, the time and money required, suggesting that health and safety can only be ensured within the financial budget of each individual event.

Vignette

A 26-year-old male sports event coordinator, involved in both indoor and outdoor spectator sporting events, describes the financial considerations that surround health and safety implementation during crowd events.

> *"So I mean obviously.. if you could lay out cotton wool for every member of the crowd.. and have 20 paramedics standing by.. and 2 doctors.. and a fire engine outside then you would do. But you can't can you.. you know what I mean. So generally.. it's down to.. hopefully keeping volunteers on side and working well erm.. yes obviously a paramedic and that sort of thing.. but… its really doing the best you can, with the budget you've got, on everything. And you can't jeopardise safety.. but at the end of the day.. if there isn't a budget for a fence of £2000.. then you've just gotta manage that area the best you can.."*
> *Events coordinator, Outdoor spectator events (Interviewee 16)*

Such an account indicates the challenge event coordinates face with ensuring health and safety compliance, within a specified event budget.

Vignette 1 Financial considerations surrounding health and safety standards

5.3.3.2 *Health and safety training*

Health and safety training was an issue discussed during stakeholder interviews (4, 6, 7, 10, 11, 12, 14, 15, 16, 16, 17, 20, 21, 26, 28, 31, 34, 35, 36). Large scale crowd events appeared to have a separate specialised health and safety team, who communicate with stakeholders to ensure all aspects of health and safety are covered within every aspect of an event. To ensure risk assessments cover all possible hazards, and to discuss areas of improvement for future events. Whereas small scale events appeared to train team members in health and safety, in order to deal with the issues alongside primary role responsibilities. Thus small scale events might have less access to specialised expertise and guidance surrounding health and safety, with the level of health and safety training, and depth of understanding unclear. Additionally interviewee 14 suggested training and information provided to ground staff could be improved:

> *"So they don't train [in health and safety].. or give people that information.. now we do give on degree day [celebratory crowd situation] the stewards have an aid memoir.. which is a kind of little card, that is sort of a punch line [explaining what to do].."*
>
> *Health and safety officer, Fire officer (Interviewee 14)*

However, a number of stakeholders stated never having considered health and safety training to equip them for their role, including interviewee 6:

"[health and safety] It's not something I have sort of had training in particularly.. so obviously I'd get someone who is trained to do it.. to be on board as well.. just to make sure that it's all above board and correct.."

Event organiser, Open day event (Interviewee 6)

Stakeholder interviews also indicate that advanced training for security guards, has led to a greater respect for their role, and increased professionalism within the vocation. As seen during interviewee 21:

"I am involved in the training at [college name] its NVQ 2 is for stewards, NVQ 3 is for supervisors.. 9 months of training.. fire evacuation, first aid, different elements. And you have to pass each of the elements.."

Security trainer, Security (Interviewee 21)

A number of stakeholder groups also appeared to have specialist trained units, for different aspects of crowd organisation (10, 16, 18, 20, 21, 36). The police for example have specialist units trained in crowd control, for example interviewee 20 suggested:

"…[I am] public order trained which is trained units of police officers, to help deal with crowd, crowd issues and crowd problems really.."

Police Sergeant, Public order (interviewee 20)

Vignette
Specialised training was also required for ground staff involved in certain events (primarily spectator events), aiding the safety of crowd members and staff members. As highlighted during an interview with a 43-year-old male, Senior Venue Department Manager, involved in spectator events, primarily indoor music events.

"And there's a specific way we have to do that, for their own safety.. we sort of have to go in there as a line.. they all hold hands. The one at the end grabs the person, passes them down the line.. lifts them into the pit area. And then the doormen start coming back in.. because it can be that dangerous. Because crowds surging.. moving and so we're trained in specific ways, to see that people can get them out. And again the worst thing is somebody falling over in a crowd.."

Music event, Security officer (Interviewee 10)

Vignette 2 Specialised training surrounding crowd safety

Similar approaches and opinions emerged concerning crowd event organisation, primarily compliance to safety in protecting crowd members, venue reputation (7, 10, 18), and legal obligations. For example one stakeholder suggested:

"And that's more to the point where even though it's our building and our land.. there's a [organisations] reputation to think of.."

Music event, Security officer (Interviewee 10)

5.3.3.3   Risk Assessment

Assessing the risk potential for a crowd event, was an issue seen as particularly important (1, 6, 7, 8, 10, 12, 14, 15, 16, 18, 20, 20, 21, 23, 26, 27, 28, 30, 34, 36, 37, 38). Risk assessments were a task seen throughout stakeholder interviews, including interviewee 38:

"We seek to address our health and safety responsibilities via a risk assessment (which is required as part of the race licence insurance). In the main this covers trip hazards which are likely to be encountered on the off-road course, plus other issues such as people and cars being in close proximity on the school field.."

Participatory race event, Event coordinator (Interviewee 38)

As well as interviewee 27:

"I prepare a risk assessment document and hold a pre-event briefing with emergency services and other involved agencies.."

Event coordinator, Race event (Interviewee 27)

A number of stakeholders suggested that the initial risk assessments were conducted before being checked by a health and safety advisor. For example interviewee 6 said:

"Erm.. we have to obviously do a whole risk assessment on health and safety, and check for the risks there. And then our health and safety, and risk assessments, and fire hazard people come and have a walk around, just to check that it's all ok.."

And interviewee 15:

>"And then a health and safety plan, and event document, which covers all of those issues. And presented with that, we would then go through it and make sure it was all relevant, and pick out anything that we thought they'd missed.."
>
>*Health and Safety Officer, Health and Safety (Interviewee 15)*

One method of assessing risk potential for events was to categorise events against previous incidents that occurred at past events of a similar description. For example interviewee 21 said:

>"Now anything moving towards C, and C+ [categories given to football event of varying risk potential] is a high profile, highly proactive, could be troublesome game. Like we played [football team] the other week. And that was troublesome. So they categorise by the fixture. If you see any A, B, C, or D.. that's what it means. It depends whether the police are in or whether they're not.."
>
>*Security trainer, Security (Interviewee 21)*

The police appeared to describe a more systematic structured approach to categorising events, to determine the level of security required.

During stakeholder interviews it became apparent that the police and stadium security, were working together to learn from, document and improve on incidents that occur during each match. However, other stakeholders did not appear to dedicate such consideration to the importance of conducting and documenting thorough, detailed, and accurate risk assessments during the organisation of a crowd event. Risk assessments were seen by a number of stakeholders to be an obligation, an example of *'health and safety gone mad'*. For example interviewee 16 suggests:

>"It almost falls back to this culture of people covering their own back, if you know what I mean.."
>
>*Event coordinator, Outdoor spectator events (interviewee 16)*

Moreover, a number of stakeholders also described health and safety considerations as "*common sense*", including interviewee 13

> "*Erm.. but that's.. that's.. [risk assessments] I would say fairly common sense..*"
>
> *Event Managers, Open day event (Interviewee 13)*

And interviewee 30:

> "*Other than that there's nothing in terms of security. Just general common sense..*"
>
> *Miniature railway events, Ground staff (Interviewee 30)*

Such findings indicate a lack of consideration for the importance of thorough safety checks, and assessments of the potential risks across each aspect of an event. Also, a lack of knowledge as to the aim, and purpose of a risk assessment. Additionally a number of stakeholders appeared to suggest that the emphasis on health and safety regulations within crowd events, was in place to protect crowd organisers. Protection from legal costs should an accident occur, the organisers must be seen to have been following health and safety standards. Moreover, failure to protect crowd members, and resultant accidents, come at a financial cost to the organisers. As shown during interviewee 10:

> "*..because if we get it wrong, people sue, and they do, quite often. So you know.. as long as we're pretty protected on that then.. you know.. and that's for all the events, obviously..*"
>
> *Music event, Security officer (Interviewee 10)*

As well as interviewee 1, suggesting that the responsibility falls to those who carry out health and safety risk assessments, should an accident occur as a result of their negligence.

> "*And then you are sort of covering the whole company when you're doing it as well. So it's your arse on the line..*"
>
> *Exhibitions, Ground staff (Interviewee 1)*

However, a number of stakeholders did not consider risk assessments to be the most accurate method of ensuring safety, with some suggesting that more adaptable approaches are advantageous, including interviewee 27:

"Despite being Event Director since 1990, there are always challenges on the day. In my personal view Risk Assessment is not really worth much when you are staging an event around public roads and 8.5 miles. You have to think on your feet and trust your judgement hoping you make the right decision. Above all the safety of everyone is paramount.."

Event coordinator, Race event (Interviewee 27)

5.3.3.4   Emergency evacuation

Stakeholder interviews suggest that large scale crowd events often work together with the emergency services, during their organisation and planning. Whereas, small scale crowd events, are often organised independently, and only call upon the emergency services as and when required during the event itself. For example interviewee 7 suggested:

"…at the moment my deputy has just gone off for a meeting with the emergency services, for a meeting for a large scale event that's going to take place in the future. And that has had a lot of planning.."

Security coordinator, Public order (Interviewee 7)

As well as interviewee 27:

"St John Ambulance and [company] are employed to provide medical cover on the day for both participants and spectators. If required the Air Ambulance is on standby.."

Event coordinator, Race event (Interviewee 27)

The main issue when discussing fire evacuation, was the importance of calculating maximum capacity to ensure the safe evacuation of crowd members in emergency situations (see also Capacity of an event, page 169). However, smaller scale crowd events did not appear to appreciate the importance of clear emergency evacuation procedures. A number of stakeholders appeared to suggest that outdoor events did

not require fire safety considerations, as all crowd members could escape easily from the danger. Interviewee 30 suggested:

> *"We have NO form of evacuation procedure. Its every man for himself. But we have a number of gates that you can open to let people out if the need arises.."*
>
> *Miniature railway events, Ground staff (Interviewee 30)*

Also interviewee 16 said:

> *"…that kind of venue is very low risk, because it's obviously outside. I mean it's literally a field. I mean you could pull people into the rugby pitch if you really needed to get people away from a specific area. I guess it's only really a bomb scare that would be the reason to get people out of that whole area. It's unlikely to be fire.."*
>
> *Event coordinator, Outdoor spectator events (interviewee 16)*

A number of stakeholders discussed human behaviour delaying fire evacuations, when designing the layout of crowd events. For example interviewee 12 suggested that fire marshals are trained to encourage crowd members to leave via their closest exit, as opposed to the entrance point they used:

> *"So we had to have a specific training plan for all of the fire marshals. To sort of look after the exhibitors, and make sure they went through the nearest exit, rather than the one that they thought they knew.."*
>
> *Event's organiser, Open day event (Interviewee 12)*

Training regarding panic reduction during emergency situations, represents a gap in the knowledge among stakeholders interviewed (4, 10, 12, 14, 17, 20, 21, 23, 26, 30, 32). The majority of stakeholders suggested panic behaviours would be dealt with by the paramedics. Security stewards mentioned that their training involves identifying crowd members suffering in a crowd (for example those experiencing panic), before ejecting such crowd members. For example interviewee 10 said:

> *"All the security.. they literally. It's very difficult sometimes, because people do panic, and get upset, and the security have to stand and try to see*

who these people are.. and then you've got the next issues of trying to get
them out of the crowd.."

<div align="right">

Music event, Security officer (Interviewee10)

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However, once ejected crowd members are referred to paramedics who then deal
with the panic. Moreover, police involved in stakeholder interviews said they aim to
separate crowd members intent on engaging in antisocial behaviour, but that
training in panic reduction within crowds, was not received. Interviewee 17 for
example indicated that it is the responsibility of paramedics to deal with panic:

"Generally I suppose you would just call the paramedics. If somebody
was not well. But if it was a big crowd and a big event, then there would
more likely to be a paramedic on site.."

<div align="right">

Police Community Support Officer, Public order (Interviewee 17)

</div>

Interviewee 23 also said:

"It is for people to be dealt with by our first aiders if they feel
panicked.."

<div align="right">

Health and safety, St John's Ambulance (Interviewee 23)

</div>

5.3.4 Public Order

Large scale crowd events that require a police presence benefit from the immense
body of experience and expertise within the police force (Table 13). Regular training,
and vast experience, highlights gaps in the knowledge of smaller scale events,
which do not benefit from the collaboration of a police presence. Small events
appeared to organise public order independently, calling on the police only when
issues arise during an event.

A number of stakeholders suggested that the type of crowd members attending an
event provide more critical information than the crowd member numbers attending.
For example interviewee 29 suggested:

"And that's from a legal point of view.. but actually you know, crowd
management, well it doesn't really matter how many people you have its

about what type of people… erm.. you know.. what type of event you're
actually doing determines the type of person who comes.."

Fireworks event, Event coordinator (Interviewee 29)

Table 13 Summary of stakeholder findings in relation to public order

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
Public Order	Staff	1, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 21, 24, 26, 27, 27, 28, 29, 30, 31, 32, 33, 35, 36, 37, 38	Challenging antisocial behaviour (7, 10, 18, 20, 21, 23, 24, 36, 37)	Understaffing (7, 10, 12, 14, 15, 17, 19, 21, 26, 27, 28, 29, 30, 35, 38) Polite (33, 35, 36, 37)
	Crowd control	1, 4, 7, 9, 10, 12, 14, 15, 16, 17, 18, 20, 25, 26, 27, 28, 29, 30, 31, 34, 36, 37	Crowd control (1, 4, 7, 9, 10, 12, 14, 15, 16, 17, 18, 20, 25, 26, 27, 28, 30, 31, 36, 37) Crowd management (29, 34, 36)	
	Monitoring crowd behaviour	4, 7, 12, 15, 17, 18, 19, 20, 21, 23, 23, 24, 27, 28, 29, 30, 31, 34, 35, 36	CCTV (4, 7, 18, 20, 21, 23, 24, 24, 36)	
	Police	7, 10, 14, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 33, 35, 36, 37, 38	Terrorism (14, 16, 25, 27)	
	Response to crowd behaviour	10, 18, 19, 20, 23, 24, 26, 33, 34, 37	Reactive (10, 20, 26) Proactive (18, 19, 20, 26, 34, 37) Proportionate (18, 20) Speed of response (18, 20, 23)	Flexibility (33)
	Segregation between crowds users	18, 19, 20, 21, 22, 24, 31,		
	Tactics employed	10, 18, 19, 20, 34, 36, 37	Police horses and dogs (19, 20)	

5.3.4.1 Staff

Staff employed within crowd events, and the presence of marshals, stewards and volunteers was an important issue identified during stakeholder interviews. One problem was the availability of resources, and problems associated with under staffing during an event (7, 10, 12, 14, 15, 17, 19, 21, 26, 27, 28, 29, 30, 35, 38). For example interviewee 28 said:

> *"If more people were employed then this could help, but as there are limited walkie-talkies etc then it might be a problem keeping in contact.."*
>
> *Ground staff, Music festival (Interviewee 28)*

Additionally, the importance of staff being polite to crowd users was only discussed in a small number of interviews (33, 35, 36, 37). Encouraging crowd members to follow instructions, and respect authority, was a major concern for ground staff (including: stewards, marshals, volunteers). Thus challenging anti-social behaviour is a priority, to encourage a positive atmosphere and prevent the escalation of negative crowd behaviours (7, 10, 18, 20, 21, 23, 24, 36, 37). Discouraging crowd members from smoking, swearing, racist chanting, drinking excessively, and obstructing the view of other crowd members, were issues of concern for ground staff, security, and the police. For example interviewee 20 suggested:

> *"And people are supposed to sit down in their seats.. but they don't. and that causes a lot of trouble as well really. And that's more in the early stages for the football club security to encourage them to sit, but there's a way of speaking to people and doing that, and if they do it wrong.. that can.. antagonise people as well.."*
>
> *Police sergeant, Public order (Interviewee 20)*

As well as interviewee 37:

> *"They can't stand up at the front. And if they insist on standing at the front, they're going to have to leave the ground…. We need to start building things up a bit, because next year we're going to have a ZERO tolerance.."*
>
> *Security football event (Interviewee 37)*

Moreover, interviewee 36 suggested:

> *"Different personalities of the stewards. Like see some are good at showing people to their seats.. (timid, and polite). But you wouldn't put them up at the front here, by the pitch. Cos people would get past them. Whereas no one's going to try and get past a huge guy are they?"*
>
> *Football steward, Security (Interviewee 36)*

Such findings suggest that personality, manners, and behaviours, communication, and diplomacy of ground staff, each play a role in controlling antisocial behaviour, and dealing with negative incidents. Additionally, a number of stakeholders suggested that respect for authority was an indicator of crowd member intent to cause trouble within crowd events. As highlighted during interviewee 7:

> *"The first indication we've got that something's amiss, is if there's significant number of people who were quite clearly very anti-authority. And do not take instruction or guidance in any constructive way whatsoever.."*
>
> *Security coordinator, Public order (Interviewee 7)*

Moreover, the manner in which ground staff communicate with crowd members, and willingness to assist, were issues said to be of concern, including interviewee 33:

> *"…we would ask all of our staff members to be polite and willing to help anyone with specific needs.."*
>
> *Event organiser, Art gallery (Interviewee 33)*

5.3.4.2   Crowd control

Maintaining crowd behaviour was described as *'crowd control'* (1, 4, 7, 9, 10, 12, 14, 15, 16, 17, 18, 20, 25, 26, 27, 28, 30, 31, 37) on more occasions than '*crowd management'* (29, 34, 36), with a total of 19 stakeholders using the word '*control'* to describe crowd strategies. Including interviewee 10:

> *"…they would do that.. and look at how they're going to do the crowd control plans.."*
>
> *Music event, Security officer (Interviewee 10)*

5.3.4.3 *Monitoring crowd behaviour*

The control room was described by a number of stakeholders as the hub of the event organisation, from which crowd user behaviour could be monitored (4, 7, 12, 15, 17, 18, 19, 20, 21, 23, 23, 24, 27 ,28, 29, 30, 31, 34, 35, 36). However, only large scale events had the financial capability for a control room. From the control room crowd behaviour was monitored using binoculars, Close Circuit Television cameras (CCTV), and radio communication between security on the ground, and individuals from each team within the control room. For example interviewee 20 suggested:

> *"And you'll have a control room where the people who are in control of the ground security, will be there and are working with the person in charge of the police security, and it will all be on camera.."*
>
> *Police Sergeant, Public order (interviewee 20)*

Stakeholders involved in crowd management, and public order discussed different methods of monitoring crowd behaviour, primarily using CCTV to detect problem areas, and changes in movement of the crowd, and the emergence of negative behaviour. CCTV was used to detect and prove antisocial behaviour within crowd events, as seen during interviewee 20:

> *"Now.. in more modern day football grounds……. there are much better CCTV coverage.. all around the stadium.. and the concourse areas.. underneath the stadium, where there are bars and cafes.."*
>
> *(Police sergeant, Interviewee 20)*

And also interviewee 21:

> *"We've got warning that everything is being recorded on CCTV. So that if there is any problem, and they do cause trouble, then we can pinpoint it. With the cameras.."*
>
> *Security trainer, Security (Interviewee 21)*

CCTV was also used to monitor activity within car parks, and to deter thieves from operating, as described during interviewee 7:

> *"Erm.. and what we will do is, we will fill a particular car park, and then when we've got it full we can monitor it with staff, and we can monitor it with CCTV.."*
>
> *Security coordinator, Public order (Interviewee 7)*

5.3.4.4   Police

Anti-social behaviour was an issue expressed during stakeholder interviews, with alcohol and violence being of particular concern amongst stakeholders, as well as the presence of drugs, smoking, and swearing (7, 10, 14, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 33, 35, 36, 37, 38). Every stakeholder from the public order domain mentioned alcohol as causing greatest concern during crowd events, primarily over consumption, and resultant violence. For example interviewee 10 suggested:

> *"My main problem areas are… errrrrm.. students wise 18+ years… alcohol.. the amount they drink and the way they behave. And in a crowd situation it causes a lot of issues.."*
>
> *Music event, Security manager (Interviewee 10)*

The banning of alcohol in seated areas of stadia was evident during football events for example, but not rugby, or music events. As suggested by interviewee 21:

> *"So people are allowed to drink alcohol in the concourse areas, but they're not allowed to bring it out. They are not allowed alcohol over the yellow line.. so we have to have a steward here.. to stop them coming out. But we don't allow any alcohol in viewing of the pitch.. which is standard at most pitches.."*
>
> *Security trainer, Security (Interviewee 21)*

Despite the incidence of antisocial behaviour associated with alcohol, complete removal of alcohol at football events was not mentioned as an option, primarily due to financial profits gained through alcohol sales. For example during interviewee 24:

> *"Well they won't stop selling alcohol altogether, they make too much money from it.."*

Police involved in interviews discussed organising events based on previous events, behaviours and incidents that occurred at similar events. Together with specific intelligence surrounding the event in hand, and expected crowd members. The police maintain a clear structure, involving '*spotters'*, and '*evidence gatherers'*, to predict and monitor crowd member behaviour. Moreover, police records log the history of antisocial behaviour incidents surrounding different crowd events, (football matches, and music festivals for example), recording crowd members who display a *'hooligan element'*, or *'a group of drinkers'* (Public order, Interviewee 18). Such information is then used to aid the planning and organisation of subsequent events. However, such information did not appear to be disseminated to smaller scale events with no police presence. One stakeholder suggested:

> *"If I get information, or intelligence, indicating that a certain group are attending, and they're seeking disorder.. that's easy then isn't it. I'm thinking, there's going to be a planned flight.. and it's going to involve this many people.. therefore I need this many police to prevent that.."*
>
> *Police Chief Superintendant, Public order (Interviewee 18)*

Vignette

A 60 year old male operations manager, involved in spectator events (primarily outdoor spectator football events), described methods of dealing with crowd users who break the law during football events. Tasks include observing individual behaviour from the control room, liaising with the police, and communicating information to the head stewards.

> *"The police spotter will identify the individuals who need to be removed. Then when they move during half-time, the police may try and remove them (at which point they pass through the custody suit, to gain personal information, before being ejected, to the police station). When caught, the individuals get a ban from attending the games. Also, if any football fan is arrested, they are banned from attending any international football events.."*
>
> *Operations Manager, Security (Interviewee 36)*

This illustrates systems used for recording information on individual crowd users, in order to prevent incidents occurring during future crowd events.

Vignette 3 Methods of dealing with crowd users who break the law during football events

5.3.4.5   Response to crowd behaviour

Stakeholders stressed the importance of adopting '*proactive*', '*flexible*', and '*proportionate*' responses to managing and controlling crowd behaviour (10, 18, 19, 20, 23, 24, 26, 33, 34, 37). However, health and safety professionals appear to believe that reactive perspectives are still evident in crowd safety standards. One major concern during stakeholder interviews was to adopt a *proactive* approach (18, 19, 20, 26, 34, 37). However, a number of health and safety professionals suggested that the current health and safety legislation takes a *reactive* perspective, altering methods and standards prior to crowd disasters (10, 20, 26), as opposed to dealing with issues before they arise. For example interviewee 26 suggested:

> *"The reason it's all seated is because in ninety odd people lost their lives at Hillsborough.. it isn't because they wanted to do it.. it's because we've actually proven that the grounds wasn't safe because of those things.."*
>
> *Health and Safety, British Standards Institute (Interviewee 26).*

Such findings suggest that stakeholders believe it is important to adopt a proactive approach to managing crowd events, but may not always achieve such ideals.

Another priority expressed during stakeholder interviews was to ensure that the level of response to crowd behaviour was *proportionate* to the crowd behaviour being observed (interview 18, 20). An issue identified during interviewee 18:

> *"In terms of the stewarding numbers you always try to get a proportionate response, because you don't want it to look heavy handed. Because the idea is that as tension goes up, the number of people that we use in the segregation areas goes up. As tension comes down.. you know you have the minimum number in there.."*
>
> *Police Chief Superintendent, Public order (Interviewee 18)*

However, *flexibility* was an issue discussed during just one of the stakeholder interviews, which could represent a possible gap in knowledge (interview 33):

"Flexibility is a priority, and to avoid problems during the evening, all staff will need to think on their feet.."

<div align="right">

Event organiser, Art gallery (Interview 33)

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The *speed of the response* was also an area of concern amongst stakeholders involved (interview 23, 18, 20), with a number of stakeholders suggesting:

"If things go badly suddenly.. you know you've got a very different atmosphere that you're policing, and it can change very very quickly.. very quickly. You know I have always said that the name of the game with public order policing is Anticipation. You know, its anticipating what could happen.."

<div align="right">

Police Chief Superintendent, Public order (Interviewee 18)

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5.3.4.6 Terrorism

The issue of threats of terrorism within events involving large numbers of people was discussed during stakeholder interviews (7, 14, 16, 25). A 28-year-old male architect, involved in the physical environment of crowd venues stressed the importance of designing in factors to prevent against such risk factors:

"..the planning department has to assess the building on 'Crowded Places: The Planning System and Counter-Terrorism' (I am not sure of the correct title) as this is real problem in recent years and the government wishes to place measures to control the vulnerability of buildings with a large number of people.."

<div align="right">

Architect, Physical environment (Interviewee 25)

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Additionally a 63-year-old male security manager involved in spectator events (music), described a government initiative introduced to combat the issue of threats of terrorism within crowd events.

"But the government's main thing now for crowds.. is the crowded spaces agenda. Basically looking at reducing the threat from terrorism. Protect, prevent….. It was about designing out to prevent.. or designing in things, to prevent terrorist atrocities.."

<div align="right">

Security Manager, Public order (Interviewee 7)

</div>

5.3.4.7   Segregation between crowd users

Segregation within crowds was a key issue during stakeholder interviews (18, 19, 20, 21, 22, 24, 31). Stakeholders discussed the separation of crowd members with different priorities, primarily sporting events, involving opposing teams. For example interviewee 20:

> *"And they've got a role of containing people, and segregating them. And perhaps even, if they're not complying with the rules of the premises.. removing them. They can eject them, but then if they commit criminal offences, then the police have to deal with them.."*
>
> *Police sergeant, Public order (Interviewee 20)*

And interviewee 18:

> *"….it's about filtering.. in certain pubs.. to make sure that you've got the risk group in there. As opposed to normal jo-public who're not any risk or threat to anybody.."*
>
> *Police Chief Superintendent, Public order (Interviewee 18)*

5.3.4.8   Tactics employed

The police in particular discussed tactics used to monitor and manage behaviour in crowds, including the use of police horses, and dogs. Police horses were said to be used to gain a heightened view over crowd users, as shown during interviewee 20. Moreover, the horses could be used to manipulate the movement of crowds, and prevent access.

> *"And from the position of the people riding them.. they're very high up, so.. because they are four foot above the other officers, and can see exactly what is happening.."*
>
> *Police Sergeant, Public order (interviewee 20)*

Additionally, police dog units were used as a preventative tactic to manipulate the movement of crowds, and prevent aggressive crowds from entering certain areas. Such methods are also said to be used to '*kettle'* crowd members, and prevent crowd members leaving certain areas. For example, during football matches,

different supporters were kept separate and monitored, during which time dogs were used to ensure that crowd members stayed in one area, where they could be observed to prevent negative behaviour escalating. As described during interviewee 20:

> *"So the idea was that people did not get too close to the crowd…….we used to keep the dogs in the vehicle.. perhaps with the back of the van open and then they could be a deterrent as in being heard.. and as in.. could be removed from the back of the van if things got out of hand.."*
>
> *Police sergeant, Public order (Interviewee 20)*

5.3.5 Communication

Stakeholders reported a number of issues surrounding planning methods of communication during crowd events (Table 14). The communication of information and ideas between stakeholders (and to crowd members), is important to the success of a crowd event.

Table 14 Summary of stakeholder findings in relation to communication

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
Communication	Information planning	4, 7, 8, 9, 10, 12, 13, 14, 15, 16, 20, 21, 24, 26, 27, 30, 30, 36, 37, 38		Sharing of information (4, 7, 8, 9, 10, 12, 13, 15, 20, 24, 26, 30) Usability of information (8, 15, 26, 27, 37, 38) Awareness of information available (10, 14, 15, 16, 20, 21, 26, 30, 36, 37) Successes and failures were not discussed between stakeholders
	Guidance	3, 4, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 22, 25, 26 27, 29, 30, 31, 34, 36, 37, 38, 41	Followed for legal compliance (3, 4, 8, 10, 12, 14, 16, 18, 22, 25, 26, 27, 29, 36, 38) Regulations (11, 25, 26) Followed to ensure standards are met (3, 4, 10, 14, 15, 16, 22, 26, 30, 34, 37)	Lack of guidance for small scale events. Guidance (usability and availability) Unaware of guidance available, or standards in place. Lack of guidance (13, 17, 29, 31, 38)

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
	Communicating information	1, 4, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 17, 20, 23, 24, 25, 26, 27, 28, 30, 32, 37	Use of radio communication (1, 8, 17, 20, 24, 28)	Breakdown in communication (14, 15, 17, 20, 24, 32) Language barriers (1, 7, 9)
	Signage	1, 4, 5, 7, 8, 13, 15, 16, 22, 23, 26, 27, 28, 28, 30, 31, 32, 33, 33, 34, 38	Placement of direction markers (1, 5, 7, 8, 13, 15, 23, 28, 30, 32, 34, 38) View information / clarity (23, 32, 34, 38) Text size (4, 21, 22) Strategies (4, 28, 30, 32, 38)	Disregard for developing effective, and efficient signage
	Wayfinding	1, 5, 7, 8, 12, 12, 15, 17, 18, 23, 27, 30, 31, 32, 38	Advanced warning of event. Logistics	Map availability (5, 8, 17, 30)
	Meetings (briefings and debriefs)	4, 6, 7, 8, 9, 15, 17, 20, 21, 28, 31, 33, 37	Negotiation Focus on health and safety concerns	Lack of evaluating ideas / Lack of feedback from crowd member experience / Debriefs determined by the size of the event, level of antisocial behaviour, police

5.3.5.1 Information and guidance for planning crowd events

The availability and usability of guidance to assist the planning of crowd events, was an issue raised across stakeholder interviews (3, 4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 24, 25, 26, 27, 29, 30, 31, 34, 36, 37, 38, 41). One key issue that became apparent throughout stakeholder interviews was the lack of guidance available for developing a comfortable environment for crowd members, to improve the user experience of crowds (13, 17, 29, 31, 38). For example interviewee 38 said:

> "I feel we need a more structured approach for the main preparations on the day before the race – usually everything gets done, but sometimes more by luck than organisation.."
>
> Participatory race event, Event coordinator (Interviewee 38)

Moreover, the usability of current guidance available surrounding crowd events, was questioned by a number of stakeholders (13, 17, 29, 31, 38), with interviewee 15 suggesting:

> *"I mean if you look at some of them on the internet, it's reams and reams of paper. And it's just information overload, that probably no one would ever take any notice of, or read, or whatever. Or even if they did know where it was they probably wouldn't read it all.."*

> *Health and Safety Officer, Health and Safety (Interviewee 15)*

A number of stakeholders suggested not being aware of certain recommendations for events. guidance concerning adequate numbers of toilet facilities for example, during interviewee 1:

> *"But there's no determined amount [of toilets] or anything, I don't think.."*

> *Exhibitions, Ground staff (Interviewee 1)*

Stakeholders also suggested that guidance was not required, and that a system of asking for information worked better than providing a document of information for stakeholders to read. For example interviewee 15 suggested:

> *"So we've taken the view that we have this informal system in place now, where people know that when there's an event that they want to run an event, that they should contact us. Even small events.. I mean, for instance the careers fair. Regularly held.. they use the same buildings.. they sometimes have different little events going on.."*

> *Health and Safety Officer, Health and Safety (Interviewee 15)*

Moreover, interviewee 29 suggests that there is no exact guidance that is suitable for all crowd events, thus making guidance difficult to document and use:

> *"Judging the actual method of saying.. oh it's, you know, 1000 people, that's 3 people. 2000 its 6 people. But there is no linear scale.."*

> *Fireworks event, Event coordinator (Interviewee 29)*

And finally, one stakeholder mentioned The Green Guide (2008) for sports stadiums, when discussing the design of crowd venues:

"So we feel that we have built what is a stadium that is at a standard of football stadium. It complies with all the Green Guide predictions. (4th edition).."

Stadium architect, Physical environment (Interviewee 22)

Standards and guidance are available from a health and safety perspective, and although health and safety experts appeared fluent in reciting standards, stakeholders involved in the organisation and coordination of crowd events did not appear to utilise the guidance available surrounding crowd events. Interviewee 14 said:

"We normally look at corridor widths.. always being a minimum of 1.1 meters.. which allows wheelchairs, very good access. Wheelchair access can be reduced right down to 850mm we normally work on 1.1 so you've got plenty of movement.."

Health and safety officer, Fire officer (Interviewee 14)

Additionally, stakeholder interviews identified a lack of feedback from crowd members, from which to improve subsequent crowd events. With only three stakeholders indicating that feedback was gained from crowd members, including interviewee 12:

"We do ask for feedback afterwards.. but I can't think of anything that has been brought about of it being too crowded.."

Event's organiser, Open day event (Interviewee 12)

Thus, it might be suggested that stakeholders, primarily organisers, and coordinators strive to gain feedback from crowd members, in order improve the user experience of crowds.

5.3.5.2   Communicating information between stakeholders

Communicating information between stakeholders was an issue discussed throughout stakeholder interviews (1, 4, 7, 8, 9, 10, 12, 13, 15, 16, 17, 20, 23, 24, 25, 26, 27, 28, 30, 37). However, interview findings appear to show a lack of

appreciation for the importance of sharing information within an organisation, and between different stakeholders (14, 15, 17, 20, 24, 32). As stated by interviewee 26:

"And I think that was a problem with lots of events going on at the same time.. but the events don't communicate with each other.. like maybe where they had problems.. or where to improve.. or.. they didn't seem to have a set number of toilets for the set number of people. They seem to just do a bit of guess work."

Health and Safety, British Standards Institute (Interviewee 26).

Additionally interviewee 14 suggested:

"And sometimes I come in here and there are events going on that I have not been made aware of.."

Health and safety officer, Fire officer (Interviewee 14)

For example, within a large UK university involved in research, there were a number of large events being organised throughout the year, each with a different purpose, but each involving similar issues, concerns and organisation. Yet, due to a lack of communication between different departments within the UK University, issues of concern, and solutions to previous problems, were not transferred between departments. As stated during interviewee 26:

"Well if you've got the university.... you could have an athletics meeting.. a big rugby match, and a swimming event.. and the cricket event.... And they all turn up at the same time.. on the same weekend.. because they don't communicate."

Health and Safety, British Standards Institute (Interviewee 26).

Furthermore, from a health and safety perspective, numerous events could have been scheduled to occur simultaneously, due to a lack of communication. Under such circumstances, facilities (car parking, toilets for example) may fail to meet demand for the numbers of visitors.

Such issues highlight the importance of having structured systems in place to ensure communication, and the transfer of information. The UK University (involved in the research) trusted a 'word of mouth' approach to ensuring events were

discussed with the health and safety department. Organisers were *asked* to provide information surrounding the event, and subsequently complete a risk assessment prior to the event. Such information was then checked and logged by the health and safety department. However, had an event organiser failed to communicate with the health and safety department at the university, no risk assessment would have been completed.

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Vignette

A 57-year-old male health and safety officer, involved in a variety of events within a large UK university, including both indoor and outdoor spectator events (music, sporting), conferences and exhibitions, participatory race events, and commercial events. Areas of expertise included risk assessments, and maintaining health and safety standards.

> *"So we've taken the view that we have this informal system in place now, where people know that when there's an event that they want to run an event, that they should contact us. Even small events.. There's this relationship that we've managed to create, with everyone who runs events, erm, that they contact us if they want any information, and they keep us informed of what's going on. And we get information about all events on a weekly basis anyway, through [information board]. So we know exactly what's going on. If there's anything of interest that we haven't heard about, then we'll get hold of the people organising it but that's rare now. Because certainly over the 3 years that I have worked here we now have this relationship with various people, who run these types of events. Erm.. and it seems to work.."*
>
> Health and Safety Officer, Health and Safety (Interviewee 15)

This account indicates how health and safety issues are sometimes managed on the basis of trust, as opposed to following stringent guidance, and surveillance to ensure compliance.

</div>

Vignette 4 Informal health and safety systems

However, a second health and safety officer (Interview 14), did not appear to hold such faith in the current system. Suggesting that the current lack of a structured system, was inadequate, and did not ensure that all events were communicated with health and safety, before going ahead.

> *"Erm.. I don't think at the moment there is a central point as an event coordinator.. organiser who knows what is going off in each building, and how many events are going off in each building at any one time. That I think is still a bit open-ended.. and not really managed as I think it should be. I mean my personal view at the university is that there should be someone*

who manages that role. That they control everything.. everything has to come through them.."

<div align="right">*Health and safety officer, Fire officer (Interviewee 14)*</div>

5.3.5.3 Breakdown in communication

Breakdown in communication, and a lack of systems for sharing information between departments of a large UK university, contributed to a major incident, as the security had not been made aware of the act playing at the union, and the antisocial behaviour of crowd members at previous performances.

Moreover, interviewee 7 revealed that:

> "...basically the whole structure, we can communicate events. Now this goes back a few years.. when we had that unfortunate event……. And the post-mortem (if you'll excuse the term), on that event, rose a number of questions……...There was no coordination…. and no one person knew what events were taking place.."

<div align="right">*Security coordinator, Public order (Interviewee 7)*</div>

And finally interviewee 15 said:

> "That was a simple breakdown in communication. The events coordinator didn't speak to this person about it.. that person obviously didn't know about it so didn't pass on any information.."

<div align="right">*Health and Safety Officer, Health and Safety (Interviewee 15)*</div>

Radio communication used in a number of the events (1, 8, 17, 20, 24, 28), to distribute information between staff during the event, consistently within crowd events with a police presence. Walkie-talkies were used in lower budget events, along with megaphones to disperse information to crowd members, and control the crowd. For example interviewee 28 said:

> "If we were unable to control the big crowd.. using megaphones to shout directions helped.."

<div align="right">*Ground staff, Music festival (Interviewee 28)*</div>

Yet if the information is not filtered through to a central figure, confusion may occur. Large crowd events with a police presence had a control room available, to which all information was communicated, and coordinated throughout the event. The availability of a central point of communication appears to be beneficial to the organisation of the crowd.

Additionally, language barriers were a concern (1, 7, 9), with interviewee 9 suggesting:

> *"Yeah.. no.. it's a fantastic event. It's a nightmare organising it.. cos you're dealing with so many different cultures.. and languages. And they don't always understand you.."*
>
> *Event organiser, Students union (Interviewee 9)*

However, interviewee 7 showed motivations to improve the situation:

> *"All of my staff have been on rudimentary Japanese lessons. Not brilliant, but it's a start. They can all count to 10, and they can all say welcome to ********.. if they've got the book there anyway.."*
>
> *Security coordinator, Public order (Interviewee 7)*

5.3.5.4   Signage

It is important that crowd members understand how to get to an event, and have sufficient signage to navigate around the venue. Signage was discussed throughout a large number of stakeholder interviews (1, 4, 5, 7, 8, 13, 15, 16, 22, 23, 26, 27, 28, 30, 31, 32, 33, 34, 38). However, confusion surrounding way finding, was accepted as a problem inherent to crowd event organization. For example interviewee 21 suggested:

> *"The signs are really big and clear.. but people still get lost though.."*
>
> *Security trainer, Security (Interviewee 21)*

Also a 55-year-old female Postgraduate Career Development Coordinator, involved in the organisation of academic conferences and exhibitions, described her disregard for developing effective, and efficient signage.

"Well we do all that (signage).. But they still get lost.."

Event Managers, Open day event (Interviewee 13)

Such findings suggest a gap in understanding surrounding the importance of developing intuitive signage, and way finding systems within events. Few stakeholders were concerned with overcoming shortcomings and achieving improvements. For example, when signage failed, and crowd members were unable to find their desired destination, stakeholders did not express concern. Stakeholders appeared to feel that they had done all they were required to do in providing signage, and that failure lay with the crowd members themselves. Stakeholders did not appear to realise, or accept that if crowd members are unable to find their way during crowd events, signage could be inadequate, and require amendments. For example interviewee 23 reveals:

"This place is like a maze! Especially on your first day. But then I still get lost now. What with the numbering and lettering. V1-14 etc… it's just confusing. It's easier to just say.. right.. take me there! It's not clear.."

Health and safety, St John's Ambulance (Interviewee 23)

5.3.5.5   View information signage

However, there appeared to be a lack of knowledge surrounding the placement of information, and signage, to ensure clear viewing areas. With few stakeholders referring to standards for layout (4, 32, 34, 38).

"They kind of give a like 4m in front of the ticket office window for viewing space.. so you then kind of have to kind of… on the actual physical flat 2D diagrams.. we kind of.. just literally marked out.. like on scale drawings.."

Human Factors Engineer, Physical environment (Interviewee 4)

The placement of signs to reduce congestion caused when viewing signage, was an issue discussed by a number of stakeholders. Particularly those involved in the design of transportation hubs, and the organisation of art galleries. For example interviewee 4 suggested:

> *"People are going to congregate in front of those to view them. And so you want to make sure that that group of people aren't standing in a main throughway. Because obviously then you're going to get all of the issues with people.. like movement and blocking and stuff……. So we worked out the kind of viewing cone, of where people would stand to view them.. because obviously people can't stand right underneath them but a little bit back.."*
>
> *Transportation, Physical environment (Interviewee 4)*

Such insight suggests that those responsible for the physical environment have high regard for, the careful arrangement of signage. Conversely, other stakeholders dismiss the issue, suggesting a gap in knowledge surrounding the importance of signage. Lack of signage strategy with some stakeholders, particularly during small events. Such issues require attention, amendments, and improvements, yet stakeholders must be aware of such requirements, before attention will be given to signage strategies. Additionally interviewee 34 identified methods of reducing congestion, and preventing bottlenecks:

> *"The placement of interpretation and artwork is essential in reducing the potential for bottlenecks. For example, placing an information panel or exhibition timeline at the entrance to an exhibition will encourage visitors to gather and may create a visitor flow issue. Good signage and interpretation will encourage visitor to behave in a predictable way and make the experience more enjoyable for the visitor and more manageable operationally.*
>
> *Event coordinator, Art gallery (Interviewee 34)*

Such stakeholders take responsibility for signage, accepting that the specific placement of signage, impacts crowd member behaviour. Thus, failure for crowd members to follow signage, and find their way, stems from inadequate signage strategies. However, a number of crowd organisers and coordinators failed to appreciate their role and responsibility surrounding signage.

5.3.5.6   Text size

Consideration is given to establishing the optimum text size for signs (4, 21, 22),

including interviewee 4:

> *"So we just looked how the effect of text size effects where people are going to stand as well. Yeah.. so it's all like where we'd put… because you'd have to consider queues and things like that as well.."*
>
> *Transportation, Physical environment (Interviewee 4)*

Additionally, interviewee 22 highlighted the large size signage within stadium design, used to ensure that signs are clearly visible to all crowd members. Such issues could be used in temporary signage also.

> *"Yeah well I mean we spent quite a lot of time on the signage. The first proposals we had on signage were over the top. There were too many signs. So we enlarged and cut down the number of signs that we needed.."*
>
> *Stadium architect, Physical environment (Interviewee 22)*

5.3.5.7 Temporary and fixed signage

Close attention was paid to signage in purpose built venues for one particular event, (for example football stadium design). Although football stadia are used for alternative crowd events, including rugby matches, corporate events, and music concerts, the fixed signage focuses on the main event of football, and may therefore provide contradictory information to crowd members. Whereas, less regular crowd events, held in venues that are built for many different purposes appear to pay less attention to signage. Temporary signage, does not receive the same level of research and detail, as fixed signage. One steward for example, discussed the difficulties in allowing rugby events to be held at football stadiums. For example interviewee 36 said:

> *"And the trouble is they will say.. 'Well I came here last week, and I could walk anywhere..' And I'm like, well I'm sorry.. that was the rugby rules.. this is football. And that can be quite difficult.."*
>
> *Football steward, Security (Interviewee 36)*

One exception being, the placement of safety signs (fire exits for example), which are regulated depending on the building design, and irrespective of the crowd event

being held. However, problems were seen when crowd organisers attempt to cover up safety signage, in order to alter the appearance of the venue. For example interviewee 15 suggested :

"But we had issues with er.. they put drapes around the walls, to cover the fire signs for a start. So we had issues with the fire signs.. and visual warning signs. And things like that.."

Health and Safety Officer, Health and Safety (Interviewee 15)

Such issues highlight discrepancies between safety, and aesthetics, within crowd events.

5.3.5.8   Signage strategies

Few stakeholders discussed strategies in dealing with signage (4, 28, 30, 32, 38). One stakeholder mentioned walking around the different routes that crowd members might take, to determine where to place signs. For example interviewee 32 said:

"But we walk around.. and **** my colleague takes some notes.. and says right.. we need a sign here. And that says session room 2 and 3, and then another sign as you get up the stairs to say session room 4 and so on…. So you do have to walk it through, as if you were a delegate.."

Event organiser, Conference (Interviewee 32)

Moreover, it is important to be able to see the next arrow at any point, with marshals present to aid the signage, and remove confusion, as seen during interviewee 38:

"The race route itself is marked out with stakes, tape, direction arrows and kilometre boards – the general philosophy to the positioning of these is that at any point a runner should be able to see the next direction arrow or distance marker. Marshalls are also positioned at key points along the route.."

Participatory race event, Event coordinator (Interviewee 38)

Additionally interviewee 30 reveals:

> *"And we have the red and green lines.. and there is a big red bar over one line.. and a big green bar over the other queue.. but people don't see it. They have no idea.. so I have to lean out of the window and say.. you see that huge sign up there.."*
>
> *Miniature railway events, Ground staff (Interviewee 30)*

Organisers must develop strategies to assist with signage and way finding. However, the issue currently requires attention, and is often somewhat dismissed.

5.3.5.9 Wayfinding

A number of stakeholders discussed the distribution of information to assist with way finding to an event (1, 5, 7, 8, 12, 12, 15, 17, 18, 23, 27, 30, 31, 32, 38). The dispersal of emails and posters for example, as suggested during interviewee 13:

> *"You should get a joining email that tells you where the room is. Gives you any details.. ****** put up notices. Most of our regular events are in their main training room. When they're anywhere else we get little A4 sheets that we stick around to direct people.. erm… [sigh] not always so successfully.."*
>
> *Event Managers, Open day event (Interviewee 13)*

Additionally, way finding was a major area of concern in event planning. For example interviewee 1 said:

> *"Erm… the only things that you usually find is that you.. if you've got so many people that you look after, you're taking them from like a conference area.. to. To.. like an area where all the catering is.. you start to lose people and people start wandering off.. but thats the only thing you really start to notice at that sort of thing.."*
>
> *Exhibitions, Ground staff (Interviewee 1)*

Also interviewee 8 said:

> *"And we weren't using every building, but you did need to get people around. So that was quite challenging because I think the bit of the campus that we decided to use isn't.. is not as simple actually. And it was just getting people to make sure they didn't go the wrong way. So I suppose really that was about signage, and that was about marshalling.."*
>
> *Outdoor event, Event's organiser (Interviewee 8)*

And also interviewee 12:

> *"The biggest headache for me is just the logistics… With 7,000 people we have to have a plan to move them around…….. So yes it's kind of a you know.. a military procedure you know. To try and organise where people are going at what time and how.."*
>
> *Event organiser, Open day event (Interviewee 12)*

The previous experience of stakeholders was expressed as important in developing clear signage and information, for example interviewee 12 said:

> *"Luckily I've done it for a couple of years now so I kind of know what's going on. But at first glance you think.. 'WOW.. it's never going to happen!!' People will just be all over ***** and get totally lost.."*
>
> *Event organiser, Open day event (Interviewee 12)*

5.3.5.10 Meetings (briefing and debriefing)

From the stakeholders interviewed, briefings, and debriefs appeared to focus on health and safety issues primarily (4, 6, 7, 8, 9, 15, 17, 20, 21, 28, 31, 33, 37). With stakeholders from public order and health and safety perspectives, discussing the importance of briefings, and debriefs surrounding an events, more than any other stakeholders. For example interviewee 6 said that health and safety was the focus of briefings:

> *"Erm.. briefings, and training sessions in terms of what to do if, in the case of a fire. Any sort of other issues as well. And we walk the course and*

tell them where everything is, where all the exits are… all the erm.. fire drill places are. And, everything they need to know. And that has been erm. I have been guided on how to do that by our hazard, and health and safety department…"

<div align="right">*Event organiser, Open Day event (Interviewee 6)*</div>

As well as interviewee 33 suggested:

"At the next event all staff will be briefed in advance on how to deal with fires and emergency evacuation, with a team responsible for each floor.."

<div align="right">*Event organiser, Art gallery (Interviewee 33)*</div>

Fire safety and evacuation procedures in particular, do appear to take precedence in team, and event briefings.

Additionally, the discussion of debriefings after an event, to discuss concerns, and areas of success for the next event appeared to be limited (15, 18, 20, 40). The police appeared to utilise debriefs well, but not within all events. However, debriefs appeared to focus on police involved in crowd events, at the top of the hierarchy, whereas information and feedback from ground staff (police constables, and police community support officers), could be lost due to a lack of debriefing. Moreover, debriefings appeared to be determined by the size of the event, or the level of antisocial behaviour experienced. For example interviewee 20 suggested:

"At the end of the match you had to have a debrief if there were any issues raised. And if there were a lot of issues they would get everybody together for that but if not they would just do it in their individual support units.."

<div align="right">*Police sergeant, Public order (Interviewee 20)*</div>

Furthermore, the size of an event appeared to determine whether or not meetings, briefings and debriefings would occur.

During large high profile events requiring a police presence, in which case the police would organise the structure of the entire event, and coordination between stakeholders. As stated during interviewee 15 said:

"So now on a regular basis we get risk assessments from them.. we look at them, we check them, we comment on them. Have meetings, and er that's how we manage the events…"

Health and Safety Officer, Health and Safety (Interviewee 15)

However, stakeholders do appear to think about the importance of debriefings, but may not always follow the good intentions through once the crowd event has finished. For example, interviewee 33 stated that:

"We hope to go run through each event afterwards to decide on any changes for the future.."

Event organiser, Art gallery (Interviewee 33)

Vignette

A 63-year-old male security manager involved in organising security within various events, including: spectator events (music, sporting), conferences and exhibitions, participatory race events, and commercial events, described the scale of planning involved.

"Erm.. typically, we have a planning meeting. Usually the police coordinate these things, which invariably is a meeting here with them. In which they tell me, what's intended, who's coming. And then we'll work out what's required. .."

"Right.. it depends on what it is.. for a meeting for a large scale event that's going to take place.. that has a lot of planning. And in fact this is a planning visit, for a lot of people, who have never been here before. Just to have a look around, and get a feel for it…"

Security Manager, Private security (Interviewee 7)

Vignette 5 Planning involved in crowd events organisation

Therefore the event organiser hopes to have an event debrief, however, with no organised debrief, the event could go ahead with no follow-up evaluations. However, there appears to be a lack of evaluation of ideas, and practices within crowd events. Although debriefs were utilised in a number of the stakeholders interviewed, information from all stakeholders could be lost along the hierarchy through a lack of evaluation, and feedback loop. For example, Interviewee 17 suggested:

> *"We didn't have a debrief no.. but we did raise it with the sergeant.. but I doubt anything would have come of it.."*
>
> *Police Community Support Officer, Public order (Interviewee17)*

Information from crucial stakeholders in crowd events could be lost due to a lack of evaluation, and feedback from the ground staff, to the organisers, and those responsible for the physical environment of crowd events.

Vignette

A 26-year-old female Human Factors Engineer working in the transportation sector, described her frustration surrounding the lack of evaluation of ideas when designing transportation hubs (for example train stations). When asked "*Once you've finished doing the project.. do you go back once its completed to evaluate the work..?*" Interview 4 indicated:

> *"It depends really.. I mean sometimes yeah. I mean literally that project still hasn't got any further than when I left it. It could literally take years and years and years for a brand new station to get the go ahead to be built.. and actually be functional….. But you do go back after kind of, they've all been commissioned. And kind of like check that everything is as it should be.. And see if there's any issues. Just general issues with the passengers.."*
>
> *Transportation, Physical environment (Interviewee 4)*

Thus, evaluation could be lost, due to the long process, and time involved in the venue design process.

Vignette 6 Frustrations with the lack of design evaluation (train stations)

Additionally negotiation between stakeholders was expressed as a problem for those involved in venue design in particular. The negotiation between those responsible for the physical environment, organisers, and consumer desires, together with the financial constraints, in order to create a desirable venue for all stakeholders. For example, interviewee 25:

> *"My work normally consists of negotiation and communication with a client to obtain their desired design and scheme.."*
>
> *Architect, Physical environment (Interviewee 25)*

In addition interviewee 4 reiterated negotiation difficulties:

"The things that architects and stuff don't really understand. Everyone has a completely different way of looking at things.. and everyone thinks that their way is the best way.."

Transportation, Physical environment (Interviewee 4)

5.3.6 Physical environment

Considerations surrounding the layout of a crowd event and the design of a venue are crucial in planning a successful event (Table 15). Particularly the positioning of crowd members, and seating within spectator events.

Table 15 Summary of stakeholder findings in relation to the physical environment

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
Physical environment	Layout	1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 23, 24, 26, 27, 30, 31, 31, 33, 34, 37, 38	Positioning (1, 3, 4, 5, 6, 8, 9, 12, 13, 14, 16, 23, 26, 30, 31) Walkways (3, 6, 9, 12, 13, 14, 30) Space availability (2, 9, 13, 15, 16, 17, 18, 26, 27, 30, 33, 34)	Encumbrances (26) Ticket machines (4, 30)
	Venue design	1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 21, 23, 25, 26, 30, 32, 33, 34, 35, 38	Suitability (1, 2, 4, 6, 7, 8, 9, 11, 12, 13, 14, 16, 18, 20, 21, 23, 26, 30, 32, 33, 35, 38) Reputation (7, 9, 10, 12, 30)	
	Spectators	1, 2, 5, 6, 13, 14, 16, 20, 21, 22, 23, 24, 26, 27, 30, 31, 33, 34, 35, 36, 37, 38	Seating design (1, 2, 5, 6, 13, 14, 16, 20, 21, 22, 23, 24, 26, 27, 30, 31, 33, 34, 35, 36, 37, 38) Seating comfort (1, 14, 21, 22, 31)	Financial considerations
	Design scheme	1, 3, 4, 7, 8, 10, 11, 14, 15, 21, 22, 25, 25, 27, 30, 35	Aesthetics (7, 15, 22, 25,30) Architecture (4, 21, 22)	

5.3.6.1 Layout

The layout (positioning, walkways, space availability) of a crowd event was an issue discussed throughout stakeholder interviews (1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 30, 31, 33, 34, 37, 38). When discussing the layout of an event, stakeholders appeared to take one of two perspectives: commercial tactics (to increase browsing time), and health and safety perspectives (to improve fire evacuation routes). Health and safety must be adhered to, however, the extent to which the health, safety, and comfort of crowd members are prioritised, is questionable.

Event layout appeared to be based on the previous experience of those stakeholders involved, as opposed to specific training and standards surrounding layout. Stakeholders with insufficient previous experience in events layout, admitted their gap in knowledge, and mentioned discussing the layout plans with other more experienced sources. Including interviewee 12:

> *"Well in actual fact I went to our estates department.. because I'm not erm.. sort of trained in planning or anything like that. So I asked planning for the erm.. er the plan sort of with all the dimensions on.. and the layout and everything.."*
>
> *Event's organiser, Open day event (Interviewee 12)*

Furthermore, ensuring adequate walkways within a venue, and space between stalls was another issue of concern emphasized during stakeholder interviews (3, 6, 9, 12, 13, 14, 30). For example interviewee 6:

> *"So in terms of where each exhibitor stand goes.. we look at making sure there's walkways in between.."*
>
> *Event organiser, Open day event (Interviewee 6)*

Additionally, difficulties in controlling how much floor space each exhibitor takes up at an event, appeared to be a problem highlighted during conference, exhibition, and open day events in particular (2, 9, 13, 15, 16, 17, 18, 26, 27, 30, 33, 34). For example interviewee 6 suggested:

> *"...as a guide they [exhibitors] need to be 2x3meters [exhibition space].. but.. erm.. we allow room, in case they are bigger.. to spread out a bit more, but they [exhibitors] can get competitive over space.."*
>
> *Event organiser, Open day event (Interviewee 6)*

Also, interviewee 9 said:

> *"Well we do a walk around the building and we have a look at what space we've got available, and we know how much space that we give each stall. And then we just work it out from there.."*
>
> *Event organiser, Students union (Interviewee 9)*

However, a number of stakeholders appeared to dismiss layout considerations as '*common sense'*, for example interviewee 13:

> *"Erm.. but that's [layout considerations].. that's.. I would say fairly common sense.."*
>
> *Event Managers, Open day event (Interviewee 13)*

5.3.6.2   Venue suitability

The suitability of the room, for the event in hand, was an issue discussed, to accommodate desired layouts (1, 2, 4, 6, 7, 8, 9, 11, 12, 13, 14, 16, 18, 20, 21, 23, 26, 30, 32, 33, 35, 38). As suggested during interviewee 13:

> *"I have looked at the rooms that ******* booked them for me.. but erm.. you know. We discuss the room possibilities, and the room layouts. And I decide the running order of the day.. so……. you have to think about the rooms you use, and the suitability for purpose.."*
>
> *Event Managers, Open day event (Interviewee 13)*

Findings indicate that venues that are not purpose built for a specific crowd situation, can create difficulties in the physical environment and organisation, that organisers consider out of their control. For example interviewee 13 suggested:

"Erm.. but largely.. erm.. what you look for is a room that seats the number you want. And then you have to adapt what you are doing to suit the room.. rather than the other way round.."

Event Managers, Open day event (Interviewee 13)

The venue was often described as determining the scale of the event that could be held, for example interviewee 33 said:

"The choice of venue determines the scale of the show.."

Event organiser, Art gallery (Interviewee 33)

Alternatively, the venue is sometimes chosen once the scale and type of event was decided, as highlighted during interviewee 32:

"So you chose your venue according to… I wouldn't chose the same venue for the annual conference as I would for a one day meeting or an exhibition, or something like that, they are totally different venues. So that's the start.."

Event organiser, Conference (Interviewee 32)

The reputation of an event or venue appeared to be important to stakeholders (7, 9, 10, 12, 30), with interviewee 10 indicating:

*"The **** is completely independent, this building is owned by the ******. But if something goes drastically wrong, then people automatically look at it and think well it's at the *****, they don't necessarily split the two.."*

Music event, Security officer (Interviewee 10)

As well as interviewee 7:

"And again what we've got to watch is the reputation of this [venue]"

Security coordinator, Public order (Interviewee 7)

Such findings suggest that the reputation of the venue is a priority, and decisions are made to ensure that the reputation is not compromised.

5.3.6.3   Spectators

Seating comfort was an issue discussed during stakeholder interviews, with particular concern for the spacing of seats. A number of interviews indicated that leg room was an issue of concern when organising crowd events (16, 22, 26, 31), including interviewee 16:

> "Erm.. and hopefully if there's enough legroom in the seats as well.. because that annoys me at [stadium] there's not enough room.."
>
> Event coordinator, Outdoor spectator events (interviewee 16)

And interviewee 26 also discussed the comfort of seating facilities, and the discomfort caused when seats are placed too close together:

> "Cos when you stand up or something.. I have cut my leg here.. cos I've jumped up, and caught the seat in front.."
>
> Health and Safety, British Standards Institute (Interviewee 26).

Such findings indicate that stakeholders do consider seating comfort, however, financial considerations appeared to influence the level of comfort provided by venue seating. With interviewee 22 suggesting that increased ticket prices would provide additional comforts:

> "So we've got, you know, all the seats are the same. And then we've got the executive seats, which are padded. And then padded with arms, for the vice presidents. And then right at the end there we've got the media seats.. which have got a little drop down table.."
>
> Stadium architect, Design (Interviewee 22)

A number of stakeholders used a limited number of seats, but not sufficient numbers for all crowd members. Moreover, interviewee 16 stressed the financial considerations surrounding seating comfort:

> "I mean.. if you could afford to have armchairs around the rugby pitch where you've got space.. then of course. But you'd then have to sell the tickets at… well.. for example, the grandstand usually works out £10 per

head.. to purchase the grandstand at cost. So.. you've got to sell the tickets at £10 a head.."

Event coordinator, Outdoor spectator events (interviewee 16)

Additionally, seating comfort was utilised as a tool for encouraging crowd members to stay and browse conference and exhibition stalls. For example interviewee 1 suggested that the more uncomfortable the seating provided, the less time crowd members will stay at the stall:

"Well if you want them to come onto your stand and have a free coffee.. and so you can have a quick chat with them.. then you put stuff like bar stools on.. rather than comfy lounge seating. So then they don't stay there forever.. you've got them for like the 10 minutes.."

Exhibitions, Ground staff (Interviewee 1)

Vignette

Segregation of seating areas, and exit routes, was an issue highlighted as important in controlling evacuation times, and pedestrian flow during ingress and egress. As described by a 49-year-old male police sergeant, involved in maintaining the security of spectator events (music festivals, sporting events), participatory race events, and demonstrations.

"Yeah.. I think things have been much much more improved with the seated stadiums…. ground is separated off into sections. So although you can get a large amount of people you can't get everybody trying to get out of the same gateway.."

Police sergeant, Public order (Interviewee 20)

Such findings reveal the increased control that seated stadiums enable.

Vignette 7 Seating segregation and pedestrian flow

5.3.6.4 Design scheme

Protecting the health and safety of the user was a key priority across stakeholder groups, with aesthetics considered a secondary concern once legal requirements have been met (1, 3, 4, 7, 8, 10, 11, 14, 15, 21, 22, 25, 27, 30, 35). An architect interviewed suggested that the creativity surrounding venue design, was secondary to ensuring the legal regulations were met.

"The aesthetics is the part that I enjoy but you need to follow the fundamental regulations first then you can be creative.."

Architect, Physical environment (Interviewee 25)

Crowd event organisers must ensure that the venue is completely adequate for the event. Moreover, crowd organisers need to work with architects, to ensure that problems are not built into the venue design, for example providing sufficient space for toilet facilities. There is only so much that an event's organiser can do with the building once constructed, (or with old buildings). As seen during interviewee 3, once the venue is constructed, organisers have limited room for improvement:

"We sometimes find that the size of facilities is not large enough to cope with the demand, causing areas of congestion. For example, this can be the width of a passageway, staircase, the number of ticket gates in a station or the number of lifts, stairs and escalators to go from one floor to another.."

Human factors engineer, Physical environment (Interviewee 3)

5.3.7 Public Relations

Public relations discussed during stakeholder interviews included the organisation involved in events, as well as management and advertising involved in promoting events. Stakeholders appeared to dedicate time and money to the public relations surrounding events management, rather than user experience and satisfaction. The aim of which appeared to be financially motivated among a number of stakeholders, to increase profits from events. Such findings represent a gap in knowledge among organisers, and coordinators in particular, failing to appreciate the business case for increased user satisfaction. No amount of advertising will encourage crowd members to return to an event that they did not enjoy (due to inadequate attention to user experience), both are essential to achieve a successful event.

5.3.7.1   Organisation

One major issue stressed throughout stakeholder interviews, was the importance of organisation, planning ahead, and the preparation that contributes towards a successful event (2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22,

23, 26, 27, 28, 29, 30, 31, 32, 33, 36, 38). Preparation to ensure that everything is in place ready for the event, as seen during interviewee 31:

> *"I start organising it in June.. well in fact over a year before [the event].."*
>
> *Event coordinator, Religious event (Interviewee 31)*

Effective time management, and ensuring that all issues are dealt with in time for the event, was another issue identified during stakeholder interviews, for example interviewee 6:

> *"..we have a timetable of activities that we need to do in order to organise it.."*
>
> *Event organiser, Open day event (Interviewee 6)*

As well as interviewee 38:

> *"I feel we need a more structured approach for the main preparations on the day before the race – usually everything gets done, but sometimes more by luck than organisation.."*
>
> *Participatory race event, Event coordinator (Interviewee 38)*

However, one problem that became apparent was that stakeholders, who had previous experience in the same position for a number of years, may become complacent with the organisation (4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 27, 29, 30, 31, 32, 37, 38). For example interviewee 6 said:

> *"This was my 18th fair.. so.. I think all the changes that I would have ever put in place, I've already done really. So no not for that, I can't think of anything that I would have done differently.."*
>
> *Event organiser, Open day event (Interviewee 6)*

Also interviewee 29:

> *"Yeah.. it's based on the fact that we'll often do repeat events. So.. we'll look at, how well it went last year. Erm.. and the fact that we've done the events before.. so even if it's a different size.. we have.. we might go, oh,*

well actually it's a similar place as last year. Similar sort of people.. we probably need that many stewards.."

<p align="right">*Fireworks event, Event coordinator (Interviewee 29)*</p>

5.3.7.2   Technology

Stakeholder interviews indicate that stakeholders use technology to enhance the user experience of crowds, yet financial considerations restrict the use to events that have sufficient budgets. Timing tag systems for example, were used in large-scale participatory race events with sufficient budgets. However, small-scale events do not have sufficient funds to enable the use of such technology, to create a better event for the user, for example during interviewee 27:

"The timing tag was primarily introduced to help us manage the assembly areas and start to eliminate the need for people to push their way to the front, and juniors to sneak into the adult only assembly area.."

<p align="right">*Event coordinator, Race event (Interviewee 27)*</p>

Additionally one stakeholder discussed the introduction of event applications for mobile phone devices, to enhance the user experience of the event:

"..producing your own App. Where you can find.. erm… it's like an erm map of the exhibition. And it shows where our stand is.. and where all the other points of reference that they would want to go to. So like where the catering is. Or where the conference hall is for conferences.."

<p align="right">*Exhibitions, Ground staff (Interviewee 1)*</p>

However, such technology comes at an expense to stakeholders, with a number of stakeholders, as stated during interviewee 21:

"And we've got a new score board, first game today.. we've not had anything before.. and we've not really known what time. But we have to wait for donations, sponsoring. It's a cut throat business.."

<p align="right">*Security trainer, Security (Interviewee 21)*</p>

5.3.7.3   Advertising

Stakeholder interviews suggest that advertising and marketing were used to influence crowd member numbers positively and negatively, through either

increasing or reducing levels of advertising (1, 2, 5, 6, 7, 8, 10, 11, 12, 13, 15, 16, 17, 19, 21, 22, 24, 27, 30, 32, 33, 37). For example interviewee 16 said:

> *"We didn't market it because we didn't want too many people there. Because it was winter and we didn't have a budget for it so we couldn't cordon off the area..."*
>
> *Event coordinator, Outdoor spectator events (interviewee 16)*

However, stakeholders expressed financial concern for under attendance, and loss of profit, highlighting the attention given to financial considerations, and profit margins.

Advertising was also an important method used to inform the local community about an event, to ensure the community are made aware of the event, and any possible disruptions in advance. The distribution of signs, newsletters, and emails, to the local community were methods of communicating details of the event.

> *"..we try and do everything we can you know. We out the date in the community newsletter and all that.. so that people are warned about this busy day.."*
>
> *Event's organiser, Open day event (Interviewee 12)*

Additionally interviewee 27 suggested:

> *"We also erect advance warning signs to motorists two weeks prior to the event to advise them of potential traffic delays on the day and also erect 300 plastic cortex notices promoting the event. These are more for warning drivers and pedestrians of the event so they can make alternative arrangements on the day if they need to.."*
>
> *Event coordinator, Race event (Interviewee 27)*

5.3.7.4   Management

Management systems to ensure all resources are in place for an event to run smoothly also appeared to be a priority for stakeholders (1, 7, 8, 10, 13, 14, 15, 17, 20, 23, 24, 26, 27, 30, 31, 32, 36, 37, 38). A number of stakeholders indicated that

management systems were inadequate, and changes were required, for example interviewee 24 said:

"Imminent system changes, to reduce the number of supervisory stewards. From twelve down to four managers. Pass information down to four groups of stewards.."

Head of security, Security (interviewee 24)

As well as interviewee 7:

"And you would get a department organising an event, that might draw 1000 people. And so would another one, and another one, and there might be a football match on that would draw a lot of people. And then all of a sudden there is this situation where it is total chaos. So we created a new post at the time.. the security coordinator. Who did other things as well, but a major part of his job was events coordination.."

Security coordinator, Public order (Interviewee 7)

Such changes to management systems aim to improve the communication of information throughout the hierarchy.

Vignette

Stakeholders from the police expressed clear, structured management systems within the organisation of events. As 49 year old male Police Sergeant described the clear management structure involved in crowd events, in order to achieve a successful operation.

"But there you will have separate parts of the operation split up.. with each unit having what is called, a bronze commander. You have a.. well if it's a large event, you'll have what's called a gold command. Then there would be someone like a deputy, or assistant constable then at other events you'll have a silver commander, which is usually a Chief Superintendent, or a Superintendent. But then on the ground, you'll have overall of the PSUs and inspectors, are the bronze commanders. Which are usually Chief Inspectors.."

Police Sergeant, Public order (interviewee 20)

This highlights the importance of clear management systems within the police, ensuring that all information is communicated throughout the hierarchy.

Vignette 8 Management systems surrounding crowd events

The importance of a direct reporting line was discussed within the organisation of crowd events, to ensure that issues are reported, and dealt with before and during an event (1, 7, 8, 10, 13, 14, 15, 17, 20, 23, 24, 26, 27, 30, 31, 32, 36, 37, 38). For example interviewee 24 indicated the passage of information during a football event:

> *"Managers together with 'Head of Operations', 'Operations Manager', 'Head Steward', and twelve 'Managers'.. subsequently pass on information to their teams, with two hundred and twenty 'Stewards'.."*
>
> *Head of security, Security (interviewee 24)*

Findings indicate that improvements are required in the management of crowd events, in order to ensure that all issues from various stakeholders are dealt with. Also, all stakeholders need to be made aware of the process, and the requirements involved. Such findings suggest that reporting lines might allow information to be missed, or misinterpreted, as it is passed from the head of operations, to the ground staff (e.g. stewards).

5.3.8 Crowd movement

Ingress and egress during crowd events was a particular concern for stakeholders interviewed, together timing of events, and starting times (Table 16). Additionally, the flow of pedestrians, and issues surrounding accessibility, and congestion were stressed across stakeholder interviews.

Table 16 Summary of stakeholder findings in relation to crowd movement

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
Crowd Movement	Egress and Ingress	1, 3, 4, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 19, 20, 21, 25, 26, 28, 30, 31	Egress – mass exodus (1, 3, 4, 6, 9, 12, 13, 14, 15, 16, 17, 19, 20, 25, 26, 28, 30) Controlled Ingress – fire safety (1, 6, 7, 10, 16, 25, 26, 30, 31)	
	Timing	1, 2, 4, 8, 12, 13, 15, 17, 18, 19, 20, 26, 27, 28, 29, 30, 31, 32, 38	Time of the day (2, 8, 12, 15, 17, 18, 19, 20, 26, 27, 28, 29, 30, 31)	Staggered entry (1, 12)

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
	Pedestrian Flow	1, 3, 4, 5, 6, 12, 13, 14, 15, 16, 17, 19, 20, 20, 26, 28, 30, 31, 34	Pedestrian flow (1, 3, 4, 5, 6, 12, 13, 14, 15, 16, 19, 20, 26, 28, 30, 31, 34)	Pedestrian flow modelling (3, 4, 14)
	Congestion	1, 2, 3, 4, 6, 10, 12, 14, 16, 17, 18, 20, 26, 27, 30, 31, 33, 34	Bottlenecks (1, 3, 4, 6, 12, 14, 16, 26, 30, 31, 33, 34)	
	Accessibility	13, 14, 22, 26, 30, 33, 34, 36, 38	Wheelchair access (14, 22, 34, 36)	
	Queuing	4, 10, 26, 30, 31, 37		Queue curlers (30) Distractions (30)
	Traffic management	7, 8, 12, 15, 17, 26, 27, 38		

5.3.8.1   Ingress and Egress

Ingress must be controlled to meet safety guidelines, primarily fire safety maximum capacity standards (1, 6, 7, 10, 16, 25, 26, 30, 31, 37). The control of which appeared to be manipulated through increasing or decreasing advertising for an event, distributing tickets (even for free events), and having staff at the entrance to control capacity.

Also the introduction of electronic ticketing, and electronic turnstiles was discussed (37), aiming to improve security for crowd members, prevent fraudulent tickets, improving the user experience. For example interviewee 37 said:

> "Errr.. these cards are also an e-ticket, that will be able to use them in the shop, in the concourse, bars etc… also applies to the programme.. errr.. they will be able to top up the card, and then that should speed things up at the doors, because there's no need for change.. they just give the card.."
>
> *Security football event (Interviewee 37)*

Egress was an issue of particular concern, as ingress is generally gradual, whereas egress is often sudden mass exodus. Major problems highlighted during stakeholder interviews included, compliance to fire safety regulations, speed of egress, bottlenecks and congestion.

Capacity is informed by evacuation procedures, speed of egress, and maximum time for evacuation. One stakeholder suggested that within stadium design guidance, egress must take a maximum of 8 minutes.

> *"Well that's for health and safety you see.. You have to be able to evacuate the stadium in 8 minutes. Sometimes they will practice at the end of a game.."*
>
> *Health and safety, St John's Ambulance (Interviewee 23)*

The main aim that emerged from stakeholder interviews was to increase the speed of ingress and egress to events, particularly stadium events. New stadium designs, are introducing electronic ingress and egress, as opposed to turnstile staff, in order to increase the speed of exit. As stated during interviewee 26:

> *"If you look at most of the tickets now….. Are swipe.. barcode. You don't have any ticket man.. turnstile people. It makes it quicker to get in. because it's just scan it.. in you go.. scan it.. in you go.. so there's no queuing.."*
>
> *Health and Safety, British Standards Institute (Interviewee 26).*

> *"The capacity is informed by our evacuation procedure. We are regularly visited by a Fire Officer who will advise us how many visitors we can safely evacuate through each fire evacuation route in the event of the fire alarm activating. On this advice we will set the capacity of visitors in order that we are compliant.."*
>
> *Art gallery, Event coordinator (Interviewee 34)*

Vignette 9 Health, safety and user experience

Moreover, the importance of maintaining clear exit routes was stressed by stakeholders involved in the organisation of crowd events (7, 9, 14, 15, 24, 34). Such as interviewee 14:

> *"So there are control factors like that. That you know your seating should be anything more than 4.. and no more than 14.. should be interlinked together and ideally secured to the floor. And we normally make them no longer than 14, because if you make it any more than that you're making it slower for people to wait to get out.."*
>
> *Health and safety officer, Fire officer (Interviewee 14)*

As well as interviewee 15:

> *"Making sure they're not blocking fire exits.."*
>
> *Health and Safety Officer, Health and Safety (Interviewee 15)*

Discussion surrounding ingress and egress was primarily from public order stakeholders (police and security), and health and safety stakeholders. Such findings might suggest that ingress and egress procedure are drawn from a safety perspective, to ensure compliance with standards. Whereas comfort and user experience are not a priority in such issues. Whereas ground staff mentioned problems encountered when exit routes are blocked. For example suggesting that

with the best intentions, organisers plans are not always followed through entirely.

5.3.8.2 Timing

One issue discussed throughout stakeholder interviews was the importance of timing considerations (1, 2, 4, 8, 12, 13, 15, 17, 18, 19, 20, 26, 27, 28, 29, 30, 31, 32, 38). Frustrations were seen during interviewee 31:

> *"Now the main problems experienced.. numbers perhaps. Yeah there was one thing that I did have to address this year (which sounds very silly), but its timing everything….. When you've got a lot of people you don't want them to be waiting around, because they will get bored.. They get uncomfortable.."*
>
> *Event coordinator, Religious event (Interviewee 31)*

5.3.8.3 Time of the day (peak hours)

The impact of peak hours was discussed within a number of interviews (2, 4, 8, 12, 15, 17, 18, 19, 20, 26, 27, 28, 29, 30, 31,), for example interviewee 12 said:

> *"So the open day is open from 10am-15:30pm. So.. erm.. the bulk of our arrivals will be getting here at a very similar time.."*
>
> *Event's organiser, Open day event (Interviewee 12)*

Interviewee 30:

> *"And it's amazing how when we open we're not very busy and by the time we close we're not very busy.. but in the middle it goes mad.."*
>
> *Miniature railway events, Ground staff (Interviewee 30)*

And interviewee 4:

> *"And so again you have to shut the gate line.. stop people going down.. Just feed them down there.. cos it's just crazy in the morning.."*
>
> *Transportation, Physical environment (Interviewee 4)*

5.3.8.4   Staggered entry

Few stakeholders discussed introducing staggered entry times for events, to control pedestrian flow. In order to control the number of crowd members at the event at specific times, staggered entry was discussed (1, 12):

> *"So what we did for that was instead of saying you can all come between 10-3.. we said.. this 900 people can come between 10-11.. then they have to go, ready for the next 900 between 11-12.. until the end of the day. So it was staggered.."*
>
> *Event's organiser, Open day event (Interviewee 12)*

As well as interviewee 1:

> *"Erm.. and you can try and control that by letting so many people in at a time as well.."*
>
> *Exhibitions, Ground staff (Interviewee 1)*

5.3.8.5   Pedestrian Flow Modelling

Interview findings indicate a gap in knowledge for stakeholders surrounding pedestrian flow modelling, and venue design and layout (3, 4, 14). One stakeholder expressed interest in the potential benefits of pedestrian flow modelling software, with the limiting factor preventing the use of such software being insufficient financial resources. Yet priorities focused on the importance of gaining access to pedestrian flow modelling software, without fully understanding its role, and strengths.

Pedestrian flow modelling was seen to be the ideal solution to the problem of crowding, and overcrowding by some stakeholders. For example interviewee 14:

> *"I think if you could get that modelling system that would be fantastic…. it would be a great benefit to the ****…. helping to re-design.. and say if you want this kind of occupancy then it won't work, or it will work. So.. but I don't know how much that software package is.. I don't know whether it is a very easy thing to operate, whether it is a very complex system. Where you'd have to go away and do a degree on how to use it.."*
>
> *Health and safety officer, Fire officer (Interviewee 14)*

However, the software is expensive to contract consultants to carry out analysis of an event, venue, or layout, and thus, only large scale crowd events would benefit from such information. Furthermore, pedestrian flow modelling software has significant limitations, failing to consider comfort in the calculation of capacity. Additionally, there is the lack of psychological dimensions, and crowd characteristics considered. Interviews suggested that crowd member characteristics could be imported into pedestrian modelling software, in order to suggest the impact on crowd dynamics.

> *"And there's kind of behaviours that we know people do.. that aren't really programmed into the model. So it's not as realistic yet, as it should be. The programme itself is just sort of like throwing a load of marbles in a maze. I mean it's a great start.. but it's not as realistic as how people actually behave.."*
>
> *Transportation, Physical environment (Interviewee 4)*

Thus, although many stakeholders viewed Pedestrian flow modelling as the ultimate solution to their bottleneck, congestion, and capacity calculations, the software requires improvement, to account for human behaviour entirely, and may not be the all-encompassing software some stakeholders believe it to be.

5.3.8.6 Congestion

When discussing congestion and pedestrian flow, stakeholders compared and likened the issue to that of '*herding sheep'*, including interviewee 1:

> *"It's very much like herding sheep.. in an event or conference.."*
>
> *Exhibitions, Ground staff (Interviewee 1)*

As well as interviewee 12:

> *"Yeah that's basically what it is yeah.. just sheparding people to where they need to be.."*
>
> *Event's organiser, Open day event (Interviewee 12)*

Bottlenecks were a major concern (1, 3, 4, 6, 12, 14, 16, 26, 30, 31, 33, 34,) across stakeholder interviews, for example interviewee 31 suggested:

"Bottlenecks and things.. that comes into.. not so much the hall usage, but it does come into the church, we have to make sure that general capacity for the church is not taking up so much that there isn't room to move. And then they have tables dotted around. But what I have got to be aware of is that the tables are spaced well enough for movement.."

Event coordinator, Religious event (Interviewee 31)

As well as interviewee 34:

"The layout of exhibitions is essential for managing visitor flow…. Corridors and stairwells are particular areas where visitor flow can be an issue. For our busiest exhibitions we operate a strict timed ticketing system to ensure that visitors are not queuing on stairs or landings, and we plan for holding areas as part of the build to accommodate for the numbers of visitors who will be arriving at their allocated times. Each exhibition will have a strategy for managing visitor flow and staff are issued with the risk assessments and visitor management strategy as part of their Health and Safety training.."

Art gallery, Event coordinator (Interviewee 34)

Additionally, from a health and safety perspective, interviewee 14 indicated potential bottleneck problem areas, due to differing capacities across sections of one venue, and the importance of identifying possible bottlenecks.

"And again.. you could have a mass in one.. and then a few in another area. But then as they move through it suddenly bottlenecks up. So that what we've got to look at.. is there anywhere there where it could suddenly bottleneck.."

Health and safety officer, Fire officer (Interviewee 14)

Deciding on layout to allow flow:

"There can be a lot of bottlenecks forming for that event…… So I literally do it based on popularity.. and to make sure there's a steady stream..

and there's the same sort of people in all areas. So we'll spread the popular
company's about. Then the next ones that aren't so popular.. so there's more
space…. Really. So that tends to work quite well. And I don't really notice
any area being particularly more busy than others.."

Event organiser, Open day event (Interviewee 6)

Small scale, low budget events, dismissed crowd flow considerations as common
sense and requiring little thought. Such lack of interest may contribute to inadequate
planning for crowd flow during small scale events. For example interviewee 6
suggested:

"In terms of spreading the crowds out.. if you base it on popularity of
the company…. in terms of them walking…. I think that's quite an easy thing
to do really. We make sure there's enough space.. erm…. For the ****
lecture theatre (that's the biggest hall)… go all around the outside.. and then
there's groups of 4… so they can go between the groups of 4.."

Event organiser, Open day event (Interviewee 6)

Stakeholders involved in the design of transport hubs, discussed methods of
establishing floor area for pedestrian flow, based on theories of crowd behaviour.
Crowd behaviour, recommendations concerning the distance crowd members walk
from the edge of a wall, or object, was described during interviewee 4:

"We literally drew on all the standards of stuff like that….. So there's
a thing called an edging effect.. where people won't walk ermm.. I think it's
about ½ meter close to like the edge.. like a wall. So like literally.. once
you've drawn those 1/2m in from every wall.. pillar.. and whatever. Then you
kind of see the main area where people would walk.."

Transportation, Physical environment (Interviewee 4)

5.3.8.7   Accessibility

Catering for all individuals appeared to be important to stakeholders interviewed (13,
14, 22, 26, 30, 33, 34, 36, 38). Health and safety guidance and legislation dictate
accessibility standards, including corridor and exit widths and turning circles for
wheelchair access. For example interviewee 21:

"So we've got disabled in each section.. facilities.. a steward on the lift.. and he looks after all the disabled. And he'll be sitting there with the wheelchairs, or the walking disabled. And the lift is used to take them up there and the steward looks after them. And fetches the food or drink or whatever."

Security trainer, Security (Interviewee 21)

Standards and regulations surrounding venue design, and corridor width, ensure access for all, including appropriate wheelchair access as highlighted during interviewee 14:

"We normally look at corridor widths always being a minimum of 1.1 meters.. which allows wheelchairs, very good access. Wheelchair access can be reduced right down to 850mm we normally work on 1.1 so you've got plenty of movement. But we also say that your main aisle has got a 2m width exit route, we try and say that. So in other words you're not making a pinch factor. And again that goes into the design and layout of the area.."

Health and safety officer, Fire officer (Interviewee 14)

Vignette

A 37-year-old female events coordinator for a UK art gallery, explained the importance of working with specialist organisations, in order to create environments enjoyable for all users.

"The layout of exhibitions is essential for managing visitor flow. We work with organisations such as 'Disabled Go' to ensure that all our spaces are easily accessible by visitors in wheelchairs, and during the implementation phase for any exhibition operational issues such as visitor flow are included.."

Art gallery, Event coordinator (Interviewee 34)

Such findings highlight the importance of seeking knowledge from specialists in areas such as inclusive design.

Vignette 10 Gaining specialist knowledge on inclusive design

A number of stakeholders appeared passionate about the inclusive design of events and venues for all (13, 14, 22, 26, 30, 33, 34, 36, 38). Organisations working with disability specialists, appeared to go beyond the required arrangements, taking pride

in the comfort and facilities available to heighten the experience of users with special needs. Including interviewee 22:

> *"And there is a raised platform over there.. with an electronic lift. NADS (National Association for Disabled Supporters), and if you have a look at their write up, they know we've got it right.."*
>
> *Stadium architect, Physical environment (Interviewee 22)*

Conversely, other stakeholders appeared to view accessibility as another regulation that must be adhered to by law. Such stakeholders did not appear to appreciate the importance of inclusivity from a user experience perspective. Thus, it did appear that the experience of crowd members with disabilities was not always given adequate consideration. The access of all crowd members must be considered by law, but in a number of cases, viewing areas were provided slightly apart from the mass crowd of spectators, thus, possibly altering the atmosphere experienced. As seen during interview 36:

> *"Disabled access is pitch side, with the best view in the house. Not quite the same atmosphere. You're not part of the crowd entirely, as people are at the very front, the other side of the seating, on the flat. Wheelchairs, would not be able to get up the stairs, so the surrounding pitch is available for wheelchair supporters.."*
>
> *Football steward. Security (Interviewee 36)*

Moreover, consideration for the *atmosphere* and *crowd experience* of individuals with special needs, received less attention. Therefore, the issue should be considered during the design and organisation of venues and events, and not as a bolt on, applied only to meet legal obligations.

5.3.8.8   Queuing

Providing distractions to combat the boredom experienced whilst queuing for long periods, was discussed during interviewee 30:

> *"When they actually go into the queue.. erm.. it goes in a U shape.. and there are some issues there about what they can see when they're in*

the queue…… I personally think that we need to be doing more for people while they're in the queue.."

Miniature railway events, Ground staff (Interviewee 30)

From a commercial perspective, reducing queue time was seen as a priority by some stakeholders. Excessive queuing might deter crowd members from buying food and drink from an event for example, or from attending future events. As shown by interviewee 26:

"If you've got more serving outlets it must work a lot better.. commercially it works a lot better, but also you don't have people queuing.. so people can get away.. and you've just got more space. And that's what the problem is.. because people are queuing up because it's not quick.. it's not efficient.."

Health and Safety, British Standards Institute (Interviewee 26).

Whereas other stakeholders viewed queuing as an issue that must be managed for the health and safety of crowd members.

Vignette

British people are renowned for queuing behaviours, even when queuing is unnecessary, or even detrimental to pedestrian flow. A 26-year-old female Human Factors Engineer working in the transportation sector discussed the possible role of culture and the impact of the physical environment on the behaviour of pedestrians within a transportation hub in central London.

"So people literally queue either side of the door [to the train].. so there's still the room for people to get off.. out there's queues either side.. And those queues are what causes all the backup.. because people aren't filling space.. they're actually queuing in a straight line…. I think it's just something to do with our country.. people just love queuing! Haha! Because there's no need.. there's absolutely no need. But I guess they're just trying to be polite.."

Transportation, Physical environment (Interviewee 4)

Therefore slight changes to the physical environment of a venue can have large effects on the pedestrian flow, and human behaviour. Such behaviours must be researched during the design stage in order for improvements to be made.

Vignette 11 The relationship between culture and crowd behaviour

5.3.8.9   Traffic management

Traffic management was an issue highlighted by public order stakeholders interviewed, as a major area of consideration during the organisation of large scale crowd events (7, 8, 12, 15, 17, 26, 27, 38,).

> *"Generally its traffic management, but then obviously in that we have to make sure that the crowds that leave the ground, go a certain way, or go… or aren't.. well there's no oncoming traffic to the crowds.."*
> *Police Community Support Officer, Public order (Interviewee 17)*

As well as interviewee 12:

> *"It finishes at 3:30pm. Erm.. so then it's a real bottleneck because everybody who came by train is wanting to get back on the bus to get to the train. And we use the town service.. ***. Which is just a regular timetabled service so that runs out of our control basically. I think it runs something like every 10 minutes. So we can get a lot of people you know on the bus every time it comes around. But it's also the time when schools finish too. So it does get a bit hectic. So you sort of have to keep placate people and telling them that the bus will be here in a bit. Plus it is a town centre service and not specifically run by us.."*
> *Event's organiser, Open day event (Interviewee 12)*

5.3.9 Event capacity

Calculating for the maximum number of users attending a crowd event was a crucial aspect of events organisation (Table 17). Considering the safe numbers within an event, and venues, requires a great deal of time and expertise. Moreover, tactics employed to monitor the number of users attending specific events, including ticketing for free events, was discussed during stakeholder interviews.

Table 17 Summary of stakeholder findings in relation to event capacity

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
Event capacity	Capacity of an event	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 21, 23, 24, 25, 26, 27, 29, 29, 30, 31, 32, 33, 34, 37, 38	Monitor capacity (1, 4, 6, 9, 10, 11, 13, 15, 16, 17, 27, 32, 33, 34, 37, 38) Limited by venue (10, 12, 13, 14, 30, 31, 33 Expectations (1, 2, 6, 7, 8, 10, 12, 13, 15, 17, 18, 21, 24, 29, 32, 34, 37)	Monitor capacity by eye (4, 6, 12, 14, 34) Monitoring capacity in different areas of one venue (6, 15, 10, 12, 34) Not important (5, 9, 29) Concerns over under occupancy (11, 16, 33)
	Ticketing	1, 2, 7, 8, 10, 11, 13, 15, 16, 17, 18, 26, 30, 30, 32, 33, 34, 37	Allocation (7, 8, 11, 15, 16, 33, 34, 37) Sales (7, 10, 15, 17, 18, 30)	Tickets per timeframe (34) Ticket free events (10, 16)
	Capacity calculation	2, 4, 8, 9, 10, 12, 13, 14, 15, 16, 17, 25, 26, 27, 29, 31, 32, 33, 34	Health and safety (2, 4, 8, 9, 10, 12, 13, 14, 15, 16, 17, 25, 26, 27, 29, 31, 32, 33, 34)	Comfort

5.3.9.1 *Capacity of an event*

Fire safety appeared to be a major priority throughout stakeholder interviews, with rigid calculations carried out to ensure capacity limits would provide a safe exit in the case of an emergency (2, 4, 8, 9, 10, 12, 13, 14, 15, 16, 17, 25, 26, 27, 29, 31, 32, 33, 34). Including interviewee 15:

> *"Specifically fire.. yes.. that's the main issue with regards to the maximum occupancy of buildings.. And that's governed and regulated by ticketing. So they'll only ticket for a certain number of people for the event.."*
> *Health and Safety Officer, Health and Safety (Interviewee 15)*

As well as interviewee 34:

> *"The capacity is informed by our evacuation procedure. We are regularly visited by a Fire Officer who will advise us how many visitors we can safely evacuate through each fire evacuation route in the event of the fire alarm activating. On this advice we will set the capacity of visitors in order that we are compliant.."*

Stakeholder interviews indicate that capacity was calculated from a safety perspective, however, the extent to which safe capacity limits provide a comfortable environment for crowd members, was not discussed. For example interviewee 6 said:

"We use fire evacuation standards to calculate capacity.."

Event organiser, Open day event (Interviewee 6)

Vignette

Fire safety standards are used to calculate the capacity restrictions for crowd venues. As described by a 59-year-old male fire safety officer, involved in maintaining safety standards during spectator events (music, sporting), conferences and exhibitions, participatory race events, and commercial events. His area of expertise included, capacity calculations, evacuation strategies, and fire safety.

> *"Fire capacities…. What we call floor loading. So I work off a document known as British Standard BS9999…… The floor space itself can accept a lot of people, probably over 1000 people. But the units of escape that dictate units of escape width and how that has been calculated, says that you can only have 450 people in here for an exhibition. Or 600 for a seated audience.. so it goes up and there's these different kind of what we call floor space factors. So for a standing audience its 0.5square meters per person.."*
>
> *Health and safety officer, Fire officer (Interviewee 14)*

Vignette 12 Fire safety standards and capacity calculations

However, a minority of stakeholders dismissed the issue of capacity (5, 9, 29), including interviewee 5:

"We don't do anything for capacity.."

Event organiser, Exhibition (Interviewee 5)

Such insight represents a gap in knowledge surrounding the importance of controlling for expected crowd numbers. Failure to plan and control crowd numbers is a reactive method that could jeopardise the safety of crowd members. One stakeholder described the organisation of crowd events as a "*gamble*", which is a concern for safety.

> *"Erm… taking the gamble of how many you need. How many stewards you need.."*
>
> <div align="right">*Fireworks event, Event coordinator (Interviewee 29)*</div>

5.3.9.2   Monitoring capacity

Methods of monitoring crowd event capacity was discussed throughout stakeholder interviews (1, 4, 6, 9, 10, 11, 13, 15, 16, 17, 27, 32, 33, 34, 37, 38). Monitoring capacity across different areas within one venue, was highlighted as difficult to enforce during crowd events. A number of stakeholders discussed various tactics employed across stakeholder groups, to monitor capacity, however, the reliability of methods used is questionable. As seen during interviewee 34:

> *"Our building has a maximum capacity and we are obliged to monitor visitor flow at all times to ensure that we do not exceed this capacity. In order to achieve this we calculate the visitor capacity for each of our areas, galleries, meeting rooms, studios, and when we plan a new exhibition or event we set the capacity either per event or per time period.."*
>
> <div align="right">*Art gallery, Event coordinator (Interviewee 34)*</div>

Previous experience within crowd events appeared to have an impact on the priority given to monitoring crowd capacity. For example during interviewee 29:

> *"Yeah.. it's based on the fact that we'll often do repeat events. So.. we'll look at, how well it went last year. Erm.. and the fact that we've done the events before.. so even if it's a different size.. we have.. we might go, oh, well actually it's a similar place as last year. Similar sort of people.. we probably need that many stewards.."*
>
> <div align="right">*Fireworks event, Event coordinator (Interviewee 29)*</div>

Stakeholders with previous experience in events that had gone well, and particularly events that had gone wrong, appeared to appreciate the importance of ensuring strict capacity regulation, and reliable methods of adhering to maximum capacities. A number of stakeholders suggested that capacity was an important consideration, yet failed to discuss what was being done to monitor capacity, and to what extent it was a reliable intervention. Including interviewee 25:

"Yet again this is controlled strictly by regulations to control and asses the number of people leaving a room safely and unrestricted.."

Architect, Physical environment (Interviewee 25)

Another tactic employed was to have members of staff, or security stewards on the entrance, to monitor numbers, and stop entry once the event looks full to capacity. As described by a 36-year-old female, involved in the organisation of conferences and exhibitions within a large UK university.

"We have a student on the door, and when it starts to get a bit, sort of uncomfortable. We stop letting people in.. and then as people leave.. it's one in one out.."

Event managers, Open day event (Interviewee 12)

However, it was not established what constitutes 'uncomfortable', or what measures are in place to determine discomfort.

Moreover, a large number of stakeholders mentioned that crowd numbers were monitored '*by eye',* (by members of staff) with no specific method employed to control crowd numbers (4, 6, 12, 14, 34). As indicated during interviewee 4:

"They literally have to monitor the CCTV.. Erm.. so they'll have a couple of screens.. and they can split them into quad views. So they can get four CCTV views on that screen. And they just literally monitor [capacity] erm.. areas that aren't like the platforms, and the walking around areas and the escalators.."

Transportation, Physical environment (Interviewee 4)

As well as interviewee 6:

"Ah yes.. So what we tend to do, is we can sort of tell by looking at it… to make sure there's enough room in the different areas.. so we know that they're not overcapacity.. because of course the capacity for [venue] lecture theatre is seated.. is quite a huge number.. and you wouldn't be able to get that many in there with the stands.. so it it's.. more or less impossible to get it over capacity.."

Event coordinator, Outdoor spectator events (interviewee 16)

Such methods lack reliability, and differ depending on staff member differences of opinion. They also indicate a possible disregard for the importance of controlling capacity during crowd events.

5.3.9.3   Ticketing

A number of tactics were employed across stakeholder interviews, to monitor capacity across different areas of the event venue. Providing a specific number of tickets for an event, was one method of controlling the capacity of an event, utilised by a number of stakeholders (1, 2, 7, 8, 10, 11, 13, 13, 15, 16, 17, 18, 26, 30, 30, 32, 33, 34, 37). Including interviewee 16:

> *"[tickets] That's a good simple way of controlling the grandstand. Rather than having someone who has to keep an eye on the front aspects. Obviously you've got people overseeing.. ensuring that people are acting safely, on the grandstand. But it obviously takes a hell of a lot of time, and it makes it far more difficult if you're counting people on.. counting people off.."*
> *Event coordinator, Outdoor spectator events (interviewee 16)*

Distributing tickets for free events, aimed to ensure that expected numbers are controlled (10, 16). As shown during interviewee 10:

> *"We don't do non-ticketed events.. I think you'll find that with anything that you look at (event wise) is now ticketed. Even if it's a free event.. it'll be ticketed.."*
> *Music event, Security officer (Interviewee 10)*

However, small scale events do not always allocate tickets, which could lead to unprecedented numbers attending, as highlighted during interviewee 10:

> *"..about 3 years ago when JLS did a free open concert.. turning on the Christmas lights in Birmingham. And it was a non-ticketed event. And it just shows how a free event, anyone can come along, if you don't ticket it.. and have an idea of what's going to come through the door (should we say).*

The disaster happened because their expectations were for a crowd of 3-4000.."

Music event, Security officer (Interviewee 10)

Such failure could be due in part to a lack of knowledge and experience in planning events, or may be due to the type of event being held. During an open air celebration, or an annual fairground for example, tickets may not be convenient for organisers or crowd members. As indicated during interviewee 8:

"It wasn't ticketed at all, so people could just.. some of the events were bookable.. like we did some trial swimming lessons.. or some other things that people did have to book. Because there were only so many places on it.."

Outdoor event, Event organiser (Interviewee 8)

One stakeholder discussed the allocation of tickets per half an hour, with tickets indicating a specific time to attend a particular venue (34). Such methods aim to control the flow of pedestrians throughout a venue, specifically monitoring capacity within popular areas of an event. Stakeholder 34 suggested:

"When the events and exhibitions are set up we set a maximum ticket allocation per half hour, or the overall capacity for a seated event, and we can only issue tickets up to this capacity as the box office will not allow us to oversell.."

Art gallery, Event coordinator (Interviewee 34)

However, the reliability of such methods is questionable, particularly with crowd member use of social media such as *Facebook* and *twitter*, to advertise events without consent of event organisers. Additionally, efforts were made to encourage crowd members to arrive to events early, in order to distribute arrival time of crowd members.

Vignette 13 Tactics used to encourage the early arrival of crowd users to an event

5.3.10   Facilities

Facilities were discussed throughout stakeholder interviews, including considerations given to, and availability of welfare facilities, refreshments, and car parking for crowd members (Table 18).

Table 18 Summary of stakeholder findings in relation to crowd facilities

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
Facilities	Welfare facilities	1, 4, 5, 6, 7, 8, 10, 13, 15, 16, 17, 19, 20, 21, 22, 25, 26, 27, 28, 30, 31, 33, 36, 38	Water (1, 4, 6, 10, 13, 15, 16, 17, 19, 20, 21, 22, 25, 26, 27, 28, 30, 31, 33, 36, 38) Toilet facilities (1, 5, 7, 8, 13, 17, 25, 28, 30, 38) Disabled toilets (21, 22, 36, 30)	Toilets unimportant (1, 5, 7) Lack of disabled facilities (30)
	Food and drink	1, 5, 7, 8, 9, 10, 12, 15, 16, 17, 20, 21, 24, 30, 31, 32, 33, 37, 38	Catering (1, 5, 7, 8, 10, 12, 15, 16, 17, 20, 21, 24, 30, 31, 32, 33, 37, 38) Refreshments (1, 5, 7, 8, 9, 12, 15, 17, 20, 21, 24, 30, 31, 32, 33, 38)	
	Car parking	26, 27, 31, 38, 12, 13, 33, 6, 8, 30, 15, 17, 21, 7	Safety and security (7, 15, 17)	Limited (21, 30) Not considered (5, 13) Public transport alternatives (7, 12)

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
	Superfluities	1, 5, 6, 8, 11, 17, 18, 21, 22, 23, 24, 24, 27, 28, 29, 30, 31, 33, 37, 38	Music (8, 11, 28, 33) Technology (22, 27, 30) Television screens (22, 31, 23, 18) Smart phone applications (1)	Financial constraints

5.3.10.1 Welfare facilities

Stakeholders appeared to be aware of the legal obligation to supply drinking water during crowd events, from a health and safety perspective (1, 4, 6, 10, 13, 15, 16, 17, 19, 20, 21, 22, 25, 26, 27, 28, 30, 31, 33, 36, 38). For example interviewee 10 suggested:

"..the licensing law says that every club environment, which we are, should give out free drinking water… erm.. that's part of the licensing act, and we have to have that available.."

Music event, Security manager (Interviewee 10)

Other stakeholders suggested that water drenched sponges were distributed during participatory crowd events, to ensure that crowd members remained hydrated, and comfortable during the race:

"Liaison with local authority, emergency services, commercial partners, other agencies and suppliers for such items as vending cups and sponges for use at drink and sponge stations around the course.."

Event coordinator, Race event (Interviewee 27)

However this does not appear to be adhered to across all crowd events, with a number of stakeholders stating that water facilities are not always provided. Such as interview 17:

"Sometimes.. but not all the time. Well they've got a big bucket of water, and they dip cups in it, and then hand it out to loads and loads of hands. But they won't do it for ages.. and then people lob the cups.. and wee in them.."

Additionally, providing sufficient toilet facilities was an issue raised during stakeholder interviews (1, 7, 8, 13, 17, 25, 28, 30, 38). Those stakeholders involved in the design of buildings were aware of the importance of ensuring sufficient facilities were designed into buildings. For example interviewee 25 suggested:

"Specific guidance is given on the number of facilities provided in a building of a complex nature other than a residential building, so that an adequate provision is provided to satisfy the number of people using the building. It can vary from one building type to another.."

Architect, Physical environment (Interviewee 25)

Additionally, when crowd events are held in temporary venues, outdoor venues, or venues that were not built for purpose, the facilities available may not meet the numbers and specific needs of all crowd members, thus requiring additional planning. However, a number of stakeholders did not appear to be aware of specification regarding the provision of adequate toilet facilities, suggesting that the issue may not be considered important within crowd events (5, 1, 7). Including interview 1 who when discussing consideration given to toilet facilities said:

"But there's no determined amount (of toilets) or anything I don't think.."

Exhibitions, Ground staff (Interviewee 1)

As well as interviewee 7:

"..no specification is available.."

Security coordinator, Public order (Interviewee 7)

Such findings suggest that stakeholders involved in the interviews were not aware of health and safety standards regarding toilets facilities (The Green Guide, 2008). The provision of toilet facilities appeared to be based on personal judgement and previous experience of the organisers involved in each different event. As shown during interviewee 38:

"Last year we arranged for some portaloos to be available on race day, since the previous year the availability of only the school toilets was criticised.."

Participatory race event, Event coordinator (Interviewee 38)

However a number of stakeholders suggested that they gained specific advice regarding toilet facilities. As seen during interviewee 8:

> *"..we got [member of staff] to look at toilet provision.. and one of the problems we had with the area we were choosing was that many of the buildings didn't have toilets.."*
>
> *Outdoor event, Event organiser (Interviewee 8)*

Another key issue that emerged was that toilet facilities available to staff were somewhat better than those used by crowd members during crowd events. For example interviewee 28 discussed working at a music festival:

> *"Better and cleaner toilets and campsite due to being a staff area (I think it was because less people were using them).."*
>
> *Ground staff, Music festival (Interviewee 28)*

Moreover, there appeared to be minimal consideration given to the provision of facilities for crowd members with disabilities (21, 22, 30, 36). With a small number of stakeholders mentioning specific provision of RADAR toilets, that are locked and opened as and when required by individuals with disabilities, who possess a RADAR key.

> *"They are the RADA toilets.. with the key.."*
>
> *Security trainer, Security (Interviewee 21)*

As well as interviewee 22:

> *"We have the disabled toilets here.. left and right alighting.."*
>
> *Stadium architect, Physical environment (Interviewee 22)*

5.3.10.2   Food and drink

One major concern for stakeholders was ensuring the provision of adequate refreshments, and bar facilities to meet the demand of crowd members (1, 5, 7, 8, 9, 10, 12, 15, 16, 17, 20, 21, 24, 30, 31, 32, 33, 37, 38). Monitoring expected numbers was important when considering refreshments. For example interviewee 12 said:

"We do work quite closely with [another department] to keep check on the numbers we're expecting. We're in the [name] building.. so there's the little coffee shop in there.."

Event's organiser, Open day event (Interviewee 12)

Profit appeared to be at the root of considerations with interviewee 16, for example indicating that refreshment facilities were subcontracted, to limit the risk of loss of profits.

"Erm.. Obviously just depends on the budget for the event. So if you have got a big number of people coming.. you would hope you could attract 1 or 2 food stands.."

Event coordinator, Outdoor spectator events (interviewee 16)

Refreshments were also available as a distraction from queuing time, thus aiding user experience. For example interviewee 30 indicated:

"Or you can go and have a sit down and cup of tea, and come back when its less busy. And generally speaking people are pretty good. And they can see we're trying our hardest.. cos we do work really hard.."

Miniature railway events, Ground staff (Interviewee 30)

5.3.10.3 Car parking

Stakeholder interviews suggested a lack of consideration concerning the availability of car parking facilities for crowd users during crowd events (6, 7, 8, 12, 13, 15, 17, 21, 26, 27, 30, 31, 33, 38). Car parking appeared to be an afterthought for crowd organisers, or not considered at all. One stakeholder from a health and safety perspective for example, suggested that crowd event organisers do not dedicate adequate attention to car parking facilities:

"They don't sit down and think.. let's think, where are they going to park.."

Health and Safety, British Standards Institute (Interviewee 26)

However, car parking facilities did appear to provide a health and safety concern,

with a number of stakeholders suggesting a need to consider where car parking would be located, to ensure crowd member safety when moving from their car, to the event. Ensuring crowd member vehicles are parked safely, and in a secure location, with limited risk of theft, was discussed by a number of stakeholders. However, discussion primarily came from stakeholders within the police and security, concerning inadequate provisions made by event organisers to protect against car theft. One example being a Police Community Support Officer, involved in the policing of a music festival event, during which, inadequate lighting in car park areas, contributed to a large number of thefts.

> *"..the lighting was rubbish. So.. come 10pm it was.. well before then.. come about 8-8.30pm it was pitch black. So you couldn't see the people that were possibly causing problems anyway.."*
> *Police Community Support Officer, Public order (Interviewee 17)*

Additionally, car parking could have a negative impact on the local community (21, 38), if crowd members are forced to park along side streets, or in surrounding car parking (hotels and supermarkets for example) for ease of access to an event. For example during interviewee 38:

> *"We aim to contain all car parking on the school field so as to avoid disruption to local residents.."*
> *Participatory race event, Event coordinator (Interviewee 38)*

Yet some stakeholders appeared to suggest that car parking was not an issue they felt was a concern to them, viewing the issue of parking as the responsibility of crowd members, rather than the event organisers (5, 13,). As highlighted during interviewe 13:

> *"their (crowd members) problem rather than mine.."*
> *Event Managers, Open day event (Interviewee 13)*

However, incentives were suggested for alternatives to car parking at an event, including increasing public transport use (7, 12). Incentives to encourage crowd members to use public transport to access the event, for example a number of stakeholders mentioned the use of 'park and ride' systems, and rail travel with complimentary or reduced ticket pricing. For example interviewee 12 suggested:

"..we try wherever possible to recommend and suggest to people that they actually come via another form of transport……… So to make that more attractive to travel by train we do give away free bus tickets at the railway station. So that, once they get into [town name] they don't have to pay anything else in order to get into campus.."

Event's organiser, Open day event (Interviewee 12)

Moreover, warning crowd members that they are required to organise car parking, as there is insufficient parking available was mentioned. Thus crowd members will not view insufficient car parking as unexpected upon arrival.

"I monitor the bookings and when I get to about 1,000 people saying they're coming by car, I tend to put a little notice on the booking form saying there is no car parking on the campus.. it's all gone.. you know.. try and find a different way of coming..'

Event's organiser, Open day event (Interviewee 12)

5.3.11   Satisfaction

Stakeholder interviews appear to indicate a gap in knowledge surrounding user experience, comfort and satisfaction, with a distinct focus on financial considerations (Table 19). The suggestion is that stakeholders assume user satisfaction will ultimately come at a high cost. However, such stakeholders do not appear to understand the business case for developing a positive crowd experience, and enhancing crowd satisfaction. For example interviewee 16 suggests:

"…it's all down to cost. It really is. If you've got an increased budget. It should really be expediential shouldn't it? If you've got a bigger budget you should be able to put on a better event.. and the spectators should have a better time, both in their seat, and ergonomically how they're sitting.. as well as the entertainment they're watching.."

Event coordinator, Outdoor spectator events (interviewee 16)

Table 19 Summary of stakeholder findings in relation to crowd user satisfaction

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
Satisfaction	Experience	1, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 22, 25, 27, 29, 30, 31, 34, 37, 38		
	Atmosphere	1, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 22, 25, 27, 29, 30, 31, 34, 37, 38		
	Satisfaction	10, 14, 16, 18, 25, 30, 31, 38		

5.3.11.1 Experience

Crowd member experience was discussed as an issue relating to financial considerations surrounding an event budget. A number of stakeholders discussed providing a basic level of service for standard ticket prices, with additional services, and comforts provided at additional costs. For example interviewee 22 suggested:

> *"So we've got, you know, all the seats are the same [price]. And then we've got the executive seats, which are padded. And then padded with arms, for the vice presidents.."*
>
> *Stadium architect, Physical environment (Interviewee 22)*

Crowd members therefore accept and expect a basic level of service and comfort, due to a lower priced ticket. Compared to more superior conditions and prices, where expectations may be higher. Such findings indicate that stakeholders are willing to heighten crowd member comfort, providing crowd members are willing to pay more for it the increased comfort and satisfaction experienced.

Crowd member enjoyment was an issue discussed across stakeholder interviews. The police and security described aiming to maintain, and segregate antisocial behaviour, to enable the general public to enjoy an event. As shown during interview 18 said:

"..we mustn't forget that you know.. the majority of people go to the football because it's fun. And they go there to meet their friends.. and have some social time I suppose. So.. after a long journey, usually by train.. the fans are looking for a pub to go into. A lot of publicans won't have them in there, because of a fear that there's going to be violence.."

Police Chief Superintendent, Public order (Interviewee18)

And interviewee 34:

"Good signage and interpretation will encourage visitors to behave in a predictable way and make the experience more enjoyable for the visitor and more manageable operationally.."

Art gallery, Event coordinator (Interviewee 34)

Vignette:

A 59 year old male, Fire Safety Officer described the consideration of crowd user experience, when designing fire evacuation procedures, and alarm systems, within large scale crowd events.

"What they also have in large events is that normally they don't have an alarm that alerts you the general public. They have an alarm that alerts the stewards.. so they're aware that there's an alarm going off somewhere. And they'll first of all try and police that signal. So it doesn't ruin the show.. because if it's something silly like someone burnt some toast.. then you've suddenly missed half of the show because someone burnt some toast, then you would want your money back.."
Health and safety officer, Fire officer (Interviewee 14)

Vignette 14 Fire evacuation procedures and the user experience of crowds

This indicates that those responsible for the physical environment aims to create a space that aids the enjoyment of an event, for example interviewee 16 said:

"…if they can sit down, they're going to enjoy the event far more than standing up for 2 hours.."

Event coordinator, Outdoor spectator events (interviewee 16)

5.3.11.2   Atmosphere

Creating the right atmosphere for each individual event was a recurrent concern throughout stakeholder interviews. Event organisers and coordinators interviewed,

aimed to create the right ambience, through music and lighting, as seen during interviewee 24:

> *"They have the guy who sits up there [tiered seating] and beats the drum.. right next to the away fans [football].. to stir up atmosphere. It encourages chanting, and when there's a goal, people stand up and chant.."*
>
> *Head of security, Security (interviewee 24)*

And interviewee 5:

> *"..thinking hard about the flow of people throughout the displays [art gallery], the types of projects and how best to allow people to interact with them and displays, music, presentations. We spent a long time developing a 'theme' for the show which will run throughout the board headers, the [event name] show booklet and the advertising.."*
>
> *Event organiser, Exhibition (Interviewee 5)*

Such comments highlight the importance stakeholders place on creating the right atmosphere during crowd events, suggesting user experience is a priority. However, stakeholders from physical environment perspectives discussed concerns surrounding layout, and the effect on the atmosphere within a crowd. For example interviewee 22 discussed the positioning of seating areas for crowd members with disabilities, to ensure that all crowd members experienced the atmosphere of the football game within the stadium design.

> *"Some people still prefer to be pitch side.. so we have the option for both.. so but these are as good as seats as you're get in the house.."*
>
> *Stadium architect, Physical environment (Interviewee 22)*

Moreover, the positive impact of having large numbers of crowd members, on the atmosphere at an event was also discussed, for example interviewee 13 suggests:

> *"Yes.. and a different atmosphere when the event is full to when it is half empty.."*
>
> *Event Managers, Open day event (Interviewee 13)*

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Additionally, police and security involved in stakeholder interviews discussed maintaining a positive mood, to prevent antisocial behaviour developing, with the potential benefit of improved crowd user satisfaction, on behaviour. For example interviewee 18 suggested:

> *"All that noise.. shouting. And you can see that things can turn on a knife edge. If things go badly.. suddenly.. you know you've got a very different atmosphere that you're policing.."*
>
> *Police Chief Superintendent, Public order (Interviewee 18)*

5.3.12 Comfort

Stakeholders reported a number of issues surrounding planning for crowd member comfort (Table 20). When planning crowd events it is important to establish what issues affect crowd member comfort, and what measures to take to enhance crowd member comfort.

Table 20 Summary of stakeholder findings in relation to crowd user comfort

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
Comfort	Personal space	6, 8, 10, 12, 14, 16, 18, 22, 25, 26, 27, 31, 33, 38	Concerned with safety parameters for personal space. / Comfort comes at an additional cost to consumers.	Comfort not considered within the planning.
	Environmental comfort (Thermal comfort)	6, 8, 10, 16, 26, 27, 31, 33, 38	Overheating in crowded venue / Overheating – accepted as a problem during affecting satisfaction / Buildings do not always allow for alterations to thermal comfort.	Dismissed as a problem that cannot be rectified. Not a concern until it becomes a health and safety issue (shows a disregard for satisfaction)
	Environmental comfort (Weather)	8, 16, 17, 20, 27, 29, 30, 38	Good weather- positive effect on satisfaction / Bad weather – negative effect on satisfaction. Wet weather- calms crowd behaviour (public order) / Extreme weather - Event closure (health and safety hazard)	Unpredictability of the British weather (unable to control for)
	Environmental comfort (Lighting and noise)	17, 18, 22, 26, 28, 31	Insufficient lighting Excessive noise and lighting (particularly after 11pm) / Security concerns / Disrupt local community surrounding event (8, 10, 12, 15, 19, 22, 26, 27, 31, 33, 38)	

5.3.12.1 Personal space

Personal space was a concern expressed by a number of stakeholders (6, 8, 10, 12, 14, 16, 18, 22, 25, 26, 27, 31, 33, 38). Consideration surrounding personal space allocation appeared firmly swayed towards ensuring safety, contrasted with comfort of the user. Personal space calculations were guided by safety standards. Thus, if it was legally safe to have a certain capacity in a given area, then that would be the capacity, with little consideration given to whether that capacity of individuals could comfortably fit in that space. For example interviewee 6 gave no mention of whether such calculations provide a comfortable environment.

> *"We use fire evacuation standards to calculate capacity."*
>
> *Event organiser, Open day event (Interviewee 6)*

Personal space and crowd member comfort levels appeared to be influenced by financial considerations, with comfort being associated with increased ticket prices for a number of crowd events, including:

> *"So they pay top dollars, and have the seats with the padding."*
>
> *Stadium architect, Physical environment (Interviewee 22)*

Such comments suggest that comfort comes at an additional price, and cannot therefore be assumed when buying a standard price ticket and planning to attend an event.

Vignette

A 26-year-old male Sports Event Coordinator, involved in the organisation of both indoor and outdoor spectator events, described the financial considerations surrounding personal space and comfort.

> *"Well it all comes down to money you see.. if we had enough money to have sofas for everyone then we would.."*
> *Events coordinator, Outdoor spectator events (interviewee 16)*

Such findings highlight the financial considerations associated with event organisation, and the compromise between user experience, and financial gain.

Vignette 15 Financial considerations that impact crowd member comfort

Additionally, new sports stadium designs considered the comfort of spectators, in the seating design, and dimensions. With interviewee 22 suggesting:

> *"All the seats.. 485 centres.. and then the elbow room. And then 760 leg room. So there's plenty of leg room for all the supporters. So there's plenty of leg room for everybody here."*
>
> *Stadium architect, Physical environment (Interviewee 22)*

Such considerations might indicate a move towards achieving the largest safe as well as comfortable capacity.

5.3.12.2   Environmental comfort: Thermal comfort

Stakeholders (6, 8, 10, 16, 26, 27, 31, 33, 38) appeared to recognise thermal comfort to be an issue causing discontent among crowd members, yet little concern was given to rectifying the issue. Overheating was a problem that was accepted, with no great desire, or concern to improve the situation for crowd members. For example interviewee 10 suggested that:

> *"People are always complaining that it's too hot, and yes it does get very hot in here.. But there's nothing we can do about that…"*
>
> *Music event, Security officer (Interviewee 10)*

Additionally, interviewee 6 suggested that:

> *"It's usually the smaller room that heats up…… But there's nothing they can do about it. It's because apparently.. there are pipes running across the ceiling.. which means the temperature gets high. And we can't prop the doors open, because they're fire doors……. So it's difficult to regulate the temperature, well it's impossible"*
>
> *Event organiser, Open day event (Interviewee 6)*

Such comments suggest the thermal comfort of a venue must be considered in the design stage, with architects taking responsibility for ventilation for anticipated occupier numbers, to prevent overheating. However, when a building is found to be overheating, measures should be taken to gain feedback from crowd members, and positive action taken to correct the problem. Such corrective measures may initially impact financial considerations, but crowd member thermal comfort currently appears to be compromised. Moreover, some buildings or venues may not allow

alterations to thermal comfort to be maintained, in which case the problem is out of stakeholder control.

Moreover, when overheating becomes a health and safety issue, in crowd situations of high density, or when radiant heat is present during outdoor events, action appeared to be taken. For example Interviewee 10 stated:

> "..the licensing law says that every club environment (which we are), should give out free drinking water… erm.. that's part of the licensing act, and we have to have that available. Errrrm.. the rooms here get extremely hot. And we have air conditioning.. but that's as good as it gets."
>
> *Music event, Security officer (Interviewee 10)*

5.3.12.3   Environmental comfort: Weather

The impact of the weather on user experience, and satisfaction did appear to be a concern to stakeholders (8, 16, 17, 20, 27, 29, 30, 38). Organisers and coordinators of crowd events in particular (8, 16, 27, 29, 38), viewed the unpredictability of the British weather, as a concern when planning events. For example, interviewee 8 stated that:

> "I mean we had to have good weather, and we did have.. it wasn't screechingly hot, and that was quite good actually. Otherwise I think in some of the venues it would have been really quite uncomfortable. But overall it went really rather well.."
>
> *Outdoor event, Event organiser (Interviewee 8)*

However, weather also had an impact on health and safety, particularly during winter events, with snow and ice, and slips, trips and falls highlighted as a concern. For example interviewee 16 suggested:

> "That's the trickiest thing in the bad weather. I mean the main thing is having good trained marshals in place…… so if there are slippery banks.. then those you try to clear. Or any other bottlenecks you try to keep clear."
>
> *Event coordinator, Outdoor spectator events (interviewee 16)*

Extreme cases of bad weather were accepted as causing events to be cancelled as user safety is the primary concern. For example interviewee 20 suggested:

> *"If there was a severe weather problem.. like ice and snow.. then the police would look at it with people from the football ground. And the referee in terms of whether it's safe to play the match. But in terms of the people getting to and from.. then the football ground and the police would look at that, and possibly cancel an event."*
>
> *Police Sergeant, Public order (interviewee 20)*

From a public order perspective, wet weather was seen to have a positive effect on behaviour, reducing antisocial behaviour, and increasing the speed of exit from outdoor events. A number of public order stakeholders referred to poor weather conditions as "*PC rain*" due to the calming effect poor weather has been seen to have on antisocial behaviour.

Vignette

A 23-year-old male Police Community Support Officer described the effect weather can have on behaviour during outdoor events.

> *"If its brighter and sunny then people tend to…. Just.. kick back in the sun and have a drink I suppose. So generally it will be alcohol related….. But if it's raining, people don't want to be stood outside on the rain.."*
>
> *Police Community Support Officer, Public order (Interviewee 17)*

Such findings suggest that good weather can have a positive impact on user experience, but can sometimes encourage anti-social behaviour, particularly alcohol misuse and subsequent violence.

Vignette 16 The effect of weather on crowd behaviour

As well as interviewee 29, showing the calming effect of bad weather on behaviour.

> *"To be honest if anything the weather actually calms people down."*
>
> *Fireworks event, Event coordinator (Interviewee 29)*

5.3.12.4   *Environmental comfort: Lighting and noise*

Lighting and noise were recognised by stakeholders (17, 18, 22, 26, 28, 31), to effect satisfaction of local communities surrounding outdoor crowd events, particularly during events that run into the early hours of the morning. Additionally, lighting and noise issues were seen to have a negative effect on safety and security

at crowd events. Stakeholders involved in public order in particular, suggested the negative impact of insufficient lighting, and excessive noise levels. For example interviewee 17 revealed:

> *"And the lighting was crap.. that one was the biggest problem because you couldn't see a great deal. And if somebody was passed out in a field, in the corner, then we wouldn't have known, because it was pitch black."*
>
> *Police Community Support Officer, Public Order (Interviewee 17)*

As well as interviewee 18:

> *"All that noise.. shouting. And you can see that things can turn on a knife edge. If things go badly.. suddenly.. you know you've got a very different atmosphere that you're policing, and it can change very very quickly.. very quickly…"*
>
> *Police Chief Superintendent, Public order (Interviewee 18)*

5.3.13   Crowd characteristics

Stakeholders reported a number of issues surrounding planning for specific crowd types (events), and different crowd member types (those attending events) (Table 21). When planning crowd events it is important to establish what type of people are expected to be attending, in order to anticipate possible behaviours.

Table 21 Summary of stakeholder findings in relation to crowd characteristics

Area	Issue	Stakeholder	Knowledge / Priorities	Dismissed / Require attention
Crowd characteristics	Crowd type	7, 8, 10, 11, 15, 16, 17, 18, 21, 29, 41	Stereotypes, personal judgement, and previous experience, used as a basis for planning crowd events. Increased intelligence and evidence gathering with police presence.	Lack of intelligence gathering, planning, and organisation before the event.
	Crowd member type	7, 10, 11, 16, 21, 29, 37, 38, 41	Anticipating the types of crowd member expected, and possible behaviour.	Insufficient planning, Unexpected behaviours / Lack of information on historical issues and behaviours, Lack of guidance

5.3.13.1 Crowd Type

Crowd type was often based on stereotypes, personal judgement, and previous experience of working in similar and different crowd situations (7, 8, 10, 11, 15, 16, 17, 18, 21, 29, 41). Stereotypes predominantly surrounded race, gender, and music preference. For example Interviewee 7 revealed stereotypes in categorising crowd types:

> *"And that particular event was a particular group, that had a black gangster following from across the midlands."*
>
> *Security coordinator, Public order (Interviewee 7)*

Gender stereotypes were also evident within sporting events, including football hooliganism, as expressed by Interviewee 18:

> *"But that gender bias is interesting around football. I have never known a female football hooligan."*
>
> *Police Chief Superintendent, Public order (Interviewee 18)*

Some stereotypes may not accurately represent the crowd type attending the event, the experience of crowd members might be compromised as a result. Thus, such stereotypes should be questioned, to cater for all individuals attending, and prevent the generalisation of negative traits to all.

5.3.13.2 Crowd member type

Anticipating the types of crowd member expected to attend an event was suggested as crucial to the success of an event. Stakeholders (7, 10, 11, 16, 21, 29, 37, 38, 41) appeared to recognise the importance of anticipating expected crowd members during crowd events.

> *"With crowd management.. Well it doesn't really matter how many people you have its about what type of people… erm.. you know.. what type of event you're actually doing, determines the type of person who come."*
>
> *Fireworks event, Event coordinator (Interviewee 29)*

When there is a police presence at an event, the intelligence surrounding anticipated crowd behaviour, and previous incidents comes from intelligence gatherers within the police. However, such information is not made available in smaller events, that do not support a police presence.

> *"Errmm. ****** fans are described as being 'generally well behaved, with a respect for ground regulations. And mix well with other fans.' So that's nice isn't it…… But there is no intelligence to suggest that there is any planned disorder."*
>
> *Security football event (Interviewee 37)*

Additionally interviewee 10 said:

> *"I know that people react to him [rap music artist] quite… erm.. developing mosh pits, jumping up and down.. crowd surfing. I know how people work with him.. the customers.. so I'll obviously plan for that, and I'll obviously reduce the capacity accordingly."*
>
> *Private Security, Senior Venue Security Manager (Interviewee 10)*

There appeared to be a lack of information and guidance available from which to anticipate crowd members, and target audience.

Vignette

A 43-year-old male Senior Venue Security Manager, involved in indoor spectator music events described the method of planning for crowd events. Researching historical crowd behaviour, and antisocial behaviour surrounding particular music artists, to anticipate security requirements.

> *"If the act has had a previous problem it will show up on Wikipedia.. such as.. erm.. if they've had serious crowd issues.. Errrm.. so on and so forth.. and then it will show up on there. So I can judge that accordingly. Now if I see a problem I'll start just delving a little bit more, into who the act is.. and how they work… and who we're going to expect to walk through the door."*
>
> *Private Security, Senior Venue Security Manager (Interviewee 10)*

Vignette 17 Lack of guidance available to events with no police presence

Such information suggests a gap in knowledge, and dissemination of historical crowd behaviour surrounding artists, or events, during the organisation of small

scale events that do not require a police presence. Furthermore, event organisation appeared to be based on previous experience, with a lack of guidance available to inform organisers as to how to predict crowd members. A number of stakeholders suggested intelligence was based on previous experience, and information passed down from the preceding position. However, information not written down for the next position, could risk being lost, and not incorporated into subsequent events planning. Thus, better logging, and recording of information surrounding event organisation is required.

5.4 Discussion

This section discusses the findings from in depth semi-structured interviews with stakeholders involved in crowd events, including event organisers and deliverers investigating the organisation, coordination, and security involved in crowd events of various descriptions. The aim of this study was to gain insight into the knowledge and reasoning behind stakeholders involved in crowd organisation within a variety of crowd events. Semi-structured stakeholder interviews were undertaken within organisations that routinely organise and host events including: music, sporting, open days, conferences and exhibitions, graduations, and participatory race events.

5.4.1 Key findings from stakeholder interviews

Similarities in approaches and priorities are apparent with crowd event organisation, primarily attention to safety requirements in protecting crowd members, venue reputation, and legal obligations. Safety was identified by those responsible for organising and delivering events as a key priority, with less attention given to user experience, crowd comfort and satisfaction. Conversely, attention to and attitudes and beliefs surrounding user experience, crowd comfort and satisfaction, were often based on personal judgment and appeared to be influenced by budget considerations. The findings suggest a lack of knowledge and usable evidence based guidance for planning crowd events regarding important aspects affecting participant satisfaction. This supports the conclusions of the literature review presented earlier in this thesis (Chapter 2).

Through systematic hybrid thematic analysis of the interview transcripts, eleven common themes were drawn from the data:

1. Health and Safety
2. Public Order
3. Communication
4. Design
5. Public relations
6. Crowd movement
7. Event capacity
8. Facilities
9. Satisfaction
10. Comfort
11. Individual differences

The ordering of the 11 themes reflects the number of references made to the issues within the interview transcripts, and was used to guide the ordering of the discussion. The following themes were discussed further: health and safety, public order, communication, crowd movement, facilities, satisfaction, and comfort.

Health and safety, and public order: Similarities of approaches and opinions emerged concerning crowd event organisation, primarily compliance to safety, in protecting crowd members, venue reputation, and legal obligations. Such issues emphasize the importance of compliance to health and safety standards, in order to maintain a positive reputation. These priorities are reflected in research on crowds, with a predominance of research in this area focusing on crowd safety (Lee & Hughes, 2007). However, well defined management systems to ensure that guidance was followed were not evident, with health, safety and security officers admitting to not always being aware of events taking place. Additionally, notable differences emerged between stakeholder groups, primarily during the planning of music events, where varying consideration to alcohol, antisocial behaviour and panic training were evident. This was also the case when anticipating target audience, and researching historical issues surrounding audience reaction to particular artists (e.g. pop groups).

Communication: There also appeared to be a lack of information available to organisers involved in relatively small scale events. Moreover, findings indicate the importance of tailoring crowd planning guidance to different crowd situations, supporting previous research (Berlonghi, 1995; Lee & Hughes, 2007; Ryan et al., 2010).Limited communication was evident between crowd event stakeholders, with

little sharing of knowledge and experience between events, and across departments within an event. Consequently events could unknowingly occur simultaneously, or problems could be repeated during the planning of numerous events across crowd situations.

Crowd movement: Additionally, signage and logistics involved in directing crowd members to correct locations, appeared to be accepted as a problem inherent to crowd management, with few stakeholders concerned with overcoming shortcomings and achieving improvements. Therefore highlighting limited understanding that the signage provision may be inadequate, requiring additional attention.

Facilities: Provision of toilet facilities for example, were not well linked to individual event capacity. Additionally car parking was considered by some to be: "their (crowd members) problem rather than mine" (Conference event orgainser). This suggests a gap in knowledge, leading to the dismissal of facility provision, as a valid problem requiring attention.

Satisfaction and comfort: Planning and attention to crowd comfort (thermal, personal space), crowd performance (facilities, signage, logistics), and participant satisfaction, were approached less consistently, often based on '*personal judgment*' (Event coordinator), and influenced by budget considerations. Thus indicating that financial considerations take precedence over user comfort and satisfaction.

The number of references made to each of the issues is of interest as it reflects the weighting of the issues within the literature (Chapter 2), with 'health and safety' issues receiving the most attention, and 'comfort' and 'satisfaction' receiving the least. This is of particular interest as the focus of this research was comfort, satisfaction and performance, which with regard to 'researcher bias' one might assume that the research was specifically looking for such issues, over those of 'health and safety', and 'public order' for example (Bryman, 2004).

5.4.2 Health and safety

Health and safety concerns were discussed more than any other issue during stakeholder interviews, in line with the considerable research regarding crowd safety. When interviewing stakeholders, many took the assumption that the

interview concerned health and safety primarily, yet at no point was this stated. The researcher reiterated the aims of the interviews, to explore issues surrounding the comfort, safety, and satisfaction of crowd events, however there appeared to be a general assumption made across stakeholder groups, that health and safety was the focus. Such assumptions suggest that health and safety was a priority for stakeholders. Moreover a possible lack of consideration for user experience could result from the fear of failure to meet health and safety guidance, and possible accidents, and legal implications. Such findings support the predominance of health and safety research within crowd events (Zhen et al., 2008; Melrose et al., 2011; Oğuz et al., 2010; Ghaznawi, 2007; Biggs et al., 2013) creating greater awareness of the issues.

5.4.2.1   Management systems

Although stakeholders appeared to realise that compliance to health and safety standards should not be left to trust, it often was. Thus, more stringent systems of ensuring compliance to health and safety procedures are required. Future research should develop understanding surrounding management systems in place to ensure compliance to health and safety standards and procedures, and methods of encouraging such issues to be viewed more seriously. Although stakeholders were aware of the importance of adhering to health and safety legislations, there was a suggestion that safety was a burden, with a disregard for the legislation. Such disregard falls in line with previous research suggesting there is a belief that health and safety legislation has 'gone mad', (Almond, 2009) an issue that became apparent when talking to a number of stakeholders.

5.4.2.2   Panic

Should an emergency arise within a crowd event, it is unclear the methods that would be implemented by stakeholders interviewed to deal with crowd users experiencing 'panic' ['sudden uncontrollable fear or anxiety, often causing wildly unthinking behaviour', Oxford Dictionary (Pearsall & Thompson, 1999)], highlighting a gap in knowledge. Few stakeholders discussed the possibility of panic within crowd events. Additionally, it appeared that the emergency services (paramedics for example), were relied upon for dealing with individuals experiencing panic within crowd situations. Stakeholders involved in the interviews appeared to suggest that

training in dealing with panic was not received, with stakeholders relying upon the emergency services. Training in reducing panic could be provided to ground staff, in order to increase understanding should an emergency situation arise. Previous research suggests that communications between staff, and a delay in warning the public about a potential disaster, are a recurring feature of crowd disasters (Sime, 1999). However, research also suggests that the delay in warning the public about the cause of an evacuation (for example) is due to the fear of igniting 'panic' within the crowd. It is important therefore that future research concentrates on methods of dealing with panic within crowd events, from individuals experiencing panic attacks due to the crowd environment, to dealing with panic outbreaks within a crowd during an evacuation, or potential disaster (Kelley et al., 1965). In addition, research concerning the negative effects of crowds on stress experienced shows the importance of increasing crowd satisfaction, and preventing panic, from a health perspective (Cox et al., 2006; Dion, 2004; Evans & McCoy, 1998).

5.4.2.3 *Legal protection and venue reputation*

Interview findings indicate a lack of consideration for the importance of thorough health and safety checks, and assessment of the potential risks across an event, highlighting a lack of knowledge surrounding the aim of a risk assessment. The risk assessment is a careful examination of what could cause harm to people (HSE, 2012b). The law requires organisations to protect as far as is 'reasonably practicable' the health and safety of those involved in an organisation. Within crowd events, the employees, and other stakeholders including those crowd users attending the event, to aid the organisation of events, to detect and control for otherwise unforeseen potential hazards, and should not be viewed as a burden for organisers to comply with. Previous research has attempted to develop risk assessments to improve the understanding and ease of use of risk prevention tools (Au, 2001). However, further research is required in order to develop understanding and improvements in health and safety within crowd events of various descriptions.

Additionally a number of stakeholders appeared to suggest that the emphasis on health and safety regulations within crowd events was to protect the crowd organisers and venue reputation. Protection against the legal costs should an accident occur, the organisers must be seen to comply with health and safety standards. Moreover, failure to protect crowd members, and resultant accidents, and

suing comes at a financial cost to the organisers. One explanation for the lack of consideration as to the importance of maintaining health and safety within crowd events could be the coverage of regulatory myths, and media perception of *health and safety gone mad*, that suggests health and safety legislation has spiralled out of control (Almond, 2009). Such research suggests that the United Kingdom Health and Safety Executive (HSE) have been challenged by the negative public evaluations of its enforcement activity (Almond, 2009). Consequently measures to instil the value of health and safety into stakeholders are challenged by negative media attention surrounding health and safety myths. (Almond, 2009) suggests that media coverage concerning the heavy handed and disproportionate enforcement, and petty implementation of health and safety regulations can create a negative image surrounding health and safety, impacting negatively on the perceptions of regulators and the law. For example the popular media coverage of the teachers who enforced the wearing of protective safety goggles for children when playing conkers (Almond, 2009). Such popular media coverage has contributed to the dismissal of the true value of health and safety regulations. However, mass media attention also builds when mass events go wrong, due to the large danger, and potential loss of life to large numbers of individuals attending the event. Consequently, stakeholders suggested maintaining the reputation of the venue, as one major driving factor for health and safety implementation.

Maintaining the reputation of the crowd venue was one major issue discussed in relation to health and safety compliance. When a crowd event goes wrong, the outcomes can be catastrophic. Thus organisers appear to have developed, and instilled a fear in protecting the reputation of the venue when organising crowd events. In some instances concerns over protecting venue reputation appear greater than the desire to protect crowd users, reflecting the predominance of research following large scale crowd disasters around the world, including Love Parade (Mukerji, 2012), Hillsborough football stadium (Nicholson & Roebuck, 1995; Smith, 1994; Elliott & Smith, 1993), and the Mihong bridge fatality in China (Zhen et al., 2008) for example.

5.4.2.4   *Financial*

Stakeholder interview findings suggest that health and safety considerations were incorporated into financial considerations, due to legal obligations. Whereas issues

surrounding crowd satisfaction, including facilities, layout, and comfort, were seen to be manipulated to meet event budget constraints. However, financial considerations should not come at the price of user experience and satisfaction, otherwise crowd members will be reluctant to return to subsequent events. Such findings represent a gap in knowledge and a gap in the appreciation for the importance of user experience and satisfaction by stakeholders.

5.4.3 Public Order

5.4.3.1   *Crowd control versus crowd management*

During the stakeholder interviews, monitoring crowd behaviour was described as *'crowd control'* on more occasions than '*crowd management'*. Crowd management is descried as a proactive approach, while crowd control is a more reactive approach (Berlonghi, 1995; Marana et al., 1998; Adang, 2002; Sime, 1999). Stakeholders described their role as controlling, rather than maintaining the behaviour of the crowd, suggesting that alterations and understanding concerning the terminology might be required. Future research could aim to determine how to alter the wording of crowd organisation literature and guidance in order to instil a maintenance role as opposed to a controlling role, in order to match the research findings surrounding keeping the peace within crowd events (Rosander & Guva, 2012). Findings support research into the difficulty of implementing vocabulary and preferred terminology into the police force, and allowing information to filter into other organisations of authority (crowd security organisations for example) by osmosis (Ratcliffe, 2002).

5.4.3.2   *Staff behaviour*

Issues surrounding the availability of resources and under staffing during crowd events was discussed, the presence of marshals (an issue highlighted as important during user focus groups, particularly with older individuals), and the importance of staff being polite to crowd users was only discussed in a small number of stakeholder interviews (see User focus groups Chapter 4). Such findings support previous research surrounding the relationship between the behaviour of authoritative figures within crowd events, and the subsequent behaviour of the

crowd. Research concerning the impact of police use of force on subsequent crowd behaviour for example (Drury et al., 2003; Hoggett & Stott, 2010; Reicher et al., 2004; C. Stott & Reicher, 1998), might suggest that stakeholders would benefit from dedicating time and resources to ensuring that ground staff within crowd events behave in a polite and compromising manner throughout crowd events, matching the behaviour of the crowd, to maintain a positive crowd experience. Such findings support user focus group findings, indicating the importance of approachable and well informed staff within crowd events (Chapter 4).

Moreover, recently published research indicates that a friendly but firm approach is most successful in keeping the peace within a crowd (Rosander & Guva, 2012). Such suggestions will be explored within complete observer event observations [Chapter 7]. Rosander and Guva (2012) suggested that maintaining an organisational strategy focusing on the festivity of an event, is the key to retaining a peaceful result. Therefore suggesting that greater importance could be placed on the issue of creating an event that is enjoyable for the crowd users, not just from a marketing and financial perspective, but also from a crowd control, and crowd behaviour perspective. However, stakeholder interview findings highlight a lack of consideration to the importance placed on crowd user satisfaction when organising an event, with priority often revolving around financial restrictions. Findings suggest that academic research findings are not being implemented into the organisation of crowd events, and priorities could be altered to improve the user experience of crowds. This supports research concerning the difficulty of implementing academic research findings into the police for example (Ratcliffe, 2002; Hoggett & Stott, 2012). Substantial research surrounds crowd psychology and the police, however problems arise in implementing research findings into the daily running of the police. An issue that appears to have been supported in these research findings, within the police, as well as private security, and other stakeholder groups including event organisers (Ratcliffe, 2002; Hoggett & Stott, 2012).

5.4.3.3   *Relationship between the public and private security*

Stakeholder interviews suggest that while the role of the police is to separate, and control antisocial behaviour within crowd members, the role of the security stewards is more to maintain the user experience of crowds, minimising the onset of antisocial behaviour. However frustrations were evident within private security interviews, with

the lack of distinction between, and understanding of their differing roles among crowd users. Such findings support the lack of research surrounding the differing role of the police and security within crowd events, as highlighted in previous research carried out for the cabinet office (Challenger & Clegg, 2011). Increasingly private security organisations are being utilised within events (such as football matches, and music festivals) in place of public police force, as an economical alternative. Future research should aim to explore the relationship between public and private security, an issue that is likely to become increasingly important with the financially motivated move from public to private security within crowd events. Thus, the following research will explore the relationship between public and private security through complete observer event observations (Chapter 7).

5.4.4 Communication

5.4.4.1 Lack of information sharing

During the organisation of crowd events, there appears to be a lack of appreciation for the importance of sharing information, within an organisation, and across different stakeholders. Such issues could be explained by the lack of police presence within small scale crowd events. During large scale crowd events that see a police presence, the planning, logging and sharing of information between stakeholders is systematic, and inherent to the role of the police. Crowd events could therefore occur simultaneously with each event organiser unaware of the concurrent event. Such planning could create unforeseen problems with car parking, and traffic congestion for example. One possible solution could be the presence of a central Event coordinator within large organisations, through which all events information must be passed. Moreover, within the police force for example, information and intelligence is stored and filed systematically, allowing data to be subsequently retrieved to monitor performance (Ratcliffe, 2002). However, such information sharing does not appear to be seen within private organisations.

5.4.4.2   Usability of guidance

Stakeholder interview findings indicate that guidance available to stakeholders in planning crowd events was not being used, particularly in the organisation of small scale crowd events with low budgets, and no police presence. Such findings are in line with the underdeveloped literature in this field (Berlonghi, 1995), and suggests the need for further research to concentrate on the availability and usability of guidance, and how to encourage use of guidance within the corresponding stakeholder groups. The HSE provide free information online surrounding the '*Guidance on running crowd events'*, providing links to additional HSE resources (HSE, 2012; The Green Guide, 2008). However, stakeholders do not appear to be aware of the information that is available, and are therefore not utilising the resources available.

5.4.4.3   Categorising events and storing information

Stakeholders within the police described a systematic structured approach to categorising events, to determine the level of security required. Systematic methods of categorising events could be applied to other stakeholder groups, to document previous events, and organise subsequent events. The police grade football matches as to their potential for risk, based on previous events, match history with different opponent teams, and individual factors specific to the day. Such tactics could be utilised within the organisation of other crowd events of various descriptions. For example, small organisations could pay greater attention to the recording of detailed risk assessments, logged, and filed for each event, allowing subsequent organisers to determine areas of concern immediately. Such findings could be the result of a lack of usable, evidence based guidance surrounding crowd events organisation (Berlonghi, 1995; Lee & Hughes, 2007). Small scale crowd events may therefore benefit from a similar rating scale, and to determine potential risk factors, and log incidents when hosting events.

5.4.4.4   Information storage

Similarly, the storage of event information, particularly regarding historical issues surrounding audience reaction to particular artists, was a major concern during

stakeholder interviews. Event security organisers appeared to rely on less robust, less reliable, less accurate methods of research including the internet, and Wikipedia. Such findings are in line with the lack of research into the differing roles of public and private security (Challenger & Clegg, 2011). Future research concerning the security of crowd events must focus on developing a database of the history of crowd behaviour for each event (music artist, or sports team for example), in order to advance knowledge regarding anticipating crowd behaviour, and making necessary arrangements.

5.4.4.5   *Staff meetings*

Stakeholders interviewed suggested that meetings, briefings, and debriefs appeared to focus on health and safety issues primarily. With stakeholders from public order and health and safety perspectives discussing the importance of briefings, and debriefs surrounding an event, more than any other stakeholders. However, the focus towards health and safety could be due to the assumption made by stakeholders, that the interview was interested in health and safety surrounding events. Although it was stated that the research focused on safety, satisfaction, and comfort surrounding events, the assumption surrounding health and safety was difficult to correct. Such assumptions highlight the strong focus stakeholders dedicate to health and safety, a focus that supports the predominance in the literature into health and safety within crowd events (Berlonghi, 1995; Ryan et al., 2010). Therefore, within complete observer event observations, briefings, meetings and debriefs were attended to determine the content of such meetings within both public and private security [Chapter 6].

5.4.5 Crowd movement

5.4.5.1   *Signage and wayfinding*

Signage involved in ensuring the wayfinding of crowd users within events appeared to be accepted as a problem inherent to crowd management, with few stakeholders concerned with overcoming shortcomings and achieving improvements. Such findings support previous literature suggesting that wayfinding and signage are not

considered sufficiently during the design process (Dogu & Erkip, 2000; Sime, 1999). As a result crowd venues may have insufficient signage to enable wayfinding of all crowd users, and remedial signage could be too expensive for events with a small budget. (Dogu & Erkip, 2000) found that the signage systems were insufficient when analysing wayfinding behaviours in a shopping mall in Turkey. Better solutions were required to enable users to locate specific shops or facilities for example. Such research falls in line with the current findings, as signage being provided by some stakeholders, was insufficient to enable crowd users to find their way. Moreover, integrating academic research into the organisation of crowd events, in order to employ the tactics that are known to improve wayfinding (O'Neill, 1991). Therefore, complete participant event observations were conducted to determine the consideration given to wayfinding and signage across a number of crowd types and events, and the contribution of wayfinding to crowd user experience [Chapter 7].

5.4.5.2   *Capacity*

Stakeholder interview findings suggest that the extent to which crowd member comfort is considered when calculating safe capacities for an event is somewhat unclear. Different methods are utilised within safety and commercial perspectives. Event capacity is calculated in line with fire safety parameters, calculating the maximum numbers of users that can evacuate a venue safely in a specified time. Stakeholder interviews indicate that capacity was calculated from a safety perspective, however, the extent to which safe capacity limits provide a comfortable environment for crowd members was not discussed (highlighting a gap in the consideration of user comfort). Such issues are a concern with regard to comfort and satisfaction of crowd members, as well as from a fire evacuation perspective, supporting the predominance of crowd safety literature compared to crowd satisfaction literature. However, monitoring capacity across different areas was said to be difficult to enforce during crowd events.

Smaller scale crowd events and organisations suggested difficulties monitoring flow between areas of a venue, with some stakeholders mentioning that such issues were controlled 'by eye'. Future research should therefore focus on establishing effective methods of (and tools for) monitoring and controlling capacity within different areas of one venue. Such issues are important from a health and safety perspective, to ensure that maximum capacities are not exceeded in different areas

of a venue. Additionally, from a crowd user comfort and satisfaction perspective, ensuring that capacity is monitored throughout a venue will aim to reduce the likelihood of bottlenecks and overcrowding.

Such findings support the predominance for using closed-circuit television systems to monitor real-time crowds. However, there are a number of associated risks in using such methods for monitoring crowd capacity, and behaviour within a venue. As shown by Marana et al., (1998) suggesting that in risk situations, a normal practice in the control of crowds is to close the arrival gates until the crowded area return to a safe capacity. However, this procedure can lead to a new crowd congestion problem created in different areas due to the closure of gates. These areas also must be monitored leading to a continuing increase in the number of installed video cameras in order to cover all the linked areas. Therefore supporting the requirement for additional, more accurate and usable methods of monitoring crowd capacity.

Substantial research looks at methods of crowd modelling and crowd simulation (Zhou et al., 2010), with recent work looking at automatic methods of monitoring crowd density through texture analysis (Marana et al., 1998). However stakeholder interview findings suggest that such sophisticated methods are not being utilised by stakeholders, particularly those involved in small scale crowd events with limited budgets. Further supporting the requirement for establishing usable, reliable and affordable methods for monitoring crowd capacity with a venue. For example, stakeholders involved in transportation discussed currently using CCTV, to monitor crowd numbers entering the platform (by eye), supporting literature regarding the use of CCTV to monitor crowd behaviour and crowd capacity across crowd venues (Poole & Williams, 1996; RSSB, 2004). CCTV crowd monitoring is used extensively within the transportation industry, similarly, stakeholders interviewed within transportation discussed the use of CCTV for monitoring crowds, supporting literature in the field (RSSB, 2004, Poole & Williams, 1996). However, stakeholder interview findings suggest that stakeholders could benefit from more sophisticated measures to ensure the safety and comfort of passengers. Further research is required to bridge the gap between the increasing literature in the area, and its use within crowd events (Zhou et al., 2010).

5.4.5.3 *Pedestrian Flow Modelling and venue layout*

Small organisations do not appear to have the financial resources to take advantage of the technology that is available to calculate safe capacity. As pedestrian flow modelling software is expensive to use, the costs might outweigh the benefits to crowd organisations. However, findings also revealed a number of stakeholders suggested that the layout of crowd events is based on '*common sense*'. Such lack of consideration for layout, positioning of obstacles, and ensuring clear exit routes, could lead to less than satisfactory conditions for crowd user comfort, safety, and satisfaction when attending an event. However, the view that layout considerations are common sense, may simply be the result of numerous years of experience in planning crowd events. Layout of events is not common sense, substantial research surrounds the area. However, if stakeholders believe that the issue of pedestrian flow is common sense, the question arises, as to how the behaviour of the stakeholders can be changed in order to improve the event, and ultimately the user experience of crowds.

Findings do not support the predominance for pedestrian flow modelling in the literature (Wang et al., 2013; Qiu & Hu, 2010; Seyfried et al., 2006; Hughes, 2000, 2002), but instead support the lack of usable guidance for assessing pedestrian flow. Research into improving the flow of pedestrians within an area, event, or throughway focuses on the development of pedestrian flow modelling software (Helbing et al., 2005; Johansson, 2009; Smith et al., 2009; Smith, 1995). Such software can be difficult to use (correctly and accurately), and expensive to gain access to, often requiring organisations to subcontract the task to consultancies at a substantial cost. It is therefore not financially viable for small scale crowd events to utilise. A number of stakeholders felt that gaining access to such software would solve all the capacity questions for their event, with the limiting factor preventing the use of such software being insufficient financial recourses. Yet priorities focused on the importance of gaining access to pedestrian flow modelling software, without fully understanding its role, and strengths. Moreover, the majority of stakeholders did not discuss the potential use of such software, suggesting a gap in knowledge.

Such findings also highlight the danger in stakeholders believing that they are already doing all that they can for their event, disregarding possible improvements that they could make to improve the user experience. Although substantial research

is being carried out into the layout of events, and venues to fit given capacities, and maximise flow, effort needs to be focused on implementing the research findings into crowd events and crowd organisers, including small scale crowd events with modest budgets. Moreover, the belief that issues surrounding the layout of an event are '*common sense*' indicates that research is required to emphasise the importance of the issue when planning an event. Attention is required to transfer academic research findings on pedestrian flow modelling, into practice within event organisation, so that crowd users can benefit from the findings.

5.4.6 Facilities

5.4.6.1 *Welfare facilities and car parking*

In 2007, (Lee & Hughes, 2007) suggested seven issues that have the potential to impact consumer satisfaction within a festival environment, of which the facilities available was one of three key issues (programme content, facilities, and food) that act as precursors to festival satisfaction. Such issues were also found to relate to visitor loyalty within festival events (Yoon et al., 2010). However, stakeholder interview findings indicate that facility provision is not always a priority during event organisation, and appeared to come down to the budget constraints.

Findings suggest that the provision of welfare facilities, and user car parking was a low priority for stakeholders, with a limited awareness of the guidance available to assist event planning. Such findings are in line with the underdeveloped literature, indicating that stakeholders consider crowd member welfare, but improvements could be made to crowd user comfort. This suggests stakeholders give limited attention to the provision of toilet facilities, and do not view the provision of adequate toilet facilities as a priority. Such findings do not support crowd user focus group findings (Chapter 4), during which the provision of adequate toilet facilities were suggested to contribute to the satisfaction of crowd users. Therefore the failure of stakeholders to consider the issue, could lead to negative experience of crowd members. Such issues could be due in part to the lack of usable guidance concerning event organisation. A number of stakeholders did not discuss using the guidance that is available, including The Green Guide (2008), The Purple Guide HSE (1999), and various local authority event guides (North West Leicestershire

District Council, 2010; The Green Guide, 2008; The Purple Guide HSE, 1999). Therefore one might conclude that current guidance for planning crowd events is not usable, and attention is required to ensure that stakeholders are made aware of the available guidance, and encouraged to use it in planning crowd events. This is in line with the underdeveloped literature, and the lack of usable, evidence based guidance surrounding crowd event organisation (Berlonghi, 1995; Lee & Hughes, 2007). Further research is required to bridge the gap between research and practice, creating evidence based, and usable guidance that will aid stakeholders involved in planning crowd events.

Complete participant event observations were therefore conducted to establish whether the information provided within stakeholder interviews fell in line with the situation experienced by crowd users when attending crowd events of various descriptions [see event observations Chapter 7]. Moreover, to explore the extent to which the provision of welfare facilities impacts the user experience of crowds.

5.4.7 Satisfaction

5.4.7.1   Financial considerations

Although crowd user enjoyment is important to stakeholders, interview findings suggest that the aim to create an event that provides enjoyment, and satisfaction for crowd users, ultimately comes down to money. Findings indicate a gap in knowledge surrounding user experience, comfort and satisfaction, with a distinct focus on financial considerations, and the assumption that user satisfaction will ultimately come at a substantial financial cost, without considering the potential benefit of providing a positive crowd event experience for the user. Such findings indicate that stakeholders assume.

Such stakeholders fail to understand the business case for creating a positive crowd experience. Crowd members might be encouraged to attend subsequent events following a positive experience (Yoon et al., 2010), and to recommend the event. Moreover, findings suggest that stakeholders are willing to consider crowd user comfort, providing the user is willing to pay more for it. However, knowing that different ticket prices are available might help to maintain crowd member

expectations, and reduce possible dissatisfaction experienced when expectations are not met. For example knowing that that seats with extra padding or legroom are available for an additional cost, may reduce expectations and dissatisfaction surrounding standard priced tickets (as with 'no frills' airlines for example). This suggests that crowd member enjoyment is important to stakeholders, however, creating an event that provides enjoyment, and satisfaction for crowd members ultimately comes down to money.

5.4.7.2   Atmosphere

The positive atmosphere generated during crowd situations was also discussed during stakeholder interviews, but with predominance for negative concerns, in line with previous research (Yildirim & Akalin-Baskaya, 2007). Additionally, police and security involved in stakeholder interviews discussed maintaining a positive mood, to prevent antisocial behaviour developing, with potential benefit of improved crowd user satisfaction, on behaviour, supporting previous research (Rosander & Guva, 2012; Hylander & Guva, 2010). Such findings indicate the potential relationship between heightened user experience and reduced antisocial behaviour, suggesting that crowd user satisfaction is important to stakeholders from various perspectives. Stakeholder findings also support research looking into the management of crowd behaviour, suggesting that crowd behaviour can be manipulated to positive effect (Zeitz et al., 2009). Similarly, (Berlonghi, 1995) stressed the importance of not managing a spectator crowd as if it were one reality, suggesting that there may be smaller crowds within the whole that may need to be simultaneously managed. Focusing crowd control on a small number of individuals as opposed to the entire crowd was discussed, with the dual aim of increasing crowd satisfaction for the majority.

5.4.8 Comfort

5.4.8.1   Weather and thermal comfort

Stakeholder interview findings suggest that although good weather can have a positive impact on crowd user satisfaction, poor weather (in particular the rain) can

have a positive effect on reducing anti-social behaviour during mass events, referred to as '*PC rain*' (interview 17). Such findings support previous research into the role of weather in maintaining positive crowd behaviour, and reducing anti-social behaviour during mass events (Rosander & Guva, 2012). However (Berlonghi, 1995) work concerning issues that can act as catalysts triggering negative behaviours within a crowd, suggested that weather can have a negative impact on crowd behaviour. However such findings also refer to heat, humidity and lack of ventilation as crowd catalysts. Stakeholder interview findings indicated a disregard for the impact of thermal comfort, despite crowd users complaining about the discomfort experienced. (Berlonghi, 1995) work indicates that such discomfort could have a negative impact on crowd behaviour, and therefore stakeholders might be advised to reconsider their lack of concern.

5.4.9 Limitations

The findings in this study are subject to the following limitations, inherent to qualitative data analysis, primarily the subjectivity of qualitative interview data. However, the standardised analysis, outlined by Bryman (2004), Hignett & Wilson (2004), and Robson (2011), seeks to minimise the subjectivity of the data collected during interviews.

Due to the convenience sample of 41 stakeholders, the findings cannot be generalised across stakeholder populations, as the sample is not representative of each of the stakeholder groups. A number of the stakeholder groups involved were modest in size (the design sectors containing 3 stakeholders for example) however the sampling was carried out until saturation of data was reached. Although questionnaires would have allowed for a greater sample size of stakeholders, the depth of the responses would have been limited, and compromised compared to the insight gained through interviews. Interviews allowed issues to be probed, and were appropriate due to the exploratory nature of the study aims.

One limitation of qualitative research is the influence that the researcher has on the research. Stakeholders often assumed that the purpose of the research was safety oriented, and thus, concentrated on telling the researcher what they do to account for safety, despite specifically being informed that the issues surrounding comfort,

satisfaction and performance were of interest. This might suggest that safety is a priority above comfort and satisfaction, or could suggest stakeholders were telling the researcher what they believed the researcher wanted to hear. Lincoln & Guba (1985) discuss '*good bunny syndrome*', during which time the respondent tries to give the answers they believe the researcher wants to receive on the topic under consideration. In being overly positive about their role within crowd events, functionality and usefulness of the findings, as well as the validity of the data might be questioned, (one of the key limitations with interview data). Similarly, interviewees may have been more positive about how they run their own event in order to improve the social desirability of their answers, and the event they organise (Bryman, 2004).

5.5 Summary and Conclusions

In summary, among the findings from interviews with stakeholders safety was seen to be a high priority, due primarily to legal obligations, and a desire to protect venue reputation. However, comfort and satisfaction of the user often received less attention, with budget considerations cited as a key reason. Additionally, inadequate communication, and management systems were in place to ensure compliance to internal procedures, with a lack of usable guidance available to assist the organisation of events at the university.

The findings of the study question the availability, usability, and deployment of information concerning crowd satisfaction and comfort, during the planning of crowd events. Yet achieving a positive, high-quality crowd experience is desirable to their overall success, and of benefit to all stakeholders. Research presented in the following chapters (involving observational data) will aim to address these gaps, with the goal of contributing to improving the user experience of crowds.

Chapter 6

6. Public and private security event observations

6.1 Summary

This chapter presents findings of research undertaken within UK public and private security organisations, routinely involved in managing events of various descriptions including: music, sporting, participatory race events, demonstrations, and marches.

Initial research in this thesis explored the user experience of crowds through user focus groups (Chapter 4), and discussed the issues affecting crowd user satisfaction across a number of user groups, highlighting differences in factors affecting crowd satisfaction, varying with regard to age and expectations. Moreover, stakeholder interviews (Chapter 5), covered areas concerning: physical environment, event planners, ground staff, health and safety professionals, public security and private security involved in events of various descriptions. Thematic analysis of the interview data concluded eleven emergent themes: health and safety, public order, communication, physical environment, public relations, crowd movement, event capacity, facilities, satisfaction, comfort, crowd characteristics. As public order was shown as the second most referenced theme (and specifically the relationship between public and private security), this further emphasised the contribution of the issue to the overall user experience of crowds (comfort, safety, satisfaction and performance). As a result the study presented in this chapter utilised complete observer observations to assess crowd management from both a public and private security perspective specifically.

Findings from user focus groups (Chapter 4) and stakeholder interview investigations (Chapter 5) were used to form the basis of the observational checklist, for event observations across various crowd situations (Appendix F). The method used in this instance was 'complete observer' observations (Bryman, 2004). Both complete observer (within public and private security, Chapter 6), and complete participant observations (observing events from the user perspective, Chapter 7)

were used within this thesis, to provide in depth insight into the user experience of crowd events.

The following key themes were drawn from the analysis of security observations, including: communication, anticipating crowd reaction, information storage, training, role confusion, financial considerations, and professionalism. Findings from security observations inform understanding of the contribution of public and private security to the user experience within crowd events. The growing relationship between public and private security, as well as the potential; impact of increased crowd satisfaction, and reduced antisocial behaviour emphasise the importance of furthering understanding of the security perspective within crowd wellbeing and enjoyment.

6.1.1 Background

Stakeholder interview findings (Chapter 5) highlighted a growing move away from public security within crowd events, towards private security, with financial objectives. Consequently the relationship between public and private security (and the differences between the two) are likely to become increasingly important. Therefore complete observer observations were considered appropriate for gaining further insight into the role of public and private security within crowd events, and their contribution to the crowd experience. Moreover, research aimed to consider how the actions of both public and private security contribute to the user and their contribution towards user satisfaction and experience both positively and negatively.

6.1.1.1   *The structure of public security*

Within the United Kingdom emergency services a Gold, Silver, Bronze command structure is used to establish a hierarchical framework for the command and control of major incidents and disasters (Figure 13). The structure was developed by the UK Metropolitan Police in 1985 following a serious riot in north London that saw the death of Police Constable Keith Blakelock (National Policing Improvement Agency (2009). The structure aims to manage interdependencies and potential conflicts effectively, whilst ensuring clarity of command throughout the duration of the event. The following definitions are taken from National Policing Improvement Agency (2009):

Gold commander: in overall control of the organisations resources at the event, and are often not onsite but at a distant control room, and formulate the strategy for dealing with the event and crowd management.

Silver commander: senior member of the organisation at the scene, in charge of all their resources. They decide how to utilise these resources to achieve the strategic aims of the Gold commander, they determine the tactics used.

Bronze commander: directly controls the organisations resources and will be found with their staff working on the scene.

Gold Commander
In overall strategic command of the operation. Sets the overarching strategy that all other plans must take account of.

Silver Commander
Coordinates the individual strategies developed by the Firearms and Public Order Strategic Commanders (Bronze) to ensure that they reflect and contribute to Gold's overarching strategy.

Operationally and occupationally competent in relevant disciplines.

Firearms Strategic Commander (Bronze)
Responsible for developing the firearms strategy and ensuring that tactical plans are developed and implemented to support it.

Operationally and occupationally competent in relevant discipline.

Public Order Strategic Commander (Bronze)
Responsible for developing the public order strategy and ensuring that tactical plans are developed and implemented to support it.

Operationally and occupationally competent in relevant discipline.

GROUND ASSIGNED RESOURCES

Figure 13 Public security structure (taken from National Policing Improvement Agency, 2009)

Research within this chapter of the thesis involved individuals from across the public security hierarchy presented above (Figure 13). Additionally private security officers were recruited to involve individuals from across the structural hierarchy.

6.1.2 An overview of the research process

This chapter describes Phase 3 of the research process, with Figure 14 highlighting where the research fits within the overall research process (Figure 14).
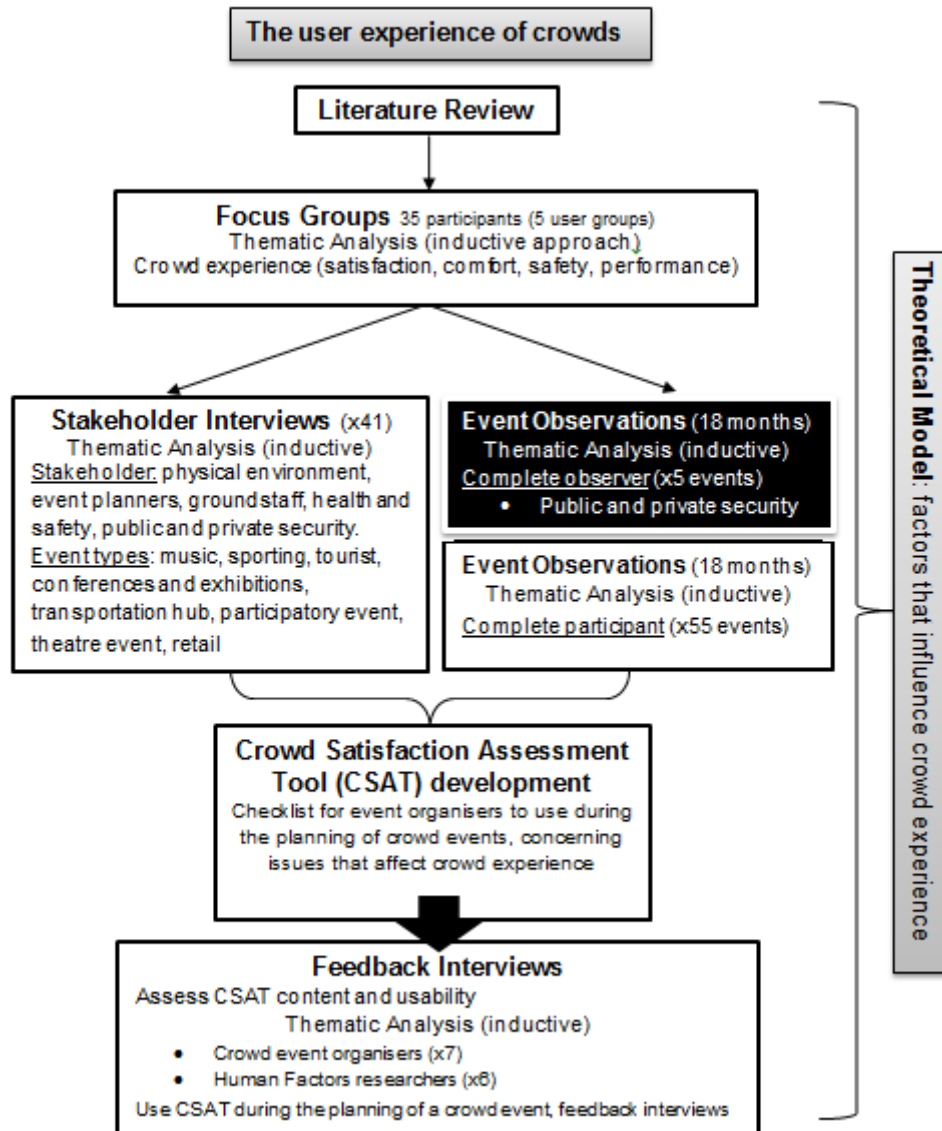
Figure 14 Overview of the research process

6.1.3 Aims and objectives

The phase of the research undertaken for this thesis described in this chapter investigated the influence of public and private security on crowd experience (comfort, safety, satisfaction and performance) within a number of crowd situations. The aims were therefore to:

1. Assess the contribution of public and private security to crowd user experience
2. Determine how public and private security manage a crowd situation
3. Understand the relationship between public and private security

Observations were conducted to gain a direct view of the management of the crowd, to complement the perspective gained through interviews within public and private officers (Stakeholder interviews Chapter 5). In order to explore the above aims, public and private security organisations involved in the different event types and crowd situations were recruited and observed. The observation checklist was based on the findings from user focus groups (Chapter 4), and stakeholder interview findings (Chapter 5). Issues were observed and recorded within each event to assess the factors that are considered within planning and organisation of crowd events and situations.

6.2 Methods

6.2.1 Design

Observations were undertaken within UK public and private security organisations which routinely manage security within crowd events. Event observations were conducted to investigate the organisation and management of crowd events, including approaches and processes used in planning for crowd situations; attitudes and beliefs regarding crowd management, comfort, safety, satisfaction and performance, and commitment to each.

Event observations were '*etic'*, as the researcher was an outsider with the purpose of observing only, and not participating in the crowd (Bryman, 2004).

6.2.2 Sample

Events to be observed were drawn from relevant event areas across the UK public (police force) and private security organisations, including music events, sporting events, and demonstrations. A range of methods were used to achieve a structured

convenience sample, with initial contact made through personal contacts within both public and private security, which were then 'snowballed' (Bryman, 2004).

The researcher observed officers across the organisational hierarchy from the Silver Commander to the Police Constable (officers on the ground) within public security (Figure 13), and the Security Manager to the Ground Steward within private security. Females were underrepresented in both public and private security observations, and therefore extra effort was made to observe both male and female officers across event observations.

Football events were selected due to the predominance of literature surrounding crowd management within hooliganism prevention (Stott et al., 2008), but primarily due to the large public and private security presence within football events compared to other crowd event types. This allowed for greater opportunities to observe the management of the crowd, and the relationship between both public and private security. Additionally, a music festival and a demonstration were observed to assess the methods used within public security.

Different crowd perspectives were observed across the event types, with allocated seating, standing and moving crowds present across events (Table 22). The following crowd types were involved: ambulatory (walking), spectator (watching an activity or event), expressive (emotional release, shouting, chanting), participatory (involved in actual activities of an event), limited movement (restricted movement), and demonstrator (picketing, marching, chanting or demonstrating at a particular location for a specific purpose), and aggressive (verbally aggressive towards or disregarding the instructions) (Berlonghi, 1995) (Table 22) (Literature review Chapter 2).

6.2.3 Procedure

Observations were conducted following the 'complete observer' method, using the principles of ethnography (Gold, 1958; Bryman, 2004). Verbal communication was observed and recorded, as well as non-verbal communication (facial expressions for example). The observations were overt, with all officers informed of the researchers' presence during the morning briefing, and all asked to be helpful where possible.

Thus, the role of the researcher was made clear to those under observation. Moreover, the observations were 'informal', with an observation checklist developed from which to prompt the researcher to issues during the observation, with issues recorded and implemented into the subsequent observational checklist iteratively (Appendix F).

During each event observation the researcher spent a full day with the security organisation, attending morning briefings, and meetings throughout the event (as well as debriefs following the event where appropriate). Interactions were observed between officers and crowd users, as well as interactions within and between public and private security officers. Rapport was built with public and private security organisations through spending time having breakfast with the officers before the public security observations, and having a cup of tea before private security observations, to build trust with the officers. The researcher also dressed in black inconspicuous clothing, in line with that worn within public and private security, in order to match the officers to some degree.

Across event observations, briefings were observed and recorded in the form of field notes, with conversations between officers also recorded as field notes. A Dictaphone was used to record briefings, meetings, and debriefs, with field notes taken from the recordings within 24 hours of the observation to enhance the reliability of the information (Hancock & Szalma, 2004). Field notes were not recorded during observations, as this was felt to interfere with and distract from the observation (for both the observer and officers being observed). Similarly photographs and video recordings were felt to be too intrusive, and caused the researcher to feel less able to integrate into the organisation, and observe accurately. Therefore photographs and video recordings were only taken at appropriate times during event observations, to capture information. Following event observations, all subsequent field notes were reviewed by the leading officer for each event, to enhance the reliability of the data (individual officers' names were removed from the data set to ensure confidentiality).

6.2.4 Analysis

6.2.4.1   Coding data

Observational field notes were analysed using the principles of hybrid thematic analysis, with data driven codes developed, and the identification of emergent overarching themes in line with the original objectives of the study (Bryman, 2004).

The observational field notes were coded and analysed iteratively (following each observation with the resultant information and suggestions implemented into the following observation and appropriate alterations made), to 'sharpen' understanding of the data (Bryman, 2004). In line with (Bryman, 2004) (and as with interview transcripts), observational field notes were read through: firstly without taking notes, secondly notes were made to capture general issues, and then thirdly transcripts were coded.

As recommended by Charmaz (2004) and Lewis-Beck et al. (2003), the first stage of data analysis involved 'line by line' coding, to ensure that contact between the researcher and the data was not lost. With NVivo (version 9.0) used to aid the systematic coding of transcripts, enabling codes to be viewed in the context of what was said, and reducing fragmentation of information.

Data driven codes were reviewed after each set of field notes were coded, to detect any similar codes or emergent themes within the data similar codes were then merged together. The process continued after each transcript, with a final review of all codes upon completion of coding. Similar codes were merged into key categories, and further to form overarching themes that had emerged from the data. Due to the 'line by line' coding, vast numbers of codes were created [one key criticism of thematic analysis (Bryman, 2004)].

Descriptive codes were developed to describe the issues reported. During the course of analysis, the codes were reviewed and revised as key categories emerged from the data. Reliability was enhanced through the systematic review of the data by two independent researchers. The first researcher coded all observational field notes, and upon completion a section of field notes were submitted to a second researcher who then coded the data separately. The two coded sections of field

notes were then compared, and any overlap or discrepancies were discussed until a final coding agreement was reached.

6.2.4.2   *Display of observational data*

As with the previous chapter (Stakeholder interviews, Chapter 5), display of the data will be structured in accordance with Hancock (1998), initially as a list of themes that emerged from the analysis of data within each event observation, showing the key findings of factors that influence crowd satisfaction within crowd events of various descriptions. Each theme will then be described, and the categories within the theme highlighted in subsections illustrating the meaning of the data, providing evidence to support reasoning for the inductive coding of data, and subsequent emergence of key themes (Braun & Clarke, 2006). However the quotes will not be taken from people, they will be extracts taken from the field notes made following each observations. Themes and codes will then be represented through quotes from public and private security officers spoken to throughout the event observations, along with extracts taken from field notes recorded during and after the event observation (Hancock & Szalma, 2004). Each phase of the research project contributed to the iterative development of a theoretical model of the overall findings that influence crowd satisfaction within crowd events of various descriptions (Figure 14).

6.3   Results

6.3.1 Crowd situations

A total of 5 events were observed, with 2 event observations involving public security, 2 private security, and 1 event involving the observation of both public and private security together during one event (Table 22). Observations were conducted over each of the four seasons, covering a range of seasonal weather conditions: sunshine, rain, snow, and wind, to assess how security deal with weather conditions during the management of crowd behaviour (Table 22).

Table 22 Crowd situation observations

Crowd Observations			Security Type	Crowd Type (Berlonghi, 1995)	Date
Music events	1	Download rock music festival (Donnington Park, Leicestershire)	Public and private security	Spectator, Ambulatory, Limited movement	Summer 2011
Sporting events (football)	2	Chesterfield Football Club vs. Macclesfield Town Football Club	Private security	Spectator, Ambulatory, Expressive	Spring 2011
	3	Leicester City Football Club vs. Burnley Football Club	Private security	Spectator, Ambulatory, Expressive	Spring 2011
	4	Leicester City Football Club vs. Millwall Football Club	Public security	Spectator, Ambulatory, Expressive	Winter 2010
Demonstrations	5	English Defence League demonstration (Leicester city centre)	Public security	Demonstrator, Ambulatory, Expressive	Winter 2010

6.3.2 Themes drawn from the data

Following analysis of the field notes obtained from the 5 events within public and private security 7 themes became evident:

1. Communication
2. Anticipating crowd reaction
3. Information storage
4. Training
5. Role confusion
6. Financial considerations
7. Professionalism

Each will be presented in order of the frequency of occurrence within field notes, with each discussed further below. Frequency of occurrence was not however used to represent importance of the issue, but instead allowed clear comparisons to be made across the issues raised.

6.3.3 Communication

6.3.3.1 Meetings and communication

Communication appeared to contribute towards the effective management of the crowd within both public and private security, as well as communication between the two throughout an event. During the event meetings, public security officers filtered information to private security, discussing progress, incidents and possible strategies to tackle the behaviour of the crowd. As seen during Event 1 (Download rock music festival):

> *"Public and private security met together (at 11am, 3pm, 7pm) to discuss the situation with the security managers from different groups across the venue, over the different campsites. Discuss the events that have arisen overnight. You guys are the face of the festival we need to ensure that people enjoy it to the maximum."*
>
> *[Police Constable – Event 1 (Download rock music festival)]*

Additionally during events in which a control room was present (Events 1, 2, 4 and 5), the control room was used by both public and private security, allowing for the communication of information within and between the organisations. The two organisations appeared to work together to manage crowd behaviour during events, sharing information and intelligence. However the police were often outside of the event (for financial savings), and therefore information has to be passed between the two teams efficiently.

Public security identified the importance of communicating with the crowd users to gain the most desirable crowd behaviour. As shown in field notes taken during a morning briefing within the public security of Event 4:

> *"We want to set the standard, show the game as a family event, welcome to our city of *******, this is what we expect of you. Follow this line of expectation and you'll have a good day out. However, we have to make it clear that failure to abide by the standard expected, and there will have to be actions taken."*
>
> *[Police Constable – Event 4 {Leicester City vs. Millwall Football Club}]*

6.3.3.2   Briefings

Within private security, information was distributed to top tier officers during the morning briefing, with each officer then responsible for distributing that information to their individual team of security officers. This method increases the risk of different information being provided to different teams of officers, opposed to the same information being disseminated to all security stewards together. It also removes time for questions as a large group within public security events, and created differences between different groups of security stewards that could have benefited from working more closely together during the event. Conversely, within public security events officers within the top tier of the hierarchy were briefed together, before distributing information to all officers working on the event, during a large pre-event assembly. Officers then dispersed to their teams and specific roles for the event. This system ensured that all officers were provided within the same information before the event began.

> *Silver commander introduces the officers. Runs through the specification of the match. Informs officers that the event will be a category C event, states what number of officers will be deployed and the expectations for the day.*

> *[Field notes – Event 4 {Leicester City vs. Millwall Football Club}]*

6.3.3.3   Debriefs

One problem seen across event observations was the lack of officer debriefs, with both public and private security explaining that implementing debriefs was expensive. Encouraging officers to pass feedback to those in charge through their line manager would encourage communications of information across the hierarchy. However officers on the ground (within both public and private security) suggested it was '*useless'* providing feedback to the senior officer as no one would listen and nothing would change.

Though formal debriefs were limited, information and feedback was passed along the hierarchy continuously during crowd events, and dispersed in team meetings during the event. For example, a Police Constable discussed the issues surrounding a surge of away supporters towards the home supporters:

"The security shouldn't have been that close to the seating and the fans, and the netting. It left nowhere to go when the fans began to surge. They should have been spaced and segregated. But because there were no police in the stadium from the start, they couldn't change the number of officers to support the security staff in time. There was just nowhere for them to go."

[Police Constable – Event 4 (Leicester City vs. Millwall Football Club)]

The event occurred during the first half of the event, with feedback and discussions between public and private security then applied into crowd management strategies for the second half of the event.

6.3.4 Anticipating crowd reaction

Differences were emphasised between the public and private security response and approaches to antisocial behaviour. Along with notable differences in anticipating target audience, and researching historical issues surrounding audience reaction to particular artists (e.g. pop groups). Within public security, officers researched historical issues surrounding audience reaction to particular artists, with previous incidents and information recorded systematically on a database, and easily retrieved for future events planning. Moreover, crowd user profile information could be obtained before, during and after the event, as and when required. With police spotters and evidence gatherers available to obtain immediate information on crowd users when identified within the crowd.

Additionally, the police maintain a stringent system of incident cataloguing and analysis, with a potential lack of information and structure available to private security organisers involved in relatively small scale events with no police presence. As seen during Event 3 (Leicester City vs. Burnley Football Club), with the communication of intelligence from the police spotter into the rest of the crowd management:

The police spotter will identify the individuals who need to be removed. Then when they move during half-time, the police may try and remove them (at which point they pass through the custody suite, to gain

personal information, before being ejected, to the police station). When caught, the individuals get a ban from attending the games. Also, if any football fan is arrested, they are banned from attending any international football events (hooliganism).

[Field notes – Event 3 {Leicester City vs. Burnley Football Club}]

6.3.4.1   Implementing health and safety

Private security officer's identified difficulties implementing rules during an event, particularly when crowd users feel the rules impair the atmosphere of an event. As shown during Event 3, health and safety measures used to enforce seating during football events were met with reluctance from crowd users:

"Everyone stands up as the players come onto the pitch. Standing in the stalls is against health and safety policy, but it is difficult to deter as the fans have always done it, and feel it enhances the atmosphere. In the old stadium there were standing stalls. Now supporters still want to stand."

[Field notes – Event 3 (Leicester City vs. Burnley Football Club)]

Alcohol was sold within each of the events observed, despite the understanding among public and private security that alcohol fuels antisocial behaviour. However, alcohol was banned in certain areas of the event, for example on the pitch side of football events as seen during Event 3:

"In the concourse areas alcohol is served until 4.15pm, but no alcohol to be taken into the pitch side seating areas. So supporters watch the match with a pint under in the concourse, and run back to the pitch when they hear a goal."

[Field notes – Event 3 (Leicester City vs. Burnley Football Club)]

Also, alcohol was completely banned from sale within the Millwall (away) supporters section of Event 4 (Leicester City vs. Millwall Football Club), due to the high risk category of the event, incidents observed during previous events, and the potential for antisocial behaviour. Yet, alcohol was on sale for the Leicester City (home) supporters. Public security officers explained that alcohol was not completely banned from sale within the football stadium due to the potential loss of profit for event organisers. Moreover, alcohol was sold to the away supporters before the

football match started, as the public security had an agreement with a public house near to the train station, allowing officers to kettle the high risk group of supporters from the station to the public house before the football match started. The agreement with the public house ensured that supporters were kept within the public house before the match, providing food was served and the police guarded the public house.

Before the start of the football match Millwall (away) supporters were then '*snaked*' down to the entrance of the stadium before the event. Snaking involved the police officers surrounding the crowd of away supporters, with a police escort at either end of the crowd (or '*snake*'). Additionally, crowd users were banned from taking drugs and alcohol into the each of the events observed. For example during Event 1 (Download rock music festival), a drugs amnesty was present at the entrance to the arena to reduce drug use and antisocial behaviour.

6.3.4.2 Mirroring security to crowd behaviour

During event observations public security officers discussed escalating the crowd management, in line with the escalating antisocial behaviour, and reducing the crowd management as the antisocial behaviour decreases. Such measures aim to mirror the behaviour of the crowd, and minimise the potential negative behaviour, opposed to aggravating the crowd and resultant antisocial behaviour further. As identified within field notes taken during Event 4:

> "We want to adopt a proactive approach, with no batons. Only if the trouble increases do the helmets and batons get implemented. Do not want to look as though we are bumped and expecting trouble, with "fire in your belly".
>
> [Field notes – Event 4 (Leicester City vs. Millwall Football Club)]

However, complication later in the game led to further assistance being required:

> "During the halftime briefing the Silver Commander suggested that another set of officers be allocated to escort the coaches back to the M1 and then on their way home."
>
> [Field notes - Event 4 (Leicester City vs. Millwall Football Club)]

6.3.5 Information storage and intelligence gathering

The collation of information was an important issue raised during public and private security observations. Public security officers described stringent systems of incident reporting and event categorisation, with a continually updated database for documenting incidents (Table 22). Such information was accessed and used during the planning of future events, as shown within field notes taken during Event 4:

> *"Majority of Millwall supporters are here to have a good day out in our city.. But Millwall does have a larger than average number of troublemakers amongst their supporters (up to 700 strong). However today we have heard that there are at most 300 troublemakers amongst the away supporters. We need to aim to identify the ringleaders as soon as possible. They will be arriving, a small number, in a mini bus, and coaches. They will be escorted in, from junction 21 M1."*

> *[Police Constable – Event 4 (Leicester City vs. Millwall Football Club)]*

Whereas crowd management within private security identified a lack of systematic structure for logging incidents, and retrieving information for the planning of future events (Table 22). Such lack of structure created the potential for gaps in the planning. Moreover, within private security there was a lack of usable guidance available to both for anticipating expected crowd behavior, with audience profile information incomplete. Thus, events that receive no police presence could create gaps in the planning. Such issues are set to become increasingly important with the increasing use of private security, in place of the public security.

Table 23 Collation of informtation within public and private security

	Public security	**Private security**
Information storage	Stringent system ▪ Incident reporting ▪ Event categorisation Storing and retrieving information ▪ Database ▪ Document all incidents ▪ Updated continuously	Lack of systematic structure for logging incidents ▪ Storing and retrieving information ▪ No clear rules to follow

Evidence was gathered and filtered through to the control room of an event, before being disseminated down the hierarchy. For example during Event 5 (English Defence League demonstration) evidence gatherers were positioned above the

crowd to gain the best position and view of the crowd behaviour and individuals within the crowd:

> *"Evidence gatherers were located above the crowd – taking video and photographs of what was happening, and any individuals who appear to be causing trouble."*

> *[Field notes – Event 5 (English Defence League demonstration)]*

6.3.6 Training

With regard to the training of public and private security officers, research findings suggest improvements in private security through input from public security. Public security officers are increasingly involved in the training of private security officers. Additionally professional qualifications have been introduced to the role of private security officers, increasing the career prospects and credibility within private security, as well as respect for the profession. As shown during Event 4:

> *"Training has greatly improved for the security staff – "whereas before the security would call the police in straight away, now they do something.. take action to help the situation."*
>
> *[Police Chief Superintendent – Event 4 (Leicester City vs. Millwall Football Club)]*

Such measures bring the role of a private security more in line with that of public security though still private security officers receive less training than that within public security. For example fundamental training and highly specialised training appear to be replaced with general training for private security officers. For example general training within private security focuses on identifying the emergence of negative crowd behaviours, as show during Event 3:

> *"Face in the crowd footage is shown during the training, with information regarding how to look out for distress in the crowd. One security officer said 'you can usually tell when someone is about to kick off'. Training encourages officers to identify and remove specific individuals engaging in antisocial behaviour."*
>
> *[Security Officer– Event 3 (Leicester City vs. Burnley Football Club)]*

6.3.7 Role confusion

The police described a good relationship between the police and private security comprising mutual appreciation and respect, with one police officer suggesting:

> "It's a good relationship we have now… we really value the role the security provide during these events.."
>
> [Police Chief Superintendent – Event 1 (Download rock music festival)]

However, frustrations emerged when private security officers suggested that crowd members often confuse their role with that of a police officer (public security), highlighting the importance of appreciating their different role and function (Table 24). For instance one security steward suggested:

> "People think we're the police, but we're not. We are here for the safety of the people.." [Security Steward – Event 2 (Chesterfield Football Club vs. Macclesfield Town Football Club)]

Table 24 Role confusion by crowd users between public and private security

	Public security	Private security
Role confusion	- Positive view of the relationship between public and private security - Value the support of private security	Frustrations when crowd users confuse their role with that of a police officer

6.3.8 Financial considerations

Similarities emerged in public and private security with regard to financial considerations (Table 25). Event observations suggested that the relationship between public and private security is becoming increasingly important with the move away from public, towards privately run security across various events (primarily music festivals and sporting events). Research findings suggest that the move to privately run security is financially motivated, with the police aiming to save money, and private security costing less per officer in comparison. However the financial savings appear to reflect parallel losses in skills and expertise in dealing

with antisocial behaviour. Thus, the potential for officers to deter antisocial behaviour and rescue a situation from escalating out of control is impaired. Public security is more expensive per officer, and therefore increasingly called upon if the situation is required, within public disorder for example, or during high risk events (Table 25). As seen during Event 4:

> *"The football club have to pay for the number of police taken inside the stadium. Thus, reducing the number initially inside the stadium has the potential to reduce costs."*
>
> [Field notes - Event 4 (Leicester City vs. Millwall Football Club)]

Table 25 Financial consideration within public and private security

	Public security	**Private security**
Financial considerations	More expensive • Per officer Called upon if the situation is required • Public disorder Used in high risk events	Used increasingly • Save money • Less expensive for event organisers Increasingly important issue

6.3.9 Professionalism

Public and private security officers also highlighted changes to the role of security stewards in recent years, with the introduction of recognised training qualifications, and police involvement in training for security guards has increased professionalism. With one stakeholder suggesting:

> *"It is a proper profession now, it has changed completely since the days of [previous stadium name] the old ground. Then you used to just turn up on the day, get in there and get people chucked out. Then you'd just collect your cash on the way out.. We are no longer thugs.. the setup is much more organised.."*
>
> [Security Steward – Event 4 (Leicester City vs. Millwall Football Club)]

Public security officers suggested that the relationship between public and private security organisations and officers has improved, with increased professionalism bridging the gap between public and private security. Within private security there

are more stringent measures in place to monitor conduct, as well as specialised training. However, there is still a substantial gap between the level of training a private security officer receives, and that of a public security officer (Table 26). Such variations and shortcomings could be increasingly important with the growing use of private security within crowd event secuirty.

Table 26 Professionalism within public and private security

	Public security	**Private security**
Professionalism	Relationship improved • Increased professionalism within private security • Bridging the gap between public and private security	More stringent measures Specialised training • Police involvement in training • Qualifications • Licensed • Career

However differences emerge surrounding the reliability of the service provided by private security organisations. With the public security providing a relatively standardised service across the United Kingdom, opposed to a number of private security organisations each providing their service. As identified by the head security officer within Event 4:

"The old organisation that supplied the security, they were getting a bit naughty, and started sending.. well say they said that they would send 60 stewards, and then you'd notice that they only actually sent 55. So they were not sending the numbers they were being paid for."
[Security Steward – Event 4 (Leicester City vs. Millwall Football Club)]

Such differences between private and public security bring into question the reliability of the service provided by private security compared to that of public security. Findings also question the consideration given to crowd user experience, comfort, safety satisfaction and performance when planning crowd events.

6.4 Discussion

The aim of this study was to collect rich and detailed information about the issues surrounding crowd experience, and has provided further evidence of the complex issues that influence crowd behaviour, and crowd management from a security perspective. Due to the relatively underdeveloped research area, researcher as

participant observations (using the principles of ethnography) aimed to provide an overview of the public and private security perspective of crowd management within crowd events.

6.4.1 Key research findings

Complete observer event observations within public and private security provided in depth insight into the crowd management perspective of crowd experience. The issues displayed within the results showed seven emergent themes that appeared to influence crowd experience from a public and private security perspective:

1. Communication
2. Anticipating crowd reaction
3. Information storage
4. Training
5. Role confusion
6. Financial considerations
7. Professionalism

Consistent with the aims of this study to enhance the user experience of crowds, the data provide further evidence on issues that impact crowd experience, advancing findings from user focus groups, stakeholder interviews, and complete participant event observations. Major findings are discussed in the following section.

6.4.2 Knowledge based public order policing

During event observations public security officers discussed escalating the level of crowd management in line with the escalating antisocial behaviour, and reducing the crowd management as antisocial behaviour levels decrease. Such measures aim to mirror the behaviour of the crowd, and minimise the potential negative behaviour, opposed to aggravating the crowd and resultant antisocial behaviour further. In accordance with the 'Procedural Justice Theory' (PJT) and the Elaborated Social Identity Model of Crowd Behaviour (ESIM), findings suggest that public and private security forces implemented discretionary force (considered 'fair'), with the aim of reducing antisocial behaviour (Sunshine & Tyler, 2003; Hough et al., 2010; Jackson et al., 2012; Stott et al., 2012). During complete observer observations, both public and private security were observed increasing and decreasing crowd management (through the number of officers, and level of personal protective equipment) in line

with crowd behaviour, and the level of antisocial behaviour displayed. Evidence suggests that such methods of crowd management confer 'legitimacy' on the security, encouraging crowd users to 'trust' the authorities and to 'self-regulate'. Such findings suggest that public and private security organisations are implementing theory from the literature, into the practical management of crowd events. However, observational data indicates that theory is implemented into public security practice and subsequently public security disperses the information to private security through involvement in training. However, further research is required to determine the extent to which this is the case.

Similarly, Reicher et al (2007) suggest that police crowd management methods can be enhanced through focusing tactics on reconciliation rather than conflict within crowd events. However observational data does not appear to support the suggestion within 'normative compliance', that crowd users will conform to the law because they perceive a moral, ethical and ideological obligation to do so (Hough et al., 2010; Stott et al., 2012; Jackson et al., 2012). Instead observations saw antisocial behaviour, and arrests within the crowd events. Finally, findings highlight the importance of tailoring crowd planning guidance to different crowd situations, supporting previous research (Berlonghi, 1995).

6.4.3 Alcohol and drugs

In line with the literature alcohol was seen to be an issue affecting crowd user mood, and sales were banned in certain areas of the stadium during the Leicester City vs. Millwall Football event (Event 4) for example (Wertheimer, 2000; Gonzalez-Palacio, 2002). Similarly, Wertheimer (2000) suggests that alcohol should be banned during public events, however stakeholder interviews suggested that such measures were not introduced within football events for financial reasons, as event organisers make a profit from sales of alcohol. Thus, despite the health and safety benefits of banning alcohol, such measures are unlikely to be introduced. Moreover, event observations indicated the importance event organisers place on maintaining an event for the majority of crowd users who do go to an event to have a good time (and not to engage in anti-social behaviour), and thus enjoying a '*reasonable'* amount of alcohol might be part of the experience. It would be unfair to remove alcohol entirely, simply to prevent the small percentage of crowd users engaging in antisocial behaviour from excessive alcohol consumption. Therefore other measures could be introduced

to reduce alcohol consumption such as, rules within football stadia to serve alcohol in the concourse areas, but ban alcohol from the pitch side viewing areas.

Moreover, measures within Event 1 (Download rock music festival) to discourage alcohol consumption included banning crowd users taking personal alcohol into the festival arena. Such measures aimed to reduce alcohol consumption, though the purpose also appears to aim to increase profit on alcohol sales within the event which could reduce crowd user appreciation and respect for the intervention. An alternative suggestion could be to place a limit on the number of drink sales per crowd user. For example allocating a certain number of drink sales per day, or per hour to reduce binge drinking, and encourage crowd users to drink responsibly. Drink allocations could be recorded electronically on individual tickets (or event wristbands) that could be scanned upon purchase of alcohol. Crowd users will always attempt to cheat the system, however introducing restrictions could allow crowd users to enjoy drinking alcohol but reducing binge drinking and negative antisocial behaviour resulting from excessive alcohol consumption.

6.4.4 Training for public and private security

Findings from event observations indicate discrepancies in the level of training provided to public and private security officers, with public security officers now contributing to the development of private security officer training. The alterations in training appear to have a positive impact on private security knowledge and professionalism. However, further research is required to explore the level of training provided to public and private security, as well as variations in training within public security, and improvements. For example differences between the levels of training received by a Police Constable, a Police Community Support Officer, and a Special Constable, and any impact differing levels of training might have on the officer's ability to deal with situations, and behaviours. Such issues are likely to become increasingly important with the growing need to save money within public security. Moreover, future research could aim to explore the possible relationship between crowd experience, and reduced antisocial behavior.

6.4.5 Communication and the importance of briefings

Research suggests that after an event a de-briefing session should be held with all of those involved (HSE, 2000; Beene, 1992). Where there are too many people to be involved in one debrief sub-group de-briefings should be held, followed by a final de-brief involving sub-group representatives (HSE, 2000). De-briefing can only be effective where an open culture exists: where staff are not afraid to identify any errors made and where suggestions for improvement, made by any staff member, will be welcomed and considered (Beene, 1992). The de-brief sessions enable the team to develop their knowledge and experience, so that the crowd management strategy can be developed, in order to improve the efficiency of future events and prevent mistakes being repeated (Beene, 1992). However, within compete observer observations, post event analysis and debriefs were not always conducted within the private security organisations. Such research suggested that information is presented in the literature, but further attention is required to ensure the methods are carried out in practice.

6.4.6 Communication and feedback

One issue raised during 'complete observer' observations was the lack of constructive feedback from public and private security officers on the ground, and implementation of feedback into future events. Events concerning public security involve debriefings of the overall events. However information and feedback from officers on the ground appeared to be somewhat limited within the events observed. Officers on the ground (within both public and private security) described providing comments and feedback to senior officers following the events as '*useless'*, as no one would listen and improvements would not be seen. Both public and private security should aim to encourage feedback from all levels of the organisations hierarchy. Officers on the ground are in close contact with crowd users, and can gain greater understanding of the issues that affect crowd satisfaction, comfort, safety, and performance. Moreover, encouraging feedback from the bottom up would be a useful method of improving crowd management strategies, and the relationship between crowd users and security officers.

6.4.7 Limitations

6.4.7.1   The guinea pig effect

With the methodology employed for this study it is possible that the observations could have been affected by the '*guinea pig effect'* (as with the study in Chapter 5 and the '*good bunny syndrome'*), with subjects changing their behaviour whilst under observation. However, alterations in behaviour to appear favourable to the researcher are believed to last for a short period of time at the beginning of the observation (Bryman, 2004). Therefore an entire day of observation should allow for a reasonable representation of the reality. Moreover, it is unlikely that such altered behaviours would have been maintained throughout the entire event. Whilst observing the events officers were focused on the fast changes in crowd behaviour, and it was clear that a situation can escalate rapidly, with officers required to be alert to changing situations continuously. Thus, officers did not appear concerned with altering their behaviours for the purpose of the observation. Conducting subsequent 'complete participant' observations was therefore deemed appropriate, to remove the 'guinea pig effect', and observe the crowd situation through the eyes of the user, as the participant.

6.4.7.2   Sample size and geographical representation

The research focused primarily on the Midlands area of the UK, and therefore did not account for regional variations in public and private security within events. However, 'complete participant' observations [event observations Chapter 7], allowed for a wider geographical spread of event observations. Moreover, small sample sizes of 5 events were attended, with observations conducted throughout the entire day, observing morning briefings and evening debriefs, resulting in substantial data collection set.

6.5   Conclusions

Findings from security observations question the clarity of the differing roles between public and private security, and crowd user understanding of these differences. Also the increasing use of private over public security within crowd

event security, and the differing levels of training an experience within public and private security.

Security observations identified that private security are used increasingly in place of public security during crowd events. Primarily to save money as private security organisations are less expensive (per officer) than public security. However, training, skills and experience within private security do not appear to meet the standards within public security. Public and private security organisations appeared to work together to maintain the atmosphere within a crowd for the majority of crowd users, whilst at the same time identifying and removing specific individuals who engage in antisocial behaviour. However the extent to which individual officers understand what is required to achieve this, and the extent to which the decisions are based on assumptions is unclear.

Security observations indicated that private security officers believe themselves to be responsible for the experience of the crowd users, while private security believe public security to be responsible for maintaining public order. Therefore the role of ensuring satisfaction within the crowd is both private and public security, with closer direct contact form private security officers. However, there was a definite determination from public security to maintain the positive experience of the majority of crowd users, through pinpointing specific individuals responsible for causing trouble within the crowd. Therefore removing the few individuals and encouraging a positive atmosphere for the crowd users shows the motivation within both public and private security to provide an enjoyable crowd experience within crowd events.

Overall, findings question the clarity of the differing roles that public and private security provide during crowd events, as well as the availability, storage and deployment of information and intelligence within such events. Findings indicate that the relationship between public and private security is improving, with better communication within and between public and private security organisations. As well as increased professionalism within private security, bringing the profession more in line with public security and the involvement of public security in the training of private security officers, together with specialised qualifications, and licensing of private security officers. However, the level of training for private security officers fails to meet the standard received by public security officers, an issue which could present problems in the future with the growing transition from publicly run security to privately run security within events. Future research is therefore required to

monitor the impact of public and private security within crowd management, with a longitudinal study using the principles of ethnography, also assessing the contribution and importance of training within public and private security, and the impact on crowd experience.

In conclusion, security observations indicate a growing need for public and private security organisations to work together, to share skills and expertise, in order to enhance the user experience of crowds.

Chapter 7

7. Event observations using the principles of ethnography

7.1 Summary

This chapter presents findings from 'complete participant' event observations undertaken across a range of crowd situations using the principles of ethnography. As seen in the previous chapter (Chapter 6), research within this thesis has explored the user experience of crowds through user focus groups (Chapter 4), together with stakeholder interviews to investigate the impact of crowd organisation on the user experience of crowds (Chapter 5).

Overall, user focus groups suggest differences in factors affecting crowd satisfaction, varying with regard to age and user expectations. Moreover, stakeholder interview findings suggested that safety was a high priority due to legal obligations, in order to protect venue reputation. Whereas, comfort and satisfaction received less attention within the organisation of crowd events due to budget considerations, and a lack of concern as to the importance of such issues. Moreover, communication and management systems were inadequate to ensure compliance with internal procedures, as well as a lack of usable evidence based guidance. Eleven themes were summarised from the data and displayed in order of frequency of references to the issues: health and safety, public order, communication, physical environment, public relations, crowd movement, event capacity, facilities, satisfaction, comfort, crowd characteristics. Findings fall in line with the weighting of the issues within the literature, with health and safety receiving the most attention, and comfort and satisfaction less attention.

Findings from user focus groups, and stakeholder interviews then formed the basis of the observational checklist, for complete participant and complete observer event observations across various crowd situations (Appendix F). 'Complete observer' event observations were presented in the previous chapter (Chapter 6) and highlighted a number of issues within public and private security in relation to crowd management and crowd user experience. Seven key themes emerged that

influenced crowd experience from a public and private security perspective: communication, anticipating crowd reaction, information storage, training, role confusion, financial considerations, and professionalism. Findings primarily question the clarity of the differing roles that public and private security provides during crowd events, as well as the availability, storage and deployment of information and intelligence between the two. Moreover, better communication, increased professionalism and training appear to be bringing private security more in line with that provided by public security. Therefore 'complete participant' event observations aimed to gain in-depth insight into the issues that are important to the crowd user within various crowd situations.

This chapter presents the findings from 'complete participant' event observations (using the principles of ethnography), undertaken within events of various descriptions, including: music, sporting, open days, conferences and exhibitions, graduations, and participatory race events. Events were selected to incorporate a range of crowd situations, and achieve a purposive convenience sample. The following crowd types were involved: ambulatory (walking); spectator (watching an activity or event); expressive (emotional release, shouting, chanting); participatory (involved in actual activities of an event); and limited movement (restricted movement) (Berlonghi, 1995).

7.1.1 Background

Event observations offered the opportunity to observe crowd events from the perspective of the user, incorporating the influences of collective issues towards the overall crowd user experience.

7.1.2 An overview of the research process

This chapter describes phase 4 of the research involving complete participant event observations, Figure 15 highlights where the research fits within the overall research process.
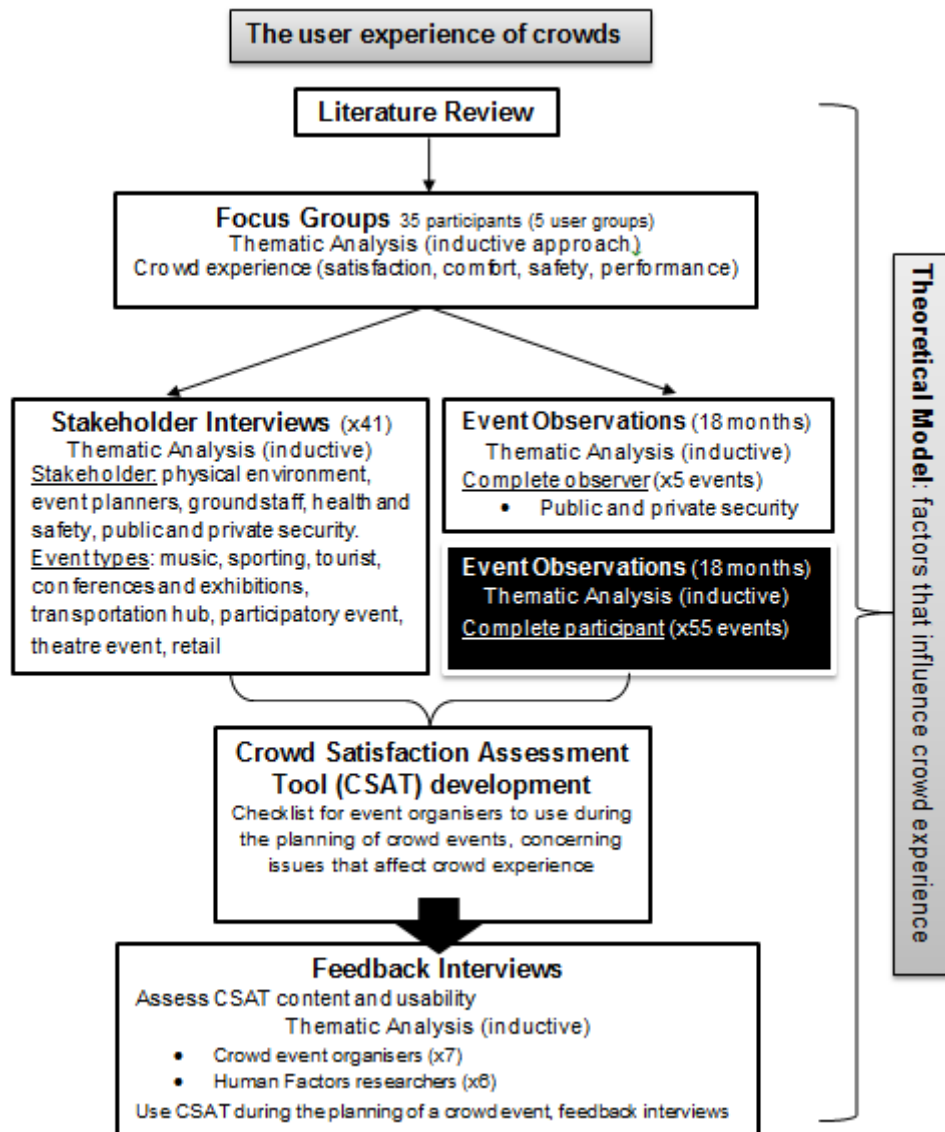
Figure 15 Outline of the research process

7.1.3 Aims and objectives

The phase of the research described in this chapter aimed to assess the factors that influence crowd user experience within crowd situations of various descriptions, using complete participant event observations to gain knowledge and in depth insight. Therefore the specific aims of the study were to:

1. Identify issues that contribute to the user experience of crowds (comfort, safety, satisfaction and performance)

2. Determine what is currently being provided during crowd events of various descriptions

3. Understand aspects of crowd events that have been organised successfully, and less successfully

In order to explore the above aims, events from the different event types and crowd situations were recruited and observed. The observation checklist was based on the findings from user focus groups (Chapter 4), and stakeholder interview findings (Chapter 5). Issues were observed and recorded within each event to assess the factors that are considered within the planning and organisation of crowd events and situations.

7.2 Methods

7.2.1 Design

Direct observations are used widely in studies of human behaviour and human system interaction. Therefore observations were considered to be most appropriate to address the aims of this study, providing good ecological validity for issues that cannot be replicated in a lab (Bryman, 2004). Event observations were 'emic', as the researcher purpose was to observe and participate in the crowd, and not solely to observe in the crowd (Bryman, 2004).

The research was undertaken across a number of different crowd event types within the UK, Europe, the United States of America, South America, and the Middle East, to observe cultural tolerance within crowd situations.

7.2.2 Sampling

Events for this study were sampled on a structured convenience basis to obtain information from specific groups and sub-groups within a population (Hancock, 1998). Events were selected to cover a wide range of crowd situations (music sporting and tourist events, conferences and exhibitions, transportations hubs, participatory, theatre and retails events). Encompassing the following crowd types: ambulatory (walking); spectator (watching an activity or event); expressive (emotional release, shouting, chanting); and limited movement (restricted movement) (Berlonghi, 1995). Moreover, events were sampled to incorporate

operational implications seen across different crowd events, and identified by Berlongi (1995), including: size of the crowd, crowd capacity, demographics of the crowd, location of the event, day and time of operations, schedule of event activities, weather conditions, seating arrangements, crowd movement patterns, density of crowd in various locations, and specific operation (transportation, parking, ticket selling for example). As with stakeholder interviews (Stakeholder interviews Chapter 5), sample size was determined by data saturation, when no new issues became evident in the data, sampling ceased.

Initial focus group findings (User focus groups Chapter 4) provided a framework from which to base the rationale for event selection. Together with a search of the literature, including Berlonghi's (1995), understanding and planning of different spectator events, to ensure that events represented each crowd situation. Events were selected over a period of 18 months to encompass seasonal differences, account for various potential weather conditions covering a range of locations within the UK (primarily within the East Midlands and surrounding areas), as well as worldwide events (USA, South America, Middle East, and Europe). Events were also sampled to include a number of features across crowd event types, including: large scale and small scale events; indoor and outdoor events; ticketed and non-ticketed events (free and paid); seated (allocated and not), standing, and moving crowd situations.

7.2.3 Procedures

A standardised observational checklist was devised from focus group findings (Chapter 4), before being piloted with five pilot events, and modified iteratively to form the final schedule (Appendix F). The purpose of the checklist was to enable events to be observed consistently and systematically (Bryman, 2004). An example of the issues considered during event observations can be identified, and the method of identifying issues seen in Figure 16 and Figure 17.

The same researcher led each event observation with digitally recorded observations obtained through a compact video recorder, and compact camera (additional batteries were carried at all times to prevent loss of data). Video recordings and still photographs were taken and field notes recorded subsequently (within 24 hours of the event observation), allowing the researcher to review each

event as necessary (Hancock, 1998). Brief notes were taken initially in order to capture the researcher's observations. One disadvantage of using cameras to record data can be the curiosity of surrounding participants, however, within the majority of crowd situations cameras were used frequently by crowd users, therefore reducing the curiosity around the researcher. To reduce the influence of the camera on the research and surrounding crowd users, the video recorder was carried in a fixed position around the neck, leaving the hands free to capture still photographs (Hancock, 1998).

Multiple techniques were used to capture the researcher's observations, in line with ethnographic traditions. These included:

- A notepad and pen were carried for recording immediate notes, allowing the researcher to go to a quieter area away from the crowd and record observations.
- Video footage allowed for oral notes to be recorded continuously and subsequently transcribed (however this often felt unnatural for the researcher and took away from the aim of complete participation during the event).

Figure 16 Field notes recorded following event observations (with regard to queuing)

Figure 17 Field notes recorded following event observations (with regard to signage)

Once the initial field notes were recorded video footage was reviewed in further detail, and additional field notes verified. Field notes were recorded and subsequently transcribed within 24 hours of conducting event observations, enhancing the reliability of the data (Hignett & Richardson, 1995). Field notes were then imported into the qualitative software tool NVivo (Version 9.0) to enhance the systematic storage and analysis of data (Hignett & Wilson, 2004). Video footage and still photographs were also imported into NVivo (Version 9.0), and further field notes made upon review of the data.

7.2.4 Analysis

7.2.4.1   Coding data

Hybrid thematic analysis was conducted (on the field notes taken following event observations) using the same methods described within complete observer event observations [the analysis section of Chapter 6]. Additionally, in accordance with

Robson (2011), coding took the form of 'event coding', with the observer responding whenever the event occurred, however timings were not recorded as timing of events was not deemed appropriate to meet the aims of the research (Robson, 2011).

Observational field notes were analysed together to determine emergent themes and overall findings. Key themes and alterations were then identified to develop a final set of emergent themes. Themes and codes will be represented through extracts taken from field notes recorded during and after the complete participant event observations, along with accompanying photographic data.

7.2.4.2   *Display of observational data*

Observational data will be presented in accordance with public and private security observations (Chapter 6). Due to the volume of data gathered over 18 months of observational data collection, the following chapter is vast. The exploratory nature of the research aims required the presentation of all research findings, in order to present the complexity of the crowd situation, and issues that influence user wellbeing and enjoyment within crowd situations.

7.3   Results

Due to the mass of data collected during event observations (filed notes, video footage, still photographs) and the nature of qualitative analysis, the volume of results presented in this chapter are substantial. In order to address the exploratory research aims within this chapter, each of the issues identified during analysis was addressed within the results, in order to highlight the complexity of the factors that interact to determine the user experience of crowds.

7.3.1 Demographics of the crowd situations observed

A total of 55 crowd situations were attended, covering a wide variety of event types within: music, sporting, tourist, conferences and exhibitions, transportation, participatory events, theatre, and retail (Table 27). A total of 5 pilot observations

were conducted, followed by 50 event observations (within various crowd situations Table 27).

Table 27 Observation type and crowd situation

	Pilot observation	Event observation
Music event		9
Sporting event		6
Tourist event		5
Conferences and exhibitions		7
Transportation hub	1	7
Participatory event	1	3
Theatre event		8
Retail	3	5
Total	**5**	**50**

The number and variety of events included music festivals (Take That live at Villa Park Birmingham), sporting events (Nottingham panthers vs. Cardiff devils ice-hockey) and tourist events (such as the Royal wedding). A full list of the crowd situations and events observed can be found in Table 28.

Table 28 Full list of crowd situations observed

Crowd situation	
Pilot study (P)	
	P1: Pilot - Lincoln Christmas Market (Dec 2010)
	P2: Pilot - London underground transport (Oct 2010)
	P3: Pilot - Nottingham retail (Oct 2010)
	P4: Pilot - Tescos retail (Oct 2010)
Music events	
	1 : Arcade Fire (Hyde Park, London)
	2 : Beardyman (o2 academy, Leicester)
	3 : Bestival (Isle of Wight)
	4 : Field Day (Victoria Park, London)
	5 : Teddy Thompson (Pub, Leicester)
	6 : Strawberry Fields (Fields, Leicestershire)
	7 : Take That (Villa Park, Birmingham)
	8 : Classical Concert (Vienna)
	9 : Wireless festival (Hyde Park, London)
Sporting events	
	10 : Athletics competition (Loughborough University)
	11 : Ice-hockey (Nottingham panthers vs. Cardiff devils)
	12 : Ice-hockey (Nottingham University vs.Nottingham Trent)
	13 : Leicester City Football Club (vs. Derby County)
	14 : Leicester Tigers (vs. Saracens)
	15 : Loughborough Student Rugby (vs. Barbarians)

Crowd situation	
Tourist events	
	16 : Barcelona fountain display
	17 : Bonfire night (Quorn, Leicestershire)
	18 : Christmas Market (Budapest)
	19 : Rockefeller Centre (NYC)
	20 : Royal Wedding (Green Park, London)
Conferences and exhibitions	
	21 : International Ergonomics Association Conference (Recife, Brazil)
	22 : International day (Loughborough university)
	23 : Levis Roots food show (Loughborough university)
	24 : Examination hall (Loughborough university)
	25 : Undergraduate Open Day (Loughborough university)
	26 : Careers fair (Loughborough university)
	27 : Beauty exhibition (National Exhibition Centre, Birmingham)
Transportation hub	
	28 : Immigration control (Egypt)
	29 : Ferry crossing (Egypt - Jordan)
	30 : Queen Allia airport (Jordan)
	31 : London Underground
	32 : Subway system (NYC)
	33 : Staton Island Ferry (NYC)
	34 : U-Bahn metro (Vienna)
Participatory events	
	35 : Carnival (Recife, Brazil)
	36 : Fairground (Loughborough)
	37 : Robin Hood Half Marathon (Nottingham)
Theatre event	
	38 : 42nd Street (show - The Curve, Leicester)
	39 : Greg Davies (comedy - Loughborough town hall)
	40 : Jimmy Carr (comedy - Assembly rooms, Derby)
	41 : Legally Blonde (show - The Savoy, The Strand, London)
	42 : The Lion King (Lyceum Theatre, London)
	43 : Cinema (Loughborough)
	44 : Peter Kay (comedy - Sheffield arena)
	45 : Shakespeare theatre (show - Nottingham castle)
Retail	
	46 : Mecca mall (Amman, Jordan)
	47 : Highcross shopping mall (Leicester)
	48 : Village fete (Old Dalby, Leicestershire)
	49 : Oxford Street (London)
	50 : Spitalfields market (London)

7.3.1.1 Environment and weather conditions

Event observations were conducted over an 18 month period (autumn 2010 to winter 2011) to incorporate a number of weather conditions encountered when attending crowd situations (Figure 18).
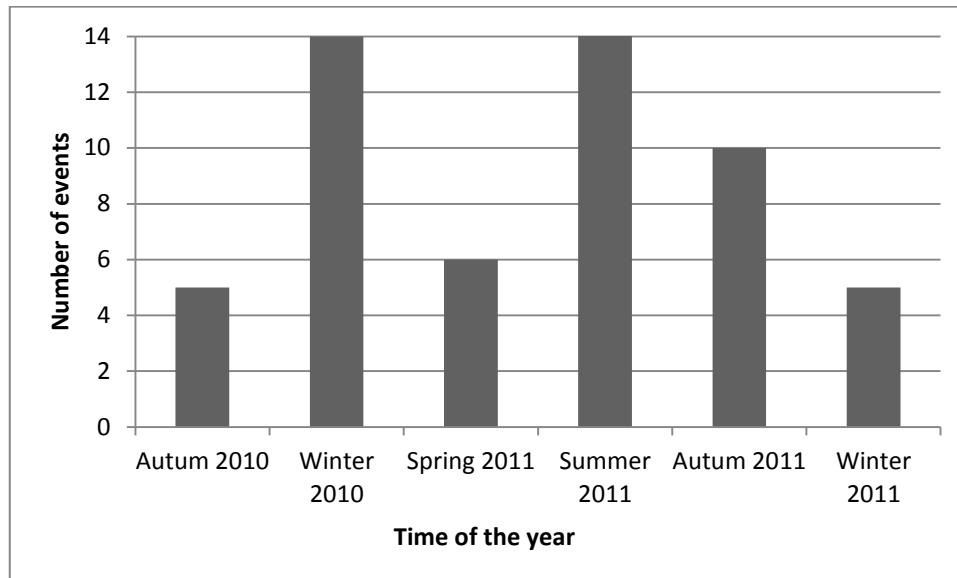
Figure 18 Time of the year crowd situations observed

A total of 31 indoor crowd situations were observed, 25 outdoors, and 3 with both indoor and outdoor sections (Figure 19).
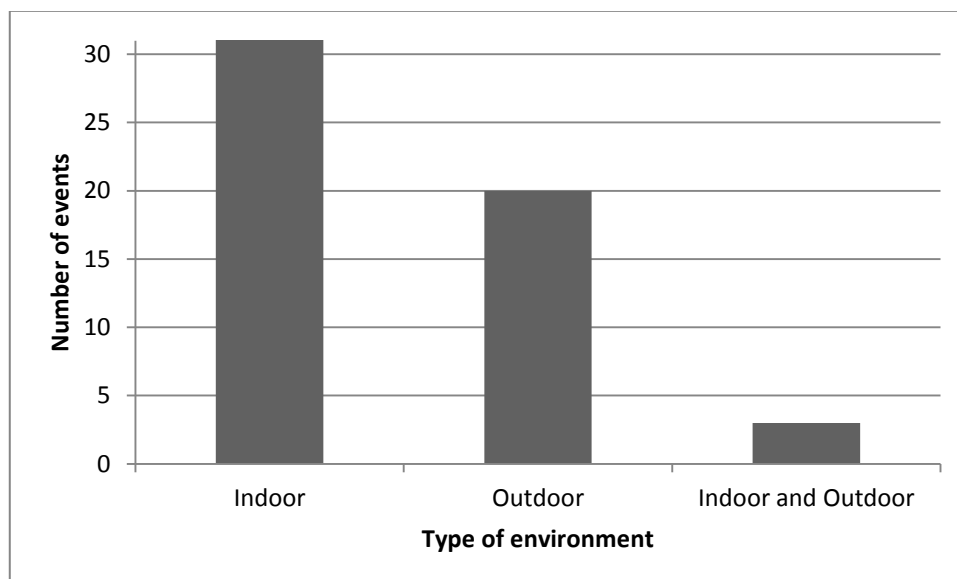
Figure 19 Environment crowd situation observed within

Within the outdoor events various weather conditions were observed including sun, rain, snow, fog and wind (Figure 20). Often a mix of weather conditions were experienced within one event, however only the predominant weather condition was recorded. The weather conditions were encountered across the different crowd situations observed.
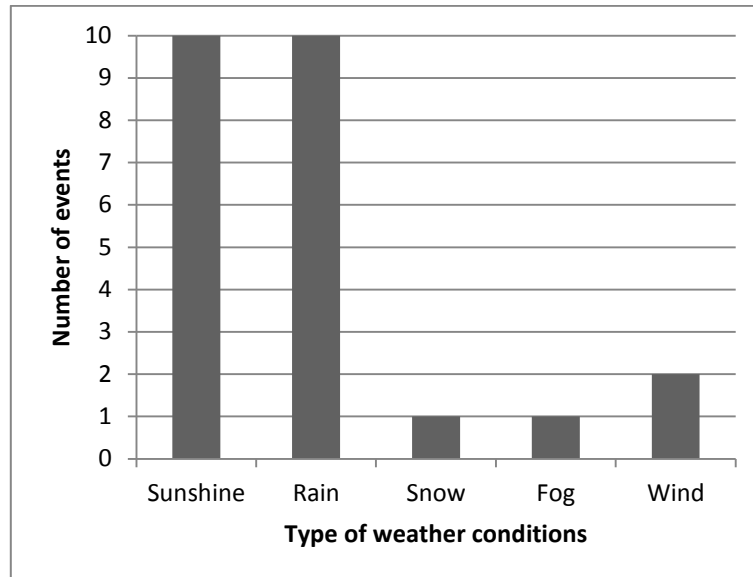
Figure 20 Weather conditions observed within outdoor events

7.3.1.2   Cross-cultural events

The majority of events were observed within the United Kingdom; however a number of event observations were carried out in other parts of the world including Europe, the USA, South America, and the Middle East (Figure 21). Table 28 shows the specific country in which each crowd event was observed.
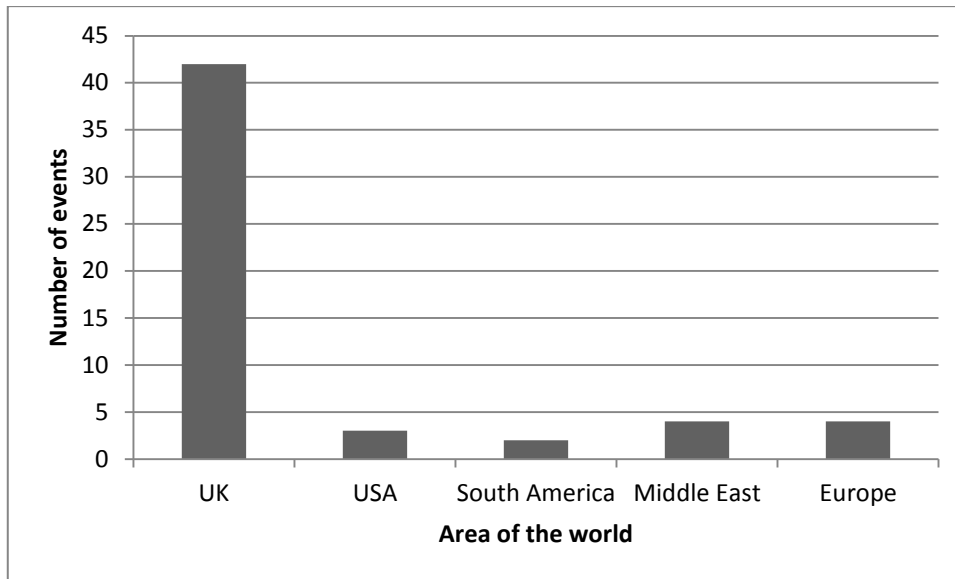
Figure 21 Cross-cultural crowd situation

7.3.1.3   Crowd user situations

Observations covered various types of crowd user situation, including seated events, standing events, moving crowd users, allocated seating, and events that comprised both standing and seated crowd users (Figure 22).
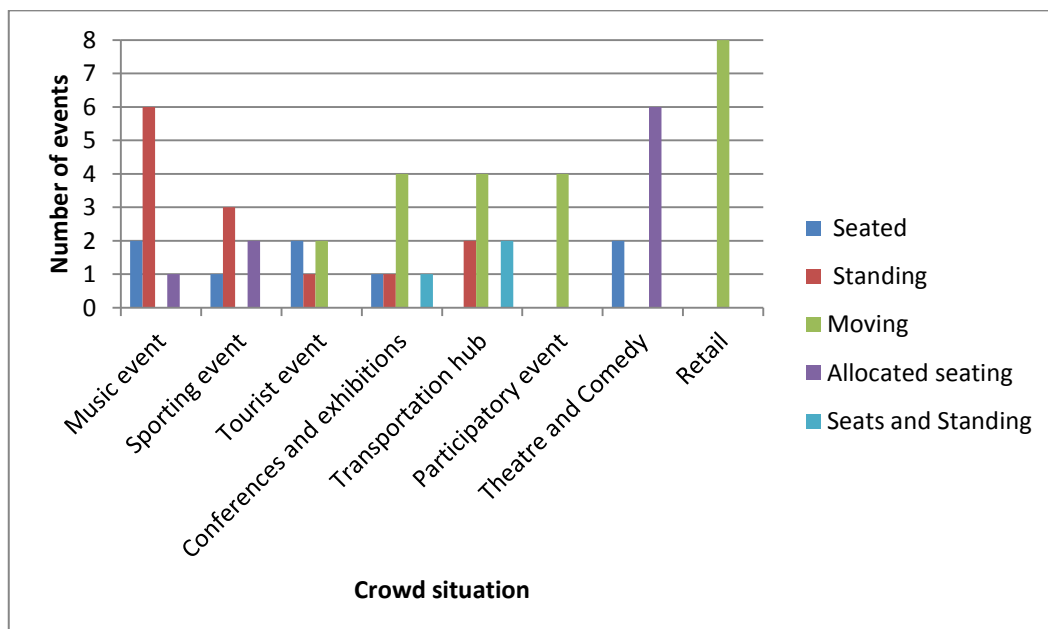
Figure 22 Crowd user situations within the events observed

7.3.2 Overall findings

Presentation of results will be structured using themes that were drawn from the thematic analysis of the observational data. Findings that emerged from complete participant event observations will be presented, highlighting fifteen common themes drawn from the data, including:

1. Communication within crowd situations
2. Public order
3. Comfort within crowd situations
4. Facilities available to crowd users
5. Queuing systems
6. Transportation
7. Crowd movement
8. Physical design within crowd situations
9. Satisfaction of crowd users
10. Health and safety
11. Public relations
12. Event capacity
13. Time constraints
14. Encumbrances within crowd situations
15. Cultural tolerances within crowd situations

Findings are presented in order of frequency of occurrence across event observations, with each theme explained further below. Emergent themes will be presented with examples to illustrate issues raised, alongside vignettes emphasising key issues including supporting photographic data.

7.3.3 Communication within crowd situations

Communication refers to how information was transferred from the crowd organisers, to the crowd users, including the clarity, understanding and accessibility of information presented. Features including signage, communicating information and possible language barriers, wayfinding, timetables and information planning are presented.

7.3.3.1   Positive issues surrounding the use of signage

Signage was the most frequently observed issue across the 55 events observed, with a number of positive issues detected surrounding the use of signage within events (Table 29). Primarily the presence of clear and simple signage, that is easy to identify, as shown during *Tourist event 20 - Royal Wedding (Green Park, London):*

> *Signs from the tube station indicating where to watch the wedding. Clear, large, illuminated signs were simple and easy to follow.*

Signage was also found to be most beneficial when placed high above the crowd, with large print that is easy for crowd users to read from a distance. Colour coded signage was also helpful for crowd users to easily identify whether or not they were in the correct location, or how to get to a required destination. As seen during *Theatre event 44 - Peter Kay (comedy - Sheffield arena):*

> *Colour coded entrances with letter coded sectioning and seating rows and numbers. Crowd users were only allowed to enter via the entrance specified on the ticket – Green (back); red (side); blue (side).*

A clear viewing area was also important to enable a number of crowd users to view the information at one time, with text that was clear and readable from a distance. As well as the use of symbols within signage, understandable over different languages and cultures is important to reduce language barriers, as shown during *Music events 8 - Classical Concert (Vienna):*

> *Toilets signage was only available in German. No icons or symbols of any kind on the door. Embarrassment when people tried to enter the wrong toilet door.*

The presence of marshals (as well as signage) to highlight a route to crowd users was advantageous as it removed the element of decision making on the part of the crowd user. Crowd users could ask marshals at any point to determine the correct direction to take, as seen during *Participatory events 37 – Robin Hood Half:*

> *Marshalls and signs throughout the route to prevent crowd users from getting lost.*

Additionally, the placing of signage warning crowd users about issues, or directions should be displayed in advance of the issue to avoid the need for quick decision. For example the placing of diversion signs to allow sufficient time for crowd users to determine which direction they need to take.

And finally, the use of robust signage was important. Delicate (often temporary) signage was seen to be insufficient against weather conditions, and other crowd users, whereas robust (often fixed) signage gave confidence that the information was correct, with arrows pointing in the accurate direction (Vignette 18).

Vignette: Signage

Signage was robust and standalone, clear and difficult to move. However when placed in the middle of the pathway it also created a possible trip hazard especially in dense crowd conditions. Other signage was confusing and could be easily moved (by crowd users or windy conditions), thus directing crowd users in the incorrect direction.

Conference and exhibitions event 25 - Open Day (Loughborough University)

Vignette 18 Signage

Table 29 Positive issues surrounding the use of signage

Signage (positive issues)	Examples from event observations
Clear and simple signage (easy to identify)	*Music event 3 – Bestival:* Signs for the bus from the train station to the hover travel ferry port were very unclear, pointing in the opposite direction to the actual bus stop, causing crowd users to wander aimlessly before asking for assistance in the train station.
High and large signage	*Conferences and exhibitions 27 - Beauty exhibition (National Exhibition Centre, Birmingham):* Signs located high above the crowds - so that everyone can view them. No obstructions (clear view)
Colour coded	*Theatre event 44 - Peter Kay (comedy - Sheffield arena):* Colour coded entrances with letter coded sectioning and seating rows and numbers. Crowd users were only allowed to enter via the entrance specified on the ticket – Green (back); red (side); blue (side).
Viewing area (clear and readable from a distance)	*Music events 4 – Field Day:* Only one sign on the entry displaying the times for each of the bands, and the names of the stages. A cube shaped with a different stage on each side – aided the viewing, as crowd members could stand at each side for the cube *Transportation hub 31 - London Underground:* Signs at the bottom of the stairway requiring a quick decision to be made as to which way to turn at the bottom of the stairs. Caused a backlog of crowd users and unnecessary congestion.
Clear symbols – reduces language barriers	*Music events 8 - Classical Concert (Vienna):* Toilets signage was only available in German. No icons or symbols of any kind on the door. Embarrassment when people tried to enter the wrong toilet door.
Robust signage	(Vignette 18)
Marshalls	*Participatory events 37 – Robin Hood Half:* Marshalls and signs throughout the route to prevent crowd users from getting lost.
Advance warning signs	*Retail 48 - Village fete (Old Daulby, Leicestershire):* Diversion signs well placed, in plenty of time before the event.

7.3.3.2   Negative issues surrounding the use of signage

A number of negative issues emerged surrounding the use of signage within the events observed (

Table **30**). Poor, unclear signage or an absence of signage was seen to cause unnecessary congestion (Vignette 19). For example, within *Theatre event 41 - Legally Blonde (show - The Savoy, The Strand, London)* it was*:*

> *Not immediately clear where to exit the theatre, which doors to use. Meaning that a number of doors were not used, causing other doors to get unnecessarily blocked.*

Additionally the use of temporary signage created difficulties in ensuring signage was not moved either purposely or accidently (Vignette 18). Moreover, signage that was not clearly highlighted was seen to cause a health and safety trip hazard, particularly when placed in the pathway of dense crowds (Vignette 18).

Complicated section numbering and seating configurations lead to confusion as crowd users attempted to locate their seats, as shown during *Theatre event 40 - Jimmy Carr (Assembly rooms, Derby):*

> *AA-JJ indicating the tiered seating or stalls and the row letters. Crowd users could be seen looking at their seats, and then at the signs, in confusion. Asking staff where they should go to get to their seats. Staff members were located next to every door to avoid confusion.*

Table 30 Negative issues surrounding the use of signage

Signage (negative issues)	Examples from event observations
Unnecessary congestion (due to poor signage)	*Theatre event 41 - Legally Blonde (show - The Savoy, The Strand, London):* Not immediately clear where to exit the theatre, which doors to use. Meaning that a number of doors were not used, causing other doors to get unnecessarily blocked. *Theatre event 42 - The Lion King (Lyceum Theatre, London):* No clear signs as you are leaving the venue, indicating which direction to different landmarks, or tube stations – would be beneficial and ease confusion for those not familiar with the area (tourists).
Temporary signage (easily moved accidentally or purposely)	*Conference and exhibitions 25 - Undergraduate Open Day (Loughborough university):* Insubstantial temporary signage indicating the direction to get to different areas of a venue easily be moved accidentally or purposely, causing confusion for the crowd user.
Complicated numbering	*Theatre event 40 - Jimmy Carr (Assembly rooms, Derby):* AA-JJ indicating the tiered seating or stalls and the row letters. Crowd users could be seen

Signage (negative issues)	Examples from event observations
	looking at their seats, and then at the signs, in confusion. Asking staff where they should go to get to their seats. Staff member located next to every door to avoid confusion.
No signage (indicating facilities for example)	*Conference and exhibitions 22 - International day (Loughborough university):* No signage for toilet facilities, required to ask staff for directions
Weather conditions	*Conference and exhibitions event 25 - Undergraduate Open Day (Loughborough university):* Large signs were blowing in the wind making them difficult to read.
Health and safety hazard (signage not clearly marked when placed in the centre of a dense crowd)	*Conference and exhibitions event 25 - Open Day (Loughborough University):* Large robust signage became a trip hazard when placed in the centre of a dense crowd (Vignette 18)

Vignette: Signage and queuing

Clear signage was hanging from the ceiling to direct crowd users to one bar located to the right side of the window (see below). However no clear signage was present for a second bar to the left of the window. As a result one bar was extremely busy, and the second was almost empty. Alterations to the signage would disperse the crowd users between the two bars, reducing queue times for crowd users, as well as pressures on staff.

Theatre event 40 - Jimmy Carr live stand-up comedy

Vignette 19 Signage and queuing

7.3.3.3   *Communicating information in advance*

The communication of information in addition to signage (Table 31). The provision of advance warning information was important during the events observed, to indicate issues and provide crowd users with sufficient time to make alternative plans.

Providing advance warning of a forthcoming event was helpful, in the form of a newsletter, or signage placed on the roads a number of days or weeks before the event, to warn local residents to expect possible delays during the dates of the event. Knowing to expect possible delays reduced frustrations during the event. As seen during *Participatory event 37 - Robin Hood Half Marathon (Nottingham):*

> *Newsletter and road signs used to inform local residents of possible delays on the forthcoming day of the event.*

Also, distributing directions to the venue, accessibility information and additional information along with the event ticket made it easy for the crowd user to plan the day in advance, as well as providing information and notification of any cancelations prior to the event.

A lack of clear information was extremely frustrating as a crowd user, for example during *Transportation hub 31 - London Underground*:

> *Lack of information for passengers, hoards of people staring up at the information screens, and a number of trains not showing on the board. Crowds of pedestrian gathered around the information desk to ask questions.*

Table 31 Communicating information in advance

Advance information	Examples from event observations
Advance warning of diversions (congestion indicated from the transportation hub)	*Tourist event 20 - Royal Wedding (Green Park, London):* At the exit of Green Park station large electronic signs directed pedestrians to Hyde Park screens to view the wedding; police with loud speakers also told pedestrians where to go.
Advance warning of a forthcoming event	*Participatory event 37 - Robin Hood Half Marathon (Nottingham):* Newsletter and road signs used to inform local residents of possible delays on the forthcoming day of the event.
Directions to the venue (provided with the ticket or on the website)	*Theatre event 41 - Legally Blonde (show - The Savoy, The Strand, London):* Good directions provided on the website and tickets information, as to how to get to the event (London underground; train services; bus and walking options)
Accessibility information provided in advance	*Theatre event 41 - Legally Blonde (show - The Savoy, The Strand, London):* Access to the main auditorium through a side entrance from the Embankment side of Carting Lane. The Box Office provided a map (at the time of booking) showing the route and access for wheelchair users (approx. 100m from main entrance).
Cancelled event	*Music event 2 - Beardyman (o2 academy, Leicester):*

Advance information	Examples from event observations
notification	Original event was cancelled (October) disappointing for those who had planned to attend the original date. Informed via email, and original ticket could be used for the new date.
Lack of clear information	*Conferences and exhibitions 23 - Levis Roots food show (Loughborough university):* Not clear that food would be served at the event. We need not have eaten prior to attending. Very generous portions given away for free. Unfortunately I had to leave a large amount of the free food as I had just eaten a large meal beforehand.

7.3.3.4   Communicating information orally

The communication of information orally was prominent during event observations (Table 32). During a queue or delay the provision of information from those in authority helped to reduce the stress and frustrations experienced by crowd users when no explanation surrounding the delay is provided (seem Vignette 19). As seen during *Conferences and exhibitions 23 - Levis Roots food show (Loughborough University):*

> *Queue very long, taking a great deal of time. A security officer spoke to everyone in the queue (in small groups), to explain the delay. "We are serving hot food as people arrive, and then once everyone has their food the event will start". Prevent frustrations building, and crowd members not having the information regarding reasons behind the large waiting time.*

The presence of easily identifiable marshals available to provide information to crowd users as and when required (Vignette 21), and loudspeakers to portray information a large number of crowd users at one time. As shown during *Transportation hub 31 - London Underground*:

> *Lack of information indicating what the delay was, and what was causing the delay. Then a loud speaker revealed that the platforms were too congested, and so the gate line was being closed (temporarily) to reduce the flow of pedestrians onto the platforms.*

Also, voice activated ticket machines appeared to reduce queue times for crowd users, as seen within *Transportation hub 31 - London Underground:*

> *Voice activated machine to book and collect tickets. Reduces queue waiting times for the help desk, and for crowd users.*

And finally language barriers were a problem when staff did not speak the same language as crowd users who required assistance, making communication difficult.

Vignette: Queuing with no explanation

During the outward journey to *Bestival* music festival (on the *Isle of Wight*), crowd users arrived at the ferry port to discover that there was a 2 hour delay. That 2 hour delay turned into 5 hours, with no additional information provided to explain or apologise for the inconvenience. On the return journey crowd users were required to queue for buses on the top of a hill, in the wind and rain (with no amenities or explanation for the delay), for 4 hours. As a result crowd missed the pre-booked train connections from the ferry port. Delays were not explained; consequently crowd users were getting very frustrated.

Music event 3 - *Bestival (Isle of Wight)*

Vignette 20 Queuing with no explanation

Table 32 Communicating information orally

Oral communications	Examples from event observations
Delays explained (Vignette 20)	*Conferences and exhibitions 23 - Levis Roots food show (Loughborough university):* Queue very long, taking a great deal of time. A security officer spoke to everyone in the queue (in small groups), to explain the delay. "We are serving hot food as people arrive, and then once everyone has their food the event will start". Prevent frustrations building, and crowd members not having the information regarding reasons behind the large waiting time
Marshals and other staff (easily identifiable) to provide information to crowd users (Vignette 20)	*Conferences and exhibitions 25 - Undergraduate Open Day (Loughborough university):* Open Day team were clearly identifiable, with red vests. Many marshals were located across the campus to provide information as and when required.

Oral communications	Examples from event observations
Loudspeakers (communicate important information to a large number of pedestrians)	*Theatre event 42 - The Lion King (Lyceum Theatre, London):* Loudspeaker announced that the show would be staring in 3 minutes, and that audience members must make their way to their seats.
Voice activated ticket machine	*Transportation hub 31 - London Underground:* Voice activated machine to book and collect tickets. Reduces queue waiting times for the help desk, and for crowd users.
Language barriers	Theatre event 41 - Legally Blonde (show - The Savoy, The Strand, London): International visitors and non-English speaking visitors may have faced difficulties when asking for information.

Vignette: Marshals communicating information orally

Open Day team were clearly identifiable, with red vests. Many marshals were located across the campus to provide information as and when required. As a crowd user it was reassuring to ask marshals for directions, or additional information.

Conferences and exhibitions 25 - Undergraduate Open Day (Loughborough University)

Vignette 21 Marshals to provide information orally

7.3.3.5   *Wayfinding*

Methods of improving wayfinding for crowd users were highlighted across crowd events observed (Table 33). The availability and distribution of maps was important to ease wayfinding across large events in particular. Fixed maps placed across a venue were useful particularly if marked with a '*you are here*' feature. Individual

maps distributed to crowd users, however additional payment for a map, on top of the entry fee was frustrating. The availability of GPS satellite navigation systems was beneficial when getting to a venue. Additionally, colour coded areas of an event aided wayfinding, particularly when accompanied with a map. As shown during *Transportation hub 34 - U-Bahn metro (Vienna):*

> *Colour codes platforms and matching routes made it easy to determine whether you were on the correct platform. The walls of the platform, signs, and platform signs matched the colours on the U-Bahn map.*

The presence of lighting to guide crowd users to the exit routes was important to aid wayfinding across events observed.

Table 33 Wayfinding

Wayfinding	Examples from event observations
Maps available (sometimes at an additional cost)	*Music event 6 - Strawberry Fields (Fields, Leicestershire):* Map provided free of charge on entering the event. Small festival, easy to locate the different areas, and meet up with friends.
Colour coded areas	*Music event 3 - Bestival (Isle of Wight):* Colour coded campsites: white, blue, red, yellow, green. Colours are shown on the maps. *Transportation hub 34 - U-Bahn metro (Vienna):* Colour codes platforms and matching routes made it easy to determine whether you were on the correct platform. The walls of the platform, signs, and platform signs matched the colours on the U-Bahn map.
Lighting to guide the entrance and exit routes	*Theatre event 42 - The Lion King (Lyceum Theatre, London):* Lighting as you entered the theatre and attempt to locate your seat. Difficult to see in parts.
GPS Satellite navigation system	*Sporting event 12 - Ice-hockey (Nottingham Universityvs. Nottingham Trent):* Used on a smart phone to navigate from the city centre car park to the event.

However a number of issues emerged to impair wayfinding and crowd satisfaction, primarily a confusing venue layout, unfamiliarity with the venue, and a lack of reference points for crowd users to find their way to and from various areas of the venue (Table 34).

Table 34 Issues hindering wayfinding

Issues hindering wayfinding	Examples from event observations
Confusing venue layout	*Music event 5 - Teddy Thompson (Pub, Leicester):*

Issues hindering wayfinding	Examples from event observations
	wall of people at venue entrance, dark, no signs to locate the bar, or toilets, or stage. Although with people standing facing the opposite direction it was clear that that was the direction of the stage.
Unfamiliar with the event venue or the location	*Retail 48 - Village fete (Old Daulby, Leicestershire):* An annual event, popular with local residents, and therefore the majority of crowd users had probably attended the event previously, or were familiar with the village location. It was difficult to determine where you had and had not been if you were not familiar with the village and the layout of the fete.
Reference points to relocate areas within a venue	*Retail 50 - Spitalfields market (London):* Difficult to relocate stalls that you had been to earlier in the day as there was no system of reference for knowing where you were in relation to the rest of the event.

7.3.3.6   *Crowd management and staff management*

The management of the crowd and the management of the staff present within crowd events were important for crowd user satisfaction (Table 35). Polite staff had a positive impact on the atmosphere within the crowd event.

Primarily, approachable polite staff made a difference to the crowd user experience, as seen during *Music events 9 - Wireless festival (Hyde Park, London):*

> *Upon exiting the bar area, member of staff serving you said: 'Thank you, have a great night' and another security staff on the exit thanked everyone. This created a good positive atmosphere among crowd users, removing irritation from delays in getting to the bar.*

Such polite manners were very different to those experienced during *Music event 7 - Take That (Villa Park, Birmingham):*

> *The security staffs were not polite; when you asking – 'Where can we go..?' 'Can we sit over there..?' The security staff looked grumpy and simply nodded, using no verbal communication to respond.*

Moreover, staff within *Music events 1 - Arcade Fire (Hyde Park, London)* could be seen:

At the end of the evening all staff members from the bars were being lined up in their bars, cheering, and celebrating a successful shift. Line managers were encouraging the celebrations.

Additionally, the design of the staff workstation appeared to impact crowd user queue times, as well as staff morale. However, the large crowds of users, and the large queue times place stress on the overworked staff at crowd events.

Table 35 Crowd event management

Crowd event management	Examples from event observations
Polite staff (how staff dispense information and instructions)	*Music events 9 - Wireless festival (Hyde Park, London):* Staff – very stressed!! (At wireless festival staff were very relaxed, polite and happy. Telling you to have a nice day once they had served you. Made a huge difference to my experience of the festival)
Staff overworked	*Music events 4 - Field Day (Victoria Park, London):* Stressful conditions with large hoards of crowd users shouting over the bar. With no clear queuing system frustrations from crowd users were being taken out on staff.
Poor workstation design (creating more work for staff and increased queue times for crowd users)	See Figure 16 Field notes recorded following event observations (with regard to queuing)
Staff morale	*Music events 1 - Arcade Fire (Hyde Park, London):* At the end of the evening all staff members from the bars were being lined up in their bars, cheering, and celebrating a successful shift. Line managers were encouraging the celebrations.
Maintain rules	*Tourist events 17 - Bonfire night (Quorn, Leicestershire):* Staff located throughout the area,available to ask questions. Ensure that rules are adhered to regarding the banning of sparklers. (Stated on the ticket that crowd users would be escorted off the premises if in possession of banned items).
Unfriendly staff fuel frustrations within crowd users	Transportation hub 31 - London Underground: Unfriendly staff at the information desk – yes they are under stress, and unsure of what is happening, but they should maintain a polite and positive attitude.
Easily identifiable staff (luminous vests)	Having staff available across the event to provide information to crowd users as and when required

7.3.4 Public order

Public order refers to the relationship between authority involved within crowd events and crowd users. Crowd user experience of security, antisocial behaviour, and public and private security during crowd events will be presented.

7.3.4.1   *Public and private security*

A number of issues concerning security presence became apparent during events observations (Table 36). The presence of large numbers of police officers made crowd users question the reasoning behind so many officers at the event. For example during *Tourist events 20 - Royal Wedding (Green Park, London):*

> *Large numbers of police and security throughout London, however surrounding Marble Arch there were suddenly very large numbers of police, and riot vans. The sudden large scale police presence made crowd users question the motives, and wonder if something had gone wrong.*

Security officers were seen to be enforcing restrictions on crowd users and items entering the events observed, and were also present to aid crowd users with any assistance required. Additionally, a number of events utilised security guards with drugs dogs to monitor crowd users entering, leaving, and during the event.

Another issue that emerged from event observations was the apprehension caused to crowd users when lighting is insufficient in areas of an event, the car parks for example (Vignette 22). As seen during Transportation hub 31 - London *Underground:*

> *Waiting on the platform at night felt intimidating on your own.*

Warning signs were also important to remind crowd users to protect themselves and their belongings for example during *Tourist event 18 - Christmas Market (Budapest):*

> *Warned of pickpockets (as with any tourist city), told to watch your handbag or backpack, to reduce the chances of being mugged.*

Table 36 Security

Security	Examples from event observations
Security (enforcing the rules of the event) throughout the event (to communicate with crowd users)	*Conference and exhibitions 21 - International Ergonomics Association Conference (Recife, Brazil):* Local area surrounding the conference was derelict. On the opening ceremony evening there was a street party as the buses dropped the delegates off.
Police presence (enforcing the rules of the law)	*Music event 4 - Field Day (Victoria Park, London):* Seeing large numbers of police and security on the entry to Field Day, made you feel more comfortable that your safety was a priority to the organisers. However, it also made you question the reasons for such large numbers of officers.
Police presence intimidating	*Tourist events 20 - Royal Wedding (Green Park, London):* Surrounding Marble Arch the police presence was strong: sniffer dogs, riot vans, mounted police horses. However the police were embracing the event, and the atmosphere of the special occasion. One policeman had his photo taken with Thunderbird, entertaining for all crowd users.*
Entry to the event (restrictions enforced)	*Music event 6 - Strawberry Fields (Fields, Leicestershire):* Entry to the event the security officers had no metal detectors, and there was no searching of bags, meaning that anyone could have smuggled things in.
Security officers with drug sniffer dogs (a deterrent against antisocial behaviour)	*Music event 4 - Field Day (Victoria Park, London):* Crowd members were searched as they entered the event. Told not to take alcohol into the event, but not everyone was checked, just random people. The decision of which crowd users to select to check is questionable, and having drugs dogs allows the dogs to decide.
Knowledgeable security staff (to assist crowd users)	*Music event 7 - Take That (Villa Park, Birmingham):* Security guards were not familiar with the local area either – ('Are we going in the right direction for Star City?'… 'Erm.. I don't know, I'm not from round here, sorry'). It is not of interest to spectators whether staff are from the area or not, they need to know general directions to help crowd users.
Reputation (some events or areas have an expectation for violence and anti-social behaviour)	*Participatory event 36 - Fairground (Loughborough):* Security is increased in surrounding pubs during the fair. Police presence increased within the town centre compared to a usual night in the town. Horror stories of people who have been attacked at the fair in the past create an apprehensive and off-putting feeling for the crowd users.
Secluded areas of an event and poor lighting feel unsafe (car park or train station for example)	(Vignette 22)
Warning signs – indicating vulnerability from pickpockets	*Tourist event 18 - Christmas Market (Budapest):* Warned of pickpockets (as with any tourist city), told to watch your handbag or backpack, to reduce the chances of being mugged.

Vignette: *Security and lighting*

Alone walking towards the venue, it was dark but there were plenty of people walking in the direction of the arena from the city. I kept a note of the route, ready for my return trip. On leaving the arena I decided to leave 4 minutes early in order to avoid the possibility of traffic (past experience exiting a multi-storey car park in Nottingham). Consequently the route I took was deserted. I suddenly realised that the streets were very dark, and secluded, but had to continue as I was unaware of an alternative route, and was already halfway through the backstreet before realising that I felt unsafe.

Sporting event 11 - Ice-hockey (Nottingham panthers vs. Cardiff devils)

Vignette 22 Security and lighting

7.3.4.2   *Antisocial behaviour*

Monitoring and reducing antisocial behaviour including drug use, hooliganism, alcohol abuse, hostility between crowd users (including pushing and shoving, and foul language) were evident across crowd events observed (Table 37).

Reducing alcohol consumption and ensuring underage crowd users did not buy alcohol was addressed through making all underage crowd users wear a coloured wristband, however this had limited effect as the wristbands could be easily removed. Moreover, bar staff were not visibly checking for the identification or blue wristbands (*Music events 2 - Beardyman (o2 academy, Leicester)*.

Being surrounded by individuals engaging in antisocial behaviour was unnerving, and compromised the crowd experience. While the presence of police and security was reassuring (Vignette 23), it did not remove the danger of the antisocial behaviour. For example during *Music event 4 - Field Day (Victoria Park, London)*

*c*rowd users asked other crowd users if they would like 'pills or powder'. Despite the high presence of security officers throughout the festival, and the security officers with sniffer dogs at the entrance points, drugs were still a visible issue. In areas where no security was present drugs were being sold. In this instance the drugs were being offered by the queues for the porta-loos within the festival.

Pushing and shoving was a major irritation within crowd events, as well as foul language and poor manners. Friction easily built between users, and tension escalated with displays of antisocial behaviour, as seen during *Music events 9 - Wireless festival (Hyde Park, London),* in which an accidental stepping on another crowd user quickly escalated into an aggressive argument *(*Vignette 23*).*

Table 37 Antisocial behaviour

Antisocial behaviour	Examples from event observations
Monitoring anti-social behaviour	*Music events 6 - Strawberry Fields (Fields, Leicestershire):* Security presence throughout the event particularly as the sun went down. Police presence also, and security officers with drugs dogs located around the dance tent.
Drug use	*Music event 4 - Field Day (Victoria Park, London):* Asked if I would like 'pills or powder' at event.
Hooliganism	*Music event 7 - Take That (Villa Park, Birmingham):* Previous Take That concerts – In the news '*Police have described middle aged female fans to behave worse than football hooligans'.*
Alcohol abuse (intimidating)	*Tourist events 20 - Royal Wedding (Green Park, London): A*lcohol was allowed to be taken into the streets of London for the event, though alcohol is usually banned from the streets and public transport within London. However this lead to a large alcohol presence on the streets.
Hostility between crowd users (Vignette 23)	*Sporting events 13 - Leicester City Football Club (vs. Derby):* Throwing items into the crowd; at the police (e.g. coins); onto the pitch. Minority of supporters' behaviour was unacceptable.
Law enforcement	*Participatory events 35 - Carnival (Recife, Brazil):* Fear that although you are not part of the trouble in the crowd you might find yourself in the middle of the trouble and the situation is out of your control. Also a fear that police might accidently groups all the fans as hooligans and enforce restrictions on all crowd users.
Manners (polite between crowd users and no foul language)	*Retail 49 - Oxford Street (London):* Lack of respect between staff and other shoppers in stores where keeping costs low is the primary function
Pushing and shoving (irritating and causes friction between crowd users)	*Music events 1 - Arcade Fire (Hyde Park, London):* disregard for others in the crowd. People cut in front of other crowd users to get a better view of the stage, disregarding other people around them in the crowd.

Vignette: Antisocial behaviour

A fight broke out at the end of the event, after the headline act finished performing. The area was extremely crowded, with people tripping over each other, very close to one another. One man trod on another lady's foot, causing her to get angry. Her partner saw what was going on, got angry and threatened the man. Luckily the other man apologised profusely, and the situation was restored, without physical violence. But the situation could have taken a turn for the worse. There were no security guards around, so it was very scary for those crowd users surrounding the issue. I was directly next to the situation when the tension started to build. It was unnerving – the lighting was poor, and I panicked that had a fight started, it could have escalated before security became aware.

Music events 9 - Wireless festival (Hyde Park, London)

Vignette 23 Antisocial behaviour within events

7.3.5 Comfort within crowd situations

Comfort refers to the wellbeing of the crowd, and refers to factors surrounding weather conditions, lighting, noise, personal space, thermal comfort, seating comfort and odours.

7.3.5.1 Weather conditions

Weather conditions had a number of effects on the crowd user experience during the events observed, within both cold conditions (Table 38) and hot conditions (Table 39).

Poor weather acted as a deterrent to crowd users, with reduced attendance evident within a number of events during cold conditions. For example, during the *Participatory events 36 - Fairground (Loughborough)* it was*:*

> *Uncomfortable and difficult to stay dry, not an enjoyable experience. And the crowd conditions were not so dense due (in part) to the reduced turnout in the rain.*

The sale of ponchos and umbrellas was important when the weather turned during an event, however a number of the sales were from illegal touts outside of the event. Moreover, areas to shelter aided the enjoyment of an event in cold conditions, allowing a break from the elements. As well as the sale of hot food and drink within event, to enable crowd users to warm up.

Issues concerning weather conditions had an impact on health and safety, with slips trips and falls as a result of ice and mud conditions, as well as windy conditions (Table 38). In the extreme case events had to be cancelled due to poor weather conditions. As experienced in the year following the observation of the *Lincoln Christmas Market (Dec 2010):*

> *The event was cancelled for the first time in 50 years (the year after attended for research, 2011) due to heavy snow and ice.*

Table 38 Weather conditions (cold)

Weather conditions (cold)	Examples from event observations
Poor weather - deterrent to attend an outdoor event	*Participatory events 36 - Fairground (Loughborough):* Uncomfortable and difficult to stay dry, not an enjoyable experience.
Areas to shelter	*Tourist events 17 - Bonfire night (Quorn, Leicestershire):* Enjoyment was enhanced through areas to shelter from the elements (even if temporarily).
Hot food and drink facilities to keep warm and refuel	*Retail 48 - Village fete (Old Daulby, Leicestershire):* Having warm food and drink available helped crowd users to warm up.
Umbrellas – obstructed crowd user view	Sporting events 15 - Loughborough Student Rugby (vs. Barbarians):
Ponchos and umbrellas for sale	*Music events 7 - Take That (Villa Park, Birmingham):* standing spectators were getting wet in the stadium with no roof. Ponchos, umbrellas for sale on the way into the stadium.
Transport delays (due to extreme weather conditions)	*Theatre event 41 - Legally Blonde (show - The Savoy, The Strand, London):* Extreme weather conditions meant that it was difficult to get to the West End of London from the East Midlands. Trains were disrupted

Weather conditions (cold)	Examples from event observations
Slips, trips and falls (straw to prevent mud or salt to prevent ice)	*P1: Pilot - Lincoln Christmas Market (Dec 2010):* Ice on the roads and footpaths – extremely dangerous to go ahead with the event.
Windy conditions	*See* Vignette 24
Cancelled event	*P1: Pilot - Lincoln Christmas Market (Dec 2010):* The event was cancelled for the first time in 50 years (the year after attended for research, 2011) due to heavy snow and ice.

Vignette: Weather conditions
After 3 days of sunshine during the festival the weather changed on the last evening. The wind increased and blew a number of tents across the campsite, as well as dust from the previously dry conditions.

Music event 3 - Bestival (Isle of Wight)

The weather conditions were a little unnerving, and made packing the tent away to return home a little more complicated.

Vignette 24 Weather conditions

Hot weather conditions provided issues around dehydration, dust, and the use of sufficient sunscreen. Water facilities were provided within outdoor events, but they were often difficult to locate and saw large queues of crowd users, as shown during *Music events 3 - Bestival (Isle of Wight):*

> Hot sunshine and large queues for the water, and only allowed to take a small bottle of water into the festival area with you. Also, as a crowd user I was reluctant to drink too much to prevent queuing for the toilet again!

However, sunscreen was a difficult to monitor during event observations, it was awkward to carry, and easy to forget to take to events. Such issues could account for the sunburn seen during a number of events.

Table 39 Weather conditions (heat)

Weather conditions (heat)	Examples from event observations
Dehydration	*Music events 3 - Bestival (Isle of Wight):* Hot sunshine and large queues for the water, and only allowed to take a small bottle of water into the festival area with you. Also, I did not want to drink too much water and then have to queue for the toilet again!
Dusty heat	*Music events 3 - Bestival (Isle of Wight):* Due to the dry hot weather conditions, the ground was very dusty. The staff wore (some of them) masks over their mouth and nose, to prevent inhaling the dust
Sunscreen	*Music events 3 - Bestival (Isle of Wight):* Hot sun we remembered sun screen, but carrying it with you was difficult. Also, I did not see anywhere to buy sun cream within the festival. There was a pharmacy, but as getting cash from the cash machine was difficult (due to large queues).

7.3.5.2   *Lighting*

Lighting was an important issue within crowd events, in terms of viewing the event, feeling safe, reducing claustrophobic feelings within a crowded area, to reduce slips, trips, and falls, as well as to alter the atmosphere of an area (Table 40).

Dark colours on the walls of a venue created feelings of claustrophobia, whereas light colours on the walls created a feeling of space. As shown during *Music events 7 - Take That (Villa Park, Birmingham):*

> *Concourse areas were extremely claustrophobic. Dark navy coloured ceiling areas, with queues merging into each other. Light colours on the walls and ceiling would have given a more spacious, less claustrophobic feeling to the area.*

Table 40 Lighting

Lighting	Examples from event observations
Viewing event (difficult if there is insufficient light)	*Conferences and exhibitions 22 - International day (Loughborough university):* Areas were so dark that it was difficult to see the different stands. Whereas other areas are so bright that the atmosphere was altered.
Unsafe feeling	*Transportation hub 32 - Subway system (NYC):* Low lighting felt unnerving when travelling during the evening, especially when travelling alone.
Atmosphere (too bright and an area loses atmosphere)	*Retail 47 - Highcross shopping mall (Leicester):* Lighting was too bright in some stores, which can give crowd users a headache.

Lighting	Examples from event observations
Dark walls feel claustrophobic	*Theatre event 42 - The Lion King (Lyceum Theatre, London):* Many stairs leading to the grand circle, in a dark narrow staircase. Use of light coloured paint would brighten the area and give a less claustrophobic feel.
Clear lit exit route	*Music events 8 - Classical Concert (Vienna):* Clear exit routes were lit up within the concert area.
Slips, trips and falls	*Theatre event 43 - Cinema (Loughborough):* Dark as you enter and exit the cinema screen, the room is rather dark, and although the seat numbers are lit up, it provides a safety hazard.

7.3.5.3 Noise

The acoustics of an event included being able to hear the event clearly, with too loud creating discomfort and too quiet creating frustrations (

Table 41). For example during the *Music events 7 - Take That (Villa Park, Birmingham)* the:

> *acoustics were not good, it was quite difficult to hear and understand what was being said on the stage. The songs were clear, and loud enough, but when the artists spoke in between singing it was not easy to hear which was frustrating.*

Additionally during the *Participatory events 35 - Carnival (Recife, Brazil)* the music became so loud that it was uncomfortable to listen to (Vignette 25).

Table 41 Noise

Noise	Examples from event observations
Acoustics	*Conferences and exhibitions 21 - International Ergonomics Association Conference (Recife, Brazil):* Difficult to hear what the delegates were saying over the sound of the air-conditioning units.
Discomfort (music too loud or speakers in close proximity to crowd users)	See Vignette 25

Vignette: Noise – loud music

The loud music on the boat was piercingly loud, and caused discomfort after a short time. As the rainfall increased, the music became increasingly irritating. One crowd users asked the people in charge if they would mind turning the music down, to which they replied that the only way to turn the music down was to disconnect the speakers and turn them around. The speakers were huge, and facing directly into the boat. Once they were altered the music became more bearable, but still uncomfortably loud.

Participatory events 35 - Carnival (Recife, Brazil)

Vignette 25 Noise and loud music

7.3.5.4   Personal space

Personal space was an issue evident during event observations, including individual seating space available, bottlenecks in narrow pathways, discomfort due to close proximity to other crowd users and the time spent in the crowd environment (Table 42).

During event observations crowd users had increased comfort when individual space was provided. Whether seating was reserved, or allocated on arrival, having an individual space for each crowd user reduced unwanted contact (pushing and shoving) between crowd users. Reducing contact experienced during the event enhanced enjoyment. As seen during *Sporting events 13 - Leicester City Football Club (vs. Derby):*

> *Once seated in the stadium you forget about the volume of people around you, and had your own personal space and comfort away from other crowd users.*

Additionally, unwanted contact when entering and exiting the event, as well as moving within the ambulatory crowds at events required close contact with other crowd users, particularly within narrow pathways and bottlenecks. Such close contact with other crowd users caused discomfort, as show during *Conferences and exhibitions 23 - Levis Roots food show (Loughborough University):*

> *Limited space to sit, very uncomfortable, not sufficient space to sit and enjoy the event.*

However, discomfort was reduced depending on the length of time crowd users were required to spend in the crowd. Knowing that the density of the crowd would end in a short time reduced the stress, whereas not knowing how long the high density crowd would last increased the stress on crowd users.

Table 42 Personal space

Personal space	Examples from event observations
Individual space (seating or standing)	*Sporting events 13 - Leicester City Football Club (vs. Derby)* Once seated in the stadium you forget about the volume of people around you, and had your own personal space and comfort away from other crowd users.
Bottlenecks (narrow pathways)	*Conferences and exhibitions 22 - International day (Loughborough university):* Feeling claustrophobic as you walk through the small walkways and you cannot get past people coming the other way, or people walking slowly.
Discomfort (due to close proximity to other crowd users)	*Conferences and exhibitions 23 - Levis Roots food show (Loughborough university):* Limited space to sit, very uncomfortable, not sufficient space to sit and enjoy the event.
Time in the crowd	*Transportation hub 31 - London Underground:* Do not have to suffer the crowds for too long, but even from one stop to another, high density crowds can be overwhelming and suffocating.

7.3.5.5   *Thermal comfort (indoor environments)*

A number of issues became apparent regarding thermal comfort within crowd events, including overheating, sweating, and cold discomfort due to air-conditioning (Table 43).

Table 43 Thermal comfort (indoor environments)

Thermal comfort	Examples from event observations
Overheating (insufficient air-conditioning)	*Music events 4 - Field Day (Victoria Park, London):* Tents with the smaller stages were too hot and sticky as lots of people crammed in to see popular artists that were performing.
Sweating	*Transportation hub 34 - U-Bahn metro (Vienna):* Extreme difference between the freezing temperatures outside and the hot temperatures inside. Wearing many layers to keep warm outside, causes passengers to overheat.
Cold discomfort (due to air-conditioning)	*Theatre event 43 - Cinema (Loughborough):* The screens can get very cold part way through a film after sitting still, uncomfortably cold, which ruined the enjoyment of the night. Learnt to take an extra layer of clothes next time you visit the cinema.

7.3.5.6   Seating

The comfort of seating provided during crowd events was important to crowd user satisfaction, with uncomfortable seating and insufficient space acting as a distraction from the event itself (

Table **44**). As seen during *Theatre event 43 - Cinema (Loughborough):*

>   *Seating was comfortable to begin with, but after half an hour discomfort began to emerge in the back and knees, which was rather distracting, and took attention away from the enjoyment of the movie.*

Table 44 Seating

Seating	Examples from event observations
Seating comfort	*Music events 8 - Classical Concert (Vienna):* Towards the interval, start to notice the discomfort. Sitting still for almost an hour and the discomfort can be distracting. Seats were close together and thus, taller individuals would have been more uncomfortable
Seating space	*Theatre event 38 - 42nd Street (show - The Curve, Leicester):* Big winter coats on the seats left little space in the individual seats for the crowd user and their coat.
Anthropometrics	*Music events 8 - Classical Concert (Vienna):* Size of the spacing between seats made it difficult for those who have long legs.

7.3.5.7   Odours

Odours had both a positive and negative impact on crowd user satisfaction during the crowd events observed (Table 45). Body odour and the strong smell food felt unpleasant in crowd situations. However smells also added to the atmosphere of an event, for example during *Tourist events 18 - Christmas Market (Budapest):*

> *The smell of mulled wine and hot food added to the festive atmosphere.*

Table 45 Odours

Odours	Examples from event observations
Body odour	*Music events 7 - Take That (Villa Park, Birmingham):* An unpleasant smell as people moved around, dancing, and standing up to allow people past.
Food (can add to the atmosphere of an event)	*Tourist events 18 - Christmas Market (Budapest):* The smell of mulled wine and hot food added to the festive atmosphere.

7.3.6 Facilities available to crowd users

Facilities refer to the amenities available to crowd users during the crowd events observed; welfare facilities, food and drink facilities, and car parking will be presented (Table 46).

The availability and layout of facilities for the number of crowd users had a key impact on crowd user experience during crowd events observed; with insufficient numbers increasing queue times to frustrating levels (Vignette 26). The layout of facilities was also important, for example having all toilet facilities situated in one area of a venue created congestion, whereas placing facilities at various points throughout a venue dispersed the crowd. As seen during *Conferences and exhibitions 21 - International Ergonomics Association Conference (Recife, Brazil):*

> *The plates of food were piled on top of one another on one table in the middle on the venue, causing congestion when all crowd users attempted to reach between other crowd users for the limited number of sandwiches and cakes available.*

Moreover, the layout of facilities was important, and appeared to affect the queuing behaviour of crowd users. As shown during *Music events 9 – Wireless festival (Hyde Park, London):*

Separate queue for each portaloo, causing confusion and frustration when other crowd users appear to get to a facility before you.

As well as *Music event 4 - Field Day (Victoria Park, London):*

The separation of the toilets was more structured than at other festivals, with metal barriers in between every 2 toilets, to ensure that people queued in 1 line for 2 toilets. This reduced frustrations between crowd users as the queuing systems seemed fair.

Placing facilities at a greater distance from the main event appeared to disperse crowd users before entering the facilities. Signage was also crucial to avoid confusion in locating facilities, with large, simple signage, placed high above the crowd level, indicating the location of facilities with the most clarity (Vignette 27).

Table 46 Welfare facilities (toilets, water points, car parking, food and drink stalls)

Welfare facilities (toilets, water points, car parking, food and drink stalls)	Examples from event observations
Layout of facilities	*Music events 1 - Arcade Fire (Hyde Park, London):* Using tactics learnt at the Wireless concert I knew to queue for the toilets in the corner, reducing the queue time as there were more toilets available to fewer crowd members.
Distance to facilities	Sporting events 10 - Athletics competition (Loughborough University): Toilets – no signs to the toilets and limited number within the venue.

Vignette: Toilet facilities

Insufficient facilities for the number of crowd users were evident across event observations. Toilets within festival areas were insufficient particularly at peak times (in the morning around 10am when campers awoke; and in-between acts performing on stage). Excessive queue times were experienced as a result.

1. Music events 3 - Bestival (Isle of Wight);   2. Music events 1 - Arcade Fire (Hyde Park, London)

Toilets were seen to be emptied regularly and refilled with toilet paper and hand sanitizer. However this did not meet the demand of the vast numbers using the facilities continuously throughout the event, with crowd users often facing unhygienic facilities after a long queue.

The layout of toilet facilities also effected the queue times, and competition between crowd users. Facilities placed in one line with one clear queue leading to all facilities, was fair system for crowd users to enter facilities as they became free. Whereas multiple queues with facilities set out in small rows with corners lead to some queues moving quicker than others, and increased competition and frustrations between crowd users as a result.

Vignette 26 Toilet facilities

A number of additional facilities were identified during event observations, the availability of cash machines, cloakroom facilities, and specified meeting points to meet up with friends at the event (Table 47).

Also the availability of VIP tickets (sold at an additional cost) for supplementary facilities and reduced queue times was seen at a number of events. Tickets were sold at a higher price for the benefit of the additional facilities (Table 47).

Vignette: Signage to indicate facilities

Sufficient signage indicating facilities was most beneficial when large, simple signage was placed high above the crowd level, clearly indicating the location of facilities.

Music events 9 - Wireless festival (Hyde Park, London)

Vignette 27 Signage to indicate facilities

Table 47 Additional facilities

Additional facilities	Examples from event observations
Cash machines available (free)	*Music events 3 - Bestival (Isle of Wight):* Cash machine: did not mention no cards accepted within the festival, or to bring cash. One area within the festival had a cash machine, and consequently the queue was ridiculous. Users unable to buy food and drink - stall holders were therefore losing money.
Cloakroom (storage for additional baggage and large coats)	*Music events 2 - Beardyman (o2 academy, Leicester):* Cloakroom – bad design – cold night – most people stored coat (£1). Queue for collecting coats – ran into the pathway for those exiting the venue. Thus, crowd member has to navigate around the cloakroom queue, in order to exit the building.
Meeting point	*Sporting events 13 - Leicester City Football Club (vs. Derby):* Specific meeting point, as well as different entrance gate numbers surrounding the ground, made it easy to meet up with friends. *Theatre event 41 - Legally Blonde (show - The Savoy, The Strand, London):* No specific meeting point made it difficult to find exactly where you needed to be, without asking staff.

7.3.6.1 Housekeeping

Issues regarding housekeeping, including the presence of litter on the floor, the availability of litter bins, staff to collect litter and recycling were evident within events observed (Table 48).

A number of events implemented incentives to encourage crowd users to recycle cups and return cups to the bar once finished. Applying a deposit of £0.20 on each pint of beer for example encouraged crowd users to collect and return not only their own cups, but the cups of others who had dropped them on the floor. Litter bins were often present within a venue, but overflowing with litter by the end of the event, leaving crowd users no alternative but to keep the litter, or put it on the floor. Moreover, areas with vast amounts of litter gave a negative and dirty impression of the event (Vignette 28). Also, hygiene and maintenance of facilities was also important for crowd satisfaction, providing toilet paper and hand sanitizer, and ensuring facilities were cleaned and poortaloos emptied on a regular basis for example.

Table 48 Housekeeping

Housekeeping	Examples from event observations
Housekeeping	*Music events 2 - Beardyman (o2 academy, Leicester):* Trash thrown on the floor – plastic cups/bottles. Did not see bins, or areas to dispose rubbish. No staff seen to be collecting trash. On exiting event – plastic ups lined the floor (trip/slip hazard)
Litter	*Participatory events 35 - Carnival (Recife, Brazil):* Litter everywhere, food and litter lined the streets. No staff employed to collect the litter throughout the event
Recycling (incentives to return litter, including deposit on cups)	*Music events 4 - Field Day (Victoria Park, London):* Recycling was a nice thing to contribute towards whilst attending a crowd event. In some cases crowd members paid a deposit and were subsequently reimbursed upon return of the item. *Music events 3 - Bestival (Isle of Wight):* Recycling policy: 20p per cup (£1 when you return 5 cups).
Maintenance and hygiene of facilities (clean, hand sanitizer toilet paper)	*Music events 3 - Bestival (Isle of Wight):* Blocked toilets that were out of toilet paper were unpleasant. The high price of tickets should provide greater attention to housekeeping.

Vignette: Housekeeping and litter

Staff employed to collect the litter from the event; however it appeared to be out of control on the entrance points. Large amounts of litter to climb over before entering the festival gave a negative first impression of the event.

Music events 4 - Field Day (Victoria Park, London)

Vignette 28 Housekeeping and litter

7.3.7 Queuing systems

Queuing was a key issue indicated during event observations, with competition between crowd users, and frustrations surrounding excessive queue times (Table 49).

Insufficient numbers of facilities provided within crowd events appeared to create excessive queue times, as seen during *Music events 4 - Field Day (Victoria Park, London)*:

> *Few toilets with long queues were extremely frustrating, so I made the decision to reduce the amount I drank as the queue for the toilet was too uncomfortable and time consuming.*

However a number of tactics within the events observed appeared to reduce crowd user frustrations and excessive queue times. Primarily, evidence of clear and fair queuing systems, to ensure that crowd users wait for the same amount of time for

facilities. For example during *Music events 9 - Wireless festival (Hyde Park, London)* (Vignette 29)*.*

Additionally, informing crowd users whilst queuing as to the reasons for the delays helped to reduce frustrations, for example during the *Conferences and exhibitions 23 - Levis Roots food show (Loughborough University):*

> *Long queues were seen at the entrance point, but security staff made their way along the queue, explaining to crowd users that the delay was due to the hot food being served, that there would be sufficient for everyone, and that all crowd users would be served before the show commenced.*

The implementation of distractions such as music, posters and refreshments whilst queuing improved the crowd experience, and reduced frustrations experienced when queuing for events, or facilities within events.

A number of strategies were noted that appeared to reduce queue times within the events observed. Firstly, allowing crowd users to pre-order drinks to be served at the interval, in order to reduce the sudden rush for refreshment facilities (*Theatre event 39 - Greg Davis*). Also, the availability of VIP tickets entitling access to additional facilities, as well as separate facilities for staff within reduced queue times as a result. Finally, a number of event introduced tickets entitling crowd users to enter the event between specific time slots, which dispersed the crowd, reduced queue times, and improved crowd user satisfaction.

Table 49 Queueing

Queuing system	Examples from event observations
Excessive queue times: insufficient number of facilities; high competition for resources	*Music events 4 - Field Day (Victoria Park, London):* Fewer toilets, longer queues for the toilets, frustrating. Made the decision not to drink as much as the queue for the toilet was too uncomfortable, and time consuming.
Clear and fair queuing system in place to reduce frustrations and competition between crowd users	*Music events 9 - Wireless festival (Hyde Park, London):* Vignette 29
Reduce crowd user frustrations: Keep crowd informed; distractions from queue (music, posters, refreshments)	*Music events 3 - Bestival (Isle of Wight):* Not told how long the delay might be, which increased frustrations.

Queuing system	Examples from event observations
Strategies to reduce queue times: pre-order drinks for interval; VIP tickets at an increased price for supplementary facilities; separate facilities for staff	*Theatre event 39 - Greg Davies (comedy - Loughborough town hall):* Refreshments could be pre-ordered ready for the interval. Drinks were then lined up on the table at the side of the main entrance.
Separate tickets for specific times to disperse the number of crowd users	*Tourist events 19 - Rockefeller Centre (NYC):* Returning for a specified time controlled the number of tourists entering. No restriction on the time between entering and leaving the venue. Never frustrated at other crowd users getting in your way as there were not too many people there, and there were plenty of opportunities to get a photo, and to take your time admiring the view.

Vignette: Queuing systems

Various queuing systems (or lack thereof) were in place across event observations.

Arcade Fire and Wireless festivals reduced the confrontation surrounding queuing for refreshment facilities through placing a security guard on the entrance point to one single queue (Picture 1.). Crowd barriers snaked one long queue from the entrance point to the bar, clarifying place in the queue. It was therefore clear who got to the queue first, reducing conflict and competition between crowd members. The system also reduced stresses placed on staff responsible for monitoring the next crowd user in the queue. Instead staff raised their hand to indicate that they were ready for the next crowd user in the line to be served. A similar system might be beneficial for other facilities including toilet facilities.

Whereas other events such as Field Day music festival encountered hoards of crowd users pressed against the bar, trying to get the attention of the bar staff (see Picture 2.). Such system caused competition and frustrations between crowd users, as well as high stress placed on staff members.

1. Music events 1; 9 - Arcade Fire; Wireless   2. Music events 4 - Field Day

Vignette 29 Queuing systems

7.3.8 Transportation

Transportation refers to the methods of travel to the event, as well as any travel required within the event. Issues in relation to car parking will also be discussed (Table 50 Transportation). Within one event a '*Festi-taxis'* service was available to transport crowd users to different areas of the venue at a small cost. Such a service was particularly beneficial to crowd users with mobility difficulties, as well as those who wished to avoid poor weather conditions.

The location and availability of car parking was important when attending crowd events, with a number of events offering allocated car parking (at an additional cost) when initially purchasing tickets, as seen during *Theatre event 38 - 42nd Street (show - The Curve, Leicester):*

>*Paying for and allocating car parking along with the booking of the ticket made the experience easier when arriving at the venue.*

Difficulty in finding car parking when arriving at an event caused stress for crowd users and reduced the enjoyment of the event, while pre-booking car parking reduced stress and frustration for crowd users on the day of the event. So too did good transport links to events, which made the organisation of transportation easier and cheaper for crowd users. Moreover, the availability of taxis was an issue within a number of events, with local taxis unable to meet the demand of the specific event.

Table 50 Transportation

Transportation	Examples from event observations
Transport (within the event)	*Music events 6 - Strawberry Fields (Fields, Leicestershire):* Festitaxi – transporting crowd members from the entrance to the arena, across the mud. £1 per person. Great idea, not seen at previous events, or festivals.
Taxis (to and from the event)	*Participatory events 35 - Carnival (Recife, Brazil):* attempting to get a taxi out of carnival was almost impossible. Thousands of pedestrians waving down cabs that had already been occupied. There was no other choice than to take a bus, however buses are renowned for being particularly dangerous for tourists. The bus station was one of the scariest places I have ever been to in my life. Walking along the dual carriageway

Transportation	Examples from event observations
Short walk to car parking or other transportation hubs (to disperse the crowd)	*Sporting events 14 - Leicester Tigers (vs. Saracens):* Car parking was situated 30 minute walk from the venue. Thus missing the congestion when leaving the event (other spectators' experienced large tailback, and extreme bottlenecks exiting car parking according to local news reports).
NO Parking areas	*Tourist events 17 - Bonfire night (Quorn, Leicestershire):* Streets surrounding the event were lined with cones prevent parking, to allow emergency vehicles a fast escape route should such a route be required.
Allocated car parking (when booking the ticket)	*Theatre event 38 - 42nd Street (show - The Curve, Leicester):* Paying for and allocating car parking along with the booking of the ticket made the experience easier
Good transport links	*Theatre event 45 - Shakespeare theatre (show - Nottingham castle):* Good transport links to the trains and bus stations.

7.3.9 Crowd movement

Crowd movement refers to pedestrian flow, ingress and egress, queuing and congestion.

7.3.9.1   *Pedestrian flow*

A number of pedestrian flow systems were observed across events: one-way systems, appeared to reduce frustrations from crowd users bumping into one another; cross-flow of pedestrians, saw competition between crowd users attempting to cross paths; no system of flow, in which crowd users bumped into one another frequently; and finally the presence of a fast lane, allowing faster crowd users to pass (Table 51).

A number of events attempted to disperse crowd users and reduce the density of pedestrian flow through spreading facilities out, such as assistance to walk to the train stations or car park following an event. *Music events 4 - Field Day (Victoria Park, London):*

> *The park was situated 1 mile between Bethnal Green and Mile End tube stations creating dispersion of pedestrians on egress to the tube stations.*

Table 51 Pedestrian flow

Pedestrian flow	Examples from event observations
One way system (reduced frustrations between crowd users)	*P1: Pilot - Lincoln Christmas Market (Dec 2010):* Crowd pushing past one another caused frustration, moving in one direction reduced frustrations. Strict enforcement from staff (loudspeakers) instructing one-way system.
Cross-flow of pedestrians (competition between crowd users)	*Transportation hub 31 - London Underground*: Pedestrians keep to the Left hand side, creating a two way flow of pedestrians, and reducing contact between pedestrians.
No system of flow – people moving in any direction and crossing paths	*Participatory events 36 - Fairground (Loughborough):* Crowd members all wanting to cross paths with one another. Busiest area of the fair.
Fast lane (to allow faster pedestrians to pass)	Transportation hub 31 - London Underground: Using the escalators and keeping to the right to allow other users to pass on the left.
Disperse pedestrians by spreading facilities	*Music events 4 - Field Day (Victoria Park, London):* The park was situated 1 mile between Bethnal Green and Mile End tube stations creating dispersion of pedestrians on egress to the tube stations.

7.3.9.2   Ingress and egress

Mass exodus from an event was the most problematic issue surrounding ingress and egress (Table 52). For example during *Sporting events 12 - Ice-hockey (Nottingham University vs. Nottingham Trent)* crowd users attempted to avoid the conditions faced when exiting the event:

> *Competition to get out of the stadium as quickly as possible. Some crowd members leave early, to ensure that they are the first to leave. Others go for a drink after the game, to avoid the initial crowd of supporters.*

A number of methods were seen to separate the ingress of crowd users, including crowd barriers used to guide and separate crowd users into different entry points (Vignette 30). As well as the specification of specific entrances stated on each individual ticket, as seen during S*porting events 15 - Loughborough Student Rugby (vs. Barbarians):*

> *No signs stating which area of the stadium to head to enter different turnstiles. Specific turnstile entrance indicated on each ticket (E.g. 20 21 32+). Electronic turnstile entrance – quicker.*

Table 52 Ingress and egress

Ingress and egress	Examples from event observations
Mass exodus from an event or venue	*Sporting events 12 - Ice-hockey (Nottingham University vs. Nottingham Trent):* Competition to get out of the stadium. Crowd users leave early, to ensure that they are the first to leave. Others go for a drink after the game, to avoid the initial crowd of supporters.
Crowd barriers to guide crowd users	Vignette 30
Separate entrance and exit points (indicated on individual crowd user tickets)	*Sporting events 15 - Loughborough Student Rugby (vs. Barbarians):* No signs stating which area of the stadium to head to enter different turnstiles. Specific turnstile entrance indicated on each ticket (E.g. 20 21 32+). Electronic turnstile entrance – quicker.

Vignette: Crowd barriers

Crowd barriers were placed in between each of the entry points at the entrance, to clearly separate crowd users.

Music events 4 - Field Day (Victoria Park, London)

Vignette 30 Crowd barriers

7.3.9.3   Congestion

Placing popular areas of an event together within a venue created frustration amongst crowd users (Table 53). Another frustration within congestion was blockages in the pathway, caused by a number of issues including other crowd users stopping unexpectedly. For example, *Transportation hub 31 - London Underground*:

> *Crowd members stopping in the middle of the path unexpectedly is to be expected at such an event, but it is infuriating. When it happens once it is irritating, but a number of times in close proximity and it is unbearable!*

Also bottlenecks forming to create uncomfortable conditions for crowd users, as seen during *Sporting events 11 - Ice-hockey (Nottingham panthers vs. Cardiff devils):*

> *Bottlenecks as crowd members enter the stairs were uncomfortable but short-lived, and therefore bearable.*

Table 53 Congestion

Congestion	Examples from event observations
Popular areas placed together – layout	*Retail 50 - Spitalfields market (London):* Burger stand was very popular – placed at the front of the school area, up close to the fence area. The queue was very large, and crossed the path entering the vintage car area. Not ideal – difficult to determine the end of the queue.
Blocked pathways (crowd users stopping and blocking each other's pathway)	*Theatre event 42 - The Lion King (Lyceum Theatre, London):* Unfamiliar with event or area causing blockages as they stand and decide which route to take. Frustration as you attempt to get past slow moving tourists, in your pathway.
Bottleneck (ingress and egress)	*Sporting events 11 - Ice-hockey (Nottingham panthers vs. Cardiff devils):* Bottleneck as crowd members enters the stairs. Uncomfortable but short-lived, and therefore bearable.

7.3.9.4 Accessibility

The accessibility of crowd events for all crowd users was an issue brought into question during event observations (Table 54). A number of events stated that they were accessible for all crowd users, yet upon attending events it became apparent that difficulties would face crowd users with reduced mobility. For example, during the *Sporting events 13 - Leicester City Football Club (vs. Derby)* stairs at the top of the stadium were extremely steep, and difficult to navigate, particularly for older crowd users. Such events had specific areas for more easy access, however planning ahead would require prior knowledge and organisation on the part of the crowd user, which if missed could lead to reduced satisfaction for the crowd user.

A number of events also had separate spectator viewing areas for individual wheelchair users that appeared somewhat out of the atmosphere of the event and other crowd users, as seen during *Music events 2 - Beardyman (o2 academy, Leicester):*

Wheelchair access and viewing balcony could cause crowd users to feel detached from the event atmosphere slightly.

Whereas other events had wheelchair spectator viewing areas that were integrated into the event, and encompassed the atmosphere of the event as well as simply providing a good view for the crowd user.

Additional issues of interest included temporary flooring to provide a flatter surface on which to manoeuvre wheelchairs, as well as sloped pavement edges between the pavement and the curb to provide a flat surface (Figure 23). Such modifications could be introduced into an area temporarily, as seen during the *Participatory events 36 - Fairground (Loughborough)*.
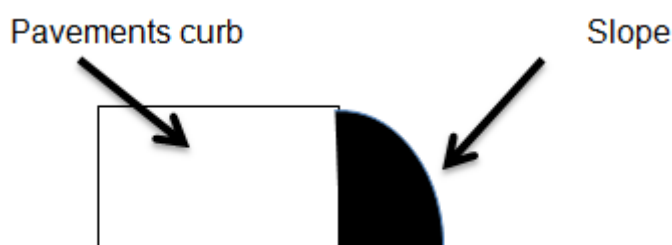
Figure 23 Sloped pavement edge

Table 54 Accessibility

Accessibility	Examples from event observations
Entry for wheelchair users	*Theatre event 41 - Legally Blonde (show - The Savoy, The Strand, London):* Access to the main auditorium through a side entrance - inform the Box Office at the time of booking and contact the Stage Door on arrival.
Spectator view for wheelchair users	*Music events 2 - Beardyman (o2 academy, Leicester):* Wheelchair access and balcony could cause crowd users to feel detached from the event atmosphere slightly.
Pavement slopes (Figure 23)	*Participatory events 36 - Fairground (Loughborough):* Pavement slopes implemented for the fair specifically, to make it easier to manoeuvre wheelchairs and pushchairs throughout the fair area (it might be a good idea for public areas to implement).
Flatter floor surface (temporary)	*P1: Pilot - Lincoln Christmas Market (Dec 2010):* Temporary floor surface to improve mobility for wheelchairs and pushchairs – manoeuvre along flat surface.
Access to transportation can be restricting	*Transportation hub 31 - London Underground:* No lift to the platform at some underground stations, making transport difficult.

7.3.10   Physical design within crowd situations

Design focusses on venue design and layout, as well as pedestrian flow systems within the events observed.

7.3.10.1 Spectator view

Spectator view was a crucial issue across spectator events observed; with difficulty viewing the event creating frustrations and reduced satisfaction amongst crowd users (Table 55). Providing large screens to ensure all crowd users could view the event irrespective of their distance from the stage was important, and ensuring all crowd users can view one of the screens or the stage from any position in the crowd. A number of strategies were observed to improve spectator view, from tiered seating areas, to raised stage areas. Within festival events, natural inclines in the venue were used to place the stage, and provide crowd users with the best view. Moreover, being faced with a restricted view during an event was not a problem, providing that information had been provided when booking the event ticket, with a reduction in ticket price implemented as compensation. For example during *Theatre event 42 - The Lion King (Lyceum Theatre, London):*

> *Metal bars along the top of the front row seating, to prevent crowd users falling over the tier, onto the seating below. However, the large metal bar provided an obstruction to the view of those sat in the first row of the tiered seating areas. It was uncomfortable to sit and either bend forward to view under the bar, or sit upright, to lean over the bar. However the seats were offered at a reduced price to compensate for the inconvenience.*

Table 55 Spectator view

Spectator view	Examples from event observations
Raised stage area (to improve viewing for crowd users)	*Music events 2 - Beardyman (o2 academy, Leicester):* Good view of the artist from anywhere in the arena. Heightened stage area – raised above the crowd. (plus large screen behind the artists, to entertain audience)
Large screens (for those who could not view)	Large screen behind the artists and at the side of the stage, to entertain audience further from the stage.
Restricted view (stated before booking, with a reduced price)	*Music events 7 - Take That (Villa Park, Birmingham):* Seating behind speakers reduced the view.

Spectator view	Examples from event observations
Tiered viewing area (enables spectators to see over one another)	*Music events 3 - Bestival (Isle of Wight):* The main stage was at the base of a hill therefore even at the very back of the viewing area crowd users could see the stage clearly. The view was only disrupted when the crowd density became uncomfortable.
Other crowd users disrupting view (taller crowd users, sitting on chairs, sitting on shoulders of other crowd users)	See Vignette 31

Vignette: Spectator view

Crowd users disrupting the view of other crowd users: taller crowd users; sitting on chairs in front of seated crowd users; or sitting on shoulders of other crowd users.

Tourist events 20 - Royal Wedding (Green Park, London)

The above photo shows the large number of crowd users sitting on the ground to watch the Royal Wedding on large screens in Green Park. However, a number of crowd users took picnic chairs into the park, and were sitting on them throughout the event. For those situated directly behind the chairs it was quite frustrating and uncomfortable attempting to view the screens over the chairs.

Vignette 31 Spectator view

7.3.10.2   Layout

Layout concerns the plan and arrangement of areas and facilities within an event venue (Table 56). A number of layout issues suggested concerns, with obstacles in the pathways and crossed pathways creating frustration for crowd users. The layout of facilities and queues to facilities was important, with a number of facilities placed in positions creating queues that crossed into passing pedestrian pathways (Vignette 32). Additionally, problems were faced when insufficient space was

allocated between pathways, and in-between stalls, creating difficulties in passing between crowd users, particularly for crowd users with pushchairs, or wheelchairs to manoeuvre around narrow pathways for example. As seen during *Retail 50 - Spitalfields market (London):*

> *Stalls very close together – small bottleneck areas, crowd members struggle to pass each other. Some people barge past, others get frustrated, and storm past.*

The main problems appeared to come from event organisers attempting to fit too much into a small area. As shown during *Retail 48 - Village fete (Old Daulby, Leicestershire):*

> *Layout in certain areas became congested. Busy areas included the vintage cars, welfare facilities and refreshments all situated in one area of the village.*

One key issue that became evident during event observations was the layout of staff facilities, the impact this had upon staff efficiency and morale, and the subsequent services for crowd users. Primarily within refreshment facilities, where the layout of amenities (fridges, bar pumps, glasses and tills) noticeably contributed to the level of work efficiency from staff, and the subsequent queue times for crowd users.

Table 56 Layout

Layout	Examples from event observations
Obstacles in pedestrian pathways and crossed pathways	*Tourist events 18 - Christmas Market (Budapest):* Items displayed in the centre of the pathway – obstacle for shoppers.
Queue layout: Queues overlapping into pedestrian flow	Conferences and exhibitions 26 - Careers fair (Loughborough university): Poor layout of the facilities meant that the queue for the toilet facilities ran out into the pedestrian flow pathway. See Vignette 32
Walkways and space for pedestrians to pass (pushchairs, wheelchairs, small children). Trying to fit too many stalls into an area.	*Conferences and exhibitions 22 - International day (Loughborough university):* Walkways close together, little space to get past each other or browse the stalls.
Staff working areas and workability (layout of facilities makes a task more difficult)	*Music events 4 - Field Day (Victoria Park, London):* Bar facilities – payment was taken at 5 tills for the entire bar. The bar staff took the drinks orders, got the drinks, and then repeated the order to the money staff, who calculated it. Staff had to keep going to and from the crowd members to tell them the exact amount that the bill had come to. Staff looked extremely stressed and unable to keep up with the high demand crowd.

Layout	Examples from event observations
Popular areas of the event (stalls and facilities) too close together causing bottlenecks	*Music events 3 - Bestival (Isle of Wight):* The festival was spread over a large area, with numerous different fields, and small areas with facilities spread out across the entire site. Spreading the bars, toilets, food stalls out dispersed the crowd, and meant that you were never too far from the facilities.

Vignette 32 Layout of queuing system

7.3.11 Satisfaction of crowd users

Factors influencing atmosphere, experience, and financial considerations will be presented.

7.3.11.1 *Atmosphere*

Atmosphere concerns aspects of events that added a positive feeling to the experience, from the music, lighting, chanting, singing, laughter used within events of various descriptions to the decoration of events, and merchandise (Table 57). For example during *Participatory events 35 - Carnival (Recife, Brazil):*

> *Excitement, music, colours everywhere. From early in the morning people were singing and dancing, in the street, on the busses. Loud music everywhere, drums, instruments.*

Additionally, sports fans [*Sporting events 14 - Leicester Tigers (vs. Saracens)*] wore the team shirt, and waved the team flag, which appeared to build atmosphere and community within the event. Singing team chants or motivational songs also increased the positive feeling within an event (Table 57).

Table 57 Atmosphere

Atmosphere	Examples from event observations
Flags, banners, scarfs, merchandise	*Tourist events 20 - Royal Wedding (Green Park, London):* Giving away free union jack flags for people to wave, and feel part of the wedding atmosphere
Music and lighting	*Music events 7 - Take That (Villa Park, Birmingham):* Walking towards the stadium, played old Take That hits to get the atmosphere going. Firemen in uniform were collecting for charity and dancing along to the songs.
Chanting, singing and laughter	*Sporting events 12 - Ice-hockey (Nottingham University vs. Nottingham Trent):* Cheering and supporting your team, adding to the atmosphere is a huge part of sporting events – particularly within an arena or stadium event. (Chanting in support of their team Nottingham University "*T.R.E.N.T. you're gonna get a shit degree*".) See Vignette 33

Vignette: Atmosphere during crowd events (singing)

Prior to the football match beginning, as the crowd users make their way into the stadium, music is playing to build the atmosphere of the event. Old footage from successful Leicester City football matches is being playing on the screens at either end of the pitch); with BBC Radio Leicester playing. As well as the team anthem from a local Leicester band (Kasabian), positive music for the supporters to sing along to, played at the beginning every game. Singing and chanting in support of the team and individual player's shows passion for the team and the game they love, and builds a positive atmosphere before the game begins.

Sporting events 13 - Leicester City Football Club (vs. Derby)

Vignette 33 Atmosphere during crowd events (singing)

7.3.12   Health and safety

Issues relating to health and safety, road safety, accidents, training, and emergency evacuations will be presented.

7.3.12.1   Slips, trips and falls

A number of health and safety issues became apparent during event observations (Table 58), primarily slip, trip and fall hazards, for example during the *Conferences and exhibitions 21 - International Ergonomics Association Conference (Recife, Brazil)*:

> *One of the auditoriums had a hole in the stage floor, a hazard for delegates to avoid falling when on the stage.*

Spillages of liquid, food and litter created slip, trip and fall hazards across the events observed; as well as weather conditions (snow, ice and rain).

Table 58 Slips, trips and falls

Slips, trips, and falls	Examples from event observations
Slip, trip and fall hazards	*Conferences and exhibitions 26 - Careers fair (Loughborough university):* Cables were stuck to the ground with thick black tape (to reduce the hazard) *Participatory events 36 - Fairground (Loughborough):* Pavement slopes implemented to prevent crowd members tripping hazards on the sudden increased pavement (curb). *Music events 6 - Strawberry Fields (Fields, Leicestershire):* Straw and hay placed down over the very muddy patches of ground, to prevent accidents.
Spillages (liquid, food, litter, dropped leaflets)	*P1: Pilot - Lincoln Christmas Market (Dec 2010):* Non-slip floor boarding in the cathedral square area. Important when the rain began to pour.
Snow, ice and rain weather conditions (increase the slip of the ground)	*Retail 47 - Highcross shopping mall (Leicester):* Liquid from outside brought inside on shoes, causing a slip hazard.

7.3.12.2   Stairways

The availability of handrails on staircases (particularly steep staircases that were unnerving to climb), increased the feeling of safety (Table 27). During the 18 month data collection phase two falls were observed on escalators (Vignette 34).

Stairways	Examples from event observations
Hand rails on stairs and trains	Theatre event 42 - The Lion King (Lyceum Theatre, London): Handrails along stairs in-between the seated tiered sections.
Steep tiered seating (difficult to pass other crowd users)	Sporting events 14 - Leicester Tigers (vs. Saracens): Standing on the tiered seating section, climbing across people to get out. Steep and restricted space. Some people do not stand to allow others to pass, and instead try to move their feet to one side allowing limited space.
Falls on stairs and escalators (two seen during event observations)	See Vignette 34

Table 59 Stairways

Vignette: Falls on escalators

During the 18 month data collection period two falls were observed on escalators, both of which were within the transportation field.

Transportation hub 31 - London Underground: Two older women fell backwards at the base of the escalator causing a blockage as people tried to help them to stand. No one pressed the emergency stop button, and so oncoming pedestrians had to try to jump over the women, as people at the bottom attempted to help them to stand. The emergency stop button was too far away from me as I was not yet at the bottom of the escalator.

Transportation hub 34 - U-Bahn metro (Vienna): An older gentleman fell backwards at the top of the escalator, he was holding on to the handrail, but the stairs were moving underneath him as he lay backwards. I pressed the emergency stop button, and people helped to get the man comfortable while the emergency services came to assist. The experience was traumatic for his wife who stood screaming at the top of the escalator, in too much shock to press the emergency stop button.

Vignette 34 Falls on escalators

7.3.12.3 *Safety signage*

Specific safety signage was observed across a number of events, highlighting warning regarding pickpockets, as well as walking rather than running to reduce accidents (

Table 60). Moreover, the availability of clearly marked exit routes was important in reducing the stress of a high density crowd situation, as seen during *Transportation hub 34 - U-Bahn metro (Vienna):*

> *Can be difficult to get through the crowd to exit the train, and you begin to panic that you will not be able to get off the train when you need to.*

Table 60 Safety signage

Safety signage	Examples from event observations
Safety signage	*Transportation hub 31 - London Underground:* Signage informing pedestrians to be safe when travelling on the London Underground: 'Do not run, walk'
Escape route (an available way out visible)	*Conferences and exhibitions 26 - Careers fair (Loughborough university):* Fire Exits were clear, but not too easily identifiable. Human behaviour encouraging people to leave via their original exit would cause huge implications during an emergency situation. *Conferences and exhibitions 23 - Levis Roots food show (Loughborough university):* Difficult to see your exit route, unless you were familiar with the venue.

7.3.12.4 Health and safety

A number of general health and safety issues were observed (Table 61). Across the events observed a number of items were banned from entering the event to improve health and safety, including sparklers [*Tourist events 17 - Bonfire night (Quorn, Leicestershire)*], umbrellas [*Sporting events 15 - Loughborough Student Rugby (vs. Barbarians)*], and glass cups and bottles [*Sporting events 14 - Leicester Tigers (vs. Saracens)*]. Moreover, a number of issues were observed to improve health and safety, from the availability of cardboard cup holders that opened out to carry up to 6 drinks from the bar. Such tools improved health and safety allowing crowd users a free hand to avoid falling, as well as increasing the number of drinks to be carried from the bar.

First aid points were also seen across events, as well as safe sex campaigns and the distribution of free condoms during a number of events. Finally, within road safety the main concern was seen when cars and pedestrians were not clearly segregated. Within *Transportation hub 29 - Ferry crossing (Egypt - Jordan) for example:*

> *No separate pathways for pedestrians, motor vehicles, and trucks when exiting the ferry port, creating difficulties for drivers of large trucks to see pedestrians clearly.*

Table 61 Health and safety issues within crowd situations

Health and safety	Examples from event observations
Banned items (sparklers and umbrellas)	*Tourist events 17 - Bonfire night (Quorn, Leicestershire):* Sparklers banned from the event. *Retail 50 - Spitalfields market (London):* Umbrella – irritating to carry along with a large bag! (security guard asked to fold the umbrella away to prevent poking in eyes)
No glass bottles or cups within events	*Conferences and exhibitions 23 - Levis Roots food show (Loughborough university):* Plastic cups and plastic bottles provided instead of glass (Good housekeeping - large wheelie bins located throughout the building, with small openings for bottles)
Container to carry 6 cups (allowing crowd users to carry more drinks, whilst having one a hand free)	*Music events 5 - Teddy Thompson (Pub, Leicester):* Getting a number of drinks from the bar, back to the other people in your group is difficult, causing spillages. Wet areas on the floor were dangerous for crowd users walking (especially when carrying drinks).
First aid points	*Music events 3 - Bestival (Isle of Wight):* Clearly marked first aid tents throughout the venue. Marked out on the map.
Safe sex advertised at large events	*Participatory events 35 - Carnival (Recife, Brazil):* advertising campaigns for contraception promoting safe sex - huge balloons, distributing free condoms and safe sex bandanas.
Road safety	*Retail 49 - Oxford Street (London):* Small path area meant pedestrians were merging into the road and traffic.

7.3.13   Public relations

Aspects relating to the organisation of events, event reputation, and crowd user feedback will be presented (Table 62). Attending an event and having a bad experience lead crowd users to be unlikely to return to that event in the future. As experienced during *Music events 3 - Bestival (Isle of Wight),* during which the organisation of the travel to and from the event was so poor (Vignette 21), with huge delays encountered, ruining the overall crowd experience, despite the actual event being enjoyable. However, few events actively asked for feedback from crowd users.

Table 62 Public relations

Public relations	Examples from event observations
Bad experience of an event reduced likelihood of returning	*Theatre event 41 - Legally Blonde (show - The Savoy, The Strand, London):* Reluctant to return after a bad experience. Bad impression of the company with whom you booked the tickets with, if you have particularly bad seats.
Poor organisation	*Conferences and exhibitions 21 - International Ergonomics Association Conference (Recife, Brazil):* Registration before opening ceremony-all delegates required to queue to register, however, the process seemed to take a long time (1 hour). There was a long queue of delegates; the area was not air-conditioned, very hot and uncomfortable.
Feedback from crowd users (crucial for improving future events)	*Conferences and exhibitions 26 - Careers fair (Loughborough university):* Feedback – I had barely looked around all of the stalls, and a steward asked if I would fill out a feedback sheet. No questions asked about the layout of the stalls, and problem areas. The feedback encouraged positive feedback, and made negative feedback difficult to portray.

7.3.14 Event capacity

Factors with regard to ticketing, methods of monitoring capacity, user expectations, and the size of individual events will be presented (Table 63). A number of strategies were observed to monitor the capacity within events: distributing wristbands, hand stamps, or colour coded tickets upon arrival at the event, as seen during *Sporting events 15 - Loughborough Student Rugby (vs. Barbarians):*

> *Tickets were exchanged for wristbands on arrival, colour-coded depending on the stand crowd users were allocated to.*

Additionally, allocated seated was used to monitor the capacity across different areas of one venue, as well as specific entrance and exit points indicated on individual tickets.

Table 63 Capacity issues within a crowd

Capacity	Examples from event observations
Monitoring capacity (wristbands, hand stamps, colour coded tickets)	*Music events 5 - Teddy Thompson (Pub, Leicester):* Walked into Rescue Rooms, hand stamped by the door staff (security measure to ensure that everyone had paid)

Capacity	Examples from event observations
Allocated seating or timings	*Theatre event 43 - Cinema (Loughborough):* Good to be able to pre-book seats in the cinema – therefore if you are attending with a number of friends, you know that you will all have seats together.
Different entrance and exit depending on ticket	*Theatre event 42 - The Lion King (Lyceum Theatre, London):* Different entrances and exits for the different levels of seating. Different bar and merchandise stall on each of the levels – reduces queuing time, and people passing on the stairs to get to the main entrance.

7.3.15   Time constraints

Issues surrounding time constraints will be presented (Table 64). The planning of events information and the presence of clear timetables were important to enable crowd users to plan their time at an event (Table 64). As seen during *Conferences and exhibitions 22 - International day (Loughborough university):*

No timings to say when different presentations were taking place. Made it difficult to plan your time and ensure that you saw everything that you wanted to.

Additionally high density crowds were bearable, if the duration within the crowd was known, and was short. However if crowd users need to be somewhere at a certain time and the crowd prevents them from getting somewhere fast, the crowd is frustrating. As seen during *Music events 3 - Bestival (Isle of Wight), where q*ueuing to leave the event, with no information provided as to how long the delays may take, created great frustrations amongst crowd users (Vignette 21).

Table 64 Time constraints during crowd events

Time constraints	Examples from event observations
Timetables	*Music event 4 - Field Day (Victoria Park, London):* Running behind schedule, so we got there in plenty of time (leaving from the Coral early), and had to wait for organisers to set up the stage. Delays caused crowd users to miss bands on other stages.
Information planning	*Transportation hub 29 - Ferry crossing (Egypt - Jordan):* Booking ferry crossing, no timetable for departures and arrivals. The company decide each day at what time the ferry will be leaving the following day. Crowd users arrived at the port at 3pm (as instructed), only to be kept waiting hours.

Time constraints	Examples from event observations
Dense crowds are bearable if there is a known end point or time but not when they cause delays for crowd users	*Transportation hub 31 - London Underground:* Extremely dense crowd, but for just a short journey distance the discomfort was bearable. For a long journey such a dense crowd would be frustrating and unbearable.

7.3.16 Encumbrances within crowd situations

Issues concerning encumbrances present within crowd events included baggage and assisting small children in pushchairs for example (Table 65).

Table 65 Encumbrances within crowd events

Encumbrances	Examples from event observations
Tourist baggage (large bags and wheeled suitcases)	*Transportation hub 32 - Subway system (NYC):* Navigating through ticket turnstiles can be taxing with luggage. Required to ask for assistance, to pass through a larger gate. If others are also asking the same question, or if other crowd members are asking station monitors for information regarding their journey, it can delay you getting through with your case.
Small children and pushchairs	*Music events 8 - Classical Concert (Vienna):* Pushchairs would have been difficult to manoeuvre, and would have been asked to be left at the cloakrooms.
Storage (baggage, pushchairs)	*Theatre event 44 - Peter Kay (comedy - Sheffield arena):* Little space available to store belonging if you do have excess encumbrances. And long queues for collecting from cloakroom facilities after the event.

7.3.17 Cultural tolerances within crowd situations

Event observations were conducted across a number of different countries allowing the researcher to experience different cultures. Findings showed that the four crowd events observed within eastern cultures [*28: Immigration control (Egypt); 29: Ferry crossing (Egypt - Jordan); 30: Queen Allia airport (Jordan); 46: Mecca mall (Amman, Jordan)*] showed less structured queuing systems, and less defined timetables in comparison to events attended within the UK, Europe and America (Table 66).

Table 66 Cultural tolerances

Cultural tolerances	Examples from event observations
Eastern cultures less structured queue	*Transportation hub 28: Immigration control (Egypt):* many pedestrians gathered around the passport control (not one clear queue) shouting to get through passport control first.
Fast lane and slow lane	*Transportation hub 31 - London Underground:* Tube etiquette - allowing other passengers off train before you get on. Keeping to the Right side of walkways and escalators (unwritten rules were applied to crowd situation).
Leaving an event early to avoid the crowd	*Theatre event 44 - Peter Kay (comedy - Sheffield arena):* Crowd member began to leave the event early – made their way to the exit as Peter Kay was still performing in order to avoid the mass exodus of the crowd.
Shared experience between crowd members	*Transportation hub 31 - London Underground:* Everyone using the trains is in the same situation – camaraderie between passengers. However, that can result in accumulated aggression being projected on the staff.

7.4 Discussion

7.4.1 Key research findings presented in this chapter

The aim of this study was to collect rich and detailed information regarding crowd user experience (comfort, satisfaction, safety and performance), and provide further evidence of the complex influences which shape the experiences of the user within crowd events.

Consistent with the aims of this thesis to enhance the user experience of crowds, the data provide further evidence on issues that impact upon crowd user satisfaction, advancing on findings from previous studies in this thesis involving user focus groups and stakeholder interviews. The findings also suggest how psychological, social and environmental factors influence crowd behaviour and satisfaction, within events of various descriptions. The key findings are summarised below.

The issues displayed within the results show fifteen emergent themes:

1. Communication within crowd situations
2. Public order
3. Comfort within crowd situations
4. Facilities available to crowd users
5. Queuing systems
6. Transportation
7. Crowd movement
8. Physical design within crowd situations
9. Satisfaction of crowd users
10. Health and safety
11. Public relations
12. Event capacity
13. Time constraints
14. Encumbrances within crowd situations
15. Cultural tolerances within crowd situations

A number of key findings will be discussed, grouped and presented with regard to similar issues that arose during data analysis. Firstly the layout of the event venue together with the movement and monitoring of crowd users. Secondly, the availability of facilities and reducing competition between crowd users; together with possible links to maintaining public order and reducing anti-social behaviour during crowd events.

7.4.2 Event design and layout

Factors concerning layout of the event venue together with the movement and monitoring of crowd users were of noteworthy importance. Event observations suggested that the layout of crowd venues contributed to frustrations between crowd users, when the layout of a venue interrupted pedestrian flow (as seen during Vignette 32) or increased contact between crowd users for example. When facilities were laid out in a way that caused queues to cross into the passing pedestrian flow, the layout appeared to contribute towards increased pushing and shoving between crowd users

Another interesting finding was the different methods used across crowd events to segregate the crowd, and disperse crowd users across the event venue. A number of events indicated a specified entrance point on each individual ticket; others allocated a specific number of tickets or a different coloured wristband for separate sections of the venue upon arrival. Such findings support stakeholder interview findings surrounding the difficulties event organisers face when monitoring capacities within a venue. Ticketed events control the maximum number of crowd users attending an event, however controlling the movement of crowd users within a venue, and the capacity across different sections of one venue appeared to be problematic. Such findings suggest that despite the attention given to pedestrian flow modelling in the literature (Seyfried et al., 2006; Smith et al., 2009; Parisi et al., 2009; Qiu & Hu, 2010) problems are still evident regarding the layout and flow of crowd users within many event venues. Such findings fall in line with stakeholder interview findings that indicate limited use of pedestrian flow modelling within crowd events organisation, particularly small scale events with limited financial resources (see Stakeholder interviews Chapter 5, page 95). Moreover, event observations suggest that poor layout contributed towards frustrations between crowd users, and areas of congestion. Such findings also support research into crowd safety, stressing the importance of the layout of facilities within an event, and the contribution towards crowd disasters, when '*clusters of people becom(ing) trapped'* (Sime, 1999), as a result of poor layout of facilities and subsequent bottlenecks.

7.4.2.1   *Ticket pricing and quality of view for the user*

Findings from events observations suggest that ensuring a clear view (of the spectator event) is crucial to crowd user satisfaction however, providing clear information when purchasing the ticket regarding the view that such a ticket will provide, and reflecting the quality of the view with a proportionally priced ticket, appeared to monitor user expectations, avoiding disappointment, and ultimately increasing satisfaction.

Findings might be explained through research concerning perceived control and service experience within crowd situations (Hui & Bateson, 1991). As highlighted by (Hui & Bateson, 1991) '*it is well established in the literature that increased perceived control exerts a significant, positive impact on human physical and psychological well-being'*. Within various issues, including tolerance for frustration (Sherrod et al.

1977), self-report of distress and anxiety (Staub et al., 1971), and physiological well-being (Langer & Rodin, 1976). Event observation findings therefore suggest that increased control has a positive effect on crowd user satisfaction, supporting previous research, that when control over the 'view' increased, frustrations decreased and wellbeing increased for the crowd user. Such findings are also in line with the HSE guidance for planning crowd events, including The Green Guide (2008) indicates: 'tickets for seats which offer restricted views or are uncovered should be marked accordingly, and the buyer forewarned' (The Green Guide, 2008). Such findings support stakeholder interview findings that suggested the importance of financial considerations when determining the level of comfort and satisfaction an event will provide (Stakeholder interviews Chapter 5). Thus an increased ticket price will allow for heightened comfort within the event organisation. However, pricing the ticket too high could prevent users attending the event.

7.4.2.2 Clarity of signage and wayfinding systems

Signage was a key issue seen during complete participant event observations with numerous issues detected across the events observed. Issues surrounding effective use of signage, and ineffective signage that led to frustrations among crowd users for example. One possible explanation for the high reference with regard to signage could be the Human Factors background of the researcher (see methodological limitations, Methodology Chapter 3, page 52), and therefore despite applying systematic observations from a checklist developed from the literature and focus group findings the researcher may have been more aware of signage issues than other issues for example.

In line with the literature event observations indicate that clear and simple signage was effective, easy to view and comprehend during crowd situations (Gonzalez-Palacio, 2002). Research focuses on signage within other service industries [primarily transportation hubs (Dixon, 2002), however findings from the present study support the use of clear signage across other crowd situations. Whereas overcomplicated signage lead to frustrations with the events observed, and required the assistance of ground staff where available (e.g. security stewards) to assist in locating an area of a venue or a specific seat number (Vignette 19 for example). Findings support previous research regarding the importance of ensuring a clear

viewing area for signage (Dixon, 2002) particularly research within the transportation industry concerning pedestrian flow within transportation hubs.

When signage was not clear and easy to view frustrations emerged, whereas large signage placed high above the crowd was most easily viewed by crowd users, providing a larger viewing area (Vignette 27 for example). Findings fall in line with stakeholder interview findings (page 95, Chapter 5), stakeholders did not appear concerned with improving signage (even when crowd users experienced wayfinding difficulties at their event), and appeared to consider such difficulties as the crowd users problem, with little concern to amend signage and improve wayfinding for the user (Chapter 5). Such findings also support research concerning crowd safety, stressing the importance of addressing wayfinding issues within events by developing clear signage, as well as enhancing wayfinding through clear and easy to follow building layout and architecture (Sime, 1999). Moreover, the issues surrounding signage and wayfinding show the importance of enhancing both crowd satisfaction and safety simultaneously, for example being unable to locate the exits from an event can be both frustrating and dangerous, depending on the reason for exiting the event.

Complete participant event observation findings also support the value given to signage considerations within the transportation industry (transportation hubs); suggesting that increased attention to signage might be beneficial to the user experience of crowds. Research suggests that inappropriate, ineffective as well as excessive information has many consequences for pedestrian flow within crowded environments (Gonzalez-Palacio, 2002). Supporting research within the transportation industry that suggested inappropriate, ineffective as well as excessive information has many consequences for pedestrian flow within crowds. Dixon (2002) suggested that ineffective signage and customer information can contribute towards crowd congestion, such as bottlenecks of passengers while standing to read inappropriately positioned information, people moving against the flow of traffic to retrace their steps or re-confirm directional information (Dixon, 2002). Moreover, findings support research suggesting that wayfinding and signage are not considered sufficiently during the design process (Dogu & Erkip, 2000; Sime, 1999). Wayfinding difficulties are associated with frustration on the user and negative appreciation of the physical setting, as well as the cooperation itself and the services offered in that setting (Sime, 1999; Passini, 1996).

7.4.3 Behaviour and competition for resources

The availability of facilities and competition between crowd users, together with possible links to public order within crowd events will be discussed here.

7.4.3.1 Availability of facilities

Current findings support previous literature emphasising the importance of the availability and layout of facilities within crowd events (Lee et al., 2008a; Yoon et al., 2010). Transport for London for example calculated a measure of '*ambience'* (within the London underground), which incorporated the quality of facilities, signage and cleanliness of the carriage and the stations. This emphasises the importance of facilities within transportation and user satisfaction (Transport for London, 2004). However, complete participant event observations suggest that a lack of consideration is currently being given to the layout and availability of welfare facilities (primarily toilets, refreshments and car parking for example), and improvements could be made across crowd situations. Moreover, a greater consideration is required to ensure that facilities meet the requirements of the number of crowd users attending the event.

Discrepancies between the provision and requirement of welfare facilities could be explained by the vague guidance available to event organisers. For example The Health and Safety Executive (The Purple Guide HSE, 1999) suggest employers are required to provide a '*sufficient'* number of welfare facilities for staff and visitors, however the term '*sufficient'* is somewhat unclear, and lacks specificity, which could be one reason for the diversity in the provision of facilities observed across crowd events. Furthermore, the 'Purple guide' suggests the '*provision of adequate facilities for refreshments, sanitary requirements, etc'*, but does not indicate specific numbers in the general guidance (The Purple Guide HSE, 1999). Findings support stakeholder interviews that indicated a lack of awareness and lack of concern for calculating the optimal number of facilities to provide during each event. Facility provision was ultimately determined by the financial budget for the event, together with minimum allowances to follow health and safety laws, as opposed to comfort and satisfaction for the users. Moreover, complete participant event observations show that facilities were often very busy during peak times (the beginning and the end of an event, or during an interval), but unused during the event itself (when

crowd users were watching spectator events for example), making it difficult to calculate the optimum number of facilities to provide across the event.

Current findings support (Berlonghi, 1995) suggestion that '*operational circumstances*' such as a '*lack of parking*' (or number of seats or cash machines available for example) can act as a '*crowd catalyst*', an issue that can *'trigger a crowd from being one that is managed to one that needs to be controlled'*. This suggests that stakeholders need to pay greater attention to the provision and layout of welfare facilities in order to enhance the user experience, and also potentially reduce antisocial behaviour within crowd events. Additionally, the '*location of facilities*' is important to the movement of the crowd, and must be considered during the planning of crowd events (The Purple Guide HSE, 1999). The Purple Guide states that when organising the catering facilities at an event the organiser must: '*prevent any obstruction that may affect the health and safety of people attending or working at the event*'. However it does not highlight the importance of layout for the enjoyment of the user, which might explain the lack of consideration given to such issues within the events observed.

7.4.3.2   *Queuing, antisocial behaviour and alcohol consumption*

Another interesting finding concerned queuing for events or facilities within an event, showed that frustrations grew when queuing was not seen to follow a fair system (Vignette 19 for example). One explanation for this could be cultural tolerances, with western cultures renowned for their tendency to form a queue (Kim et al., 2010; Pons & Laroche, 2007). When queue systems (or lack thereof) showed competition between crowd users, frustrations escalated as crowd users attempted to get to the front of the queue before anyone else. Antisocial behaviour (pushing, shoving and swearing) also appeared to increase. Whereas when a clear system of fair queuing was in place, crowd users appeared more willing to queue, experiencing less frustration. However, the Green and Purple guides (HSE) currently recommend that alcohol serving areas allow *'free flow of people to and from the bar server areas to prevent congestion and crushing hazards'*. Such single line queues were found to be more enjoyable during complete participant event observations than the free flow bar areas, from a crowd user perspective.

Alcohol often appeared to contribute towards the level of frustration whilst queuing. Alcohol contributed towards disagreements and antisocial behaviour between crowd users within the queue, such findings were in line with previous research (Gonzalez-Palacio, 2002; Wertheimer, 2000). Wertheimer (2000) recommended the banning of alcohol and drugs within public events, in order to reduce the antisocial behaviour, and increase health and safety for crowd users and staff involved in public events. Moreover, Gonzalez-Palacio (2002) supported such a ban through research highlighting the levels of accidents in railways stations as a result of excessive alcohol consumption. Additionally, during the 54 event observations one fight was observed, this took place at the end of a festival event [Wireless festival (Hyde Park, London)], and the antisocial behaviour was clearly fuelled by excessive alcohol consumption. Similarly findings from complete observer event observations within public and private security showed discrepancies between alcohol provision and subsequent antisocial behaviours within the crowd [Chapter 6 and Chapter 7]. Conversely on a number of occasions alcohol appeared to reduce frustrations, distracting crowd users from queue time [Bestival (Isle of Wight) for example]. Finally, complete participant event observation findings also support Stakeholder interviews findings indicating that despite the negative issues resulting from excessive alcohol consumption during public events, crowd users enjoy consuming alcohol as part of the crowd experience within some events, and banning alcohol would be impractical, and could even reduce user satisfaction (Wertheimer, 2000).

7.4.4 Cross cultural variations in crowd satisfaction

Four event observations were conducted within Eastern cultures (Jordan and Egypt), and the findings appear to support previous research into cross-cultural variations in crowd satisfaction. The literature suggests that Western (individualistic cultures) and Eastern (collectivist cultures), differ in their tolerance for high density crowd situations. Previous research has suggested that Western cultures (including Northern European and Caucasian North American cultures) (Evans et al., 2000), prefer lower levels of contact, and larger interpersonal distances, compared to Eastern collectivist cultures (including Asian, Mediterranean, and Latin American cultures) (Remland et al., 1995). Similarly, during event observations in Eastern cultures (Egypt and Jordan) close contact was experienced, as well as less structured queuing systems, with instead gatherings of crowd users attempting to push ahead of one another to be served for example. Results support the overall

heightened perception to crowdedness in Western over Eastern cultures (Kim & Park, 2008; Kim et al., 2010; Pons & Laroche, 2007).

There was also less structure to timetables, and timings (departures and arrivals) within the transportation crowd situations observed within Eastern cultures compared to Western cultures. However, insufficient crowd events were visited within Eastern cultures to make any comparisons within the current data study. Moreover, Eastern cultures were only observed within transportation and retail crowd situations [*28: Immigration control (Egypt), 29: Ferry crossing (Egypt - Jordan), 30: Queen Allia airport (Jordan), 46: Mecca mall (Amman, Jordan)*]. Future research could therefore expand the current study to include crowd event observations within both Eastern and Western cultures, from across each of the crowd types observed (music, sporting, tourist, conferences and exhibitions, transportation, participatory, theatre, and retail).

7.4.5 Staff management and workstation design

7.4.5.1   *Staff management*

The management of the crowd and the management of the staff present within crowd events appeared to have an important impact on crowd user satisfaction, in line with previous research (Lee et al., 2008a; Yoon et al., 2010). The presence of polite staff (security stewards, bar staff, car parking stewards for example) had a positive impact on user enjoyment during the event. Previous research within music festival events has also highlighted the importance of '*staff service'* to consumer satisfaction and ultimately loyalty to return to future events (Lee et al., 2008a; Yoon et al., 2010). Such findings are in line with the literature indicating that the friendliness of staff contributes towards the satisfaction and loyalty of event visitors (Taplin, 2013). However, measures to increase staff morale, and enhance crowd user satisfaction as a result are somewhat unclear, thus future research could focus on how to improve staff training, staff satisfaction, and subsequently crowd user satisfaction (Costa et al., 2006).

Additionally, during event observations it became apparent that the layout of staff facilities affected the efficiency of the workers, and consecutively the speed with which crowd users were being served within refreshment facilities for example. Such

findings support research that stresses the importance of workstation design towards work efficiency, and staff morale. However, the findings also show the importance of staff in the relationship between crowd users and satisfaction within crowd events. In order to enhance the user experience of crowds it might be important to focus on increasing staff training in order to increase morale (Costa et al., 2006), improving staff work facilities, and reducing stress for staff. Future research could focus on the impact of staff training and satisfaction on crowd user experience specifically.

7.4.5.2   *Workstation design and productivity*

The importance of providing optimal workstation design, and its links to workforce productivity, safety and wellbeing are well established within industry (Das & Sengupta, 1996). However, the potential link between staff productivity and crowd user satisfaction is relatively underdeveloped, though increased productivity and resultant reductions in queue times would suggest increased satisfaction for the crowd user.

Findings from the current study suggest that a number of events would benefit from assessing the workstation design, for example the layout of bar facilities for staff serving customers drinks (particularly workstations, Vignette 29 for example) found within events). A number of the events (music festivals and fair grounds for example), occur for a number of days before being transported to another area of the country, the workstation can be assessed and redesigned more easily than within fixed work areas (at a stadium for example). Future research could assess the relationship between workstation design and staff productivity, safety, and wellbeing; together with an exploration of the possible links to increased staff morale, reduced queue times, and increased crowd user satisfaction. Findings also support similar issues raised within stakeholder interviews (Stakeholder 26) showing the time taken for staff to serve drinks to crowd users, due to the poor layout of the beer pumps, and the cash till.

7.4.6 Physical design within crowd situations

The role of the physical environment and design within a crowd situation became evident across event observations. Previous research has explored the role of the

physical environment in service organisations (Bitner, 2003) (Figure 24). The theoretical framework proposed by (Bitner, 2003) suggests that a variety of objective environmental factors are perceived by both customers and employees and that both groups may respond cognitively, emotionally and physiologically to the environment. Moreover, internal responses to the environment influence the behaviour of individual customers and employees in the servicescape and affect social interactions between and among customers and employees.
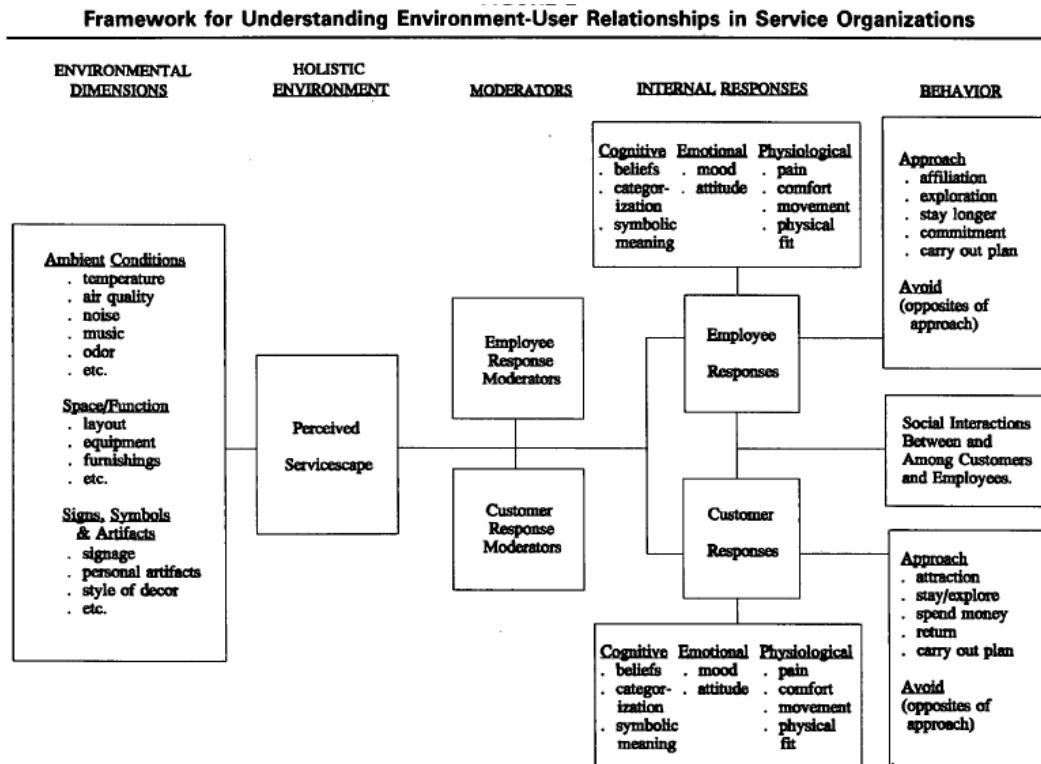
Figure 24 Framework for Understanding Environment-User Relationships in Service Organisations (taken from Bitner, 2003)

Lighting

One interesting finding from event observations was the influence of paint colour on feelings of spaciousness within crowded areas. For example dark colours on the walls of a venue increased claustrophobic feelings, whereas light colours on the walls enhanced feelings of space. Such findings indicate the importance of small changes to improve user satisfaction within a crowd event. However, use of colour on the walls of an event venue was not discussed within the Green and Purple guides to crowd safety. This supports the lack of research in the area of crowd user satisfaction, in favour of crowd safety research [The Green (2008) and The Purple (1999) guides]. Findings also support research within the marketing and service

sectors, focussing on altering the design of a space to improve the perceived service quality of the product (Bitner, 2003). Moreover, research in the service sector suggests that the physical setting may influence the customer's ultimate satisfaction with the service (Bitner 1990; Harrell et al., 1980). However there is a lack of research looking at the impact of colour on negative feelings of crowding. Future research could therefore explore the issue further, exploring methods of reducing the negative feeling of crowding coloured walls and floors within a venue. As shown during *Music events 7 (Take That [Villa Park, Birmingham)] when concourse areas were extremely claustrophobic, due in part to the dark navy coloured ceiling areas.*

7.4.7 Health and Safety

7.4.7.1   *Slips trips and falls*

Event observations highlighted a number of slip, trip and fall (STF) hazards, particularly surrounding poor weather conditions (rain and snow primarily), however STFs are only recorded and reported to the Health and Safety Executive when the resultant injury requires 7 days to be taken from work. A number of events placed straw on the ground in wet and mudded areas, to reduce slip hazards.

7.4.7.2   *Falls on escalators*

The Health and Safety at Work Act (1974) states that employers must ensure their employees and anyone else who could be affected by their work (such as visitors, members of the public, patients etc.), are kept safe from harm and that their health is not affected. This means slip and trips risks must be controlled to ensure people do not slip, trip and fall. However, during the 54 event observations two incidents (falls) were observed on escalators, both of which occurred within transportation hubs (see transportation 34: U-Bahn metro (Vienna), and transportation 31: London Underground), involving elderly crowd users. Such findings support the literature concerning falls on escalators, suggesting that escalator falls are twice as likely as other falls to involve older adults (Howland et al., 2012). Moreover, research within the USA suggests that older adults (over 75 years) have greater escalator-fall rates

than those 65 – 74 years within the USA specifically (O'Neill, 1991). Due in part to the reduced balance and strength with increasing age (Howland et al., 2012).

This could be due in part to the rushed and crowded environment of a crowd, particularly within ambulatory transportation hubs crowd situations. Though the findings did not concentrate on falls specifically the two observed might suggest future research could explore the issues, and possible solutions to improve the situation for older crowd users. Observations show the difficulty in using the emergency stop button, the act of pressing the button is not intuitive, and on both occasions the button was not within reach, nor was it easy to locate. Therefore suggesting that possibly the design of the emergency stop button could be developed. One possible suggestion could be to emphasise the 'emergency stop' button on the escalators; and placing them more frequently than just one at the top and one at the base. Also, escalators could be monitored (from a control room for example), to detect accidents and stop the escalator, as well as providing additional assistance when required.

7.4.8 Limitations

A number of limitations should be noted when interpreting the results presented in this chapter. Within the results a number of methodological limitations were evident, observational data can be criticised due to the subjective nature of the data, it is time consuming, selective, and impacts on those being observed (Bryman, 2004).

The reflexivity of ethnographic principles has inherent limitations. Information and data gained from observational fieldwork, and inferences made, would differ with different researcher perspectives. One limitation with the use of complete participant observations is that the researcher is the sole collector of the data, providing one individual perspective on the crowd situation under investigation. Thus findings of the research might be only relevant to individuals with the same characteristics and same perspective as the researcher. However, maintaining objectivity of the researcher throughout fieldwork aimed to reduce this impact. Thus, data were collected systematically (using an observational checklist developed from focus group findings) in order to limit such matters. Moreover, full immersion in the field of study allowed the researcher to gain in-depth insight into the issues that impact

crowd satisfaction within a wide range of crowd events. Within the financial and time constraints of the project such methods were deemed most appropriate for the study of an extensive range crowd events: music sporting and tourist events, conferences and exhibitions, transportation hubs, participatory, theatre and retails events (Table 28).

Additionally, observational data can be criticised for the influence the researcher has on the situation under observation, however, the researcher selected crowd situations in which they would feel most comfortable to participate, to enhance the robustness of the data collected (Bryman, 2004). Finally, rigour was enhanced through careful transcription of field notes, and the avoidance of an 'anecdotal' approach, checking of themes, to ensure themes are coherent, consistent and distinctive, themes have been analysed not just described, congruence between extracts and analytic claims, balance between analytic narrative and extracts, not rushed - giving it a 'once-over' lightly (Bryman, 2004).

7.4.9 Attention to user satisfaction within crowd situations

A number of aspects observed during the 18 months of event observations suggested that attention to user satisfaction had been considered well during the planning and delivery of crowd events. Firstly, queuing systems within a number of the events observed showed that stakeholders had placed resources on the user experience. As shown within Vignette 29 Queuing systems, in which the queue system adopted helped to reduce competition between crowd users and also reduced queue times, consequently reducing frustrations and enhancing the user satisfaction. As well as issues regarding the communication systems present within crowd situations, for example the presence of marshals to assist crowd users (including event 25 *Undergraduate Open Day (Loughborough university))*. Marshals were available to provide assistance to crowd users, and enhance wayfinding within the crowd. The availability of marshal instead of signage alone suggests that user satisfaction was considered well across a number of the events observed.

Considerations given to weather conditions within events also highlighted that crowd organisers and delivers had given attention to the user experience of crowds. For example, the sale of umbrellas and ponchos within crowds during poor weather

[including *event 7, Take That (Villa Park, Birmingham*)]. However sales of such items were often implemented by external sellers who did not appear to be employed by event organisers and delivers.

The availability of luxury facilities within crowd situations, for example the large selection of different food and refreshment options available during a number of festival events in particular [including *event 1, Arcade Fire (Hyde Park, London*); and *event 3, Bestival (Isle of Wight*)], highlights the importance event organisers and deliverers placed on user satisfaction during the events observed. As well as the capacity and the layout of crowd venues was another area of event organisation and delivery which suggested that user satisfaction was considered important within the situations observed. For example a number of events stated the specific entrance to be used on individual crowd user tickets, with the aim of distributing the crowd evenly across the venue, and reducing the potential for bottlenecks. This also served to meet health and safety aspects through monitoring the capacity of a venue, as well as user satisfaction through reducing congestion within the crowd.

Findings from event observations also suggest however that user satisfaction is considered in areas that incorporate health and safety requirements and potential profit for crowd organisers. Therefore the motivation for considering the issues described might not be to improve user satisfaction, but instead health and safety requirements, and financial profits. These findings fall in line with stakeholder interview findings (Chapter 5) that identified protecting reputation of the venue, as a motivator for adhering to health and safety standards, as opposed to protecting the health and safety of the crowd users for example.

7.4.10   Summary and conclusions

The study described in this chapter sought to examine issues affecting the crowd experience (comfort, safety, satisfaction and performance) during events of various descriptions. Specifically the study aimed to identify issues within events that enhanced or reduced the satisfaction experienced by the user (in this instance the researcher), and how particular issues could contribute to increased crowd satisfaction. Fifteen common themes emerged from the data analysis including: communication within crowd situations, public order, comfort within crowd situations, facilities available to crowd users, queuing systems, transportation, crowd

movement, physical design within crowd situations, satisfaction of crowd users, health and safety, public relations, event capacity, time constraints, encumbrances within crowd situations, and cultural tolerances within crowd situations

Event observation findings indicate that from the crowd user perspective facilities were a high priority, and competition for resources was notable within observations. Such findings fall in line with previous literature concerning festival loyalty for example (Lee et al., 2008a; Yoon et al., 2010). However, such research did not take a human factors perspective using the principles of ethnography, as with the research in this chapter. Findings from this study also support the need for additional research in the area of crowd user comfort, satisfaction and performance, in line with the underdeveloped literature.

A number of issues were observed as influential to the user experience of crowds during crowd event observations, primarily communication within an event, as well as signage strategies, queuing systems, and the availability of facilities within crowd events. Communication of information between stakeholders and crowd users was one issue observed to cause frustrations when crowd users receive a lack of information regarding timings within an event, or alterations to an event programme. Moreover, signage strategies were beneficial across a number of events within large, clear and simple signage providing the most benefit to crowd users. Whereas the presence of small, overcomplicated signage was found to contribute towards frustrations and insufficient information. Additionally the availability of facilities within a crowd situation was often found to be insufficient to meet the numbers and needs of crowd users.

Event observation findings also suggest that although consideration was given to a number of factors (including queuing systems, signage and marshals, as well as facilities available), which suggests that user satisfaction has been considered, the issues may have been considered due to the health and safety responsibilities, and potential profits, as opposed to improving user satisfaction. This supports previous research within this thesis from the stakeholder perspective (Chapter 5).

In conclusion this study has provided insight into the varying influences which contribute towards the overall crowd user experience within events. Findings from this study then fed into the development of a crowd experience (satisfaction, comfort, safety and performance) checklist and a summary model of the issues

affecting crowd satisfaction within crowd events of various descriptions. The following chapter will consider the findings from focus group, stakeholder interviews, security observations (complete observer), as well as the present study event observations (complete observer). The findings of which were combined to develop a checklist of issues to consider during the planning of crowd events and situations. The issues within the checklist were then evaluated by a number of crowd organisers to assess content, and proof of concept.

Chapter 8

8. Development of the Crowd Satisfaction Assessment Tool

8.1 Summary

This chapter describes the development and initial evaluation of the Crowd Satisfaction Assessment Tool (CSAT), developed to assist crowd organisers during the planning of crowd situations. Due to the subjective nature of the qualitative sample within this thesis it is desirable to triangulate the findings from user focus groups (Chapter 4), and stakeholder interview findings (Chapter 5), together with security observations (Chapter 6), and event observations (Chapter 7). Results were then developed to form the basis of the final study within this thesis which aimed to develop a Crowd Satisfaction Assessment Tool (CSAT), to investigate issues affecting crowd user satisfaction, and assess the proof of concept of the tool. The extent to which similar issues are identified across the studies aims to substantiate and inform the findings reported here.

This thesis has highlighted a lack of usable, evidence based guidance being used by event organisers whilst planning crowd events and situations (Berlonghi, 1995). For example, stakeholder interviews suggested that stakeholders were not always aware of the guidance that was available for organising crowds. Moreover, where guidance documents were available stakeholders were not always using the relevant guidance. Also, event organisers reported often using self-complied guidance documents, which create the possibility for discrepancies, and a lack of standardisation in the planning of crowds. There was also found to be a lack of communication between event organisers and other stakeholders, as well as a lack of ideas sharing between stakeholders and across events, as well as a lack of fundamental training for event organisers. The research within this chapter therefore attempted to bridge the gaps, through the development of a checklist referred to as the Crowd Satisfaction Assessment Tool (CSAT). The checklist was intended as a reference for event organisers to consult during the planning of crowd events.

This research focuses on the beginnings of a crowd satisfaction assessment tool, using a similar format to a risk assessment tool, but providing a checklist of important issues to consider during the planning of crowd events, to enhance the user experience. The resultant CSAT was distributed to event organisers and human factors researchers, with the aim of assessing the proof of concept of the CSAT, including the content and usefulness as well as the usability of the tool. Event organisers were required to use the CSAT during the planning of an event, before feedback interviews were carried out to assess the issues discussed. Human factors researchers were requested to read the CSAT before a feedback interview to assess the usability of the tool specifically. Therefore, research within this thesis contributes to improving the usability of guidance available to crowd event stakeholders.

8.1.1 Background

As outlined in phases 1 to 4 of the research within this thesis, research into crowds has tended to focus on crowd safety (Zhen et al., 2008), pedestrian flow modelling (Smith et al., 2009), and public order policing (Drury & Stott, 2011; Reicher et al., 2007), with limited attention given to crowd comfort, satisfaction and performance (Challenger & Clegg, 2011). Additionally, there appears to be a lack of usable, evidence based guidance for planning crowd events, and a lack of standardisation as to the planning of crowds. Safety was a priority within the literature, yet documents were not always being used by stakeholders, and were not always easily located. Research surrounding the crowd user experience, comfort and satisfaction received less attention, and similarly fewer guidance documents focused on user experience and wellbeing within a crowd event.

Research from Berlonghi (1995) has provided the definitions used within the UK and Australia. However the research paper 'Understanding and planning for spectator events' does not prove an evidence based evaluation of the issues that influence a crowd, as well as crowd user satisfaction, comfort, safety and performance. Additionally, although pedestrian flow modelling software receives great attention within the literature, little research considers the psychological aspects of planning an event, and determining an optimal crowd capacity. The research within this chapter therefore attempts to fill a gap in the guidance available for planning crowd events, and enhancing the crowd user experience.

Assessment tools are currently available to assess the risks present within a crowd situation (HSE, 2012b), and event organisers are required by law to complete and file the document before each event or before use of a crowd venue for example. However, there is currently no law or regulation stating the event organisers must assess the issues that impact the satisfaction of crowd users, and consequently less resources are given to user satisfaction during the planning of crowd events. However, due to the potential link between users satisfaction, and potential antisocial behaviours (Berlonghi, 1995), as well as the increasing competition between crowd situations such as festival events for example (Lee et al., 2008; Yoon et al., 2010), event organisers need to improve the experience that they provide.

8.1.2 An overview of the research process

This chapter discusses phase 5 of the research process (Figure 25). Figure 25 highlights how the research within this chapter fits into the thesis.
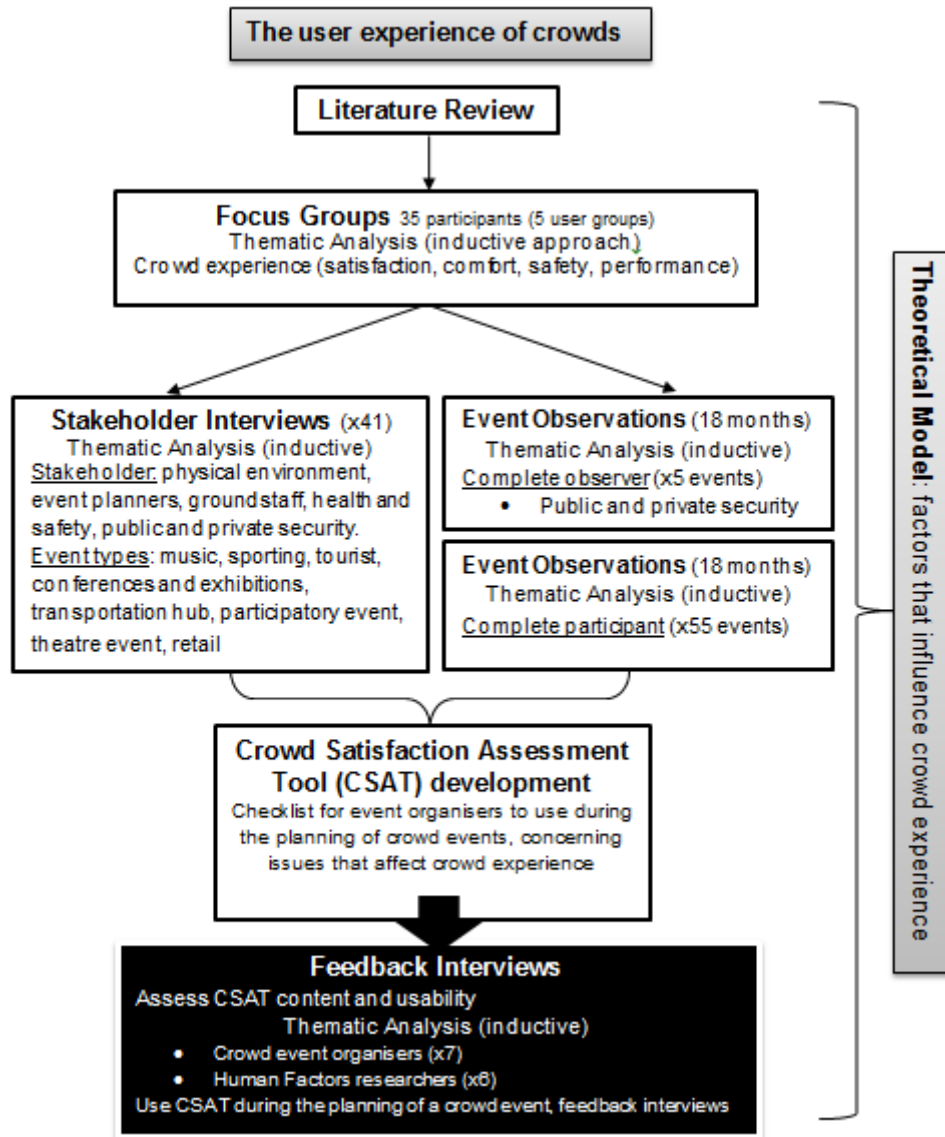
Figure 25 Overview of the research process

8.1.3 Aims and objectives

The aim of work presented in this chapter was to assess the issues highlighted as influential to the user experience of crowds within this thesis, and assess the 'proof of concept' of the Crowd Satisfaction Assessment Tool (CSAT). The intention was not however to assess the validity and reliability of the CSAT, this being beyond the scope of this thesis. But instead focused on whether such a tool was currently available, or being used within events planning. Through gaining feedback from potential user groups the study assessed the content and usability of the CSAT, as well as attitudes and beliefs surrounding the CSAT concept. Moreover, whether using the CSAT would benefit event organisers when planning crowd events, and

the likelihood of potential users utilising the CSAT during the planning of their events.

1. Evaluate the 'proof of concept' of the Crowd Satisfaction Assessment Tool
2. Assess the usability, content and layout of the Crowd Satisfaction Assessment Tool as a practical tool
3. Assess the content of the Crowd Satisfaction Assessment Tool, and therefore the findings raised in phases 1 to 4 of the research within this thesis.

In order to explore the above aims, event organisers from the different event types and crowd situations were recruited and interviewed following use of the CSAT. The CSAT was based on the findings from user focus groups (Chapter 4), stakeholder interview findings (Chapter 5), and observational data (Chapter 6 and Chapter 7). An interview schedule was developed to assess the usefulness, content and usability of the CSAT.

8.2   Methods

8.2.1 Design

The study described within this chapter used semi-structured interviews with event organisers to determine the usability, content and layout of the Crowd Satisfaction Assessment Tool. The proof of concept was assessed through asking each of the event organisers to use the checklist during the planning of an event, before completing the interview.

8.2.2 Sampling

Sampling was on a structured convenience basis, with a purposive structure, involving theoretical sampling, with participants recruited from the chosen sample groups most likely to be able to provide useful insights into the problem under investigation.

Event organisers were selected as the key potential user of the CSAT. Event areas of interest were based on the findings from stakeholder interviews (Stakeholder interviews Chapter 5) and event observations (Chapter 6 and Chapter 7). Emails were then distributed to event organisers within each of the five target event areas: sporting, music, participatory race events, conference events, and transportation hubs. Participants in this study were recruited using a range of methods (emails, phone calls), over a period of three months (March-May 2012).

Sample size was based on 'theoretical saturation' of the data (Bryman, 2004; Guest et al., 2006), interview transcripts were analysed iteratively, saturation was determined by the requirement for revision of the codes during thematic analysis of the interview transcripts (Bryman, 2004 - page 462). Once it became apparent that novel material and insights were no longer emerging from the data, and new information would have little or no effect on the results, recruitment stopped. Due to the 'proof of concept' nature of the study, and as the research aims were narrow in scope, a relatively small sample size was found to be sufficient to meet 'data saturation' (Bryman, 2004).

Interviewees were drawn from relevant stakeholder groups to achieve a structured purposive sample (Bryman, 2004), with event organisers selected to represent individuals from across a range of event types. Both human factors researchers and event organisers were selected to represent individuals across society, accounting for a range of different age groups. However the sample was predominantly University educated individuals due to the specification of the job role. Recruitment was predominantly taken from individuals residing in Leicestershire and surrounding areas to reduce time and financial costs associated with national recruitment.

8.2.3 Procedures

8.2.3.1 *Development of the Crowd Satisfaction Assessment Tool*

The research within this chapter provides a summary of the research findings described across phases 1 to 4 of this thesis. Findings from user focus groups (Chapter 4) highlighted issues that crowd users felt contributed to their satisfaction within a crowd, the findings of which then formed the basis of stakeholder interview schedules (Chapter 5), security observation checklists (Chapter 6) and security

observation checklists (Chapter 6) and event observations checklists (Chapter 7). Following analysis of the data, findings were combined to form a document summarising the issues that impact the crowd user experience. The resultant checklist aimed to provide evidence based, usable tool to assist in the planning of crowd events.

The Crowd Satisfaction Assessment Tool (CSAT) was developed as a move towards crowd organisers having more practical tools and guidance when planning crowd events (Appendix H). Based on the research findings gained from user focus groups (Chapter 4), stakeholder interviews (Chapter 5), and event observations (Chapters 6 and 7) carried out across events of various descriptions (and described in previous chapters) a checklist was developed to aid the organisation of crowd events. Each of the issues raised during the research within this thesis was considered during the development of the CSAT.

To enable this process to happen each of the issues raised within phases 1 to 4 of the research process were printed onto paper, cut out, and compiled into similar categories. The categories were then considered separately to determine the most suitable ordering of issues within the subgroups. Individual pieces of paper were placed on the floor, and rearranged over a number of days to aid the decision making process, and provide an overview of the issues within each category (Figure 26). The researcher rearranged the groupings of issues, and issues within each group until a logical content structure was developed.

The tool is referred to as the Crowd Satisfaction Assessment Tool (CSAT), as it aims to guide event organisers to issues within their event which could be improved, to increase crowd satisfaction. Additionally stakeholder feedback aimed to review the content of the tool, and the usability of the concept. The CSAT was designed to be used by event organisers during the planning of crowd events, and aimed to assist crowd event organisers during the planning of events, providing prompters and issues to think about when planning an event. The ultimate aim being to improve events for all stakeholders, enhancing crowd satisfaction, and the user experience of crowds.

Figure 26 Development of the Crowd Satisfaction Assessment Tool

Once a consolidated list of issues was compiled from the findings within this thesis, the researcher considered different methods of presenting the issues to event organisers. It was considered that adopting a format similar to that of a risk assessment would be most beneficial for a number of reasons. However, the CSAT aimed to assess the issues affecting satisfaction within a crowd situation, contrasted with the risk assessment that aims to show the risks within a crowd situation. The risk assessment template was selected as event organisers are already currently required to complete a risk assessment as part of the event health and safety regulations. Therefore event organisers would recognise the organisation and layout of the information, and the method of completing the CSAT. Additionally, risk assessments are designed to be completed easily by all, and basing the CSAT on an already established tool design aimed to aid the usability of the CSAT. A number of risk assessment templates were considered, however the HSE (2012b) was selected as the most relevant design to apply to the CSAT content.

As with a risk assessment format, the CSAT requires event organisers to firstly, consider the issues and details listed in the tool, and describe what measures are currently in place within their event to address them. Secondly, to evaluate the measures on a scale from 1 to 5, where 1 is 'very poor' and 5 is 'very good'. Thirdly,

state whether or not further action is required (yes or no), and finally describe what possible actions (if any) could be taken to improve each of the issues. Event organisers are provided with a key showing how to complete the rating scale within the CSAT, consisting of: 1 = Very poor; 2 = Poor; 3 = Acceptable (neither good nor poor); 4 = Good; 5 = Very good; N/A = Not applicable. Moreover, the aim of the CSAT is therefore to indicate to event organisers aspect of their event that could be improved, and require further attention, and whether further action could be taken to improve the situation by stating: Yes / No.

One crucial aim during the development of the CSAT was to develop a comprehensive list of issues to consider during the planning of crowd situations. Guidance currently available was crowd situation specific, including The Green Guide (2008) for sports stadium, and The Purple Guide (HSE, 1999), for music events. However the CSAT aimed to cover the organisation of all crowd situations, in order to assess the effectiveness of providing one tool for use in many crowd situations.

The arrangement of the issues was then considered in order to determine the optimal order of the issues to be considered during the planning of events. A number of different arrangements were considered, until it was decided to display the issues in the chronological order issues would arise before during and after an event. Issues were therefore grouped into the following: anticipation, facilities, and planning (to be completed before the event); monitoring and influencing (considered during the event); and responding (for reflection after the event). The CSAT shows the perspective of crowd organisers and deliverers, in terms of the ordering of the themes, while the issues within each of the six areas reflects the findings from crowd users and other stakeholders. The CSAT was then distributed to event organisers and human factors researcher to assess the 'proof of concept'.

8.2.3.2 *Feedback interviews*

Following the development of the CSAT, an interview schedule was devised, piloted with an interviewee, and subsequently modified to form the final schedule (Appendix I). Having agreed to participate, participants were briefed verbally about the nature of the research and supplied with written information, before written informed

consent was obtained from all participants. Written information regarding how to complete the task was included in the first few pages of the CSAT (Appendix H).

Content and usability: Crowd event organisers were recruited and asked to use the tool during the planning of an event, providing feedback on a number of issues including content, usefulness, and usability of the CSAT.

Usability and layout: Human Factors researchers from a wide variety of research areas within academia and industry were recruited to review the CSAT. Their focus was to be upon the layout and usability of the CSAT, to suggest improvements and alterations that could be made to the CSAT.

Each participant was provided with a paper copy of the CSAT, and an accompanying instructions section at least 1 week prior to the date of the event (providing time for the CSAT to be completed before the event). Additional instructions surrounding the nature and arrangement of the study were provided, however, as the usability of the CSAT instructions were also being assessed specific instructions about how to complete the CSAT were not provided. All information was contained within the CSAT.

Participants then completed the CSAT during the planning of their event (being asked to consider that specific event and how the CSAT would be used to plan the event), returning for the scheduled interview within one week following the event (to ensure that the information was recent). Semi-structured feedback interviews were then conducted to gain insight and knowledge into the issues surrounding the proof of concept of the CSAT including: usefulness, usability, content, and layout (Robson, 2011).

Event organisers came from a variety of event types (sporting, music, participatory race events, conferences, and transportation) encompassing the following crowd types: ambulatory (walking), spectator (watching an activity or event), expressive (emotional release, shouting, chanting), and limited movement (restricted movement) (Berlonghi., 1995).

A standardised interview programme was developed, with the same interviewee leading each digitally recorded interview (approximately 60-90 minutes each). The stakeholder interviews were analysed iteratively (after each stakeholder interview

the resultant information and suggestions were implemented into the CSAT and appropriate alterations were made). The CSAT was then submitted to the next stakeholder, and the process continued.

8.2.4 Analysis

8.2.4.1 Hybrid Thematic Analysis and Grounded Theory

Interview transcripts were analysed using the principles of thematic analysis, and drawing on grounded theory. Hybrid thematic analysis and grounded theory were carried out in accordance with (Bryman, 2004), aiming to develop a more rigorous process of analysis (Braun & Clarke, 2006).

8.2.4.2 Coding data

Development of qualitative analysis involved hybrid thematic analysis of interview data, with data driven codes developed, and the identification of emergent overarching themes in line with the original objectives of the study (Bryman, 2004).

Interview recordings were transcribed verbatim within 24 hours of conducting the interview, enhancing the reliability of the data, compared to taking notes from the interviews (Hignett & Richardson, 1995). Transcripts were then imported into the qualitative software tool NVivo (Version 9.0) to enhance systematic analysis (Hignett & Wilson, 2004). Coding was carried out iteratively following each interview, to 'sharpen' understanding of the data (Bryman, 2004). In line with Bryman (2004) interview transcripts were read through firstly: without taking notes, secondly: during which time notes were made in order to capture general emergent themes, and thirdly, transcripts were then coded.

In accordance with Charmaz (2004) and Lewis-Beck et al., (2003) the first stage of data analysis involved 'line by line' coding to ensure that contact between the researcher and the data was not lost. However, use of NVivo 9 aided the systematic coding of transcripts, enabling codes to be viewed in the context of what was said, and reducing fragmentation of information.

Data driven codes were reviewed after each interview was coded, to detect any similar codes, or emergent themes within the data, similar codes were then merged together. The process continued after each interview transcript, with a final review of all codes upon completion of coding. Similar codes were merged to form key overarching themes that had emerged from the data. Due to the 'line by line' coding, vast numbers of codes were created, one key criticism of thematic analysis Bryman, (2004). Descriptive codes were developed to describe the issues reported. During the course of analysis, the codes were reviewed and revised as key categories emerged from the data. Reliability was enhanced through the systematic review of the data by two independent researchers.

The first researcher coded all interview transcripts. Upon completion a section of interview transcript was submitted to a second researcher, who also coded the data separately. The two coded sections of transcripts were them compared, and any overlap or discrepancies were discussed until a final coding agreement was reached. Interview transcripts were analysed together to determine emergent themes with the 'proof of concept' and the overall findings. Key themes and alterations were then highlighted to develop a final version of the tool.

8.3   Results

A total of 12 stakeholders were involved, 7 event organisers from variety of event types (

Table 67), a brief description of the events the interviewees were involved in organising can be found in Table 68. Also 5 human factors researchers, from a range of human factors specialist areas within academia (2 stakeholders), and industry (3 stakeholders) (Table 69). The years of experience of event organisers ranged from 2 to 20 years, with a mean experience of 11.4 years (

Table 67). Within the human factors researchers, the years of experience ranged from 4 to 10 years, with a mean of 7.0 years (

Table 67). Additionally, the mean age of event organisers interviewed was 43.1 years, and the mean age of human factors researchers was 32.3 years (

Table 67).

Table 67 Event organisers – content, usefulness, and proof of concept

Event Organiser	Age	Gender m/f	Years of experience	Time to complete CSAT (minutes)
1 - Music events (indoor and outdoor, spectator)	44	M	10	120
2 - Olympic torch relay (outdoor moving event, spectator)	55	F	20	120
3 - Open day (indoor, moving between venues)	36	F	4	90
4 - Sporting (indoor and outdoor, spectator)	27	M	2	240
5 - Conference (indoor)	64	F	20	45
6 - Participatory race (outdoor moving event)	50	M	20	200
7 - Transportation hub (indoor moving event)	26	F	4	90
Average	**43.1**	**-**	**11.4**	**129**

Table 68 A brief description of each event organiser interviewee

Interviewee	Event type	Description of role as event organiser
1	Music	Coordinates security and planning of music events (both indoor and outdoor) before and during the event (capacity calculations, event layout, queue curlers, provision of facilities)
2	Olympic torch relay	Involved in the organisation of various events including community celebratory events, and a section of the Olympic torch relay, working with the local community and local authorities
3	Open day	Undergraduate University Open Day organisation, ensuring adequate signage and facilities, risk assessments, working with other stakeholders
4	Sporting	Organising sporting events (both indoor and outdoor) of various descriptions, observing capacity and layout, provision of facilities, ticketing, and security requirements. And working with local authorities and other stakeholders before and during the event
5	Conference	Academic conferences (booking suitable venue, liaising with delegates, arranging signage)
6	Participatory race events	Finding commercial sponsors, design of event layout, sufficient number of staff marking the route, working with local authorities (traffic management)
7	Transportation hub	Assisting with the design and usability of transportation hubs, including the London Underground (layout, signage, wayfinding) to cater for the large number of pedestrians that pass through on a daily basis

Table 69 Human factors research – usability

Human Factors Researcher	Age	Gender m/f	Years of experience	Time to complete CSAT (minutes)
1 – Academia (environmental ergonomics)	26	M	5	20
2 – Multidisciplinary consultancy (transportation)	25	F	4	60
3 – Multidisciplinary consultancy (transportation)	29	M	8	60
4 – Academia (accident analysis)	34	M	8	40
5 – Multidisciplinary consultancy (medical device usability)	47	F	10	45
Average	**32.2**	**-**	**7**	**45**

8.3.1 Overall findings

Presentation of results will be structured using themes that emerged from the thematic analysis of the feedback interview data. Emerged themes include: usefulness of the concept, communication, feedback, guidance, and experience, record of information, usability, (clarity and layout), content, and finally alterations (suggestions, limitations and additional considerations). Each will be explained further as it is discussed in the results.

Event organisers were asked to focus on the content and usability of the CSAT (Figure 27). While human factors researchers were asked to review and comment on the clarity, content, corrections, layout, limitations, and possible suggestions towards the CSAT (Figure 27). However, a number of human factors researchers also made comments on the novelty, and usefulness of the CSAT, though such information was not asked for directly (Figure 27).
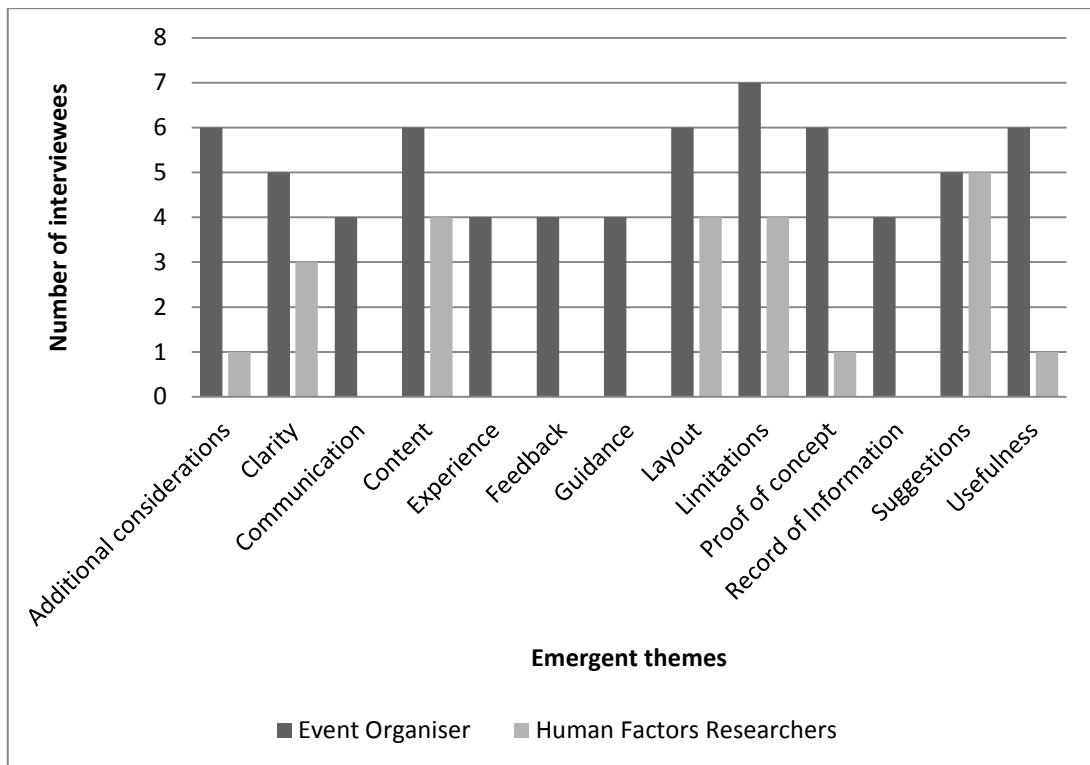
Figure 27 Summary of the emergent themes from feedback interviews

8.3.1.1   *Useful concept*

Usefulness of the CSAT concept was a key issue to emerge from the feedback interview data analysis. This referred to the discussion of issues surrounding how effective event organisers found the CSAT to be when reviewing the organisation of their event. Whether event organisers found the CSAT to be a useful, practical tool that would aid them with the organisation of future events. When asked explicitly whether the CSAT was a useful tool, 6 out of the 7 event organisers stated that it was.

Overall, 6 out of the 7 event organisers suggested that the CSAT was a useful tool (Figure 28). As shown during event organser interview 2, when discussing the organisation of the olympic torch relay:

> *"..it is also remembering it all isn't it.. and having it all there. So actually I think the premise of it all is quite useful.."*

> *(Event Organiser 2, Olympic torch relay)*

As well as event organiser 5 when organising conference events:

> *"Very very useful.. I hope it becomes something.. it's an excellent piece of work.."*
>
> *(Event Organiser 5, Conference events)*
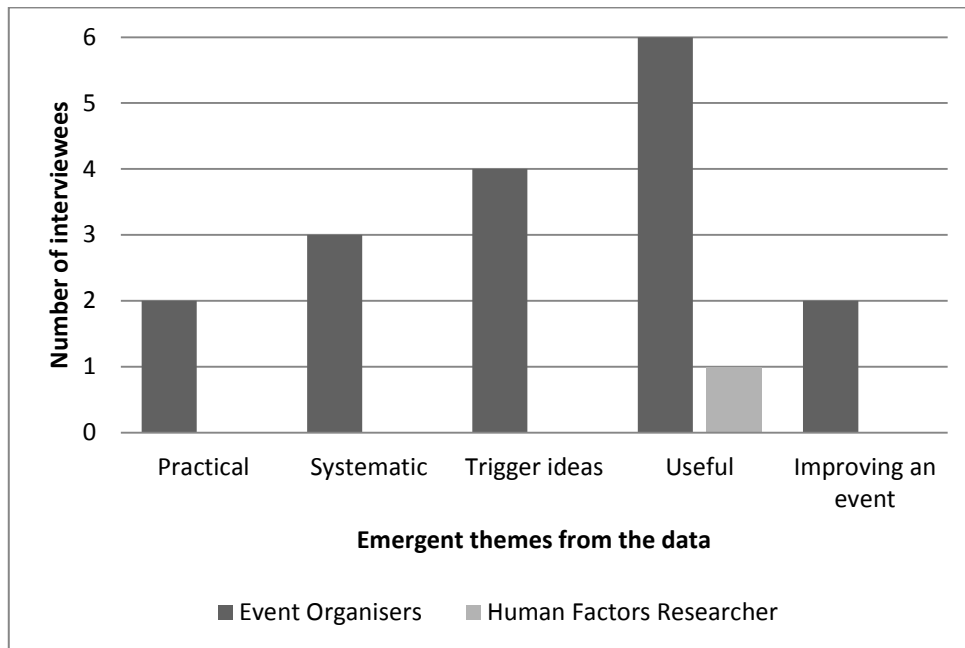
Figure 28 Issues interviewees considered within the emergent theme 'usefulness'

Event organisers also said that the CSAT triggered ideas, and acted as a good reminder for ideas that could otherwise have been forgotten during the planning of events. One event organser said that:

> *'People new to this it would be useful because you do forget things.. not big things like the toilets, but it is easy to forget things…'*
>
> *(Event organiser 5, Conference events)*

As well as event organiser 3:

> *"So I thought that was very good actually and again as I said it did trigger some ideas for me as well.."*
>
> *(Event organiser 3, Open day events)*

And also event organiser 4, when discussing sports events:

> *"I was thinking when I did it.. Yeah that's good to remember that kind of thing.. so it was useful.."*
>
> <div align="right">

(Event Organiser 4, Sporting Events)
</div>

The CSAT was also considered useful in planning ahead, prioritising ideas, and highlighting areas of concern. With one event organiser suggesting:

> *"I think the main aim for this would be for something that an event organiser could fill out, and it would be useful to them to look back on, and maybe complete before the event, and then use it to evaluate the event afterwards.."*
>
> <div align="right">

(Event Organiser 4, Sporting Events)
</div>

Event organisers appreciated the systematic and methodical structure of the CSAT, allowing issues to be prioritised. One event organiser suggested:

> *"But to see it written down and to be able to go through very systematically… I'm not.. I've never seen anything that was like this before. It's just sort of experience that I have come to this. Erm.."*
>
> <div align="right">

(Event Organiser 3, Open Day event)
</div>

The CSAT was also seen as a device that can help to improve the event, allowing organisers to review fine details of an event and identify areas of potential improvement (Figure 28). For example event organiser 2 said:

> *"It's hard to know whether that is useful or not really.. (pause).. I mean I think you do need some sort of flag.. so I think that is ok. I can understand how you would go through all of this.. and how it is a structured way of doing it. So I think it does have the potential in the sort of thing I have been doing, which is to identify where we kind of like are with things. To highlight bits that could be improved.."*
>
> <div align="right">

(Event Organiser 2, Olympic torch relay)
</div>

As well as event organiser 6:

> *"I think it was a useful tool for me to go back to and look at.. and just see if there are certain areas that can be refined for next year. I mean I am*

always looking to introduce new things.. you can always try and enhance the event..."

(Event Organiser 6, Participatory race events)

8.3.1.2 Communication

Communication refers to issues surrounding the transfer of information between the various stakeholders, and agencies involved in event organisation, and the role of the CSAT within this. Communication was an important issue discussed during feedback interviews, with 4 of the 7 event organisers suggesting that the CSAT would aid communication. The CSAT was felt to encourage communication, allowing information to be recorded, stored and shared between stakeholders, with the aim of preventing the loss of information. One event organiser suggested that currently communication between the different agencies involved in planning events could be improved:

"So the communication with all the different agencies involved.. the fire, the ambulance, Saint John's paramedics, transport... all these organisations that are involved. But they don't recognise the importance of that until it's too late. And then the things that aren't according to plan.."

(Event Organiser 6, Participatory race events)

As well as event organiser 2:

*"I think it has been the communication with people outside of the *********, and the other agencies. Which I suppose with other events is becoming increasingly important really aren't they.. because there's more and more things.."*

(Event Organiser 2, Olympic torch relay)

The CSAT addresses communication issues with good communication emphasised as a key issue to be considered when organising events (Figure 29, see also User focus groups Chapter 4). One event organiser said:

*"I mean there's a lot in the sports complex which go on and they haven't even told security that they're going on. But outside bookings go to ****** and coming to us, which poses issues.."*

(Event Organiser 4, Sports Events)

Moreover, information could easily be lost during the planning of crowd events, particularly if the event organiser changes between events (Figure 29). Thus, one event organiser suggested that the CSAT provides a tool in which to record information and pass it on to subsequent event organisers.

"The problem with any of these is the organisation. There is so much restructuring going on.. so unless they have a very good log of what has gone on before, you almost starting again. So you have to almost go back to step one and think what's going on, if they are able to support it.." (Event Organiser 6, Participatory race events)

Regular meetings and briefings were also highlighted within the CSAT, and considering such issues was reported as being important to event organisers during feedback interviews (Figure 29). One event organiser involved in the organisation of the Olympic torch relay event suggested:

"I thought it was really interesting that communication had come first because I think that is really important.. because I think that we have been having a discussion about how many times we should let staff know about things. And we have been having a discussion about how much notice they will take if they are getting information about other things at the same time. And so that has been quite interesting."

(Event Organiser 2, Olympic torch relay)
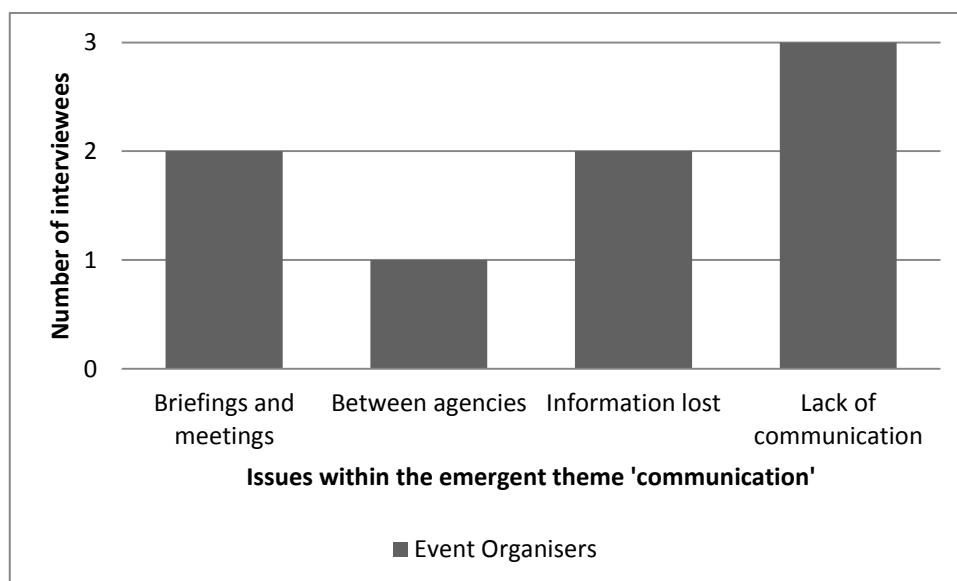
Figure 29 Issues interviewees considered within the emergent theme 'communication'

8.3.1.3 Feedback

Feedback refers to the information event organisers retrieve from stakeholders (including staff, volunteers, and crowds users) following an event, in order to evaluate the success of the event, and understand how such events could be improved in the future. The importance of gaining feedback from crowd users and other stakeholders was raised within the CSAT. Four out of the seven event organisers agreed that gaining and using feedback was important in order to improve future events, and learn from previous events. Including event organiser involved in organising the Olympic torch relay:

> *"So what we found was that getting feedback from the helpers was really important, and getting information about how we treated them and how they felt about it, and had they got enough information, and I think we found that you can't overdo the information.."*
>
> *(Event Organiser 2, Olympic torch relay)*

However, one event organiser suggested that there is insufficient time available to use the feedback that has been gained after an event:

> *"And we got some good feedback on what they thought as well.. but without spending a long time correlating certain aspects.. there was only sort of bits we could pull out.. so if someone's written a comment or erm.. whether it was open or closed questions you could say well ok, there is that general feel there. But yeah... it's something that we need to do a lot better.."*
>
> *(Event Organiser 4, Sporting Events)*

Therefore the tool is useful in indicating that issues such as feedback are beneficial, but impractical if resources (such as time) are not available to deal with the issue.

8.3.1.4 Guidance

Guidance looks at the resources currently available to event organisers (health and safety guides, The Green Guide (2008) and The Purple Guides HSE (1999), local authority documentation, and event specific guides), and how the CSAT might

compare. Further to that, whether current guidance is being used, and consideration of what scope there might be for the CSAT.
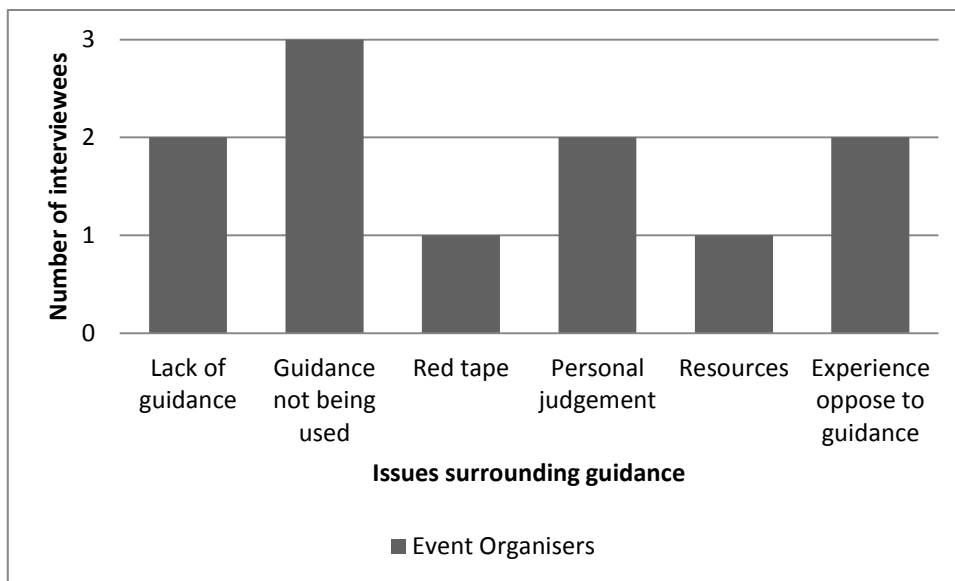
Figure 30 Issues interviewees considered within the emergent theme 'guidance'

Whilst using the CSAT event organisers suggested that current guidance available for organising events was limited, and not usable (Figure 30). For example one event organiser said:

> *"It's a useful thing to do because you can't generalise it.. you can't assume that. I think there has been a kind of guide, but I think it was almost too detailed.. and the next time it would be quite different, because the venue would be different.. you might have different things to organise.."*
>
> *(Event Organiser 2, Olympic torch relay)*

One event organiser suggested that the simple structure of the CSAT helped to trigger issues during the planning of crowd events.

> *"And I think something like this, which just gives you bullet points.. which is just a prompter, I think is actually really useful.."*
>
> *(Event Organiser 2, Olympic torch relay)*

Additionally, one event organiser said that there is currently too much strict guidance surrounding health and safety, and instead he prefers to use his own common sense:

"I mean a lot of local authorities produce guidelines as to... as an aim to people who want to stage events, but the problem now is that there is so much red tape. And health and safety has just gone over the top… I use the guidance of common sense.."

(Event Organiser 6, Participatory race events)

Event organisers suggested that current guidance is not being used, and event planning is often based on personal judgement.

"Yeah I mean that is the thing with events isn't it.. They're so unique it's generally judgement.."

(Event Organiser 4, Sporting Events)

Moreover event organiser 6 suggested that having one guidance document for organising each event would be advantageous:

"I think you are probably right actually.. people are sort of like inventing their own ways all the time.. which probably isn't really very efficient.."

(Event Organiser 2, Olympic torch relay)

However, one event organiser involved in sporting events suggested that the budget for the event dictates the resources available to different aspects of event organisation:

"Again I think that is a budget thing isn't it.. we haven't got a specialist in each area.. it just generally falls to me.."

(Event Organiser 4, Sporting Events)

Where guidance was not being used, it became evident that event organisers were using their previous experience in place of recommended or available guidance [such as local authority guides, as well as The Green Guide (2008) and The Purple Guides HSE (1999)]. For example an open day event organiser involved in organising open day events for 4 years suggested that their role involved learning whilst doing the job, rather than using a practical aid (such as the CSAT) to develop skills in organising events:

> *"So it was more learning on the job rather than trying to learn from erm.. paperwork or theory.."*

> *(Event organiser 3, Open day events)*

8.3.1.5   Experience

Experience refers to the length of time event organisers have been in such a role, familiarity with the tasks involved, and how this might impact use of (and interest in) the CSAT. Event organisers with more experience in their role suggested that their previous experience meant that the CSAT was less helpful than it would be to those new to the role. For example, the CSAT would be beneficial for those organising an event for the first time, with little or no previous experience. Such as event organiser 3:

> *"A lot of the issues were not applicable.. Especially as I have been running the event for many years……………..But if you were new to it or there was a brand new event.. then you wouldn't necessarily know to put these practical arrangements in place.."*

> *(Event organiser 3, Open day events)*

Findings suggest that event organisers felt the CSAT may be useful within the organisation of first time events. For example event organiser 3 suggested:

> *"But yeah a lot of it I was reading through and thinking well you know we've worked on that in the past.. or we've tried to develop this or.. yes it's come up in the past and it's been a problem, but we've improved it. Erm.. so I think in terms of thinking for a new event I thought it was. It would be really good for someone who was not sure of event management or whatever.."*

> *(Event organiser 3, Open day events)*

Along with event organiser 5:

> *"Somebody who's new to the job, whose a little bit unsure then something like this I think would be very valuable, yes indeed it would. Because then the one thing once you have organised one or two.. no matter how big they are whether it is Glastonbury or just something local.. it does make a huge difference and I think something like this if you did a second*

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one, it would remind you of all the different things that you did on the first one. And it is easy to forget things you know.."

(Event Organiser 5, Conference events)

Moreover, the crowd event organisers with the least experience (Event Organiser 4, Sporting Events) said that he has developed a similar checklist independently since he began his role as an event organiser 2 years ago. However he suggested that having such a checklist at the start of his role would have been beneficial:

"Yeah I mean I didn't have any training if you like… it was shadowing. So I was shadowing the previous organiser.. so of course I inherited no doubt a lot of their ideas, and the way they do things.."

(Event organiser 3, Open day events)

Additionally, one event organiser suggested that they do not work from guidance documents, but from the experience they have acquired during the planning of previous events.

"I haven't worked from a framework.. so it would seem.. I mean those kind of triggers.. It's an experience isn't it, basically.."

(Event Organiser 4, Sporting Events)

However, another event organiser appreciated the practical application of the CSAT guidance, suggesting that considering specific issues involved in the planning of a crowd event and possible solutions would be advantageous.

"So yeah.. I seem to come at it from a bit more of a practical point of view than a theory. But in saying that.. I think this (the CSAT) is quite a practical tool in that it does give you lots of practical ideas. It's not just about.. 'sit and consider what you do' there is also the opportunity to put.. what action needs doing.."

(Event organiser 3, Open day events)

Whereas one event organiser said that the CSAT was telling event organisers what they should already be aware of, and if they are not aware of the information within the CSAT, they would not be an efficient event organiser.

"I mean it's nice to have a reminder of what you should be doing.. but it is a bit like preaching to the converted.."

(Event Organiser 5, Conference events)

Such findings support the 'proof of concept' of the CSAT suggesting that if event organisers fail to implement the information within the CSAT they are *"not very good event organisers" (Event Organiser 5, Conference events)*. However, findings also indicate that event organisers need to be more aware of their strengths and weaknesses, and more willing to improve their skills with additional information and guidance where appropriate.

8.3.1.6   Record of information

Record of information refers to the methods used by the event organisers to store and retrieve event information (before, during, and after the event), and how the CSAT may contribute towards this.
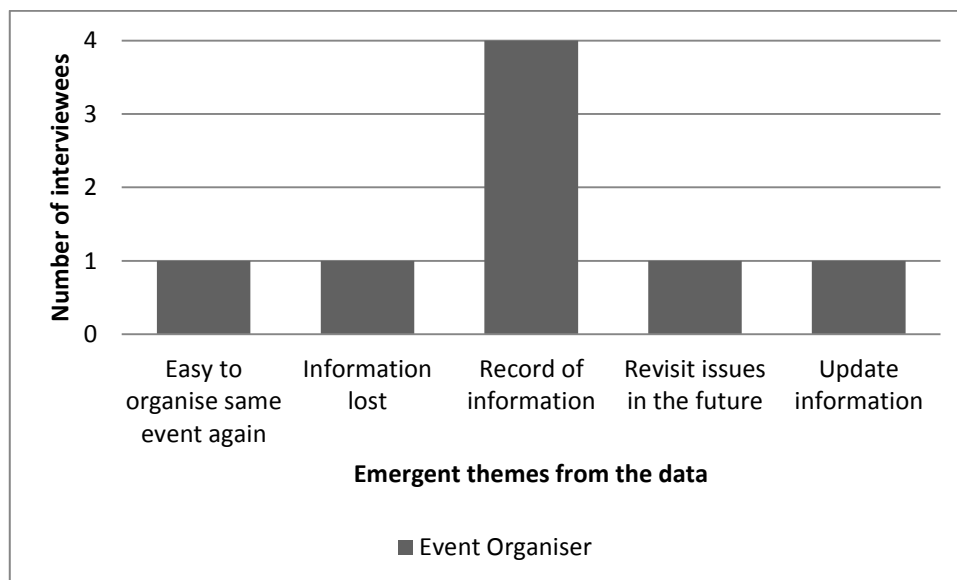
Figure 31 Issues interviewees considered within the emergent theme 'record of event information'

The CSAT was considered to be useful in providing a record of event planning information, allowing event organisers to revisit issues in the future, and update information as and when required (Figure 31).

> *"Possibly it is something that is better to have kept it electronically.. and then you can keep updating it. You can go back and visit it.. and keep it as a resource for future years as well.."*
>
> *(Event organiser 3, Open day events)*

One event organiser stressed the importance of returning to issues in the future, in order to improve an event, suggesting that the CSAT allows information to be stored in one document and returned to easily.

> *"I think anything that you do really needs to have some erm.. what's the word.. you need to go back to it otherwise if you don't learn anything from it.. or make changes to it.. there was very little point doing it in the first place. Then it's basically just a bit of paperwork.. it has got to be something that you can learn from.."*
>
> *(Event organiser 3, Open day events)*

Another event organiser involved in the organisation of participatory race events emphasised the importance of maintaining an accurate record of the organisation involved in can be beneficial to determine what issues need addressing.

> *"There should be accurate records of events (along with the local authorities and the emergency services), that should be fairly seamless. So I think something like this where people can go through an exercise.. and evaluate.. and at least have some documentation to say right that needs addressing.. that needs addressing.."*
>
> *(Event Organiser 6, Participatory race events)*

The CSAT provides a condensed document with information within a specific event, enabling information to be transferred easily between event organisers. For example event organiser 2 said:

> *"I think you've got to have it in a formalised way, or a structured way. Then that is quite helpful as well isn't it.. to just pass on to the next person.."*
>
> *(Event Organiser 2, Olympic torch relay)*

Moreover, information could be lost if not adequately recorded, an issue prevented when using the CSAT to record information, as seen by event organiser 6:

"There is so much restructuring going on.. so unless they have a very good log of what has gone on before, you are almost starting again. So you have to almost go back to stop one and think what's going on.."

(Event Organiser 6, Participatory race events)

8.3.1.7   Usability

Usability refers to issues surrounding how event organisers feel the CSAT is to use, how easy or difficult different aspect of the CSAT are to understand, issues surrounding clarity and layout will now be discussed.

Clarity refers to how clear and easy to follow the CSAT, including understanding surrounding the aims and instructions provided. Feedback interviews suggested that the CSAT was clear and easy to follow, with clear aims, and clear instructions for completion (Figure 32).
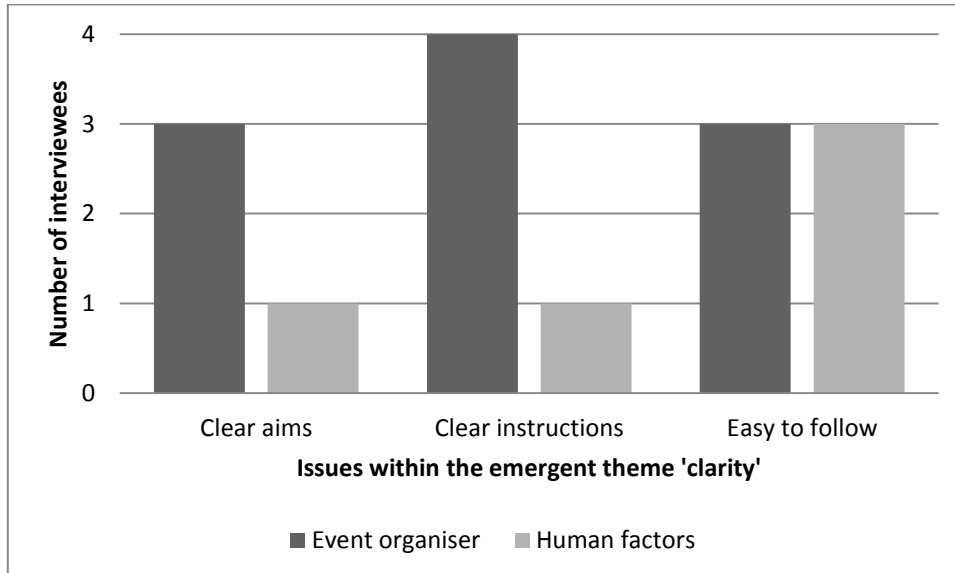
Figure 32 Issues interviewees considered within the emergent theme 'clarity'

A total of 6 stakeholder interviewees (3 event organisers and 3 human factors researchers) indicated that the CSAT was '*easy to follow' (Human Factors Researcher 5, Multidisciplinary consultancy, Event Organiser 6, Participatory race events)*, including one human factors researcher who suggested:

"The message itself was very straightforward in terms of being easy to understand and not too academic or anything.."

(Human Factors Researcher 4, Academia)

As well as another human factors researcher suggesting that the CSAT provided:

"Clear and useful information.."

(Human Factors Researcher 1, Academia)

Instructions for completing the CSAT were also felt to be clear (by 4 event organisers, and 1 human factors researcher), with one event organiser suggesting:

"The instructions made sense. It was easy to see what you were trying to do.."

(Event Organiser 2, Olympic torch relay)

Layout refers to how the CSAT is displayed and presented to the user, and the impact this has on its usability and attraction to the user. Overall interviewees viewed the layout of the CSAT positively, specifically the sectioning of the different topic areas and the presence of bullet point triggers within each separate section. As well as footers to remind event organisers of the scale from which to rate the different issues (Figure 33).
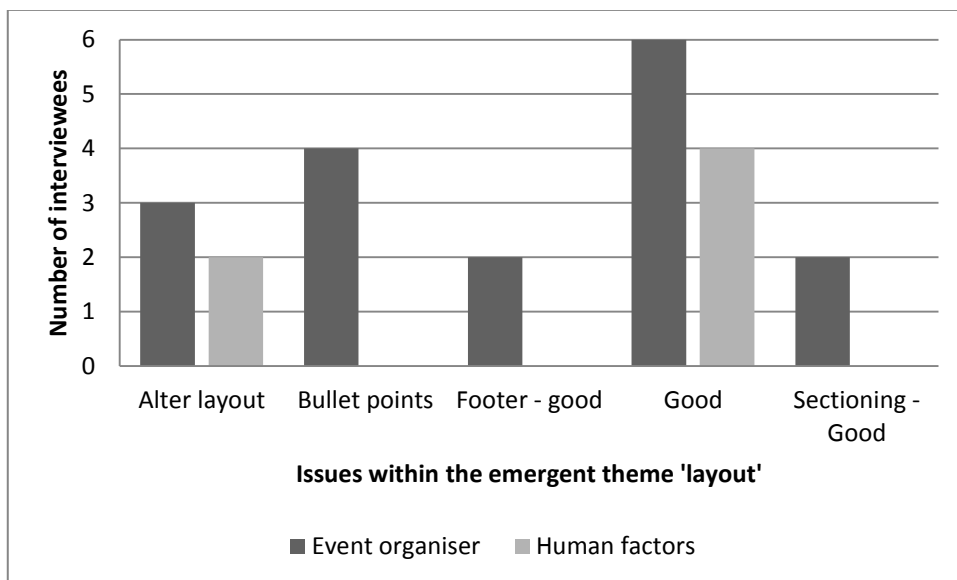
Figure 33 Issues interviewees considered within the emergent theme 'layout'

Interviewees (6 event organisers, and 4 human factors researchers) suggested that the layout of the CSAT was *"good"* (Event Organiser 5, Conference events, (Human Factors Researcher 1, Academia) and "*simple*" (Event Organiser 6, Participatory race events). With one human factors researcher suggesting:

> *"The layout is excellent.. it looks very professional.. and it was very easy to follow. The instructions were good too.."*
>
> *(Human Factors Researcher 6,)*

Additionally, *an* event organiser said:

> *"Well I thought the layout was really easy to understand.. so I thought it was easy to fill it in.."*
>
> *(Event Organiser 2, Olympic torch relay)*

Another key issue highlighted within the layout of the CSAT was the sectioning of different topics, interviewees felt that the sectioning of the different topics involved in event organisation worked well. With an event organiser suggesting:

> *"I think the way that you split it down into the pre-planning, the physical, environmental and everything was very good.."*
>
> *(Event Organiser 5, Conference events)*

Another interviewee also indicated that the sectioning helps the user feel that they are progressing through the substantial document:

> *"It feels like you're making progress, which is very important when you are filling in something like this.. it breaks it down.."*
>
> *(Human Factors Researcher 5, Multidisciplinary consultancy)*

The presence of footers on each page was considered beneficial by 2 event organisers (Figure 33), including:

> *"The bullet points really help to show what you are talking about.."*
>
> *(Event Organiser 5, Conference events)*

However, a number of omissions and areas of confusion were identified, and alterations to the layout suggested. Including: increasing the space available within each section, the consistency of the layout and the wording, and the addition of tick box (yes or no) answers as opposed to written information to reduce time taken to complete:

> *"Hmm.. I mean the stuff that you have got in here you could.. a fair amount of it could be a tick the action, and kind of a closed question. 'yes considered'. There was one where I literally just put – yes, yes, yes.."*
>
> *(Event Organiser 4, Sporting Events)*

As well as the suggestion of an additional column to state who would be responsible for completing each action:

> *"Can the identification table, on the first page, have also the names of who filled the tool, in addition to the event name, date and location?"*
>
> *(Human Factors Researcher 3, Multidisciplinary consultancy)*

And finally the use of colour for the different sections was questioned, with one event organiser suggesting that if event organisers want to print out the CSAT, using coloured sections can make the writing unclear:

> *"So just be careful of the use of colours. You might want to change some of the colours.. just so that if they come out grey. So I guess it is a cosmetic thing.. but it might just make it a bit easier for someone to look at.."*
>
> *(Human Factors Researcher 4, Academia)*

And another event organiser suggesting:

> *"..it is a structured way of doing it. So I think it does have the potential in the sort of thing I have been doing.. which is to identify where we kind of like are with things.. to highlight bits that could be improved.."*
>
> (Event Organiser 2, Olympic torch relay)

8.3.1.8   Content

Content refers to the information and material covered within the CSAT, and the relevance to event organisers. When discussing the content of the CSAT, interviewees found the content to be comprehensive and thorough. However a number of omissions were identified, suggesting that the CSAT would benefit from being more concise (Figure 34).
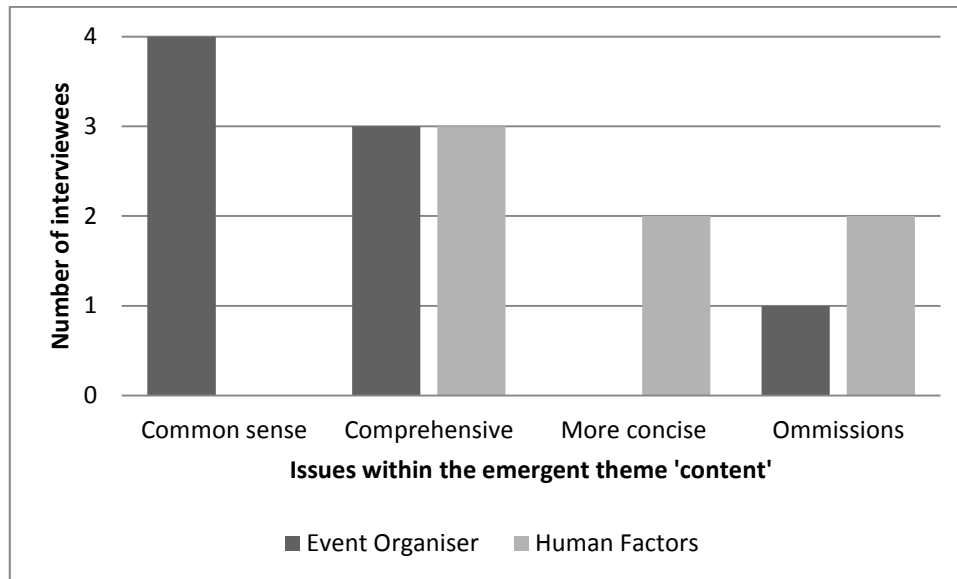
Figure 34 Issues interviewees considered within the emergent theme 'content'

A number of event organisers referred to the content of the CSAT as "*common sense*", for example an event organiser involved in the organisation of the Olympic torch relay said:

> *"A lot of stuff is common sense.. but it is also remembering it all isn't it.. and having it all there. So actually I think the premise of it all is quite useful.." (Event Organiser 2, Olympic torch relay)*

One key finding from feedback interviews was that interviewees felt the CSAT was comprehensive, covering all issues they believed to be important to the planning of crowd events. For example one event organiser involved in the organisation of sporting events said:

> *"I don't think there is anything missing.. I can say that much.."*
> *(Event Organiser 4, Sporting Events)*

Moreover, another interviewee involved in the organisation of music events said:

> *"No.. no.. Because you've got all kinds of things in there. You've got social care things as well as obviously the ingress the egress, and the issues of traffic and all that. It is very thorough.. but that's what makes it so long isn't it.."*
>
> *(Event Organiser 1, Music events)*

However, one major criticism of the CSAT was that it should be more concise, as suggested by *Human Factors Researcher 1*:

> *"It is comprehensive BUT that does mean that it takes a long time to complete.."*
>
> *(Human Factors Researcher 1, Academia)*

Likewise, an interview with a human factors researcher working for a multidisciplinary consultancy recommended:

> *"The introductory text can be more concise, in three paragraphs combining the text that you already have, the first explaining what is the tool for, the second giving the anecdote about us as event goers, and third the benefits from using the tool.."*
>
> *(Human Factors Researcher 3, Multidisciplinary consultancy)*

However, a number of omissions were acknowledged including: a section concerning first aid, and ambulance areas, information about what to do with the CSAT after completion. For example:

> *"I missed one item talking about first aid stall, like, if the event have a tent to help participants with first aid or more serious issues like an ambulance on site.."*
>
> *(Human Factors Researcher 3, Multidisciplinary consultancy)*

And also:

> *"There should be a section indicating what to do with the information following the event – a way of evaluating the event. Maybe an additional column.."*
>
> *(Event organiser 3, Open day events)*

8.3.1.9   Time consuming

Interview findings indicate that the CSAT is comprehensive, however due to the inclusive nature of the tool design, completing the tool is a time consuming exercise (

Table **67** and Table 69). The time taken for event organisers to complete the CSAT ranged from 45 to 240 minutes (

Table **67**). Furthermore, the years of experience (ranging from 4 to 20 years) indicate that the interviewee with the most experience (event organiser 5: 20 years), took the least amount of time to complete the CSAT (45 minutes). While the interviewee with the least experience (event organiser 4: 4 years), took the longest time to complete the CSAT (240 minutes). While the time taken for the human factors researchers to complete the task of reading and evaluating the layout and usability of the CSAT ranged from 20 to 60 minutes (Table 69), reflecting the differing functions of the two participant groups.

One major criticism of the CSAT was that although it is comprehensive, its comprehensiveness suggests that it takes a long time to complete. A number of alterations to the CSAT were therefore proposed during feedback interviews to reduce the time taken to complete: primarily the replacement of worded responses with a checklist of responses to be 'ticked off' upon completion. Additionally it was suggested a column be added to indicate the individual responsible for ensuring that the further action be completed, and the date at which the issues would be completed and revisited. Therefore the column 'what has already been considered or put in place?' was removed.

Another suggestion for reducing the length of time to complete the CSAT was to divide the tool up into the different sections headings and stakeholder groups: health and safety, public and private, organisers, ground staff. Thus the tool can be completed by each of the different stakeholders separately and brought together into the final document. However the aim of the CSAT is to encourage event organisers to review details of the event that might otherwise have been missed [and have been seen to be missed in previous research, Chapter 7]. Reducing the time take to complete was suggested to be a key method of encouraging the use of the CSAT by event organisers in the planning of events, a crucial issue as highlighted in the limited use of current events guidance.

8.3.1.10 *Alterations*

For the following section tables have been used to present the findings, in order to show all suggested alterations (Table 70). Alterations refer to possible changes that event organisers and human factors researchers felt could be made to the CSAT, to improve its usability and usefulness. Suggestions refer to the specific alterations that event organisers and human factors researchers felt could improve the usability and usefulness of the CSAT within the organisation of events.
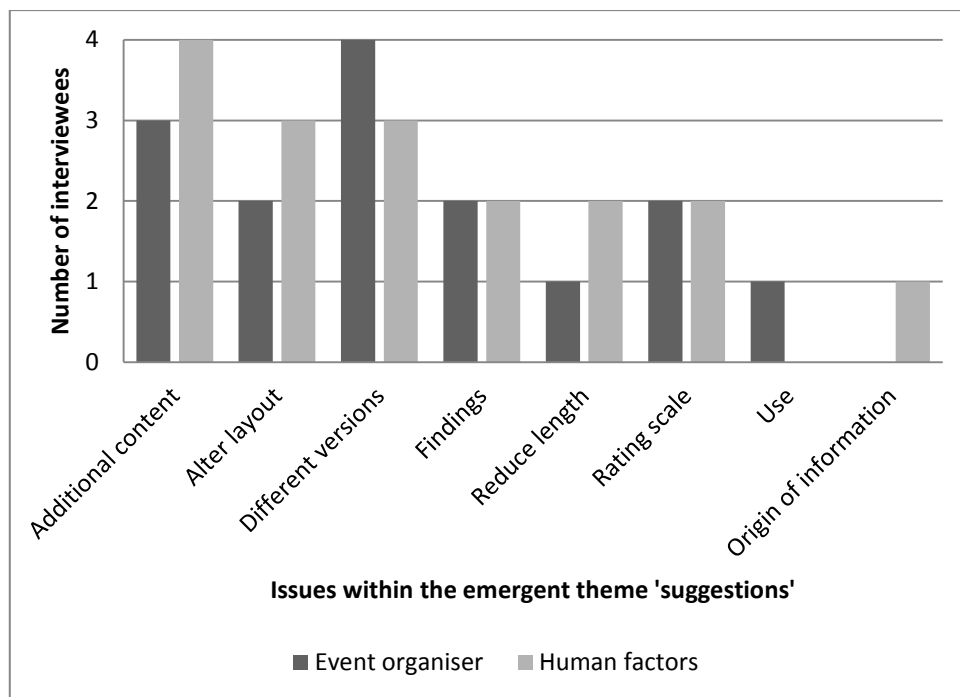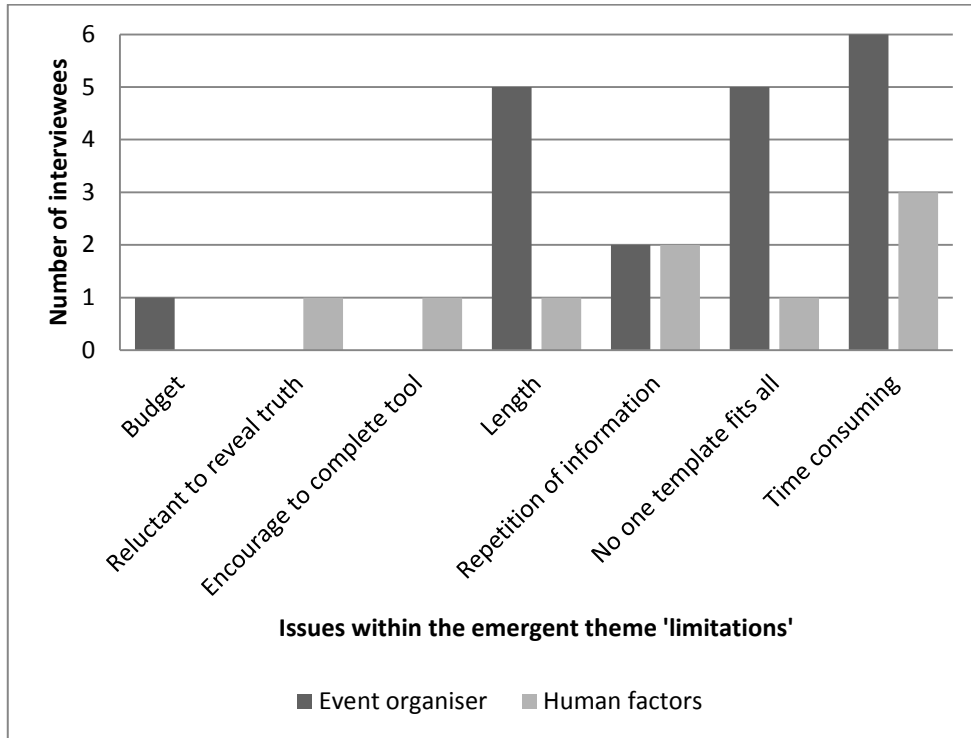

Figure 35 Issues interviewees considered within the emergent theme 'suggestions'

A number of suggestions were made throughout the feedback interviews (Figure 35).

Table 70 Suggestions made during feedback interviews

Suggestions	Event organisers comments	Human factors researchers comments
Alteration to the layout: • Page numbers • Prioritise issues further • Sex it up • Colour coded sections not good to print • Completed by numerous stakeholders • Wording altered • Typing errors highlighted • Duplicated issues • Column indicating date (to be) completed and by whom	"*Add some page numbers on the bottom..*" (Event organiser 4)	"*Dividing the work up into the different sections: stakeholder groups (H&S, security public & private, organisers). So that the tool can be used by each of the different stakeholders and brought together into the final document..*" (Human factors researcher 1) "You've got to 'sex it up' to encourage people to use it.." (Human factors researcher 4)
Additional content: • Links to external references • Revisit issues • Lost children point • Participant questionnaire (phone charger) • When the action started / finished • State where the information for the CSAT came from?	"*Possibly a lost children point?*" (Event organiser 7)	"*Consider referencing or links.. or ENDNOTEs could be inserted with references to guidance and documents that you mention. For example health and safety, purple guise, terrorism..*" (Human factors researcher 5) "*Have you thought about having a questionnaire for event participants? You could have a stall at the event containing a few touch screen applications for participants to fill the survey whilst they charge their mobile phones..*" (Human factors researcher 3)
Different versions of the Crowd Satisfaction Assessment Tool: • Electronic version (5 interviewees) • Smart phone application • Various event versions	"*An electronic version might make the information appear less daunting. You may not be aware of the number of pages were it viewed as an electronic document..*" (Event organiser 2)	"*A smart phone application..*" (Human factors researcher 1)

Suggestions	Event organisers comments	Human factors researchers comments
Findings: • Highlight key issues organisers have problems with • Different colours highlighted when the issue becomes a problem • Graphical representation of rating scale data	"*Is this intended to be printed, could be the possibility of printing in black and white, if so colours could be hard to distinguish..*" (Event organiser 7)	"*Graphical representation of the data – the rating scale is where you are going to get the important information. On a scale of 1 – 5..*" (Human factors researcher 1)
Reduce length: • Needs to be more succinct • Condense information	"*Yeah.. to just reduce the volume a bit..*" (Event organiser 4)	"*To reduce the time taken to complete the tool you could reduce the amount of writing required by the event organisers..*" (Human factors researcher 1) "*So this tool is comprehensive and covers everything.. which is great. But what it might be worth doing further down the line is divvying this whole document up into different sections that are more relevant for the specialists..*" (Human factors researcher 4)
Rating scale: • Threshold of acceptable effectiveness • Confusion	"*The only thing that I did really struggle with was the rating. Because I started off thinking well how do we do on that..? And then I was thinking you know I was basically putting good for everything.. but essentially that's because erm, I know this event and I know how it runs, and I know how it will go on the day.. because we have had that many of them..*" (Event organiser 3)	"*People tend to overestimate their work – so something more neutral, could give you more reliable, objective data..*"(Human factors researcher 4)
Used for: • Training • Deciding upon a venue	"*The tool would be useful if the event planner was trying to decide between two venues..*" (Event organiser 3)	

8.3.1.11   Limitations of the Crowd Satisfaction Assessment Tool

Limitations refer to the negative issues raised during feedback interviews, and aspects of the CSAT require improvement (Table 71).

Figure 36 Issues interviewees considered within the emergent theme 'limitations'

A number of limitations were suggested throughout the feedback interviews (Figure 36).

Table 71 Limitations suggested during feedback interviews

Limitations	Event organisers comments	Human factors researchers comments
Length	"*But it is long isn't it..?*" (Event organiser 1)	"It is a long thing but then you know I guess organising an event is not a small thing is it.." (Human factors researcher 4)
Time consuming • Encouraged to complete all of CSAT	"*I'm not sure people would have that time to spend on this..*" (Event organiser 4)	"*It's time consuming, and time is money..*" (Human factors researcher 1)
Budget	"*There isn't enough emphasis.. for me for example, I'm obviously*	"*Well time is money, and money is everything for people doing this sort of*

Limitations	Event organisers comments	Human factors researchers comments
	part-time in my events role.. I become full-time in the lead up to the events.. but to save on my budget (which includes paying me) I then go back to part-time after the event. Which then means if there is another event after the event.. so LEAP, which has now been confirmed.. the debrief for LEAP and the rugby has been slightly overlooked, to an extent, to try and make the next one happen.." (Event organiser 4)	*thing. So.. if you can get them to get to the thing quickly, that will be good for them..*" (Human factors researcher 4)
Template	"*I mean it would be very useful – but I wonder whether it is pretty much impossible to do an event plan that fits every event..*" (Event organiser 4) "*It's obviously.. a lot of the questions didn't directly relate to the events.. due to the nature of the event..*" (Event organiser 6)	
Repetition of information	"*Well there's a few bits that overlapped in a way isn't there..?*" (Event organiser 4)	"There seem to be a couple of things repeated through the tool, such as keeping wait times at the bar or for food to a minimum, however I understand why they appear in more than one section.." (Human factors researcher 2)

8.3.1.12 Additional considerations

Additional considerations refer to supplementary issues, including novelty and relevance of the CSAT as a concept (Figure 37).
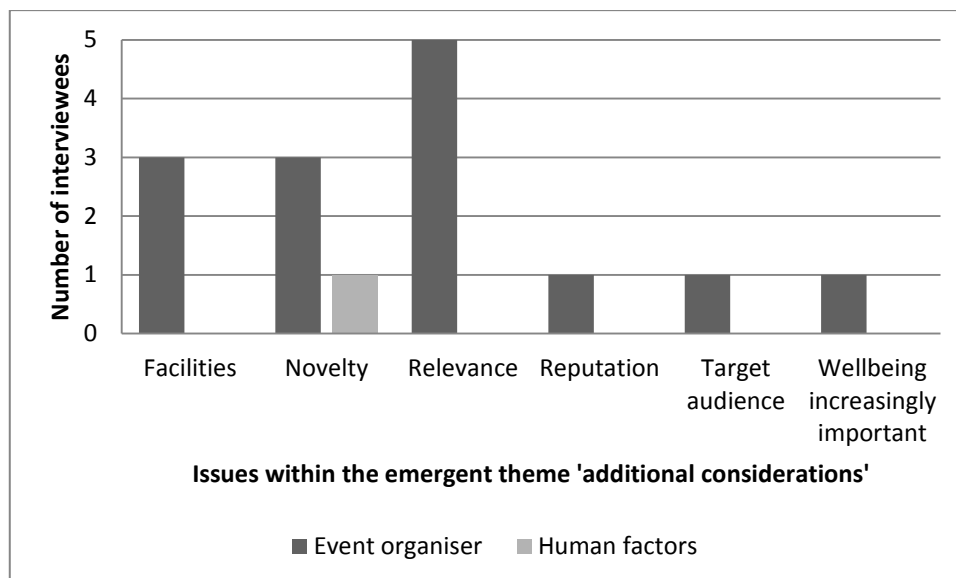
Figure 37 Issues interviewees considered within the emergent theme 'additional considerations'

A number of additional considerations were identified during feedback interviews (Table 72).

Table 72 Additional considerations highlighted during feedback interviews

Additional considerations	Event organisers comments	Human factors researchers comments
Novelty: • Double use (before and after event) • Similar idea developed by self (1 event organiser)	*"In actual fact it did give me a couple of ideas. And I thought.. oooh maybe I should make a note of that.."* (Event organiser 3)	*"Benefit is that one tool can be used for two functions: the planning of a crowd event, and the evaluation of a crowd event.."* (Human factors researcher 1)
Relevance: • Size of event (small and large) • Not all information relevant to every event	*"But it's perfect for bigger events as well isn't it.."* (Event organiser 1) *"And you are just stuck with it.. making the best of it. So other than.. yes.. I'm perhaps not convinced that all of it was relevant.. and maybe that would be the case.. maybe not everything is relevant for every event.. erm.. but yeah I think there were a lot of positives to ityou think it gives you reassurance that you have thought things through.."* (Event organiser 3)	

Facilities • Toilets	*"Everything always come back to the toilets.. do we have enough toilets for everyone..? It's quite sad isn't it.."* (Event organiser 2)	
Additional considerations • Reputation • Target audience • Wellbeing increasingly important • Capacity	*"And also if it goes wrong, reputation would be like really bad.."* (Event organiser 2) "*So sometimes it's not too clear at my events, who our target audience are within the venue..*" (Event organiser 4) *"But then the crowd satisfaction comes into it, because how people feel getting in and out of venues and so on and so forth, is a big thing.."* (Event organiser 1)	

On review of the completed CSAT it was clear that aspects of the tool had not been fully completed. For example a number of event organiser failed to use the rating scale correctly, missing out some questions or areas of the CSAT. Moreover, confusion arose as to the point of rating aspects of your own event, with event organisers suggesting that had they felt an issue to be below a certain level, they would have made alterations. As seen during one interview:

> *"If I felt the issue deserved a 3 then I would have paid attention to it sooner, and altered it. So I found the scale difficult to use as I wanted to give everything a 4 or a 5.."*
>
> *(Event organiser 3, Open day events)*

The aim of the rating scale was to highlight to crowd event organisers what areas of their event required the most attention. However, through using a tick box to indicate whether or not a consideration has been implemented, that also provides the same indication that an issue requires further attention, and should be revisited in the future. Rating each issue might be an inefficient use of valuable time. The rating scale might therefore be more suitable for gaining feedback from the crowd users surrounding the various issues, rather than asking event organisers to rate aspects of their own event. (Thus, the design of the CSAT was altered to remove the rating

scale, and replace it with a column showing the date when the issue will be revisited).

8.4 Discussion

This section reflects on the development of the CSAT and the findings from feedback interviews undertaken with event organisers and human factors researchers, and considers the importance of these findings in relation to the study aims. The section goes on to discuss the implications of the findings for future research and, finally, a critique of the study is undertaken, examining its limitations.

8.4.1 Key findings

The study described in this section sought to evaluate the usefulness of the CSAT to event organisers. The findings reveal a number of issues: useful concept, communication, feedback, guidance, experience, record of information, usable (clarity, layout), content, time consuming, alterations (limitations and additional considerations).

8.4.1.1 *Useful concept*

Overall event organisers suggested that the CSAT was a useful tool, particularly when deciding between different venue options, training those new to the role, or to trigger or remind organisers of certain issues. Providing the organiser with a systematic and methodical structure for planning ahead, prioritising ideas, and suggesting areas of concern.

8.4.1.2 *Communication*

The CSAT was felt to aid communication between the various stakeholders involved in the organisation and management of an event, encouraging communication, allowing information to be recorded, stored and shared between stakeholders, with

the aim of preventing the loss of crucial information. The CSAT addresses the issues surrounding communication, with lack of communication discussed as a key problem when organising events

8.4.1.3 *Guidance*

Event organisers indicated that current guidance available for organising events was limited, and not usable, with event planning being left to personal judgement, based on their previous experience. However the simple structure of the CSAT helped to trigger issues during the planning of crowd events, supporting the potential use of the CSAT in place of, and alongside current guidance.

Moreover, research in the literature suggests that current guidance has a predominant focus towards overcoming health and safety issues within events (The Green Guide HSE, 2008, The Purple Guide HSE, 1999). Whereas the CSAT aims to target the wellbeing, user experience and satisfaction predominantly, as well as health and safety issues. However, the CSAT aims to be used alongside health and safety guidance currently available.

8.4.1.4 *Experience*

Event organisers with more years of experience in their role suggested that the CSAT might be beneficial to those with little or no previous experience, organising an event for the first time. An issue reflected by those crowd organisers with less experience. Additionally, the practical application of the CSAT guidance was highlighted, with event organisers suggesting that reviewing specific issues involved in the planning of a crowd event, and determining possible solutions was advantageous during their planning.

8.4.1.5 *Record of information*

The CSAT was considered to be useful in providing a record of event planning information, which would enable event organisers to revisit issues in the future, update information as and when required, and pass information to future event

organisers who may replace their role, preventing the loss of adequately recorded information.

8.4.1.6   *Usable (clarity, layout)*

The CSAT was described as being *clear* and *easy to follow*, with *clear aims*, and clear instructions for completion. Overall interviewees viewed the layout of the CSAT positively, however a number of omissions and areas of confusion were highlighted, and alterations to the layout suggested. Including: increasing the space available within each section, the consistency of the layout and the wording, and the addition of tick box (yes or no) answers as opposed to written information to reduce time taken to complete (a key problem seen during feedback interviews).

8.4.1.7   *Content (omissions)*

A number of omissions were highlighted, but overall the CSAT was described as exhaustive and comprehensive, however, and it was suggested that the tool would benefit from being more concise, in order to reduce the time to complete.

8.4.1.8   *Alterations (limitations, additional concerns)*

A number of key alterations to the CSAT were suggested during feedback interviews, including the replacement of worded responses with a checklist of responses to be ticket upon completion (to reduce the time taken to complete), gaps in completion, rating scale was difficult to use, issue revisited (date and by whom).

8.4.2 Gap in provision

Feedback interviews indicate that the CSAT identifies a gap in provision, with no such tool currently available to provide evidence based information and guidance aimed at enhancing the user experience of crowds and supporting stakeholder interview findings (Stakeholder interviews Chapter 5). Findings support a lack of literature in the area of crowd user comfort, satisfaction and performance (as highlighted by Challenger et al., 2010).

A number of suggested uses following feedback interviews included use of the CSAT alongside training in event organisation, and crowd management. Additionally, interviewees suggested that the CSAT would be beneficial to determine the most suitable venue for a specific event, enabling consideration of the crucial factors.

8.4.2.1 Nothing like this currently available

Feedback interview findings also support findings from stakeholder interviews (Stakeholder interviews Chapter 5), suggesting that event organisers are unaware of the guidance that is available to them, and are not using relevant guidance in the planning of crowd events. They are instead using their own event specific knowledge and methods, which could potentially leave gaps in the planning, and could account for why the event organisers feel that they do not require guidance to assist with the planning of their events.

Therefore alterations are required to improve the usability and relevance of the CSAT to improve its acceptance and appeal by event organisers. Moreover, the CSAT would need to be marketed to the event organisers to show why and how they could benefit from the use of such a tool in the planning of an event. Such findings support stakeholder interview findings (Chapter 5), suggesting that planning information and knowledge could be lost when individuals change roles. The CSAT aims to improve the communication and storage of information within the planning of crowd events.

8.4.2.2 Not using the guidance currently available

Findings from feedback interviews suggested that current guidance for organising events was limited and not usable, supporting the lack of research in the area (Challenger & Clegg, 2011). With one interviewee suggesting that they use the guidance of *'common sense' (Event Organiser 6, Participatory race events),* as opposed to the local authority guidance available. Feedback interview findings, stakeholder interviews and literature search indicate that health and safety guidance and local authority guidance is available (The Green Guide HSE, 2008, The Purple Guide HSE, 1999, North West Leicestershire District Council, 2010), however it was

not used by event organisers involved in the feedback interviews. Event organisers are not finding current guidance advantageous to their role in events planning, suggesting a gap in the literature for a usable, evidence based tool to aid the planning of crowd events. Such findings support the lack of evidence based research in the area of guidance development for the planning of crowd events. However, stakeholder interview findings indicates that interviewees with more experience in planning events fail to cover crucial issues during their planning, issues that could improve crowd user experience (Chapter 5, stakeholder interviews). Moreover observational data indicates that crowd user experience issues are not being dealt with adequately, requiring additional attention to the user experience within the planning of crowd events [Chapter 6 and Chapter 7].

One explanation for the limited use of current guidance is the negative image surrounding health and safety, the view that health and safety concerns and guidance surrounding health and safety has '*gone mad*' (Almond, 2009). Thus, interviewees feel that they do not require the guidance, they have been in their role for a number of years (between 4 to 20 years, Table 67) and know what the task requires. However, findings from stakeholder interviews (Chapter 5) suggest that gaps in the planning of crowd events are present, and could be due (in part), to the limited use of the available guidance surrounding safety, and events planning.

An alternative explanation for the differing appreciation and use of current guidance, and potential use of the CSAT by event organisers could be found in the transtheoretical approach, similar to that used within health and safety. The transtheoretical approach seeks to determine issues surrounding, and reasons for lack of uptake (and lack of acceptance) of new ideas within an organisation (Barrett et al., 2005; Haslam, 2002; Prochaska & Di Clemente, 1982). It also suggests that organisations that do not feel they need to change their current behaviour need to be targeted in a different way (using different tactics) to those who realise that their current behaviour could be improved. Thus, implementation of the CSAT could be altered depending on the specific requirements of the individual event organiser, or separate organisation. As current crowd events guidance is not being used fully, future research could focus on reasons for this, aiming to identify measures to improve usage of crowd planning guidance (Figure 38).
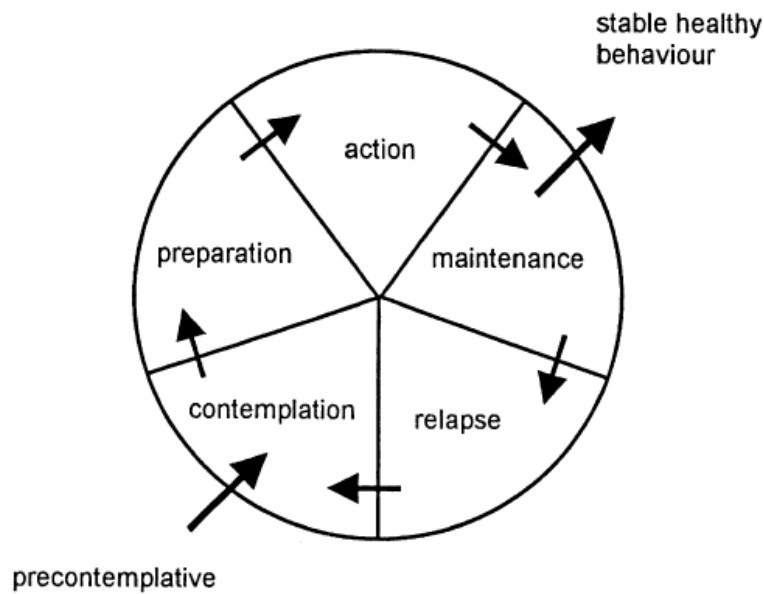
Figure 38 Stages of Change Model (Prochaska and DiClemente, 1982)

The impact of applying the stages of change model to the understanding of the crowd events could be the application of the CSAT to meet the specific requirements of the individual event, and organisation. For example, an organisation in the '*precontemplation*' phase of the model would require a different focus than one within the '*contemplation*' phase. Realising the different organisation's needs, and targeting the CSAT accordingly, could be one method of encouraging the successful implementation of the tool into the planning of crowd events, with the ultimate aim of improving the user experience of the crowd event.

8.4.3 Contradictions between respondents

A number of contradictions were noted between interviewee feedback, primarily variations surrounding time taken to complete the CSAT, and its usefulness in aiding event organisation, and highlighting areas that require improvement. Differences show the diversity in event organiser willingness to change their current behaviour for the potential improvement to crowd user satisfaction. Some event organisers have been planning and organising events for many years, believing their current method to be most appropriate. As a result such event organisers can be reluctant to alter their behaviour, despite the potential to improve the event, and the crowd satisfaction. Such differences indicate the various user needs, further emphasising the potential benefit of tailoring the tool. However as the CSAT aims to be a tool that can be used by all crowd event organisers (irrespective of their level of experience

or event type), it will be important to establish an appropriate tool for the various potential user groups, to heighten the acceptability and usage of the CSAT by all users. Findings support the stages of change model, suggesting that different organisations are at varying levels in their willingness to adopt new strategies and implement new guidance into their current organisation (Prochaska & Di Clemente, 1982).

8.4.4 Time to complete

The CSAT aimed to provide a usable tool for the planning of crowd events, however, interviewees indicated that the tool took a significant amount of time to complete, acting as a considerable deterrent for its use in the planning of crowd events. Variations in the time dedicated to completing the CSAT for the purpose of this research indicate a number of concerns. Firstly, how seriously interviewees took the task and individual commitment to the research project (with event organisers spending between 45 minutes and 4 hours on the exercise). Secondly, to what extent event organisers believe they would benefit from additional assistance in the planning of crowd events (comfort and satisfaction issues in particular). As well as the extent to which they have become complacent with the task they have carried out for the past 20 years for example.

However, irrespective of the level of experience of event organisers, the organisation of crowd events could be improved to enhance the user experience. Thus, event organisers who feel they are doing all that they can in the planning of events, miss issues that could have an impact on the satisfaction of the crowd. For example, during stakeholder interviews and event observations (Chapters 5, 6 and 7) issues such as ensuring sufficient number of toilets were made available, and organising the location and layout of toilets and signage to locate toilet facilities, could have been altered to reduce queue times and improve crowd satisfaction. However, stakeholders felt that they were doing all that they could, and all that was required of them, and were often unaware of potential improvements. Thus, the CSAT is aimed at all event organisers, irrespective of their years of experience, to provide additional guidance, and highlight aspects of an event that could be altered, to improve crowd satisfaction. The findings of feedback interviews suggest that additional attention is required to increase the usefulness and approval of the CSAT

by all event organisers, providing information that is helpful to all. It is important that all organisers use the tool, as even those with years of experience could improve the event that they are organising.

Future research could therefore focus on reducing the time taken to complete the CSAT and improving the usability of the CSAT (without reducing the comprehensiveness of its content), to encourage event organisers to use it during the planning of crowd events. In addition, future research could focus on tailoring the CSAT to specific crowd event types or stakeholder groups, thus reducing the size of the CSAT, and the time taken to complete.

8.4.5 Omissions

Feedback interviews did not identify substantial omissions within the CSAT content (despite prompting interviewees during feedback interviews). Interviewees suggested that the CSAT provided exhaustive content of issues to consider when planning an event, with one human factors researcher suggesting that the CSAT provides: *'a very thorough checklist' (Human Factors Researcher 3, Multidisciplinary consultancy),* whilst an event organiser said: *"I don't think there is anything missing.. I can say that much" (Event Organiser 4, Sporting Events).* Such findings reflect the extensive evidence based research that contributed towards the development of the CSAT (literature review, user focus groups, stakeholder interviews, and event observations). However, one potential limiting factor could be complacency, and a lack of thorough reading of the CSAT by some of the interviewees. Had interviewees read and completed the CSAT thoroughly, one might have expected omissions to have become evident. However, a number of interviewees did highlight omissions that should be included when organising events, and potential additional factors to consider for inclusion (which were added to the final CSAT iteratively).

8.4.6 Limitations

8.4.6.1   Study methodology

The findings in this study are subject to the following limitations, inherent to qualitative analysis, primarily, the subjectivity of self-report interview data. However, the standardised analysis, outlined by (Bryman, 2004; Robson, 2011) is accepted as an approach to minimise this.

8.4.6.2   Participants

Findings from feedback interviews were based on self-report data obtained during retrospective interviews with event organisers and human factors researchers. Such methods have a number of limitations, primarily social desirability bias, during which participants do not behave as they would do in the real world, instead aiming to portray their actions as more desirable than they are in reality (Bryman, 2004). Thus participants may have suggested that they already consider the issues within the CSAT, and they would rate their event highly, whereas the reality may be somewhat different. Moreover, the participants were self-selecting which could have affected the data set as individuals who responded to the invitation may hold particular views, or may have particular experiences influencing their decision to participate.

Due to the 'proof of concept' nature of the study, and the narrow scope of the research aims, a relatively small sample size (7 event organisers and 5 human factors researchers) was found to be sufficient to meet 'data saturation' (Bryman, 2004). However, due to the purposive nature of the sampling (to gain in-depth insight into the user), generalisation of the results across the event organiser population is not possible. Further research of a quantitative nature, using probability sampling would therefore be necessary to provide findings that can be generalised across the user population. A validation study would require a larger number of stakeholders from a wider range of crowd events, to establish a greater sample size.

8.4.6.3   Trustworthiness of the data

One limitation within semi-structured interview data and the use of human participants is that interviewees may not have completed the tool as thoroughly or as systematically as they were asked to. Nevertheless such insight might realistically represent how event organisers would use the CSAT in the real world,

spending minimal time on the task due to other time commitments. Findings therefore provide an interesting insight into the potential use of the CSAT by event organisers who have restricted time constraints for completing tasks.

Interviewees may also have exaggerated the time dedicated to completing the task, so as to appear to the researcher more dedicated to the research task, an issue known as respondent bias. (Lincoln & Guba, 1985 - pp. 172) discuss 'good bunny' syndrome, during which time the respondent tries to give the answers that they judge that the researcher wants. To account for such an issue interviewees were told explicitly that the researcher was not the author of the CSAT, and therefore would not be offended by any comments made, with the aim of the research being to identify areas for potential improvements. Nonetheless, interviewees may still have been reluctant to be overly critical of the CSAT. Moreover, interviewees may have been telling the researcher what they believe the researcher wanted to hear (indicating that the CSAT was perfect for example), rather than the truth (information the research is interested to hear). In being overly positive about the functionality and usefulness of the tool design and content, the validity of the data might be questioned, (one of the key limitations with interview data). Similarly, interviewees may have been more positive about how they run their own event in order to improve the social desirability of their answers, and the event they organise (Bryman, 2004).

Upon analysis of interview transcripts (and completed CSAT) it became apparent that interviewees may not have read (or completed) parts of the CSAT document in as much detail as they suggested during feedback interviews. Such issues highlight a social desirability bias, when some interviewees "*answers to questions are related to their perception of social desirability of those answers*" (Bryman, 2004 - pp 211). During which time "*an answer that is perceived to be socially desirable is more likely to be endorsed than one that is not*", with interviews wanting to show a desirable image of their completion of the CSAT, to please the researcher.

8.5 Conclusion

The study described in this chapter sought to examine the use of the CSAT by event organisers, and human factors researchers, to establish the 'proof of concept' of the CSAT. Specifically the study aimed to identify whether or not the CSAT was a useful

and usable concept, and to what extent the tool occupied the suggested gap in the literature.

The study has demonstrated the 'proof of concept' of the CSAT, the initial aim of the feedback interviews. Future research would involve further development with additional stakeholders, as well as the possible reuse of the amended tool by the original stakeholders involved in the research. However, this was the stopping point within the scope of this thesis, in which to establish the 'proof of concept'.

Chapter 9

9. Discussion, implications and recommendations

9.1 Summary

The discussion chapter will begin with an overview of the research process, and how the research progressed throughout the thesis. The key research findings will then be presented in accordance with a summary model developed (**Figure 40**), with each issue discussed. The impact and relevance of the research will be established, and suggestions then made as to future research directions following on from the research within this thesis. Finally concluding comments are presented, indicating key issues for consideration.

This thesis has presented findings from a number of studies examining the issues that influence crowd user experience, incorporating issues of comfort, satisfaction, safety and performance within a given crowd situation (Figure 39). The aims of the research within this thesis were to:

1. Determine the factors that contribute to and influence the user experience of crowds, issues affecting comfort, satisfaction, safety and performance.
2. Understand the role of stakeholders in the organisation and delivery of crowd events.
3. Identify aspects of crowd events that contribute to a positive user experience, and areas of crowd event organisation that could be improved.
4. Develop a prototype guidance tool to assist event organisers during the planning of crowd events.

In order to meet the above aims, five studies were undertaken encompassing: user focus groups (Chapter 4), stakeholder interviews (Chapter 5), security observations (Chapter 6), event observations (Chapter 7), and finally the development of a CSAT tool to assist the organisation of crowd situations, with an assessment of the proof of concept and usability of the tool (Chapter 8).

Initial research involved a review of the literature (Chapter 2), and revealed that crowd safety (Zhen et al., 2008), pedestrian flow modelling (Smith et al., 2009),

public order policing (Reicher et al., 2004; Drury & Stott, 2011), and hooliganism prevention (Stott et al., 2008) had received the greatest attention within the literature. Whereas, crowd performance, comfort, and satisfaction received less attention (Ryan et al., 2010; Johnson, 2008; Lee & Hughes, 2007; Zhang et al., 2007; Berlonghi, 1995). Therefore the overarching aim of the research within this thesis was to explore the complex issues that contribute to the user experience of being in a crowd.

User focus groups (Chapter 4) revealed differences in factors affecting crowd satisfaction, varying according to age and user expectations. Also, venue design, organisation, safety and security concerns were found to highly affect crowd satisfaction, irrespective of group differences or crowd situations, showing the importance of these issues when considering crowd satisfaction for all crowd events, for any crowd members.

Stakeholder interviews (Chapter 5) examining crowds from another perspective suggested that overall; safety was a high priority due to legal obligations, in order to protect venue reputation. Whereas, comfort and satisfaction received less attention within the organisation of crowd events due to budget considerations, and a lack of concern as to the importance of such issues. Furthermore, communication and management systems were inadequate to ensure compliance with internal procedures, with a lack of practical guidance. Findings fell in line with the weighting of the issues within the literature, with health and safety receiving the most attention, and comfort and satisfaction less attention.

Findings from security observations (Chapter 6) questioned the clarity of the differing roles between public and private security, and understanding of these differences. Also the increasing use of private over public security within crowd event security, and the differing levels of training and experience within public and private security were identified. Additionally, event observations (Chapter 7) suggested that the layout of the crowd venue together with the movement and monitoring of crowd users, as well as the availability of facilities in order to reduce competition between crowd users, together with possible links to maintaining public order and reducing anti-social behaviour during crowd events.

A prototype practical tool was therefore developed (the CSAT, Chapter 8), for event organisers to use during the planning of crowd events. Feedback interviews with

event organisers and human factors researchers suggested the CSAT was a useful concept, aiding communication, and providing organisers with a systematic and methodical structure for planning ahead, prioritising ideas, and highlighting areas of concern. The CSAT was also described as being clear and easy to follow, with clear aims, and clear instructions for completion, and was felt to aid communication between the various stakeholders involved in the organisation and management of an event, allowing information to be recorded, stored and shared between stakeholders, with the aim of preventing the loss of crucial information.

Findings were then used to develop a summary model of the factors that influence crowd satisfaction within crowd events of various descriptions, described within this chapter (Figure 40).

9.1.1 An overview of the research process

This chapter presents a discussion of the studies undertaken in phases 1 to 5 of research within this thesis, along with a summary model of the overall findings. Figure 39 shows how the summary model and discussion fit into the research process.
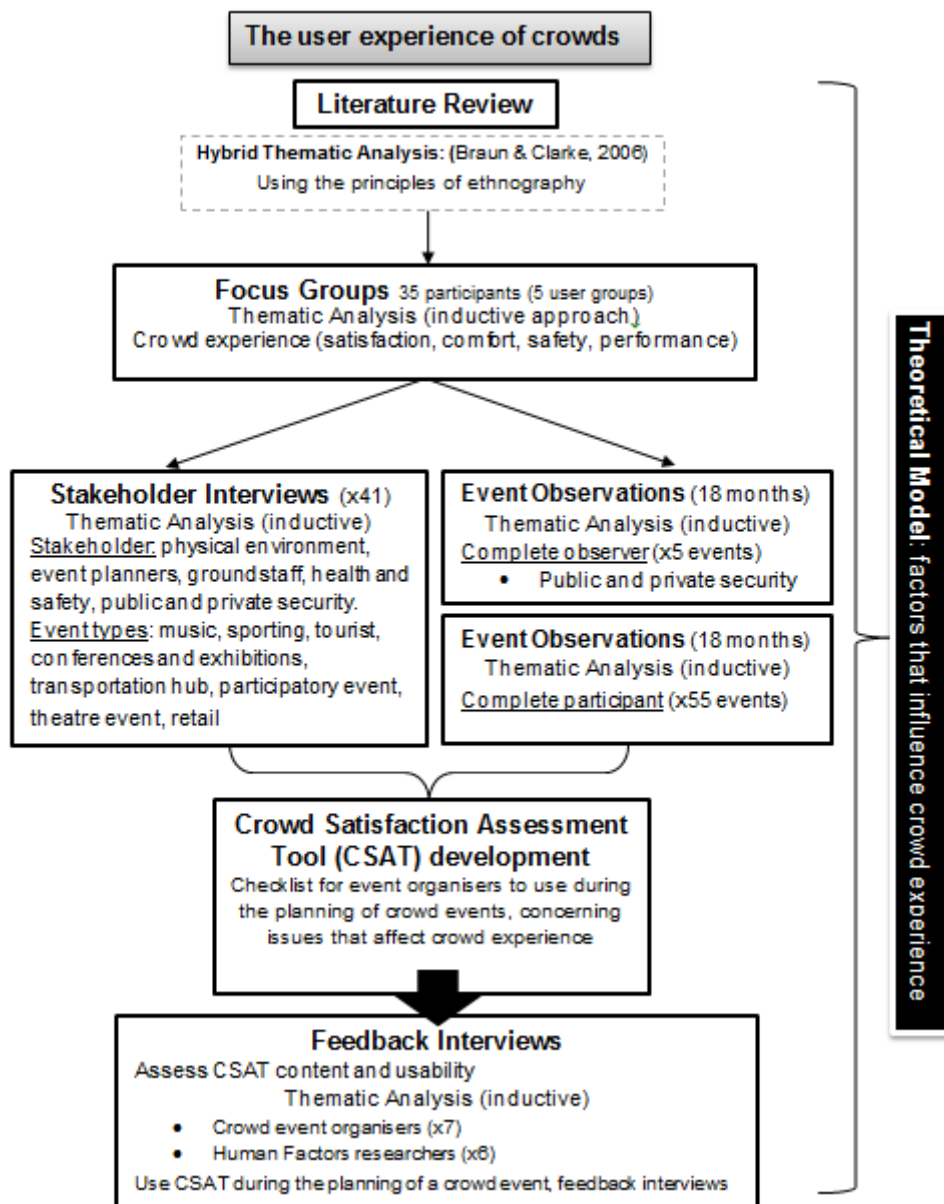
Figure 39 Overview of the research process

9.1.2 Overarching research themes

A summary of the key themes that emerged from hybrid thematic analysis of each of the 5 studies within this thesis can be seen in Table 73. The table highlights the differences in themes that emerged during each of the studies, and the development in themes across the research process. Overall **health and safety** was seen to be referred to frequently during stakeholder interviews, yet little focus was given to issues surrounding health and safety during user focus groups, and event

observations. Also, the **design and organisation** of a crowd situation was referred to frequently within user focus groups, and stakeholder interviews, but less so during event observations.

Communication of information within and between crowd situations received the fewest references during user focus groups, and the most references within event observations, as well as high references during security observations, and stakeholder interviews. This finding deserves comment as both event observations and user focus groups represent the perspective of the user. However this might indicate the difficulties in using observational data as the researcher may have been focused on the human factors issues of communication when observing the crowd situations, explaining the high priority given to the issue within event observations. Additionally, issues surrounding **stress and mood** within a crowd situation were referred to within user focus groups and not during stakeholder interviews. Moreover, satisfaction was given limited attention during stakeholder interviews, with only slightly more consideration during event observations. As well as the **comfort** of crowd users was given limited attention during stakeholder interviews, yet considerable attention during event observations.

Encumbrances were identified as an issue for consideration within crowd user satisfaction during both user focus groups, and event observations. However the issues of encumbrances was not raised during the other studies, including stakeholder interviews, security observations, and feedback interviews. This suggests that encumbrances are considered by crowd users, but not given sufficient attention by other crowd stakeholders. Also, **queuing systems** were discussed specifically in event observations more than any other study group, suggesting the impact of queuing on crowd user satisfaction. Additionally, the provision of **facilities** was referenced frequently during event observations, while less consideration was given to facilities within stakeholder interviews.

A model was developed summarising the principal findings from the research within this thesis. Key issues highlighted in the model concern: anticipation, facilities, and planning (consideration before the event); influences and monitoring (maintaining during the event); and responding (dealt with after the event has taken place). **Figure 40** shows the summary model developed from key research findings from phases 1 to 5 of the research process. The model then forms the basis of the discussion

format, with each of the six key areas within the model forming a section of the discussion (anticipation, facilities, planning, influences, monitoring and responding).

Table 73 Key research themes

	Study 1: User focus groups	Study 2: Stakeholder interviews	Study 3: Security observations	Study 4: Event observations	Study 5: Feedback interviews
Emergent themes	1. Design and organization 2. Stress 3. Safety and security 4. Motivation 5. Mood 6. Environmental factors 7. Movement 8. Goal prevention 9. Preconceptions 10. Behaviour 11. Avoidance 12. Space available 13. Distractions 14. Control 15. Encumbrances 16. Company 17. Atmosphere 18. Individual factors 19. Communication	1. Health and Safety 2. Public Order 3. Communication 4. Design 5. Public relations 6. Crowd movement 7. Event capacity 8. Facilities 9. Satisfaction 10. Comfort 11. Individual differences	1. Communication 2. Anticipating crowd reaction 3. Information storage 4. Training 5. Role confusion 6. Financial considerations 7. Professionalism	1. Communication 2. Public Order 3. Comfort 4. Facilities 5. Queuing systems 6. Transportation 7. Crowd Movement 8. Design 9. Satisfaction 10. Health and Safety 11. Public Relations 12. Event Capacity 13. Time constraints 14. Encumbrances 15. Cultural differences	1. Useful concept 2. Communication 3. Feedback 4. Guidance 5. Experience 6. Record of information 7. Usable 8. Clarity 9. Layout 10. Content 11. Time consuming 12. Alterations 13. Limitations 14. Additional considerations

9.2 Summary model of the factors influencing crowd user experience

A summary model has been developed to present the principal themes drawn from the research findings within this thesis (Figure 40). Six core areas: anticipation, facilities, planning, monitoring, influencing, and responding, were identified and used to summarise the factors influencing crowd user satisfaction across crowd situations. The model highlights the perspective of crowd organisers and deliverers, in terms of the ordering of the themes (anticipation, facilities, planning, influences, monitoring, and responding). The themes within the six areas reflect the findings from crowd users and other stakeholders involved in the research within this thesis, including user focus groups (Chapter4), stakeholder interviews (Chapter 5), security observations (Chapter 6), and event observations (Chapter 7), together with feedback interviews (Chapter 8) following use of the CSAT. Each of the six core themes within the model were colour coded to indicate the different stages of the model. Anticipation, facilities, and planning were presented in orange to show the issues to be considered before the event. Influences and monitoring were displayed in blue to indicate the issues to consider while the crowd situation is taking place. Finally, responding shown in green and designed to be considered after the event, before the planning of the future events. Issues were also numbered to show the order of consideration. Additionally, arrows were placed on the model highlighting the cyclical consideration required during the planning of crowd stations.
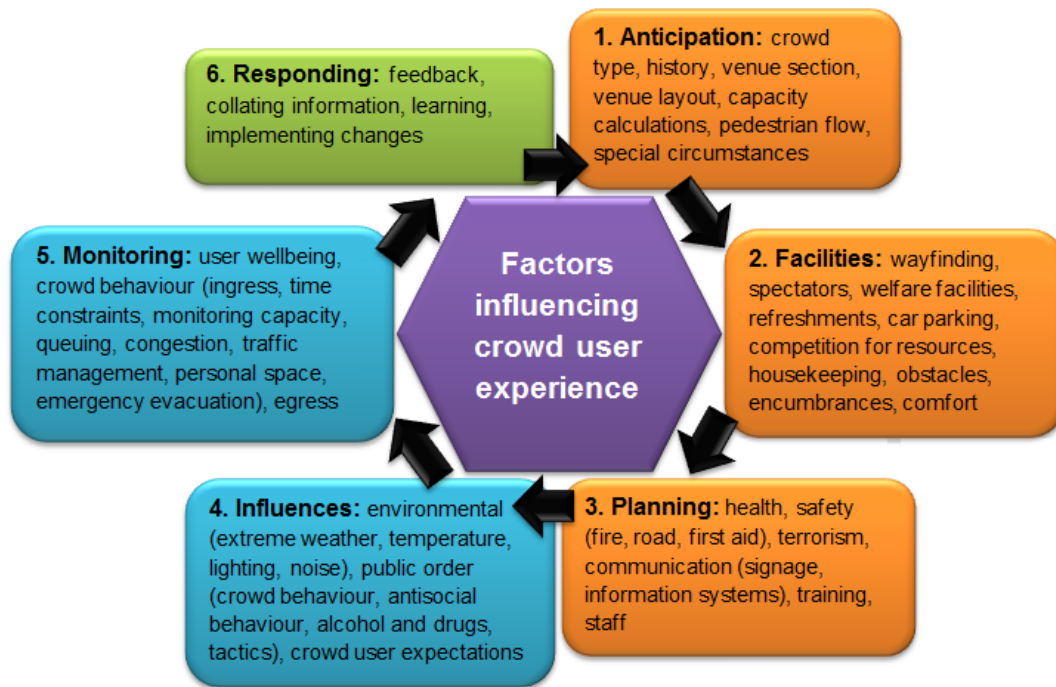
Figure 40 Summary model of factors that contribute towards crowd user experience

Within each of the six areas additional themes are stated. For example 'anticipation' (one of the principal areas), contains key themes of: crowd type, history, venue selection, venue layout, and capacity calculations, represent the issues for consideration. Furthermore, each of the themes within the area of 'anticipation' then represents a number of subthemes. The subthemes are described in further detail within the CSAT (Appendix H), for example within the theme 'crowd type', the issues of: ambulatory crowd (pedestrians walking within a crowd), spectator crowds (for example theatre and sporting events), expressive crowds (including the shouting, chanting experienced at football matches for example), participatory crowds (during which the user is involved in actual activities of an event, e.g. a race event like the London marathon), and limited movement (experienced at the front of a music festival) are involved. Within the discussion a number of the issues within each section of the model will be discussed in further detail, with some issues only mentioned in the model and not described further, to provide an overall summary of the research findings.

The summary model therefore aims to provide a summary of the issues presented within the practical tool (CSAT), with further detail (see Appendix H), and was not intended to list exhaustive details. The summary model is designed for use within academia, while the practical tool aims to provide a practical application of the

knowledge. The following sections will now use the structure of the summary model to discuss influential factors affecting crowd user experience (Figure 40). Issues including: anticipation, facilities, planning, influences, monitoring, and responding, will be highlighted and discussed with regard to crowd situations

9.2.1 Anticipation

Anticipation refers to issues that stakeholders must consider before an event (**Figure 40**), including issues surrounding crowd type, history of the crowd event and crowd behaviour issues experienced in the past. As well as consideration of venue selection, layout and capacity calculations, with further discussion of the issues presented.

9.2.1.1 *Crowd typology*

Findings from the research within this thesis suggest that the classification of crowd types presented by Berlonghi in 1995 is oversimplified, and requires further attention. Berlonghi (1995) suggested eleven different types of crowd within different crowd situations: ambulatory crowd, disability or limited movement crowd, cohesive or spectator crowd, expressive or revellous crowd, participatory crowd, aggressive or hostile crowd, demonstrator crowd, escaping or trampling crowd, dense or suffocating crowd, rushing or looting crowd, and violent crowd. A number of which were used during the sampling of crowd types within this thesis, in order to enhance the structured sampling of the data across crowd types. Those crowd types not considered for sampling included: escaping or trampling crowd, dense or suffocating crowd, rushing or looting crowd, and violent crowd, as the crowd types focused on safety and security of crowd users specifically. However, on reflection of the observational data specifically it became apparent that the eleven types of crowd oversimplify the complexity of a crowd and different crowd situations. For example, within ambulatory crowd types a number of other crowd types could be described from the observational data gathered, including tourists walking and attempting to find the way. Also, older users walking cautiously through a crowd and stopping for regular breaks, as well as parents of young children walking through a crowd with their small children. One crowd type describing a walking crowd appeared inadequate to differentiate during event observations for example. Therefore further

research is required to assess different crowd situations and expand on Berlonghis (1995) definitions.

9.2.1.2 *Pedestrian Flow Modelling software*

Findings within this thesis highlight a gap between academic research surrounding pedestrian flow modelling software in the literature, and the practical application of this research within industry. Considerable attention has been given to Pedestrian Flow Modelling software within the literature (Wang et al., 2013; Yang et al., 2012; Zhao et al., 2008). However research within this thesis suggests that Pedestrian Flow Modelling software has a limited use within more 'everyday' crowd event organisation due to the high associated financial costs. Although there is a predominance of research in the literature on crowds concentrating on pedestrian flow modelling, research within this thesis indicates that such software is not being used to calculate the optimum capacity to enhance the flow of pedestrians within the majority of events and stakeholders involved. Additionally limitations were identified during stakeholder interviews. The transportation industry for example stated using the software, but suggested limitations still present within the psychological aspects of individuals within a crowd situation. However, further research is required to assess the use of Pedestrian Flow Modelling software in larger budget events with higher budgets.

Findings support stakeholder interview findings that suggest pedestrian flow modelling software was often not used, particularly within small scale crowd events. Additionally, pedestrian flow modelling software can be used to determine the optimal number of crowd users allowed within a given area, but may not take account of individual behavioural and psychological aspects that effect movement and comfort within a crowd. This might suggest why pedestrian flow modelling software is not always used effectively during the planning of crowd situations. Research within pedestrian flow concentrates on developing modelling software to assess the number of pedestrians that can safely move within a venue. The software is used substantially within the transportation industry (Wang et al., 2013; Papadimitriou et al., 2009; Velastin et al., 2006) however findings from event observations suggest that pedestrian flow within transportation hubs requires further attention and improvements. Moreover the software could be used more extensively in other crowd situations.

As identified during a critical review of pedestrian behaviour models Papadimitriou et al (2009) indicate that advances in pedestrian modelling software over recent years (primarily multi-agent simulation systems) are based on artificial intelligence concepts, during which 'pedestrians are treated as fully autonomous entities with cognitive and often learning capabilities'. However, research into pedestrian flow modelling has limited implementation of individual behavioural and psychological characteristics when assessing flow (age, tourist, baggage to carry, commuters, additional encumbrances for example), to determine differences in the flow of each pedestrian (Parisi et al., 2009; Papadimitriou et al., 2009). However, Stakeholder interviews findings suggested that such pedestrian flow modelling software is not being used in all crowd event situations (due to the financial constraints organisers face), particularly in small scale events. This could indicate possible improvements to event venue layout could be made through making the advances in pedestrian flow modelling software more available to organisers planning crowd events. However, such software does not fully account for behavioural differences between crowd users, as shown during event observations that suggest improvements are required to pedestrian flow across crowd situations.

9.2.2 Facilities

Considerations regarding facilities including wayfinding, the provision of welfare facilities, refreshments, and car parking, in order to reduce the competition between crowd users, and crowd user comfort (**Figure 40**). Further explanation will be provided for each issue below.

9.2.2.1 Comfort

Comfort has been described as a moderating factor in the perception of a situation as crowded, and the ultimate experience of crowding and stress (Cox et al., 2006). Comfort was the third most referenced issue within complete participant event observations, distinctly different to the consideration given to comfort issues within stakeholder interviews, being the tenth most referenced to issue (Table 73). One explanation could be that the researcher was looking specifically for issues relating to user comfort, though measures were taken to standardise the collection of observational data, through the development of an observational checklist

(Appendix F). However comfort was just one area under observation by the researcher, the development of the observation checklist, developed from the literature, together with user focus groups aimed to establish a systematic observation of each event.

One interesting point to note is that comfort was not highlighted during complete observer event observations within public and private security (Table 73). Such findings suggest that comfort is not a priority for public and private security officer within event organisation. Findings from complete participant event observations support previous research suggesting that increased comfort can moderate the experience of stress and crowding within crowd situations (Cox et al., 2006; Mohd et al., 2012). Previous research focused on crowd situations within the transportation industry, whereas this research involved crowd situations of various descriptions (sporting, music, conference for example). Increased seating comfort, with padded seats and extra leg room resulted in reduced feelings of frustration. However, during complete participant event observations comfort often came at an additional financial price (through VIP ticketing options), suggesting that comfort during crowd events is often seen as a luxury, and not an expectation for crowd event organisers. Moreover, during user focus groups the availability of seating and toilet facilities were discussed as influential to the satisfaction of older adults group, comparatively more than other user groups involved. Primarily the importance placed on toilet facilities by older individuals.

9.2.2.2   *Wayfinding schemes*

Stakeholder interview findings suggested that event organisers dedicate limited time and resources to the consideration of signage and crowd user wayfindings during the planning of crowd events (Stakeholder interviews Chapter 5). Similarly, complete participant event observations highlighted wayfinding difficulties within events, that contributed to crowd user frustrations and reduced satisfaction during the crowd events attended [Chapter 6 and Chapter 7]. Such complications in signage and wayfinding support previous literature showing that as floor plan complexity increases, wayfinding decreases (O'Neill, 1991). Wayfinding difficulties are associated with frustration on the user, and negative appreciation of the physical setting, as well as the cooperation itself and the services offered in that setting (Sime, 1999; Passini, 1996) Thus, stakeholders would benefit from investing time

and resources to improving wayfinding, in order to enhance user satisfaction at their event.

Previous research suggests that wayfinding must be addressed through architectural design, as well as interior design and sign systems (Sime, 1999; Passini, 1996). Stakeholders may have been correct in thinking that their venue is difficult to navigate, an issue described as '*legibility*' by (Lynch, 1992). Yet stakeholders must aim to provide additional cues that ensure crowd users find their way, and reduce frustrations experienced. (Lynch, 1992) suggests that a venue with lower legibility will require greater attention to wayfinding strategies in order to provide an event that is usable and satisfying for the crowd user. The legibility of key architectural elements within a venue (for example the entrances) cannot be altered, but there are other aspects of an event that could be altered to improve user wayfinding. Such findings suggest that it is very important that wayfinding be considered during venue design stages, in order to maximise wayfinding for crowd users.

9.2.2.3 *Provision of welfare facilities*

Stakeholder interviews suggested a lack of concern for providing adequate numbers of welfare facilities within crowd events (Stakeholder interviews Chapter 5). Similarly complete participant event observations detected an insufficient level of welfare facilities within a number of the events observed [event observations Chapter 7]. Moreover, user focus groups also acknowledged the importance of adequate numbers of quality welfare facilities to the user experience within crowd situations.

Although there is considerable guidance available documenting the requirements for welfare facilities within an event (The Purple Guide HSE, 1999, for example), the number of welfare facilities observed during event observations (Chapter 7) was often insufficient from a crowd user perspective. For example during a number of event observations the insufficient number of facilities resulted in long queues, as well as unhygienic facilities (within toilet facilities for example). Within festival events for example this lead crowd users to miss parts of the band performances due to waiting in the queue for the toilet. This was supported by stakeholders interviews that suggested stakeholders were unaware of the correct number of facilities to provide (stakeholder interviews Chapter 5), or having difficulties calculating the

optimal number to provide to account for the peak times of use (at the beginning and the end of a spectator event for example). Research therefore indicates that stakeholders find it challenging to calculate the correct number of welfare facilities to provide from the guidance documents that are currently available, as well as deciding the optimal positioning and layout of facilities within a crowd venue.

Research into the analysis of the Hillsborough football stadium disaster (1989) has suggested that the layout of facilities within a crowd situation is important for both the safety and satisfaction of crowd users. A socio-technical systems analysis of the Hillsborough disaster for example suggested that the '*inappropriate layout of event environments'*, including the layout of facilities as a contributory factor in the crowd disaster (Challenger & Clegg, 2011; Davies et al. 2013). Such findings highlight the need for stakeholders to understand the importance of facility provision, and the need to provide adequate guidance to allow stakeholders to easy calculation of numbers and optimal layout within an event.

9.2.3 Planning

Planning considerations consisted of health and safety issues, as well as planning for communication within and between events (including signage systems) (**Figure 40**). Also the training of staff working involved in crowd events, including voluntary staff. Each of which will be discussed in further detail below.

9.2.3.1 Communication

In line with previous literature the research within this thesis found that communication within and between the different stakeholders involved in event organisation was a key contributing factor to the overall success of the event (Berlonghi, 1995). For example findings from complete participant event observations (Chapter 7) stressed the importance of keeping crowd users informed of any delays and reasons for congestion during crowd events, as well as communicating information from crowd organisers (and other staff) to the crowd users. Such findings support research into crowd safety and the importance of providing '*minimally sufficient early warning of the public on a risk communication timeline*' (Sime, 1999). Findings also support the lack of research concerning crowd communications during public events, as highlighted by Sime (1999). Sime (1999)

also suggests that '*directive public address messages from a control centre (linked to CCTV monitoring)*' are more effective than 'alarm bell' warning systems, for communicating to crowd users during a disaster. Such research supports findings from this study within the field of satisfaction, as more specific information was advantageous to crowd users. However, Sime (1999) concluded that '*poor communication between staff and a delay in warning the public are a recurring feature of crowd disasters*'. Thus, future research should focus on improving the communication of information within crowd events of various descriptions, with the aim of improving crowd satisfaction (during delays and congestion) and crowd safety (during crowd evacuations).

Similarly, communication across different events and between event organisers and crowd users were described as key issues influencing the satisfaction of crowd users (Brown & Hutton, 2013). During a recent review of the developments in the real time evaluation of crowd behaviour at planned events Brown and Hutton (2013) found that the potential for the events to meet and exceed the expectations of the crowd users were increased when the effectiveness of communication to the audience within events was increased. This supports that importance of communicating information effectively within events in order to enhance the user experience of crowds.

In terms of the tone of communication, the presence of police and well-mannered staff was also noted as important during event observations [Chapter 7], supporting previous literature concerning the importance of polite members of authority within crowd events (Taplin, 2013). Previous literature also suggests that the availability of knowledgeable staff is important for visitor satisfaction on loyalty, in line with previous literature (Lee et al., 2008a; Yoon et al., 2010). As well as the green and purple guides also showing the importance of communicating information within and between crowd users (The Green Guide, 2008; The Purple Guide HES, 1999). Moreover, well managed staff, and sufficient resources (to reduce queue times) could potentially reduce antisocial behaviours including, pushing, shoving, and swearing that can occur within crowd events, an area that would be interesting for further research. Such findings support research from a socio-technical perspective, looking at the contributory factors to the Hillsborough disaster of 1989 (Challenger & Clegg, 2011; Taylor, 1989). In which, communication and coordination before and during the match were highlighted as causal factors in the disaster.

9.2.3.2 Signage systems

Effective signage systems are important to support the wayfinding of crowd users within and between crowd situations. Event observations suggested that clear and simple signage placed high above the crowd was the most easily identifiable across crowd events observed, in line with previous literature (Dixon, 2002). Dixon (2002) suggested that ineffective signage and customer information created congestion within a crowd, and potential bottlenecks. For example when passengers stand to read inappropriately positioned information crowds can gather and interrupt the flow of surrounding pedestrians. However, despite the attention given to the provision of signage within the literature, inadequate signage was one of the major issues highlighted throughout event observations (Chapter 7), user focus groups (Chapter 4), and stakeholder interviews (Chapter 5). Findings support research from Dogu & Erkip (2000), and Sime (1999), suggesting that signage and wayfinding are not considered in sufficient detail during the design process. Findings within this thesis also suggest that signage and wayfinding are given insufficient attention during the planning of an event, as well as a crowd venue. Stakeholder interview findings (Chapter 5) support this suggestion as stakeholders suggested that signage systems had been considered adequately during the planning of crowd situations, yet crowd users were still getting lost. This suggests that the signage systems employed were insufficient, requiring further attention from stakeholders in order to enhance the user experience of crowds.

9.2.3.3 Guidance availability and usability

Although guidance regarding the planning and organisation of crowd events is available, it is not always used as effectively as it could be, and therefore improving the accessibility and usability of the guidance might be of benefit to stakeholders. The main problem identified within regard to current guidance available to event organisers was that although the guidance captures many of the issues, it does not attempt to convey the information in a form that enable practical use by event organisers and those involved in the organisation do crowd situations. Additionally, guidance focuses of the health and safety of the crowd event (in line with the literature), however guidance with greater consideration to the welfare of the crowd and the crowd experience (comfort, safety, satisfaction and performance) would be beneficial for event organisers and other stakeholders involved in crowd events.

This research highlighted that stakeholders do not always find the guidance that is available helpful to their role. Therefore, this research focuses on the beginnings of a crowd satisfaction assessment tool, to provide a checklist of important issues to consider during the planning of crowd events, to enhance the user experience. Therefore, research within this thesis contributes to improving the usability of guidance available to crowd event stakeholders. Crowd welfare guidance to date has not been from a theoretical underpinning, therefore research within this thesis aimed to provide an initial protocol of an evidence based guidance document.

Additionally, following completion of the Crowd Satisfaction Assessment Tool (CSAT), event organisers indicated that current guidance available for organising events was limited, and not usable, with event planning being left to personal judgement, based on their previous experience (Development of the Crowd Satisfaction Assessment Tool chapter 8). Conversely, feedback interviews suggested that stakeholders found the CSAT to be comprehensive, exhaustive, useful and usable, with no other similar guidance documentation currently available for their event (as far as they were aware). Moreover, event organisers suggested that the CSAT was useful in providing a record of event planning information, enabling event organisers to revisit issues in the future, update information as and when required, and pass information to future event organisers who may replace their role, preventing the loss of adequately recorded information.

9.2.4 Influences

Influences upon the crowd included issues that can affect the crowd during a crowd situation including: weather conditions, temperatures and antisocial behaviour (**Figure 40**).

9.2.4.1   *Weather conditions in relation to crowd mood*

Complete participant event observations showed that adverse weather conditions had a negative impact on crowd user satisfaction, in line with previous research suggesting that adverse weather conditions (such as heat, rain, or lack of ventilation) can act as a '*crowd catalyst'*, having a negative impact on the behaviour of the crowd (Berlonghi, 1995). Weather conditions have been shown to be a contributing factor to the experience of crowd users, with both a positive and

negative influence on crowd user behaviour and satisfaction. Within the literature Berlonghi (1995) suggested that certain weather conditions (heat, humidity, rain or hail, lack of ventilation) during an event can act as '*crowd catalysts'*, influencing the mood of the crowd, and contributing to a controlled crowd, becoming out of control.

Berlonghi (1995) suggested that rain conditions have a negative impact on crowd mood and therefore consequently a negative impact on the behaviour and level of control within the crowd. Research findings within this thesis also suggested that the effect of ambient conditions and weather are more complex, suggesting that rain has a negative impact on crowd user experience and therefore crowd mood [from the perspective of the crowd user (Chapter 4, 6 and 7)]. However, from the perspective of stakeholders in public and private security, rain was believed to have a positive impact on crowd behaviour and crowd control (Chapter 5 and 6). Therefore despite rain having a negative impact on crowd mood (according to crowd users, Chapter 4), the presence of rain was believed to reduce antisocial behaviour and improve control within the crowd (Chapter 5). Moreover, one public security officer even said that officers refer to the rain conditions seen within crowd situations as '*pc rain'*, due to the positive impact of the rain on reducing antisocial behaviour [Chapter 5 and Chapter 6].

One explanation for such findings could be that Berlonghi's (1995), work was theoretical, with no supporting research from crowd users, security officers or other stakeholders involved in crowd event organisation, to explain the information. Another explanation could be that Berlonghi (1995) did not indicate the impact of the '*crowd catalysts'* upon crowd experience (comfort, safety, satisfaction and performance), focusing on the impact of such issues on the mood of the crowd, and the subsequent change from a controlled to an out of control crowd. Moreover, Berlonghi (1995) did not indicate what level of heat was required to cause the said change in mood, and level of control within the crowd. Similarly, the studies in this thesis did not ask for specific levels of heat, but did find that satisfaction was reduced when temperatures within a crowd situation reached uncomfortable levels, and sweating lead to the experience of unpleasant body odours (Chapters 4 and 7). Therefore one might conclude that sunshine (radiant temperature), as opposed to heat (thermal comfort) is the weather condition that has a positive impact on crowd user satisfaction, but a negative impact on antisocial behaviour within the crowd.

There is therefore an interesting insight into the potential link between crowd mood and crowd behaviour (from a crowd security perspective), supporting a link between the mood of the crowd and subsequent antisocial behaviour. However, these findings indicate that during sunny weather conditions, an additional issue of increased alcohol consumption contributes to the level of antisocial behaviour, and control within the crowd, as opposed to the weather conditions per se. the issue of alcohol consumption is also a '*crowd catalyst*' according to Berlonghi (1995), and supporting findings within this thesis. Therefore increased crowd mood does not always suggest increased control over the behaviour of the crowd. Further insight into the contributing factors to crowd experience could be used to observe the links between crowd mood and crowd management.

Moreover, within user focus groups weather was highlighted as an influential factor to crowd satisfaction, with international students at university more than any other user group. Such findings indicate the importance of understanding the expectations of crowd users when planning an event, and also considering the multicultural nature of events around the world. Findings also suggest that crowd users from the United Kingdom expect the weather to be unpredictable, and therefore view weather as a factor outside of the crowd experience. Additionally, event observations suggested that although event organisers could improve the organisation of measures to increase comfort in different weather conditions, crowd users should also take responsibility for their own comfort and satisfaction when attending events. Behavioural alterations, for example bringing an extra layer of clothing, or a rain coat, as well as remembering to bring sunscreen for example, would improve the user experience.

Other weather influences included the cancel of events due to health and safety during snow, ice and sometimes heavy rain before an event. Additionally, very hot conditions can be problematic during crowd situations, and the provision of water is required to prevent dehydration.

9.2.4.2 Challenging antisocial behaviour

Stakeholder interview findings showed that the police deal with anti-social behaviour in a systematic, proportionate manner, using differing amounts of force depending on the degree of anti-social behaviour observed within the crowd. Stakeholders

suggested that the level of defence increases and decreases in line with the behaviours displayed within the crowd. Similarly complete observer event observations highlighted a systematic increase and decrease in crowd management in line with the behaviour of the crowd. Such tactics support previous research and the importance of displaying trust in the majority of crowd users, and reserving distrust for the individuals who are under surveillance, in order to prevent pockets of anti-social behaviour from escalating into riotous behaviour (Rosander & Guva, 2012; Hylander & Guva, 2010). Stakeholder interview findings saw the police discussing the role of 'spotters' and 'evidence gatherers', to continuously monitor the overall behaviour of the crowd, and potential areas, and individuals of concern within the crowd (Ratcliffe, 2002). Such tactics preserve a positive crowd experience for the majority of crowd users, supporting previous research into the role of the police in maintaining crowd behaviour (Rosander & Guva, 2012). Equally within complete observer event observations the aim from both public and private security organisations appeared to be to maintain the positive experience of the majority of crowd users attending an event. However, with the increasing use of private security in place of public security in crowd events, greater emphasis might need to be placed on the private security use of intelligence, and issue established over many years within the police (Ratcliffe, 2002). One interesting finding within the stakeholder interviews was the suggestion that private security use Wikipedia to determine whether an incident is likely to occur within a forthcoming event, based on previous events of a similar nature. However this represented a stark contrast to the strategic reporting of incidents within intelligence-led policing (Ratcliffe, 2002). Greater attention might be required if private security organisations are going to increasingly take the place of public security within crowd events.

9.2.4.3   *Knowledge based public order policing*

With the increasing use of private over public security within crowd events, attention is needed to the gaps present between the two. Most notably the systematic recording of incidents within events and the implementation of such information into future event organisation.

The proportionate responses discussed during stakeholder interviews and complete observer event observations within public and private security, are in line with research surrounding the Elaborated Social Identity Model of Crowd Behaviour

(ESIM) and its self-fulfilling prophecy (Reicher et al., 2004, 2007), and the 'procedural justice theory' (PJT) (Jackson et al., 2012). The ESIM concerns the police use of force, perceived legitimacy and consequential 'self-regulation' in crowds. Similarly, the PJT focuses on the idea of 'normative compliance', suggesting that people will conform to the law because they perceive a moral, ethical and ideological obligation to do so (Stott et al., 2012; Jackson et al., 2012; Hough et al., 2010). The PJT suggests that when public and private security forces use discretionary force, that is considered 'fair', antisocial behaviour can be reduced (Stott et al., 2012, Hough et al., 2010; Jackson et al., 2012; Sunshine & Tyler, 2003).

Support for the ESIM theory of crowd behaviour, and commitment towards its methods and principles were displayed within both public and private security stakeholder interviews. Private security stewards discussed identifying individuals within a crowd who are causing unrest, and removing the said individual, or few individuals (as opposed to removing large numbers of crowd users). Moreover, identifying individuals portraying antisocial behaviour including swearing, and racist chanting within football crowds for example, and arresting specific individuals was discussed, as opposed to clamping down on the entire crowd. Furthermore, the police utilised 'spotters' to identify (through CCTV and surveillance) specific crowd members involved in antisocial behaviours.

Moreover, stakeholder interviews within the police suggested that the enjoyment of the mass was a priority when policing crowd events, as the majority of football fans for example, are attending the game for enjoyment motives, supporting previous research concerning how the positive relationship between the police and crowd members aids the 'self-regulation' of the crowd, during which the crowd members police themselves (Reicher et al., 2004; Rosander & Guva, 2012). From the research, public and private security appear to be aware of the potential link between enjoyment of the mass, and 'self-regulation' of the crowd, and aim to create a positive enjoyable event for the majority, whilst at the same time reducing the potential antisocial behaviour.

9.2.5 Monitoring

Consideration around monitoring crowd satisfaction within events incorporated issues within crowd behaviour: ingress and egress, pedestrian flow, queuing

systems and emergency evacuations (**Figure 40**). Further discussion will be provided below.

9.2.5.1 *Monitoring capacity within crowd situations*

Monitoring the number of crowd users within a venue, and across different areas within one venue were issues highlighted within the research conducted in this thesis. A number of methods were discussed including the use of CCTV, as well as monitoring crowd numbers 'by eye'. Findings within this thesis indicate that events may have provided a safe environment for crowd users, but the crowd density experienced was not always comfortable, supporting Stakeholder interviews findings (Chapter 5) and the literature (Chapter 2) showing methods used to monitor crowd capacities. Stakeholders indicated difficulties in the use of CCTV to monitor crowd density within a venue, moreover other stakeholders suggested that crowd monitoring was carried out to monitor safety, rather than to enhance the comfort of crowd users. Moreover, research by the Health and Safety Executive (1999, 2000) suggests that monitoring the crowd allows organisers to detect problem areas to enhance the early detection of crowd problems and assess the effectiveness of crowd control procedures that are already in place, the effects of the built environment on crowd user movement, and the development of long-term actions for maintaining crowd safety (HSE, 1999, 2000). Whereas little attention is given to the comfort of crowd users within high density situations. However, improving the comfort of crowd users could reduce the stress and crowding experienced (Cox et al., 2006; Mohd et al., 2012). Thus, future research could focus on improving the systems used to monitor crowd capacities within crowd events, with the aim of preventing bottlenecks, and discomfort for crowd users. Developing methods of monitoring crowd capacity, and developing indicators of comfort levels. Research currently focuses on indicators for differing levels of safety and acceptability, but improving the comfort of crowd users could in turn improve the relationship between crowd users, reducing anti-social pushing and shoving behaviours.

Findings within this thesis also support the sociotechnical systems thinking model used to analyse the Hillsborough disaster (1989) (Challenger and Clegg, 2011; Davies et al. 2013). Analysis of the disaster highlighted that 'over reliance on technology', and 'inadequate simulation capabilities' were contributory issues in the systems analysis of the crowd disaster. Therefore, similar issues are still being

detected within crowd events today, and though such issues may not be the sole cause of a crowd

9.2.6 Responding

Responding refers to the use of feedback from crowd users, and the implementation of changes following evaluation of a crowd event or situation (**Figure 40**).

9.2.6.1 *Consumer satisfaction and loyalty*

Research conducted within this thesis supports the lack of research in the areas of crowd user experience from a human factors perspective (Young et al., 2012). Research surrounding visitor experience within events is predominantly practical research carried out within specific events (Doorne, 2012), with limited availability of evidence based, published research (Yoon et al., 2010; Žabkar et al., 2010; Ryan et al., 2010; Bodet & Bernache-Assollant, 2009; Shonk, 2006). Moreover, research focuses on a marketing perspective, with limited research in human factors surrounding the systems perspective of issues affecting crowd user satisfaction. Thus, research is required to further understand the complexity of issues that interact and contribute towards the user experience of crowds. Research focusing on the satisfaction of crowd users and aspects of the event that can be altered or monitored to enhance the crowd user experience is also required. Such issues are increasingly important with the rise in festival events in particular over recent years, with growing competition between event organisers to encourage attendance, and return to subsequent events (Lee et al., 2008; Yoon et al., 2010). The issue of loyalty towards an event is therefore becoming increasingly important, with the growing competition between events, particularly the growing number of music festival events over recent years (Taplin, 2013).

Research findings within this thesis also support previous research concerning festival loyalty, a term coined 'festivalscape', describing *'the general atmosphere experienced by festival patrons'* (Lee et al., 2008; Yoon et al., 2010). Lee et al (2008) proposed seven issues that have the potential to impact consumer satisfaction during festival events: programme content, staff service, facilities, food, souvenirs, convenience, and information availability. Similarly, research within this thesis highlights the importance of a number of the aforementioned issues during

events observed, including: staff service, facilities, food, convenience, and information availability. Lee et al (2008) also suggest that facilities including parking, rest areas, and toilets are prominent in visitor complaints, therefore indicating that increasing the number of facilities available, the availability of trained personnel, and regular cleaning, improves quality and performance, and thus consumer satisfaction (Lee et al., 2008). In line with such findings, event observations within this thesis stressed the importance of the availability and quality of facilities within crowd events, and the overall user satisfaction. Moreover, consistent with the literature, event observations suggest that the availability and quality of food to impact festival value and thus loyalty. Similarly, during event observations findings showed events offering a variety of foods added to the crowd experience, and increased crowd user satisfaction. However, current findings also suggest that the cost of the food available also affects crowd satisfaction with overpriced food and beverages causing frustration for crowd users.

Findings within this thesis indicate that the festival programme is ultimately the dominant factor in establishing festival value, and subsequent satisfaction. However, the findings that food and souvenirs are of value to support findings from complete participant event observations. Additionally aspects influencing the organisation of events, event reputation, and crowd user feedback will be presented. Attending an event and having a bad experience lead crowd users to be unlikely to return to that event in the future. As experienced during *Music events 3 - Bestival (Isle of Wight),* during which the organisation of the travel to and from the event was insufficient, with huge delays encountered, ruining the overall crowd experience, despite the actual event being enjoyable. However, few events actively asked for feedback from crowd users. Such findings support stakeholder interview findings, suggesting that stakeholders (particularly event organisers within small scale crowd events) often fail to obtain crowd user feedback, moreover, even when feedback was obtained there was insufficient time or resources available to review and implement feedback into future events.

9.3   Recommendations for future research

Research within this thesis has provided insight into an area of crowd organisation that has received less attention until recent years (Brow & Hutton, 2013; Brown, 2012; 2010). As is to be expected, however, there is opportunity for further research to develop on the insights into the issues that influence the user experience of

crowds, including validation of the CSAT, development of a more detailed typology of crowd types, and cross cultural variations in the user experience of crowds.

9.3.1 Typology of crowds

A review of the literature (Chapter 2) indicated limited definitions of crowd types (Berlonghi, 1995), and future research could therefore aim to develop a typology of crowds. Berlonghi (1995) defined 11 types of crowd as:

1. Ambulatory crowd
2. Disability or limited movement crowd
3. Cohesive or spectator crowd
4. Expressive or revellous crowd
5. Participatory crowd
6. Aggressive or hostile crowd
7. Demonstrator crowd
8. Escaping or trampling crowd
9. Dense or suffocating crowd
10. Rushing or looting crowd
11. Violent crowd

Following analysis of the data within this thesis it became apparent that the typology of crowds established by Berlonghi (1995) was somewhat insufficient. Findings from stakeholder interviews also reflect the weighting of a number of issues within the literature, emphasising the need to increase the evidence base for different crowd types, and definitions of each. Additional data collection could therefore aim to contribute to the development of a more detailed typology of crowds. Berlonghi's (1995) research also identified issues that influence the behaviour and mood of a crowd, including 'crowd catalysts' such as weather conditions that can cause a stable crowd to become unstable. However subsequent research is required to gather detail as to the reasons why certain issue act as a 'crowd catalyst' within events. For example within this thesis additional issues were highlighted as important to the satisfaction of a crowd, compared to those stated by Berlonghi (1995). Research might include event observations across a longer time period, incorporating more crowd types. Definitions could be developed from the data, and assessed through interviewing crowd stakeholders to determine understanding and

identify any missing definitions. This would develop a more practically rooted definition of crowd types, for use within academia and industry.

9.3.2 Cross cultural variations in crowd experience

The research within this thesis provided a good geographical spread of the events for observation. Complete participant events observations were conducted in various locations across the UK, Europe, the USA, South America, and the Middle East. Though insufficient sample size was observed outside of the UK to determine specific factors within the various locations, with the majority of events observed within the UK. Future research is needed to explore the issues surrounding cross-cultural variations in crowd experience (comfort, safety, satisfaction and performance) further. Substantial literature considers the cross-cultural variations in tolerance for crowds, but primarily from a retail crowding perspective (Kim et al., 2010; Pons et al., 2006; Pons & Laroche, 2007). Future research could therefore use the principles of ethnography to explore crowd satisfaction across various cultures and crowd situations, furthering the research within this thesis. Moreover, considering complete observer observations of public and private security within crowd events around the world would highlight similarities and differences in the management of crowds. Such research could be used to gain understanding of crowd management and security considerations in multicultural events, an important consideration with regard to the growing international appeal of large events around the world. Additionally, stakeholder interviews could be conducted within stakeholders involved in crowd organisation from different parts of the world. Data could then be used to communicate skills and experiences between stakeholders around the world, and sharing experiences, benefits, and limitations of organising crowd events.

9.3.3 Level of crowd user satisfaction across events

It would be beneficial to establish metrics for success of crowd events, to indicate to event organisers and deliverers where an event requires improvements, and additional attention. Future research could measure crowd user satisfaction across different events, either using a repeated measures design (with the same participants attending each crowd event), or a mixed design (with a different sample of crowd users recruited during each events). Satisfaction could be measured using a Likert scale questionnaire design (Taplin, 2013); alternatively overall satisfaction

can be measured using comparisons against user expectations (Crompton & Love, 1995). Such measures could determine the level of crowd user satisfaction experienced by crowd users across various crowd situations. Determining an accurate measure of crowd user satisfaction would be beneficial for assessing the impact and success of different interventions on the level of satisfaction experienced within a crowd. For example the level of crowd satisfaction could be gathered from an event before the CSAT was used during the planning of the event. The CSAT could then be used during the planning of the subsequent event, and the level of crowd satisfaction assessed to determine differences before and after using the CSAT. Such research could therefore quantify the impact that using the CSAT could have on the user experience of crowd users and overall crowd satisfaction.

9.3.4 Development and validation of the Crowd Satisfaction Assessment Tool

Feedback interviews supported the 'proof of concept' of the CSAT. Future research developing the tool would require the validation of the resultant CSAT prototype. One possibility could be to produce quantitative data findings from the CSAT, to show event organisers the areas in which further attention is required during the planning of future events. Further research is also required to quantify the research findings presented within this thesis. Research of a quantitative nature could be advantageous for supporting issues raised during the exploratory 'proof of concept' research using the CSAT. As well as gaining insight into the generalisability of the research findings. Such research might strengthen the business case for the CSAT, particularly when attempting to gain 'buy-in' from the target audience, including potential buyers, and users of the tool. Moreover, implementing the tool into an organisation and assessing the outcome could provide further insight into understanding how to design usable guidance documents for industry application. Research to validate the CSAT could be considered similar to that executed during the validation of the Quick Exposure Check (QEC), adopting a quantitative validation of the tool (Buckle, 1998; David et al., 2008; 2005). Future research could continue the participative iterative ergonomics approach, similar to that adopted in the evaluation of the QEC (David et al., 2005). The QEC tool underwent a series of tests for its usability, sensitivity, reliability and measurement validity, involving 150 practitioners (Buckle, 1998; 2005), as seen in Figure 41. Reliability of the CSAT

could similarly be assessed using as many different crowd events and event organisers as is practically possible.
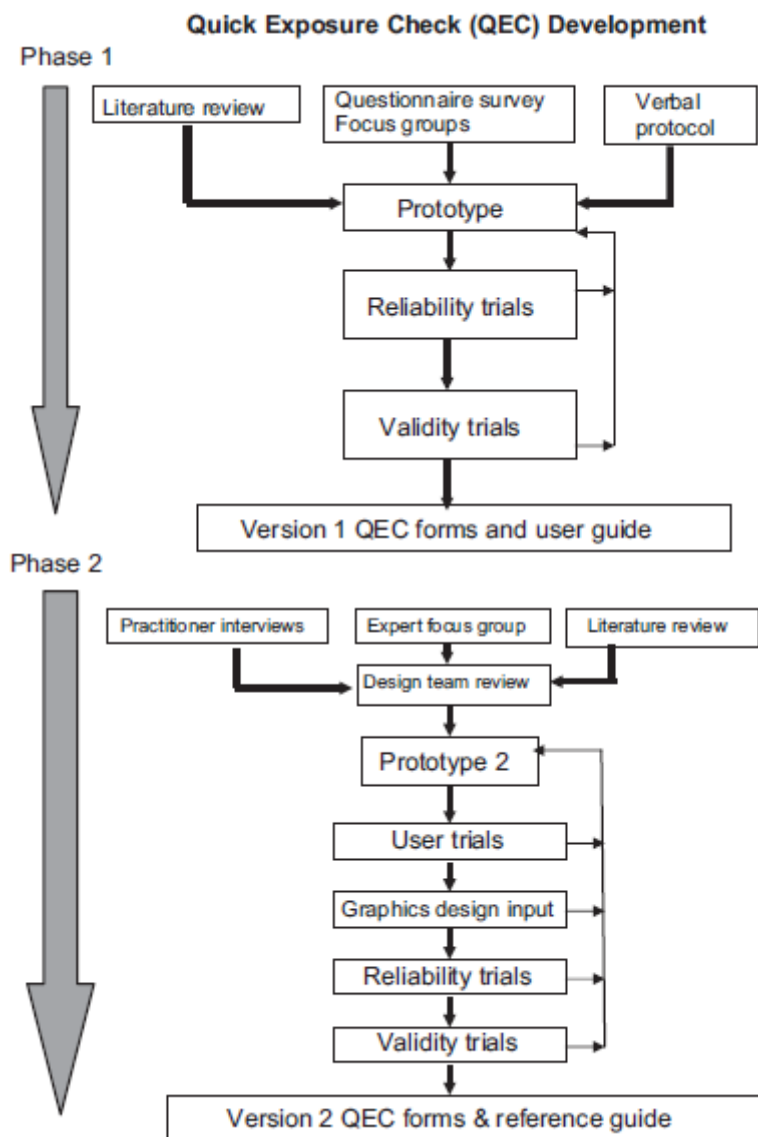
Figure 41 Quick Exposure Check (QEC) development process

Reliability trials for example could involve event organisers reviewing an event (using the CSAT) on two separate occasions to compare the two completed CSATs to determine the extent to which the two uses differ, assessing the reliability of the CSAT [as with the QEC reliability trails (David et al., 2008)]. Research could also gain feedback from crowd users (as well as event organisers), taking an additional (perhaps simplified) version of the CSAT into a crowd event. Additionally, as suggested in the feedback interviews, a smart phone application could be developed, based on the CSAT. The application could be downloaded when the

tickets are purchased, or in the queue for the event (as a distraction from the queue for example). Additionally, a phone charging station could be positioned within an event (particularly a festival event taking place over a number of days), at which point crowd users could charge their phone, and in return complete a feedback questionnaire on the satisfaction of the event, while they wait. Research would be required to determine the optimum length of the questionnaire, and most significant questions for establishing the views of crowd users. Moreover, further training could be considered for event organisers, to implement findings from this thesis, along with the implementation of additional qualifications to include the human factors considerations when planning a crowd situation, utilising the CSAT.

9.4 Critical review of the thesis

The research within this thesis aimed to provide a holistic view of the issues that impact crowd user experience, and has served to show the complexity of the issues the influence crowd satisfaction. Previous research into the user experience of crowds, including that of Berlonghi (1995), has developed a simple list of issues that impact the experience of a crowd. However the research within this thesis has assessed user, stakeholder and security perspectives of various different crowd situations, in order to develop a holistic overview of crowds. Moreover, The Green Guide (2008), and The Purple Guide (HSE, 1999) provide guidance documents of the issues to consider when organising a specific crowd event (a music festival, or a sporting event in a stadium). Research within this thesis aimed to explore the user experience of crowds, with previous research focusing on the safety and pedestrian flow within crowd situations, as well as hooliganism prevention and improving security within crowds. The research provided a 'proof of concept' for the CSAT, as well as a model developed to summarise the factors that influence the user experience of crowds. However, through achieving this, the CSAT is justifiably long and therefore all issues presented within the tool are not relevant to all crowd types.

Reflecting upon the research presented in this thesis, a number of strengths are apparent. Primarily the number of interviews and observations undertaken and the range of crowd situations covered in the data collection, within both public and private security, and also across different parts of the world. Additionally, the observation of crowd events over an 18 month period is strength of the research within this thesis. Different seasonal variations were incorporated and different

crowd situations, to provide a comprehensive overview of the issues that impact crowd user experience.

9.4.1 Methodological limitations

Methodological limitations were highlighted for each of the sections of this thesis, within the methodology chapter (Chapter 3). However a number of specific limitations are evident throughout this thesis.

9.4.1.1 *Purely qualitative research approach*

One limitation of the research within this thesis could be the lack of quantitative support for the issues gained through qualitative data collection and analysis. Therefore future research could validate the CSAT and summary model using quantitative methods. However, qualitative methods were considered the most appropriate for meeting the aims of the research within this thesis, as the research aimed to explore an area of crowd experience that was relatively underdeveloped. Qualitative methods therefore gained further depth and insight into the issues that impact the organisation and delivery of crowd events to meet the needs of the user.

9.4.1.2 *Self-report issues and sampling*

One limitation of the research within this thesis is the reliance on self-report data from user focus groups (Chapter 4), stakeholder interviews (Chapter 5), security observations (Chapter 6), and event observations (Chapter 7). However measures were taken to reduce the risk of self-report data, including the triangulation of each of the different research methods to produce the CSAT and summary model.

Although data collection ceased when data saturation was achieved, a larger sample size across different user groups, and stakeholder groups, as well as across different crowd stations observed, would enhance confidence in the data, and conclusions drawn. For example within security observations just one demonstration was observed, with no demonstrations observed within event observations. Therefore further research concentrating on demonstration crowd

situation specifically would gain further insight into demonstration crowds specifically.

9.4.1.3 *Researcher bias*

Data gathered through complete participant event observations could be subject to the biases of the researcher, as the researcher gathered the observational data, analysed and presented the findings. Therefore the views and knowledge of the researcher could impact the issues identified during event observations. The researcher had a human factors and psychology background, and may therefore have been concentrating on particular aspects of an event, consequently missing noteworthy issues as a result. As described within the methodology section of the research (Chapter 3), an observational checklist aided the systematic collection of observational data, aiming to reduce the researcher bias.

9.4.1.4 *Generalisability and transferability of the research findings*

The research presented within this thesis has a number of strengths and weaknesses, as shown above. With the triangulation of data from user focus groups, stakeholder interviews, security and event observations, into the development of the practical CSAT, and summary model of the factors that influence crowd satisfaction. This provided a rigorous basis for the understanding of issues that impact the user experience of crowds. However, due to the qualitative methods used the generalizability of the findings across different crowd situations is limited. Though the feedback interviews and assessment of the 'proof of concept' of the CSAT support the comprehensive issues raised surrounding crowd user experience. Further research is required in order to generalise the findings to crowd situations other than those involved in the research within this thesis.

9.5 Concluding comments

Research to date had covered the bio-medical, environmental, psycho-social and physiological perspectives of crowd experience. However, there had been limited

consideration given to crowd experience from a human factors perspective, to assess the systems perspective of crowd events. Thus, research in this thesis explored crowd user experience (comfort, safety, satisfaction and performance); to develop a holistic perspective of the issues that interact within a crowd event and indicate issues that impact the user experience of crowds. This approach to the assessment of crowd user experience aimed to determine how the event could be improved for crowd organisers, deliverers, and end users of the crowd event.

Research in this thesis has highlighted the complex interaction of factors affecting crowd user experience. It has also indicated the varying attention given to crowd experience across different crowd situations. Findings have identified considerable variation in the organisation of different events, the security planning, the provision of resources and facilities across different events observed. The research within this thesis attempted to show aspects of crowd events that are currently being conducted successfully to provide a positive experience for crowd users; as well as issues that led to frustrations among crowd users, reducing the experience of the user. Findings within this thesis identify a number of core issues suggested to impact crowd user experience, and varying awareness of user needs, as well as differing levels of empathy and understanding surrounding user experience.

Findings from the research within this thesis suggest that focusing event organisation on the core issues will help contribute to the success of the crowd event, and the user experience. A full list of the research findings were developed into the CSAT (Appdenix H) to provide stakeholders with an 'exhaustive' (in the context of this research) basis of issues to consider when planning events. However, focusing attention and resources on relatively inexpensive interventions might encourage event organiser 'buy-in' and commitment to enhancing the user experience of crowds (satisfaction, safety, comfort and performance). Such as ensuring queuing systems allow for a clear definite line so as to reduce competition between crowd users; as well as (where appropriate) few drink options to reduce queue times and reduce stress for ground staff working at crowd events. Further research is required to assess the cost-benefit analysis of providing issues raised during the research within this thesis, including providing clear and sufficient signage, sufficient facilities to meet the requirements of the user for example.

Despite the daily encounter humans experience with crowds, whilst commuting to work or completing the weekly grocery shop for example, the research within this

thesis highlighted that more could be done to improve the organisation of crowd situations for the user. The organisation and planning of crowd situations requires attention and improvements in order to enhance the user experience, through reducing the negative experience of crowding, and enhancing the positive feelings that being part of a crowd can provide.

9.5.1 Relevance and impact

Findings from the research undertaken within this thesis should be of interest to event organisers involved in planning crowd situations, including stakeholders involved in the organisation of spectator events, to public and private security organisation. The research findings would be of particular interest to those stakeholders new to the role, and might have potential benefits within the development of training programmes for crowd stakeholders involved in different aspects of crowd situations.

With the growing world population, the importance of understanding the issues influencing the user experience of crowd is ever increasing, and understanding how to enhance the user experience of crowds is an issue that is likely to become increasingly important. With an increased population comes an increase in the number of users for services within the community. For example understanding how to organise transportation hubs to accommodate larger numbers of crowd users in a more comfortable environment will become more and more important. Also understanding the design, organisation and layout of museums and art galleries for example, will be important to provide a more satisfying and comfortable experience for the user despite the increased demand on services. Additionally an increasingly aging population will unavoidably lead to additional considerations for the design of crowd situations to accommodate all users. Moreover, the growing competition between event organisers involved in festival events in particular, will result in growing demands and higher expectations from crowd users. This will inevitably lead crowd organisers to develop methods of enhancing the experience they provide the crowd with, in order to improve the loyalty of crowd users to an event.

Within public and private security specifically, furthering understanding as to the importance of providing an environment that encourages crowd users to withdraw from antisocial behaviour, and provides an enjoyable experience for the majority of

crowd users is important. The police in particular are interested in continually improving the training, and understanding surrounding keeping the peace within crowd situations. Additionally, with the increasing use of private security within crowd situations, understanding and guidance on crowd situations could be used to improve the training of private security officers. Research findings from this thesis would also be of interest to the training of event organisers, and security stakeholders. Furthering the development of the CSAT would enable the implantation into training programmes for event organisers and deliverers, and other stakeholders involved in crowd situations.

Humans experience crowds throughout their lives, and therefore understanding and improving the user experience of crowds is relevant to us all. With potential benefits ranging from reducing antisocial behaviour during football events, improving the layout and increasing the flow of pedestrians through train stations, to encouraging the loyalty of crowd users to return to future festival events for example. Providing a safe, enjoyable and comfortable crowd situation for crowd users is of benefit to all stakeholders involved in crowds.

10. References

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Appendices

Appendix A

Focus Groups Schedule

<div align="center">

Focus Groups Schedule
(90 minutes)

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Email sent out before focus group: Think of a time when you have been in a crowd and found it enjoyable, and why, and an example of when you have been in a crowd and had a bad experience and why?

Distribute informed consent forms and participant questionnaires

Brief explanation of the structure of the focus group, and what the focus group will discuss.

Ice breaker
Introductions from each member of the group: positive and negative examples

Victoria Kendrick
Positive: Leeds Festival 2005 – sunny, good atmosphere, brilliant music.
Negative: London underground line closure – diverted, hot, noisy, people impatient, cramped, confusion, unsafe.

- Personal examples
- Crowd situation and types of crowds (rather than actual experiences)
- Whilst at crowded events, what would have improved your experience?
- Was there anything in particular that you would have changed?
- Was there anything you didn't like?

<div align="center">

GROUPED PROMPTS

</div>

- Experiences in such crowds
  - Positive and negative
- Problems you might encounter?
- Factors affecting your enjoyment in the crowd
- Imagine you are one of the people in the photograph – what factors might be affecting how you are feeling?
- Would you like such a situation?
- Would you avoid such a situation?

Retail
Photo A: Outdoor market:
- Security
- Goal achievement
- Encumbrances (bags)
- Being able to achieve your goal – with as little stress as possible

Photo B: Outdoor market
- More open space

- Bargain to be had
- Children

Photo C: Indian market
- Traffic safety
- Organisation
- Security

Photo D: Indoor Supermarket
- Trolley
- Time constrictions
- Time of day
- Children
- Being able to achieve your goal – with as little stress as possible
- Physical obstacles

Photo E: Christmas shopping
- Holiday shopping
- Atmosphere
- Shopping mall
- Sales shopping

Photo F: Chinese street
- Mobility – impaired
- Walking aid / wheelchair
- Slow walkers
- Scenery
- Time pressures
- Vacations – more to enjoy looking around

Religious pilgrimages
Photo G: Hajj – Mecca – Saudi Arabia
- Extremely high density
- Media coverage of previous disasters
- Crushing hazards
- Joy / excitement if you are a Muslim attending
- Exit from crowd in emergency
- Annual

Photo H: Western Wall - Israel
- Personal space
- Safety
- Strong desire to see the site – may not notice crowd
- Heat

Photo I: St. Peters Square – Rome
- Organisation

- Personal safety – escape route should you require one
- Weather – umbrellas
- Cobbled street

Tourism

Photo J: Queue for Vatican City - Italy
- Queue
- Would you get up early in the morning in an attempt to avoid the queue?
- Or would you be happy to queue?
- Why do you think that might be?

Photo K: The Great Wall of China
- Tourists
- More time to enjoy the views
- Photography

Photo L: Mona Lisa – Le Louvre
- Do not mind the crowd as long as you get to see the paintings and appreciate it
- Noise
- Photography
- Sweat
- Personal space

Transport

Photo M: Train station platform
- Being able to get to where you need to be
- Stress
- Work commute
- Insufficient seating for passenger requirement
- Pressure to compete for a seat

Photo N: Underground station platform
- Claustrophobia
- Underground – enclosed
- Media coverage of major disasters
- Escape route should you require it
- Safety – fall onto the track

Photo O: Entrance and Exit to Underground
- Physical obstacles – bus stops
- Relief to be in the fresh air
- Confusion
- Tourists stopping to find out the direction they need to take
- Commuters in a hurry

Entertainment / Spectator

Photo P: Music gig - indoor
- Balance
- Crowd surfers
- Enjoyment
- Hot
- Alcohol / Drugs

Photo Q: Music festival - outdoor
- Option to more further away from the stage
- View performance from the screens at the side of the stage
- Anticipation if you have never been to a festival before

Photo R: Sports stadium – tiered spectators
- Good view of the event from all seats
- Steep seating – safety
- Football hooliganism
- Negative behaviour in a crowd

Photo S: Bonfire night
- Cold
- Muddy underfoot
- Lighting
- Safety
- Organisation of the event
- View of the bonfire and fireworks

NOTES..
Have you attended such an event?
Would you like to attend such an event?
What would you be thinking about before attending such a situation?
What was it about the situation that made you feel like that?
What might you have changed?

Appendix B

Focus Group Informed consent

Informed Consent

The focus group will last for approximately 60 minutes, during which time we will discuss our experiences of being in a crowd of people.

The focus group will consist of the presentation of a number of photographs highlighting a number of different crowd scenarios. The group will then discuss examples of their personal experiences in similar crowds, positive and negative experiences they might have encountered. The focus group will be recorded for later analysis, all information will remain confidential, and anonymity protected in the publishing of results.

As participants you have the right to withdraw from the investigation if you wish to do so at any point during or following the focus group.

Name…………………………………………………………………………...

Signed………………………………………………………………………….

Thank you for your help,

Victoria Kendrick BSc; MSc
(Loughborough University, Ergonomics Department - Humans Sciences)

(Leave Blank)

Participant number…………………………………………………………

Group number…. ………………………………………………………….

Appendix C

Focus group photo schedule

Appendix D

Stakeholder interview schedule (first draft)

Prompts	Issues to cover	Notes

Background
(Introduction)
• What do you mean by that?
• How do you do that?
• Why do you think that is effective?
• What in your opinion could be improved? Works most effectively?
	• **Who** are you?
	• **What** is your job title?
	• **What is your responsibility** on this task? (How does this tally with the clarity of their role)
	• **Where** does your information regarding role come from? (are you told this, or is there misinterpretation)
	• Each person's understanding of:
	  o **What issues are important?**
	  o What measures have been put in place to ensure a good experience is had by each crowd member?<hr>1. **Training**
	  a. Crowd management
	  b. Crowd control
	2. **Role**
	  a. How has your role changed?
		{Following the observation – ask individuals to confirm areas / to fill in the gaps in what you observed.}

Design
• Organisation of crowd,
• Sectioning,
• Clear exit routes,
• Toilet facilities,
• Seating,
• One-way or contra flow system,
• View
	1. **Possible problem areas:**
	  a. Flow of pedestrians
	  b. Bottle-necks
	  c. Exit routes
	2. **Facilities:**
	  a. Toilets
	  b. Food and beverage
	  c. Car parks
	3. **Preparation before an event**
	  a. Information on particular crowd members?
	  b. Design of crowd venue?
	  c. Capacity?
	  d. Anticipated ingress/egress?
	4. **Positive design**
	  a. What?
	  b. Why?
	5. **Negative / areas for improvement?**
	  a. What
	  b. Why?
	  c. Recommendations
	6. **Briefing**
	  a. Before event
	  b. Debriefing
	  c. Feedback - crowd members?
		Debrief of successes and failures – to improve future events

Communication
• Information availability
	1. **Information communication**
	  a. Effective
	  b. Problems?	

• Language barriers	**2. Possible improvements** a. Feedback?	

Stress
 • Anxiety,
 • Frustration,
 • Vulnerability,
 • Intimidation
 • Claustrophobia
 	
Mood
 • Manners,
 • Boredom,
 • Hostility,
 • Excitement,
 • Anticipation
	1. Crowd member satisfaction
	2. Crowd behaviour
	  a. Monitoring
	  b. Steps to restore calm
	3. Monitor stress
	  a. Detection
	  b. Crowd members (individuals/ groups)
	4. Prevent panic
	  a. Emergency situation?
	  b. Ingress / Egress
	5. Boredom:
	  a. Prevention?
	  b. Management
	6. Dissatisfied crowd members:
	  a. How do they voice their concerns? Grievances?
	7. Police and security
	  a. Who's role to calm crowd / prevent unrest?
		Training?

Safety and Security
 • Hazards,
 • Slips, trips & fall,
 • Trampling risk,
 • Violence
	1. Health and safety standards:
	  a. Improved
	  b. Future events?
	2. Accidents
	  a. Prevention
	  b. Slips, Trips, and Falls
	3. Emergency services:
	  a. Working together
	  b. Prior to an event?
	  c. During an event?
	  d. During an emergency situation?
	4. Police and Security
	  a. Work together to calm the crowd
	  b. Spacing of police / security
	  c. Independent event security
	5. Violence
	  a. Prevention
	  b. Managing
	  c. Intervention	

Environmental factors
 • Weather,
 • Heat,
 • Vision,
 • Noise,
 • Pollution,
 • Odours
	1. Weather
	  a. Variances
	  b. Extremes
	  c. Overheating / water available?
	  d. Too cold during / winter
	2. Measures to call off crowd events
	  a. Meetings
	3. Noise
	  a. Regulations	

	b. Maintained	

Navigation
• Disorientation,
• Losing people in a crowd
	1. Assistance
	    a. Staff available
	2. Signage
	    a. Who in control
	    b. Design and organisation
	    c. Feedback
	3. Meeting points?
	    a. Lost children
	4. Direction around crowd event
	    a. Map
	        i. Available
	        ii. Distributed?
	5. Directions to event
	    a. By transportation
	        i. Car
	        ii. Bus
	        iii. Train
	        iv. Air	

Company • Accompaniment of friends, • Lonely in a crowd		

Goal prevention
• Conflicting goals,
• Prevention of goal achievement,
• Competition between crowd members
	1. Organisers different priorities?
	    a. Safety
	    b. Satisfaction
	    c. Financial
	    d. Business perspective:
	        i. Returning
	        ii. Reputation	

Preconceptions • Prior experience, • Prior expectations, • Cultural norms, • Stereotypes	1. Consideration to differing crowd member **priorities**?	

Behaviour
• Inappropriate,
• Antisocial,
• Pushing
	1. Antisocial behaviour?
	    a. Prevention
	    b. Management
	    c. Action against	

Avoidance
• Of a crowd,
• Unavoidable crowd
	1. Ensuring that crowd members have a **positive experience**:
	    a. What measures are in place?
	    b. Who?
	    c. How?
	    d. Return to future events?	

Space available • Personal	**1. Adequate space for crowd members?**	

space	a. Measures in place
	b. Who?
	2. **Complaints** of inadequate space?
	    a. Feedback
	    b. Improvements?	

Individual factors • Physical height, • Age • Impact?		

Encumbrances
• Trolleys,
• Wheelchairs,
• Pushchairs,
• Suitcases
	1. What measures are in place to aid those with encumbrances:
	    a. Pushchairs
	    b. Suitcases
	    c. Trolleys
	2. What measures are in place to ensure crowd members have sufficient room to
	    a. Manoeuvre.. encumbrances
	    b. Store.. encumbrances
	3. What specifications have been considered to ensure disabled access?	

Distraction
• Unfamiliar surroundings,
• Presence of factors that distract from the crowd situation
	1. Procedures - distract from the crowd density?
	2. Ensure/develop/maintain positive atmosphere:
	    a. Music
	    b. Video footage
	3. Improvements
	4. Recommendations	

Atmosphere • Positive • Negative • Why?		
Motivation • Desire to be in the crowd, • Purpose (mutual, enjoyable) • £$ Financial motivation		
Control • Being in control of the situation, • Confusion, • Choice		
Time constraints • Rushing, • Bearable for a given time		

Notes: (*Points of interest that arise during interview – revisit when interview responses lessen*)

Appendix E

Stakeholder interview schedule (final draft)

Crowd Research Questions

1. What does your role involve?

2. What considerations are given to the following issues?
   a. Capacity (e.g. Monitoring overall numbers in building/separate areas)

   b. Signage (e.g. Way finding, information communication)

   c. Layout (e.g. Bottlenecks, ingress/egress)

   d. Health and Safety (e.g. Evacuation, pedestrian flow)

3. How do you ensure sufficient availability of the following?
   a. Facilities (e.g. Seating, toilets, car parking)

   b. Refreshments (e.g. Food and beverages)

   c. Security (e.g. Stewards, marshals)

4. What measures are taken to deal with the following issues?
   a. Comfort (e.g. Personal space requirements, thermal comfort)

   b. Atmosphere (e.g. Providing an enjoyable experience)

   c. Stress/Panic (e.g. Prevention/reduction during overcrowding)

   d. Crowd member differences (e.g. Age, physical health, mobility)

5. What are the main problems (if any) that you experience in planning for large crowds/events?

6. What areas (if any) do you feel could be improved, in order to enhance the event experience?

Thank you again for your time,

Victoria Kendrick

Postgraduate Researcher,
Loughborough University

Appendix F

Observational checklist

	Good	Bad	Notes
Design (organisation of crowd, sectioning, clear exit routes, one-way or contra flow system, view)			
Facilities (toilets, seating, welfare, refreshments, car parking)			
Stress (anxiety, frustration, vulnerability, intimidation and claustrophobia)			
Safety and Security (slips, trips and fall hazards, trampling risk, violence)			
Motivation (desire to be in the crowd, mutual, enjoyable purpose, financial motivation)			
Mood (manners, boredom, hostility, excitement, anticipation)			
Environmental factors (weather, heat, vision, noise, pollution, odours)			
Navigation (disorientation, losing people in a crowd)			
Goal prevention (conflicting goals, prevention of goal achievement, competition between crowd member)			
Time constraints (rushing, bearable for a given time)			
Preconceptions (prior experience and expectations, cultural norms, stereotypes)			
Behaviour (inappropriate, antisocial, pushing behaviours)			
Avoidance (of a crowd, or unavoidable experience of a crowd)			
Space available (personal space)			
Distraction (unfamiliar surroundings, presence of factors that distract from the crowd situation)			
Control (being in control of the situation,			

confusion, and choice)			
Encumbrances (trolleys, wheelchairs, pushchairs, and suitcases)			
Company (accompaniment of friends, or feeling lonely in a crowd)			
Atmosphere (positive feeling in a crowd)			
Individual factors (physical height, age)			
Communication (information availability and language barriers)			
Notes			

Appendix G

Ethical approval

An **observational study** is currently being conducted, for research purposes.

The study aims to determine the factors affecting crowd performance, incorporating safety, satisfaction, and comfort.

Observations will be conducted across various crowd situations, throughout the year.

Thank you for your time and cooperation,

Loughborough University, Design School

Appendix H

Crowd Satisfaction Assessment Tool (19th Draft)

Crowd Satisfaction Assessment Tool

Victoria Kendrick, Roger Haslam, Patrick Waterson

Loughborough University

Usability test

Thank you for taking the time to review the Crowd Satisfaction Assessment Tool, your help is very much appreciated.
Please read through the tool and highlight anything that:

- ✓ Doesn't make sense
- ✓ You like/dislike about the layout

Also:

- ✓ How long did it take you to read through? ……………………………… minutes
- ✓ How easy were the instructions to understand (the wording used)?

………
………
………………………………………………………………………………
………
………………………………………

- ✓ How easy was the tool to follow?

………
………
………………………………………………………………………………
………
………………………………………

Once you have read through the tool and highlighted anything that you want to, let me know.
Many thanks,
Victoria

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Name	
Event name	
Event date	
Event location	

What is the Crowd Satisfaction Assessment Tool?

The Crowd Satisfaction Assessment Tool aims to enhance the user experience of crowd events, by helping event organisers plan effectively and make good decisions. The tool can be used before an event, as part of the planning process, or following an event, as part of the evaluation process. By highlighting aspects of an event that could be improved, user satisfaction may be increased.

The design of the tool allows organisers to go through each of the issues and determine what is already in place, what more can be done, and what might be possible to achieve within an individual event to improve its overall success.

Achieving a positive, high-quality crowd experience is desirable to overall event success. If crowd users have a good crowd experience, they will be more likely to return to the event in the future, and ultimately increase reputation for organisers.

How to use the tool

1. Consider the issues and details listed in the tool, and describe what measures are currently in place with your event to address them.
2. Evaluate the measures on a scale from 1 to 5, where 1 is 'very poor' and 5 is 'very good'. Not all issues will be applicable to every event, and therefore a "N/A" option is included.
3. State whether or not further action is required (*yes or no*).
4. Describe what possible actions (if any) could be taken to improve each of the issues.

Key

✓ **Overall rating:** *1 = Very poor; 2 = Poor; 3 = Acceptable (neither good nor poor); 4 = Good; 5 = Very good; N/A = Not applicable* (Rate the measures currently in place for each of the issues, to determine whether all the necessary issues are being dealt with effectively.)
✓ **Requires attention**: *Yes / No* (Highlight whether further action could be taken to improve the situation, or remove the issue.)

Structure of the crowd satisfaction assessment tool

The crowd satisfaction assessment tool consists of five sections.

Section	Considerations	Page number
1. Anticipation	Who? (Crowd demographic)	1
	Where..? (Venue selection)	2
	Where..? (Venue layout)	3
	Where..? (Capacity)	4
	Facilities	<u>9</u>
2. Planning	Safety (planning ahead)	5
	Communication (way finding)	6
	Resources (training)	8
3. Influences (things that influences the crowd)	Environmental issues	12
	Public order	15
4: Monitoring	Crowd behaviour (during the event)	17
5. Responding	Feedback	19

Anticipation..
Who? (Crowd demographic)

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Crowd type	**Cater for the needs of the crowd:** ✓ Gain feedback from crowd users/staff members involved in previous/similar events			Yes / No	
	Anticipating expected crowd members: ✓ Issues that have occurred with similar events ✓ Where is this information stored? **Target audience:** ✓ Who are you catering for? ✓ Know the crowd users to expect at your event			Yes / No	
	Crowd type ✓ Ambulatory crowd (pedestrians walking within a crowd) ✓ Spectator crowds (for example theatre and sporting events) ✓ Expressive crowds (including the shouting, chanting experienced at football matches for example) ✓ Participatory crowds (during which the user is involved in actual activities of an event, e.g. a race event like the London marathon) ✓ Limited movement (experienced at the front of a music festival)			Yes / No	
	Cultural differences: ✓ Typical behaviour expressed during the				

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
	event ✓ Cultural differences in crowd behaviour ('keep left and keep right behaviours' *LINK to reference*)				
	Avoidance of a particular aspect of an event: ✓ Do crowd members avoid certain areas of an event?			Yes / No	
	Familiarity with the event: ✓ Previous experience within this event / similar events ✓ Crowd member expectations			Yes / No	
	Do crowd members have a common goal? ✓ e.g. Race participants for the London marathon **Or conflicting goals?** ✓ e.g. Football fans from opposing teams			Yes / No	
History	**Historical issues surrounding crowd / event type?** ✓ Where is the information stored? How is information obtained during the planning of the event?				
	Previous experience: ✓ Has the event been held before?				

Where..? (Venue selection)

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Venue design	**Venue suitability:** ✓ Aspects of the venue that you may want to change ✓ Venue reputation			Yes / No	
Design scheme	**Design:** ✓ Aesthetics ✓ Architecture – visitor experience built into new building design (*LINK Ref. Populous*)			Yes / No	

Where..? (Venue layout)

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Venue layout	**Floor space:** ✓ Crowd movement ✓ Sufficient stairs and entrance points **Positioning:** ✓ Do stalls or signs interfere with the walkways? **Walkways - space availability:** ✓ Wheelchair users ✓ Pushchairs and young children ✓ Tourists' luggage			Yes / No	
Layout of staff facilities	**Serving areas (food and drinks):** ✓ Reduce time taken to serve crowd members ✓ Reduce queue / waiting times ✓ Better organisation of the workstation - Increase productivity serving more customers in a given time			Yes / No	

Layout for spectators	**View:** ✓ Do all spectator areas provide a clear view? ✓ Walkthrough venue to ensure unobstructed view			Yes / No	
Spectator view	**Unobstructed:** ✓ Walk through of venue to ensure all areas / seats have a clear view ✓ Reduced price tickets for obstructed view (crowd users expect a reduced view)			Yes / No	
Pedestrian flow	**Pedestrian flow:** ✓ Edging effect (the distance pedestrians will keep from walls or other obstacles) ✓ Cross flow of pedestrians ✓ Flow rate through turnstiles (standards) ✓ Number of exits and width of ✓ Emergency evacuation **Input from specialist consultants:** ✓ Detailed analysis (static and dynamic crowd flow) *LINK to consultancies*			Yes / No	
Accessibility	**Accessibility:** ✓ Disability (including sensory) ✓ Wheelchair access			Yes / No	

Where..? (Capacity)

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Capacity	**Comfort level provided:** ✓ Psychological factors (not always accounted for within pedestrian flow modelling software) ✓ Does the safe capacity provide a comfortable area for crowd users?			Yes / No	

Capacity calculation	**Capacity calculation:** ✓ Pedestrian flow modelling software ✓ Fire safety standards ✓ Area per crowd user (square meters) ✓ Evacuation time constraints (escape routes)			Yes / No	
Ticketing	**Tickets:** ✓ Control the capacity ✓ Tickets for free events to monitor numbers ✓ Different tickets for different sections of one venue ✓ Coloured wrist bands for easy identification once inside the venue **Allocation:** ✓ Specific entrance point specified on each individual ticket **Information:** ✓ Tickets indicate – seat number; and how to get to the venue (for different entrance points) **Price :** ✓ Free event ✓ Expectations of crowd users for the price paid?			Yes / No	

Facilities

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Way finding	**Meeting point:** ✓ Area for friends to meet ✓ Lost children point **Map:** ✓ Available to crowd users (free)			Yes / No	

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
	✓ Signage located across the venue ('you are here')				
Spectators	**Seating comfort:** ✓ Seating design ✓ Leg room ✓ Padding ✓ Space for bags and coats?			Yes / No	
Welfare facilities	**Water facilities:** ✓ Drinking water available across the venue ✓ Distribute water to crowd members at the front of spectator events (cups / sponges) **Toilet facilities:** ✓ Number of toilets available? ✓ What is the average queue time? ✓ Time spent waiting for the toilet is time away from the event crowd users have paid to see. ✓ Large queue time - deterrent from buying more drinks ✓ Signage to alternative toilets ✓ Cleanliness, hygiene, maintenance (monitored) **Disabled facilities:** ✓ Number of facilities available? ✓ What is the average queue time? ✓ Accessibility, convenience **Changing facilities:** ✓ Showers ✓ Baby changing facilities			Yes / No	
Food and drink	**Catering:** ✓ Fast food			Yes / No	

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
	✓ Variety: Vegetarian / Vegan / Halal / Healthy options / Sweet / Gourmet ✓ Food allergies ✓ Queue time? ✓ Prices **Refreshments:** ✓ Hot and cold drinks ✓ Bar (alcoholic drinks) ✓ Winter events – hot chocolate, liquor, mulled wine **Queue times:** ✓ Limit drink options to reduce queue times during peak areas of the venue ✓ Quick serve beers / wine / cocktails **Additionally:** ✓ Carry cases for beer and wine – to allow crowd users to carry drinks more easily				
Car parking	**Car parking:** ✓ Distance from event (shuttle bus) ✓ Safety and security ✓ Public transport alternatives / incentives ✓ Impact on local community ✓ Ground surface in bad weather			Yes / No	
Competition for resources	**Reduce competition between crowd users:** ✓ Sufficient resources for the numbers of crowd members expected ✓ Antisocial behaviour if crowd members are in competition for resources ✓ One marked queue for each stall (particularly in peak flow areas of the venue) ✓ Security guard / member of staff at the			Yes / No	

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
	queue entrance: Check ID, manage antisocial behaviour and queue jumping **Allocated seating**: ✓ Reduce competition between crowd users				
Staff facilities	**Staff facilities:** ✓ Separate toilets and food areas for staff ✓ Area for staff to escape the crowd			Yes / No	
Housekeeping	**Litter:** ✓ Staff employed to remove litter ✓ Bins – emptied regularly ✓ Slips, trips, and falls **Rubbish bins:** ✓ Located across the venue ✓ Next to food and drink areas ✓ Regular emptying **Recycling facilities:** ✓ Recycling to reduce litter ✓ Plastic bottles, paper cups, tins, glass ✓ Recycling incentives to discourage throwing litter (e.g. deposit per returned cup)			Yes / No	
Additional entertainment systems	**Music:** ✓ Loud speakers on the walk to the event – atmosphere ✓ Significant songs played outside around the stadium (e.g. football songs on the walk to the stadium entrance) **Technology**: ✓ Applications (smart phones) ✓ Mobile phone charging points **Television screens:** ✓ Atmosphere in areas of the venue not			Yes / No	

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
	directly viewing the event				

Planning..
Safety (planning ahead)

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Event information	**Guidance for events planning:** ✓ Green guide, purple guide (*LINK to reference*) ✓ Local authority guides ✓ Health and safety specific guides			Yes / No	
Accidents	**Recording of information:** ✓ Who needs to be informed? ✓ Where is information stored? ✓ Prevention of accidents			Yes / No	
First aid	**First aid:** ✓ Training ✓ First aid kits available ✓ First aid areas for crowd users who require assistance (highly visible)			Yes / No	
Fire safety	**Fire drill:** ✓ ALL staff fully trained ✓ Regular fire drill procedures ✓ Monitor capacity			Yes / No	
Road safety	**Road closures:** ✓ Diversions			Yes / No	

	✓ Signs placed ✓ Marshalls (high visibility)				
Terrorism	**Awareness:** ✓ Specific government guidance ✓ Specialised training for staff			Yes / No	

Communication (way finding)

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Communication	**Advance notifications:** ✓ Negotiations with stakeholders (e.g. local authorities, public and private security) ✓ Organisation of the event ✓ Potential for breakdown in communication ✓ Radio communication **Inform local community of event:** ✓ Expect road / traffic delays on this date ✓ Letters distributed to the local community			Yes / No	
Customer service	**Staff:** ✓ Manners when serving the general public ✓ Prevent conflict and competition for resources between crowd users (e.g. being served at a bar)			Yes / No	
Signage	**Placement of direction markers:** ✓ Directing people from car parks and stations ✓ Walk through to ensure markers are in correct locations ✓ Temporary or fixed signage ✓ Signage strategies (increasing level of detail as move closer to allocated seat) ✓ Clear signage, colour coding for entrance point (indicated on ticket)			Yes / No	

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
	✓ Signs high above the crowd and large enough to view from a distance ✓ **View information (clarity):** ✓ Text size / colour ✓ Sign size / colour ✓ Anticipated viewing distance				
Information	**Communication systems:** ✓ Alert crowd users to safety/other announcements **Language barriers:** ✓ Crowd user information available in multiple languages Crowd users with sensory disabilities			Yes / No	

Resources (training)

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Staff	**Easily identifiable:** ✓ Uniform (bright colours facilitate enjoyment for crowd users) ✓ High visibility **Resources:** ✓ Risk of understaffing ✓ Risk of insufficient resources			Yes / No	
Training	**All staff fully trained:** ✓ Voluntry staff ✓ Full-time / part-time ✓ Security ✓ Marshalls **Training:** ✓ Polite / Manners with crowd users – to facilitate enjoyment of crowd users and				

	mediate disagreements between crowd users			
	✓ Professionalism			

Influences (things that influence the crowd)
Environmental issues

Issue	Potential Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Weather conditions	**Extreme weather:** ✓ Health and safety hazard ✓ Event cancellation ✓ Mud slip hazards **Rain**: ✓ Areas for shelter ✓ Sale of umbrellas / raincoats / ponchos ✓ Clear ponchos for staff ✓ Area to store umbrellas near to entrance ✓ Flooding - precautions in areas of potential puddling ✓ Straw – to reduce mud on the ground **Wind:** ✓ Shelter from the wind ✓ Secure **Ice and snow:** ✓ Salt availability ✓ Salt dissemination **Sun:** ✓ Sale of sunscreen ✓ Drinking water – free **Prior warning:** ✓ Advanced warning for crowd users (email / leaflet) to consider weather conditions and			Yes / No	

Issue	Potential Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
	arrangements for appropriate amenities				
Temperature comfort and air quality	**High temperatures:** ✓ Ventilation ✓ Air-conditioning ✓ Welfare facilities – water distribution **Low temperatures:** ✓ First aid - Thermal insulation blankets ✓ Indoor areas ✓ Sheltered areas			Yes / No	
Lighting	**Insufficient lighting:** ✓ Security concerns ✓ Personal security ✓ Car parking areas ✓ Entrance and exit routes ✓ Slips, trips, and falls ✓ Route marking ✓ Traffic and pedestrians ✓ Emergency lighting (generator)			Yes / No	
Noise levels	**Hearing protection:** ✓ Staff (regular checks to ensure use) ✓ Crowd users / Infants ✓ Monitor excessive noise (particularly after 11pm) ✓ Curfew noise (checks to ensure compliance) **Acoustics:** ✓ Can sound be heard clearly from all areas of the venue? ✓ Can announcements be heard? ✓ Does the wind affect the acoustics? ✓ Can alarms be heard			Yes / No	

Influences (Things that influence the crowd)
Public order

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Crowd behaviour	**Crowd behaviour:** ✓ Crowd control and management ✓ Violence **Boredom:** ✓ Distractions in queue areas (music; trivia question signs; posters / advertisments) **Stress:** ✓ Control over the situation **Panic:** ✓ Clear exit routes marked ✓ Security staff available / highlighted			Yes / No	
Observing crowd behaviour	**Observing** ✓ Control room ✓ CCTV ✓ Stewards located throughout the crowd			Yes / No	
Response to crowd behaviour	**Response:** ✓ Proactive – think ahead and consider possible issues before they arise / areas of concern ✓ Proportionate – react to the crowd with appropriate level of management, to match the behaviours displayed			Yes / No	

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
	✓ Flexible – review the crowd situation throughout the event and be prepared to revise the plans ✓ Plan ahead in order to prevent a reactive response ✓ Speed of response				
Antisocial behaviour	**Alcohol abuse:** ✓ Age ID ✓ Wristband to highlight underage crowd users ✓ Staff monitor alcohol consumption ✓ Remove intoxicated crowd users **Drug abuse:** ✓ Drugs amnesty at the entrance of the event ✓ Zero tolerance ✓ Staff monitoring drug use **Behaviours:** ✓ Staff monitoring antisocial behaviour ✓ Pushing and shoving ✓ Queue jumping			Yes / No	
Challenging antisocial behaviour	**Tactics:** ✓ Segregation of crowd users (e.g. opposing football fans) ✓ Police horses and dogs used as a deterrent			Yes / No	
Segregation between crowds users	**Barriers split crowd into sections:** ✓ Reduce the pressure of the crowd on the barriers ✓ Aid crowd management ✓ Pressure sensors - measure pressure on barriers			Yes / No	
Relationship between	**Public and private security:** ✓ Communication			Yes / No	

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
public and private security	✓ Information sharing				

Monitoring
Crowd behaviour (during the event)

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Time constraints	**Time constraints:** ✓ Timetables / schedules ✓ Time spent in crowd – duration of crowd event ✓ Unexpected delays -			Yes / No	
Timing	**Time of the day:** ✓ Staggered entry (indicated on the ticket) ✓ Peak hours			Yes / No	
Ingress	**Controlled Ingress:** ✓ Specific entrance specified on the ticket and clearly signposted (*See ticketing*)			Yes / No	
Monitor capacity within one venue (and across different areas of one venue)	**Monitoring capacity:** ✓ By eye ✓ Door stewards ✓ Wrist bands indicating different areas of a venue **Door stewards:** ✓ Staff to check correct tickets **By eye:**			Yes / No	

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
	✓ Monitor when crowd feels uncomfortable **CCTV:** ✓ Sufficient lighting ✓ Staff to monitor crowd numbers across numerous areas of one venue ✓ Highlight increasing congestions and bottlenecks				
Queuing	**Queuing:** ✓ Queue curlers – barriers to organise queue areas ✓ Distractions whilst queuing (*interesting information and games provided within the queue to pass the time for crowd users*) ✓ One specific queue leading to the facilities – staff member directing the next customer to be served.			Yes / No	
Congestion	**Bottlenecks:** ✓ Identify areas of possible congestion (limiting pedestrian flow) **Personal space:** ✓ Discomfort ✓ Competition between crowd users **Escape routes:** ✓ Clearly marked ✓ Even / level surface			Yes / No	
Traffic management	**Delays:** ✓ Encourage public transport to the event (information provided along with ticket)			Yes / No	
Egress	**Time of egress:** ✓ Fire safety - Time limit to vacate (*LINK guidnace*)			Yes / No	

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
	✓ Rehearsal ✓ Effect if an exit is blocked **Egress (motor vehicles)**: ✓ Car parking bottlenecks ✓ Encourage car parking further away from the event, to reduce congestion ✓ Surface of the car park (grass / concrete) ✓ Anticipate weather effects				
Emergency evacuation	**Clear exit routes:** ✓ Clearly indicated ✓ How are they maintained? ✓ Traffic cones, marshalls			Yes / No	

Responding

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
Meetings	**Evaluation of ideas:** ✓ Briefings; debriefs			Yes / No	
Feedback	**Feedback from crowd users:** ✓ Customer services ✓ From previous / for forthcoming events ✓ Where is feedback stored? ✓ How is the feedback information used? ✓ Past feedback questionnaires - Complaints or praise ✓ Social media comments and feedback (twitter/facebook) **Feedback from staff:**			Yes / No	

Issue	Considerations	What has already been considered or put in place?	Overall Rating	Requires attention	What more could be done?
	✓ Staff across the hierarchy ✓ All stakeholders				
	Avoidance of a particular aspect of an event: ✓ Do crowd members avoid certain areas of an event? ✓ Due to lack of signage (e.g. failure to notice a second set of toilets around the corner)			Yes / No	

<u>END</u>
Thank you so much for contributing to the improvement of the Crowd Satisfaction Assessment Tool….

Appendix I

Feedback Interview schedule

Event organiser feedback interview questions

Overall

How long did the tool take to complete? Did you find the TOOL time-consuming to use?
Would pictures help at all..?
Use the tool to review and evaluate an event you have organised. {Free Fest}
Did you find the TOOL useful? (Usefulness)
Would you use the TOOL?
How could the TOOL be improved?
Was there anything that the TOOL did not cover?
Was the TOOL easy to use? (Usability)
{As you are completing the tool please highlight any issues that are unclear, and note down any additional issues that may have been omitted.}

- Do you have any comments about the tool at this stage..? How does it seem to you..?

Initial questions (usability):

Now that you've used the CSAT.. What are your initial impressions of the CSAT?

- Time to complete..? How long did it take you to complete the tool

What about the wording..? How does it seem to you..?
What about the usability..?
Do you have anything to add to improve the usability/wording..?

Usefulness

Having completed the CSAT:

- What was your impression of the usefulness of the device for you specifically..?
- Which aspect of the CSAT did you find most useful to complete..? Why..?
- Were there any issues that you

Remember I am here to learn exactly what the CSAT provides, and the more issues that you highlight the better. I will not be offended by anything that you have to say, and would really appreciate your professional prospects in order to improve the tool.

Layout

- On a scale of 1 to 5 where 1 is very difficult and 5 is very easy:

- How easy or difficult did you find the layout to follow..?
- Do you have any comments about the layout..? The presentation of the information..?

Overall rating for each part of the Crowd Satisfaction Assessment Tool

- On a scale of 1 to 5 where 1 is very difficult and 5 is very easy:
  - How easy or difficult did you find the tool to use..?
  - How easy or difficult was the tool to follow..?
- Was there any time when you were unclear about what you had to do..?
- Do you have any comments about the wording..? The clarity of the information..?
- Would you be willing to use this tool..? As part of your event organisation / preparation / evaluation..?
  - <u>Why..?</u> What was it about the tool that you liked..?
  - <u>Why not..?</u> What was it about the tool that you did not like..?
  - What alterations would need to be implemented to encourage you to use the tool..?