

Factors influencing experience in crowds – the organiser perspective

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Abstract

Crowds are a commonplace encounter but the experience for participants can be highly variable. Crowds are complex sociotechnical phenomenon, affected by many interacting factors. Little is known, however, about how those responsible for organising crowd situations approach their responsibilities. This study conducted semi-structured interviews (n=41) with organisers responsible for different aspects of the design, planning, management and operations of events and other crowd situations. The objective was to understand organisers' priorities, along with the consideration given to the experience of crowd participants. The interviews revealed that organisers generally prioritised finance, security and health and safety aspects, whilst giving limited explicit attention to other important factors that affect participant experience. Organisers tended to approach their planning and decisions on the basis of their own experience and judgement, without accessing training or reference to guidance. It is suggested that the non-use of guidance is in part due to problems with the guidance currently available, both its content and its form. The organisers of infrequent or small-scale events have the greatest knowledge and experience gap. It is concluded that in order to achieve a consistent, high quality experience for crowd participants, there needs to be improved understanding among organisers of the complexity of crowds and the multiple factors influencing participant experience. Guidance and tools need to be usable and tailored to organisers' requirements. Organisers of infrequent or small-scale events are especially in need of support.

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Research highlights

- Investigation into crowd organisers' priorities and how they operate.
- Interviews conducted with 41 crowd organisers involved in a range of capacities.
- Organisers prioritise health and safety and commercial considerations.
- Insufficient attention is given to other aspects important for crowd participant experience.

Keywords: event planning, event organisation, crowd ergonomics

1. Introduction

Enhancing the experience of being part of an event, gathering or crowd has been of interest for centuries. The Coliseum in Rome, for example, built in 70 AD, was designed to heighten the enjoyment of spectators. It is believed to have contained features such as shaded viewing areas and numbered entrance points for the comfort of spectators (Perkins, 2004). The design also contained 80 passageways throughout the amphitheatre to allow for quick and efficient ingress and egress. Centuries on, however, ergonomics and human factors aspects of crowd situations are still being overlooked, with the experiences of participants too often poor as a consequence (Filingeri et al., 2017). Understanding how the various actors involved in the design, planning, management and operations of crowd situations is important to understand where improvements could be made towards optimising the experience for participants.

Crowd situations occur in wide ranging environments, anywhere from a field, marquee, concert hall, to a railway station. In some situations, there is flexibility to alter the layout. In others, permanent infrastructure and available space are a restriction. Extensive guidance is available for planning and managing crowd situations (e.g. Work Safe Victoria, 2007; SGSA, 2008; HSE, 2010; Cooper, 2014, EIF, 2016). This guidance gives advice on: venue layout, pedestrian flow, queuing, monitoring occupancy, signage, welfare facilities and dispelling antisocial behaviour, for example. However, the focus is generally on preventing dissatisfaction rather than enhancing satisfaction. Another dimension, according to Still (2013), is that many crowd situations are designed, planned, managed and operated by organisers without adequate knowledge, understanding and competencies, in contexts where licensing is not required. In practice, there is a wide diversity of outcomes, ranging from crowd situations providing an excellent experience for participants to those where it is very poor (Filingeri et al., 2017).

Research concerning the wellbeing and experience of crowd participants has examined, for example, satisfaction of individuals in crowds (Machleit et al., 2000); psychological reactions to a given crowd situation (Worchel and Teddie, 1976; Worchel and Yohai, 1979; Hopkins et al., 2016; Pons et al., 2016); impact of prior expectations and experiences (Webb and Worchel, 1993); gender and experience

(Rustemli, 1992; Ozdemir, 2008); personal and cultural space preferences (Martinez, 2009; Pons and Laroche, 2007); and crowding and goal performance (Klein and Harris, 1979). Attention has also been given to the impact of different crowd situations on individual experience of stress (Cox et al., 2006). Moreover, studies have considered a range of different crowd types including those occurring with retail environments (Whiting, 2013; Pons et al., 2016); restaurants (Robson, 2011); music festivals (Janchar et al., 2000); sporting events (Johnson, 2008); and religious pilgrimages (Hughes, 2003).

When it comes to beneficial aspects of crowds, Yildirim and Akalin-Baskaya (2007) explored the effects of crowding on human health and behaviour and found that crowding and close inter-personal distances increase stimulation, which if maintained at an optimal level may be welcome to participants. Studies have identified beneficial aspects of crowds for businesses (Whiting and Nakos, 2008; Brown, 2010; Brown and Hutton, 2013). Most notably, the Walt Disney Company coined the term “guestology” to describe their user-centred approach to optimising participant experience at their theme parks (Ford and Dickson, 2009; Ford et al., 2012). This involved customer interviews, focus groups, observations and surveys to gain insight into their customers’ expectations and reactions, to understand the user experience. This user-centred approach is claimed to have been effective in creating ‘magical’ experiences for participants, contributing to a successful business model, positioning Disney as an exemplar of service excellence. This foregrounding of attention to participant experience is a rarity, however.

With regard to crowd design, planning, management and operations, Berlonghi (1995) defined 11 different types of crowd, depending on the nature of participants and their behaviour: ambulatory; disability or limited movement; cohesive or spectator; expressive or revellous; participatory; aggressive or hostile; demonstrator; escaping or trampling; dense or suffocating; rushing or looting; and violent. Berlonghi also described crowd catalysts, triggers that could affect the mood of a crowd, altering it from one that can be managed to one out of control. Although these definitions aimed to help distinguish different crowds, allowing appropriate strategies to be developed for crowd oversight, little evidence exists to confirm the categorisation. Evidence of the successful translation of Berlonghi’s framework to the organisation of actual crowd situations is also limited.

More recent research has identified a need to develop more rigorous, systematic data collection techniques, from which to enhance theoretical understanding and conceptual analysis of crowds (Haghighia et al., 2013; Turrís et al., 2014). Haghighia et al. (2013) highlighted the need to improve understanding of the influences on crowd behaviour, with systematic collection of data in support of medical emergency management in crowd situations. This approach might also be applied to participant experience within crowds, which might also benefit from more stringent, usable systems for gathering information and responding accordingly. Turrís et al. (2014), developed an event model to characterise crowds of pedestrians, allowing comparison of different crowd situations. The modelling aimed to strengthen the assessment of risk in order to prevent the spread of infectious diseases within crowds. The model incorporated crowd demographics (event type, geography, size, temporality); dynamics (crowd type, crowd behaviour, purpose of event, political context); and design (protective factors, special hazards, onsite health services, host community burden) to define a crowd. Although this event model focused on improvements related to public health and the spread of infectious diseases, the model and methodology could be used to support the planning of crowd situations with the aim of enhancing the user experience.

The existing studies of crowds have, however, tended to be restricted to a limited range of factors, confined to particular crowd types and not embracing the socio-technical systems perspective that ergonomics and human factors (E/HF) would advocate (Challenger, et al., 2009; Davis et al., 2014; Martella et al., 2017). It is readily apparent that crowd situations involve significant interactions between humans and features of the environment as well as a multitude of social exchanges. The oversight of crowds entails complex organisational processes and coordination. These characteristics place crowds clearly within the scope of E/HF, with its human centred, systems approach.

The study reported in this paper extends our previous research, which examined influences on crowd participant experience (Filingeri et al., 2017). This earlier study involved a combination of focus groups with different user groups (35 focus group participants, age range: 21-71 years) and observations (55 different crowd situations, e.g. transport hubs, sport events, demonstrations). Important influences on participant experience in crowds included: physical design of crowd space and facilities (layout,

queuing strategies), crowd movement (monitoring occupancy, pedestrian flow), communication and information (signage, wayfinding), comfort and welfare (provision of facilities, environmental comfort), and public order. Whilst our research encompassed crowds that resulted in positive experiences for participants, there were also many negative experiences. These were present across numerous different circumstances, suggesting there are repeating common failures in how crowd situations are designed, planned, managed and operated. It was concluded that ergonomics and human factors aspects of crowds are often overlooked, with a corresponding failure in the planning of crowd situations to consider methodically important influences on participant experience.

Responding to this finding, the aim of the investigation reported in the present paper was to improve understanding of how those responsible for crowd situations approach and fulfil their activities. The term 'organiser' is used here broadly to describe those responsible for the design, planning, management and operational aspects of crowds. The involvement of organisers may range from being formal and well defined, e.g. as with sports stadia or performing arts venues, through to situations where the organisation is looser and less explicit, e.g. crowds in public spaces such as shopping streets. The activity of organisers has been examined from the perspective of different organiser roles, responsible for overseeing different aspects of crowds. The overall goal was to identify areas of crowd organisation that could be improved, leading to a more systematic approach to design, planning, management and operations, resulting more often in positive outcomes for participants.

2. Methods

Semi-structured interviews were conducted with crowd organisers involved with crowds in a wide range of capacities in the UK. Structured convenience sampling was used to recruit interviewees, on the basis of what was relevant to and meaningful for understanding the various roles involved in organising crowd situations (Bryman, 2004). Sample size was determined through data saturation, i.e. recruitment ended when novel material and insights from the thematic analysis of transcripts no longer emerged (Strauss and Corbin, 1998).

Interviewees were recruited to encompass the sociotechnical variation found across different crowd situations: purpose, size of crowd, venue capacity, demographics of crowd, day and time of crowd, schedule of activities, weather conditions, seating arrangements, crowd movement patterns, density of crowd in various locations, and other specific aspects (transportation, parking, ticket selling for example). This diversity of crowd related factors was as identified in previous research (Challenger, et al., 2009; Davis et al., 2014; Still, 2013; Filingeri et al., 2017; Martella et al., 2017). The recruitment included the following crowd types, as defined by Berlonghi (1995): ambulatory (walking), spectator (watching an activity or event), expressive (emotional release, shouting, chanting), participatory, demonstrator, and restricted movement.

A semi-structured interview schedule was developed to ensure that questioning was consistent yet flexible (Stanton and Young, 1999). The question set and prompts were based on our previous research, which identified factors contributing to experience of crowds from a participant perspective (Filingeri et al., 2017) (Table 1). The interview questions covered approaches and processes adopted in the design, planning, management and operational aspects of crowd situations, along with interviewee attitudes and beliefs regarding crowd participant experience (i.e. participant safety, goal achievement, comfort and satisfaction), and commitment to each.

- Insert Table 1 about here -

The study complied with the requirements of Loughborough University Ethical Advisory Committee.

2.1 Analysis

Qualitative interrogation of the interview data involved hybrid thematic analysis, designed to support the identification, analysis and reporting of themes (Braun and Clarke, 2006). Interview recordings were transcribed verbatim and analysed on a sentence-by-sentence basis (using qualitative data analysis software NVivo 9). Analysis was conducted iteratively, using theory driven codes, with further emergent themes identified in line with the original objectives of the study (Bryman, 2004; Braun

and Clarke, 2006). Interviews were analysed in relation to themes drawn from our previous research (Filingeri et al., 2017). Further sub-themes, associations and patterns specific to the present data were then identified. Consistency of the coding and analysis were examined through review of the data coding by two researchers working independently (the first and last authors); additionally, transcripts were reviewed by each interviewee to assess the correct representation of the material.

3. Results

A total of 41 interviews were conducted across different crowd organiser roles, with 25 males and 16 females (25-64 years; mean = 45.5 years). Interviewees were classified into the following areas of responsibility: design and planning (physical environment, event planners, health and safety) (n=23) and operational (ground staff, private security and police) (n=18) (Table 2). Interviewees included paid members of staff, as well as contract workers and volunteers (ground staff only). Some interviewees, were predominately involved in crowd organisation, for others, this was only a small part of their job role. Some Interviewees reported to the managers of the individual events or venues they were involved with. Others worked as or reported to consultants involved in specific aspects of a crowd situation (e.g. architects designing a venue; health and safety advisors). The interview sample also included those working in private security and the police, managed and deployed by a central organization (i.e. a specific security company or regional police force).

Interviewees were involved in organising a wide variety of crowd situations: music events, sporting events, theatre performances, participatory events, tourist events, conferences and exhibitions, retail crowds and transport hubs (Table 3). Individual interviewee's involvement often extended to a number of different crowd situations (hence the total exceeds 41 in Table 3). The presentation of results that follows is structured by the five overarching themes identified by Filingeri et al (2017): physical design of crowd space and facilities (venue layout, queuing problems and strategies); crowd movement (monitoring capacity, pedestrian flow); communication of information (signage and wayfinding); comfort and welfare; and public order.

- Insert Table 2 about here -

- Insert Table 3 about here -

3.1 Physical design of crowd space and facilities

Interviewees indicated that the physical design of the environment (crowd spaces and facilities) was approached primarily from health and safety and commercial perspectives, with less emphasis on the experience of crowd participants.

3.1.1 Venue layout

Organiser priorities concerning venue layout (space availability and usage, planning and arrangement of areas and facilities within a venue, and walkways) were around two aspects: (1) health and safety, particularly with respect to fire evacuation; (2) commercial considerations, to increase productivity (e.g. increased revenue through an increased number of stalls; increasing browsing time in certain areas). Layout decisions were often based on the previous experience of organisers. Organisers responsible for venue layout often had not received training specific to designing, planning and managing crowd situations. This was suggested to be due in part to a lack of standardised training and qualifications required to organise an event. One health and safety representative, involved in a variety of crowd events (i.e. music, participatory, and tourist events) suggested:

“Well you see, you don’t actually need qualifications [to plan a crowd event]. Anyone could start an event and although there’s plenty of event management courses available, there is no accepted standard, it’s not compulsory” (Health and safety interviewee)

Familiarity with relevant standards and guidance was also limited. Some interviewees recognised this gap in their knowledge and skills and sometimes sought advice from others:

“I’m not trained in planning or anything like that, so I asked planning for help with the er... the plan with all of the dimensions and the layout of the venue” (Event planner interviewee)

A number of organisers described layout decisions as “*fairly common sense*” (*Event planner interviewee*), and therefore not needing extensive consideration during the organisation of an event. For example, an event planner involved in tourist events described how the capacity was calculated for the event:

“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 [the capacity] from there” (Event planner interviewee)

Organisers reported that often they are required to work within the constraints of a specific venue for an event and, therefore, the degrees of freedom with the layout may be restricted. Moreover, optimising profit was a key priority for organisers of commercial situations, with increasing retail space a priority over pedestrian flow and comfort. One interviewee described the competing priorities between commercial motivations and providing ample space for pedestrians when designing train station upgrades for example:

“Rather than having extra space in the station for passengers to walk around [referring to the design of station upgrades], they [the train operating company] would rather put another retail unit on the concourse area as that will make money” (Physical environment interviewee)

Where compromises of this nature occur, there is the prospect of organisers attempting to fit or tolerating too much activity in a small area, resulting in a crowd situation that adheres to the letter of health and safety requirements and other regulations but that may not provide a comfortable experience for crowd participants due to restricted pedestrian flow, bottlenecks and congestion.

3.1.2 Queuing problems and strategies

Queue length and time spent queuing were discussed in relation to the health and safety of crowd participants (i.e. with respect to reducing entry/egress time, monitoring occupancy, providing sufficient entry/exit points):

“Corridors and stairwells are particular areas where visitor flow can be an issue and so for our busiest exhibitions, we operate a strict timed ticketing

system to ensure that visitors are not queuing on stairs or landings” (Event planner interviewee)

Queuing arrangements were also discussed with regard to the commercial incentives of reducing queue times and increasing profits (e.g. increasing sales of food and drink).

Queuing strategies employed across different crowd situations varied considerably, depending to some extent on the expertise and previous experience of organisers. A variety of effective and less effective queuing strategies were discussed, including use of queue curlers, swipe-barcodes on tickets, colour coded wristbands, numbered entrance points, and specified entry times to reduce queuing times and “...*make it [queuing] quicker*” (Health and safety interviewee). The interviews revealed that developing intuitive queuing systems for attendees was a challenge for organisers, as were their insights into why arrangements did not always work as expected:

“We have red and green lines and there’s a big red bar over the red 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?” (Ground staff interviewee)

Generally, there was an absence of careful consideration to designing and implementing efficient queuing systems, even among experienced organisers. Those involved in organising small scale crowds indicated that they often did not have awareness of or access to information or guidance to assist with the selection and implementation of effective queuing systems.

3.2 Crowd movement

Interview findings indicated that crowd movement, capacity calculations, ingress and egress and pedestrian flow were a consideration and a priority area for organisers of large scale crowd situations.

3.2.1 Venue capacity and occupancy monitoring

Organisers were motivated to give attention to crowd capacity from a safety perspective. Interviewees explained that crowd capacity is often calculated in line with

fire safety parameters, based on the maximum numbers of users that can evacuate a space safely in a specified time:

“We use fire evacuation standards to calculate capacity” (Event planner interviewee)

For larger venues, with different areas, capacity may be determined on an area by area basis, as described by an event coordinator for a large art gallery:

“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” (Event planner interviewee)

Methods of monitoring occupancy against capacity were discussed in the interviews, with the monitoring of occupancy across many different areas of a venue described as particularly difficult to manage. This can lead to situations where overall occupancy is within capacity, while certain areas become congested and overcrowded.

Some interviewees discussed how they monitor occupancy between areas of a venue *“...by eye” (Private security interviewee)*. Alternatively, a number of others described use of closed-circuit television (CCTV) systems to monitor crowd occupancy, primarily for large-scale crowds or transport hubs. Additionally, within transport hubs, crowd occupancy was sometimes maintained by closing the entrance (e.g. gates or barriers at a train station) to allow crowd numbers to return to a safe level. However, this procedure was not deemed to be entirely effective, described as *“...creating further congestion in other areas” (Health and safety interviewee)*.

Prioritisation of crowd participant comfort and satisfaction when planning capacity and managing occupancy levels was not apparent in the interviews. Circumstances were described, however, where extra personal space was available with increased ticket prices. One Ground staff interviewee, involved in sporting events, described different ticket options available:

“Well, if people [crowd participants] want to have that bit more room, we have VIP ticket options available, with access to facilities with fewer people, but that comes at a cost of course” (Ground staff interviewee)

3.2.2 Pedestrian flow

A number of interviewees (most notably those responsible for health and safety) discussed pedestrian flow modelling software (PFMS) as a valuable tool when determining venue capacity, “... a silver bullet” (Health and Safety interviewee) as one described. However, interviewees did not appear to fully understand the functionality and limitations of PFMS, namely its benefit in assisting with identifying hazards (i.e. overcrowding, areas of congestion), rather than being able to provide solutions to the problems identified (e.g. suggestions for alterations to the layout). A health and safety officer, involved in a variety of crowd situations (i.e. music events and sporting events), commented:

“I think if you could get that [Pedestrian Flow] modelling system that would be fantastic.... It would be a great benefit to the [event] helping to re-design... I don't know how much that software package is or how easy it is to operate, whether it's a very complex system” (Health and safety interviewee)

PFMS was not, however, widely used among organisers interviewed for this research. A number of reasons were given for this, with the software described as: difficult to use; requiring specific training; requiring subcontracting to external specialists; and too expensive for small-scale crowd situations.

The software allows for physical factors of pedestrians to be considered in the modelling (e.g. age, height, gender), as well as certain psychological/behavioural aspects (e.g. familiarity with location, stopping to rest). Other parameters likely to be important in designing and planning for the experience of crowd participants, such as avoiding confusion and anxiety, are not incorporated in the modelling. As highlighted by an interviewee from the transport industry:

“There are behaviours we know people do that aren't really programmed into the model. So it's [PFMS] not as realistic yet as it should be... it's just sort

of like throwing a load of marbles into a maze” (Physical environment interviewee)

An alternative approach to PFMS included walking around the venue observing crowd participant behaviour and, through this, identifying congested areas. Interviewees suggested that pedestrian flow arrangements were based on “...using your initiative” and “...previous experience”, (Event planner interviewees).

3.3 Communicating information: signage and wayfinding

The importance and benefits of effective signage were appreciated by interviewees. One, involved in the organisation of sporting events, described the influence of signage on the behaviour and satisfaction of the crowd:

“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” (Event planner interviewee)

Whereas interviewees emphasised the importance of large and clear signage to assist wayfinding, they also suggested this is not always sufficient to guide attendees through the crowd. As one interviewee involved in music events put it:

“The signs are really big and clear but people still get lost” (Security officer interviewee)

Various strategies were described by interviewees regarding the deployment of signage. Event planners discussed walking around an event to “...check that signs are placed appropriately” (Event planner interviewee); another suggested that “...signs should be placed at every intersection to avoid confusion” (Event planner interviewee). One interviewee from the transport industry discussed the consideration given to “...viewing angles” (the viewing envelope for which signage is visible and legible), when placing signs within a train station (Physical environment interviewee).

There was a range of awareness among interviewees of the guidance available on provision of signage within a venue. This was greatest in the organisers of large scale, regular crowd situations.

3.4 Comfort and welfare

Interviewees suggested that consideration given to the comfort and welfare of crowd participants (e.g. provision of facilities and effect of environmental factors such as weather conditions) was often based on “...*personal judgment*” (*Event planner interviewee*). Interviewees had differing insights as to what was required to provide a positive experience for participants. A number of interviewees indicated that the quality of the entertainment (e.g. the art displayed at a gallery; the music at a festival; or the sport at a stadium) was the main factor influencing patron satisfaction. However, other interviewees identified a positive influence of comfort on overall experience of participants in a crowd. One event planner involved in sporting events said:

“If they can sit down, they’re going to enjoy the event far more than standing up for two hours” (Event planner interviewee)

Interviewees indicated that user comfort and satisfaction were influenced by financial considerations. One event planner involved in music events said:

“It’s all down to cost, it really is. 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 [enjoyment of the] entertainment they’re watching” (Event planner interviewee)

With regard to the provision of facilities (e.g. seating, food and beverage stalls, drinking water points, toilets, car parking), interviewees were sometimes unaware of the standards and guidance pertaining to this. One security officer involved in music and sporting events suggested “...*no specification is available*” (*Private security interviewee*). Interviewees also explained that it can be difficult to accurately predict and cater for peaks in demand (e.g. at the beginning and the end of a spectator event).

In some instances, organisers did not consider that an issue of importance to crowd participants was within their remit to address. For example, when discussing car parking facilities, one interviewee said:

“...it’s [parking] their [crowd participants’] problem rather than mine” (Event planner interviewee)

Adverse weather was a factor that interviewees (especially those involved with outdoor crowd situations) indicated they need to plan for. Interviewees highlighted the unpredictability of the weather as a particular difficulty. Rain was described as having a negative impact on crowd satisfaction with crowd users leaving an event early, or purchasing fewer beverages, for example. Rain was also discussed as being a safety issue. As one event planner involved in sporting events said:

“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 or bottlenecks, then you try to clear them” (Event planner interviewee)

However, from a behavioural perspective, interviewee representatives from private security and the police viewed the presence of rain during certain events as favourable in reducing antisocial behaviour. One police officer said that they refer to the impact of ‘PC rain’, due to the positive impact of rain on crowd behaviour. This was highlighted by a Police Community Support Officer involved in a variety of crowds (i.e. sporting and participatory events) who described the effect of weather on behaviour during outdoor crowds:

“If it’s brighter and sunny then people tend to 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 in the rain” (Police interviewee)

For large scale events, interviewees indicated that adverse weather was an area that received considerable planning by authorities (e.g. police force, fire brigade, paramedics) before events, recognising the potential consequences for health and safety.

3.5 Public order

Interviews with police and private security officers recognised that providing an enjoyable experience and maintaining good order are interlinked. A positive atmosphere allows participants to feel safe, encourages self-regulation by the crowd and reduces antisocial behaviour. One police officer involved with a sporting event said:

“We mustn’t forget that you know the majority of people go to the football because it’s fun. They go there to meet their friends and have some social time I suppose [not to engage in antisocial behaviour]. So, after a long journey, usually by train, the fans are looking for a pub to go into” (Police interviewee)

Both police and private security interviewees said that they aim to deal with anti-social behaviour in a systematic, proportionate manner. Interviewees described implementing interventions to assert security matched to the behaviour of the crowd, as opposed to “...going in there with all guns blazing” (Police interviewee). As a Police Chief-Superintendent involved in a sporting event reported:

“If I get information or intelligence indicating that a certain [antisocial] 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 fight and it’s going to involve this many people. Therefore I need this many police to prevent that” (Police interviewee)

Another strategy described was identifying individuals in a crowd causing unrest and removing those individuals, as opposed to removing large numbers of crowd users. In this connection, the police utilised ‘spotters’ and ‘evidence gatherers’, whose role involved identifying (through CCTV, surveillance and researching previous incidents) specific crowd members involved in antisocial behaviours and removing them from the crowd.

It was reported that police and private security differ in the methods used to design and plan for a crowd. Police officer interviewees described structured methods of planning for occasions, drawing on a database of information from previous similar situations. After events, crowd situations are categorised based on the experience and outcomes. The level of security for future situations is then based on this categorisation. Private security officers described less well defined methods of planning for crowds, for example “...using ‘Wikipedia’ (Private security interviewee) as a source of intelligence on previous similar gatherings. Large-scale crowd situations requiring a police presence, benefit from the training the police receive, their expertise, experience and resources. Organisers planning small-scale crowds, only deployed security where this was considered necessary, then using private security (either in-house or external). In these circumstances, the police only become involved when serious public order issues arise.

3.6 Organiser priorities

It was apparent from the interviews that organiser priorities and mode of operation differed between large-scale regular crowds and small-scale infrequent crowds. These differences are summarised in Table 4. Level of experience and expertise of organisers, along with financial considerations, were prominent differences.

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4. Discussion

This research conducted 41 interviews with organisers involved in various aspects of designing, planning and managing crowds, in order to understand how their activities, contribute to the experience of crowd participants. We believe that there is currently no comparable research that has examined crowd experience from the standpoint of organisers, across a wide range of crowd situations and event types. Recurrent themes from the organiser interviews were: i) prioritisation of finance, security and health and safety; ii) training and guidance; iii) planning and modelling tools; iv) size and frequency of crowd; v) attention to factors important for participant experience; and vi) involvement of police and private security. These themes are now each discussed in detail.

4.1 Prioritisation of finance, security and health and safety

It was apparent from the interviews that priorities for organisers involved in the design and planning of crowd situations were financial, security and health and safety matters. Much less attention was given to crowd participants' goal achievement, comfort and satisfaction. These priorities are mirrored in the research literature, where there has been an emphasis on crowd security and safety (Berlonghi, 1995; Lee and Hughes, 2007; Drury and Stott, 2011), including prevention of hooliganism and other similar disorder (Stott et al., 2008; Rosander and Guva, 2012).

Financial aspects were important for event planners involved in commercial crowd situations. There was sometimes an assumption that improving the experience for

crowd participants (e.g. reducing queueing or improving wayfinding) would incur significant financial cost, necessitating an unacceptable ticket price for clientele. Such concerns are understandable with respect to permanent infrastructure modifications (e.g. increasing numbers of permanent toilets; car park extensions etc.) or those that would require the deployment of more personnel. More modest measures can be implemented, however, to enhance the experience for crowd participants (Filingeri et al., 2017). Our interview findings suggest that the Walt Disney Company service exemplar approach (Ford and Dickson, 2009; Ford et al., 2012) is not widely adopted. This approach capitalises on a detailed understanding of participants' requirements, desires and reactions, in order to enhance the experience on offer. Few crowd organisers interviewed in the present study mentioned the business case for creating a positive experience that would, for example, encourage participants to recommend and attend subsequent events (Yoon et al., 2010).

It is not surprising that the health and safety of crowd participants should be to the fore for those involved in designing, planning and managing crowds. There have been many high profile incidents, with serious consequences for both crowd participants and organisers (e.g. the 1989 Hillsborough sports stadium disaster in the UK, Davis et al., 2014; pilgrimages to the Hajj in Saudi Arabia, Hughes, 2003). Among our crowd organiser interviewees, legal obligations and protecting venue reputation were seen as key considerations. Over dominance of these motivations, however, may divert attention from wider aspects of crowd participant experience, which may also benefit safeguarding health and safety. With regard to the venue layout, for example, research analysing crowd disasters has found that the arrangement of facilities is important for both the safety and satisfaction of the crowd (Challenger and Clegg, 2011; Davis et al., 2014). A socio-technical systems analysis of the 1989 Hillsborough sports stadium disaster in the UK, leading to the death of 96 spectators, concluded that "*Inappropriate layout of event environments e.g. position of crowd barriers and amenities...*" was a contributory factor to the crowd disaster (Davis et al., 2014). The health and safety of crowd participants and their goal achievement, comfort and satisfaction are interlinked.

4.2 Training and guidance

Crowds are complex phenomenon and achieving a good outcome for all stakeholders requires attention to a wide range of aspects. Interview findings indicated differences

in the level of training, experience and qualifications of organisers involved with crowds. Often no crowd specific training had been received. Some organisers with limited previous experience indicated that this created a gap in their knowledge. Other organisers did not see the need for training, regarding their activity as ‘common sense’.

Despite extensive guidance in the UK and around the world available to support design, planning and managing crowds (e.g. Work Safe Victoria, 2007; SGSA, 2008; HSE, 2010; Cooper, 2014; EIF, 2016), there was little evidence of use of this by organisers interviewed for this research. The absence of use by crowd organisers is likely to be explained by a combination of a lack of awareness of the guidance; perceived or actual lack of relevance to their particular crowd situation; the guidance being difficult to understand and translate into practice; and/or crowd organisers’ confidence in their own experience and judgements.

Still (2013) suggested that the subjective approach often taken to planning crowd situations, with many decisions taken at the discretion of organisers, contributes to the variations in the design, planning and implementation seen across crowds. Many interviewees in the present study explained how they use their personal judgement. This was coupled with attitudes and beliefs regarding the experience of crowd participants ranging from insightful to unsympathetic. This corresponds with the inconsistencies we observed in our previous research from the perspective of participants in crowds (Filingeri et al., 2017). We found that aspects important for the positive experience of crowd participants were often not implemented in a satisfactory manner.

Previous research has highlighted the need for evidence based guidance on organising crowds (Berlonghi, 1995; Lee and Hughes, 2007; Ryan et al., 2010; Still, 2013). It is not apparent, however, to what extent the guidance currently available to crowd organisers is based on research evidence, nor that it has been evaluated with rigour for its effectiveness (Wijermans et al., 2016). The Green Guide (SGSA, 2008) and Purple Guide (EIF, 2016), for example, concerned with sporting and music events respectively, were compiled with the involvement of industry and technical stakeholders. Although the guidance is very detailed, in some instances compromise is apparent between competing interests (e.g. recommendations for personal space), which may be to the advantage of crowd organisers rather than crowd participants.

The extent of detail in these guides may also be an obstacle to their use by anyone other than the organisers of large-scale, well-resourced crowd situations.

Whereas guidance such as SGSA (2008) and EIF (2016) address specific crowd situations, many issues (e.g. provision of welfare facilities, signage etc.) are common considerations regardless of crowd purpose. HSE (2010) provides some guidance for organisers irrespective of crowd type, but with a confined focus on crowd safety. We support the call of Wijermans et al. (2016) for research towards a role and task structured suite of guidance, applicable across different crowd situations. This needs to draw on multidisciplinary research evidence, addressing different generic factors involved in crowd organisation.

4.3 Size and frequency of crowd

Crowd situations can range in scale from participant numbers in double figures to hundreds of thousands and a particular crowd situation may be regular or infrequent. Organiser interviewees in this study spanned this range of crowds. Often they had similar priorities but, as might be expected, they differed in their mode of operation (Table 4). Organisers of large-scale crowd situations benefit from the extra resources available, although these resources do need to be deployed effectively. Organiser of regular occasions benefit from learning and experience. This does not always mean, however, that the experience of crowd participants will be well-catered for.

The organisers of small-scale/infrequent crowd situations face particular challenges. They may have limited experience and knowledge of the considerations involved. Budget limitations may restrict their access to training but also other professional support and services. As described above, the guidance available to support crowd organisers may be impenetrable to organisers of small-scale gatherings. EIF (2016), for example, concerned with music events states “*Due to the complexity of organising a wide range of events, the guide contains a large amount of detail, which may not always be relevant for some smaller events.*” Further research is needed into how organisers of small-scale/infrequent events can be advised, guided and supported.

4.4 Planning and modelling tools

Monitoring occupancy was recognised by interviewees to be important from a safety perspective, to ensure that maximum capacities were not exceeded in different areas of a venue and to prevent bottlenecks and overcrowding. Researchers have developed a variety of approaches to support this. For example, texture analysis enables the automatic estimation of crowd density using pattern analysis of images of crowds (Marana et al., 1998; Zhou et al., 2010). Few organisers in this research, however, had used these advanced methods, particularly organisers involved in small scale crowd situations with limited budgets. Elsewhere, less sophisticated crowd density assessment charts have been used in the transport industry (RSSB, 2004). These provide a pictorial schema for users to judge crowd density. There is no information on the validity and reliability of the chart method, however. In future, there may be a greater role for sophisticated monitoring technologies, particularly for large-scale crowd situations (Martella et al., 2017). There is a need for research to examine pathways to bridging the gap between the maturing science on crowd density assessment and its practical application by crowd organisers (Zhou et al., 2010).

Pedestrian flow modelling allows organisers involved in the design and planning stages of crowd situations to assess the effects of the environment and layout on crowd movement. This can allow changes to be made that eliminate congestion points altogether or to implement crowd management strategies to alleviate the effects. However, despite the considerable research that has been devoted to modelling pedestrian flow, as apparent from the literature (e.g. Hughes, 2003; Johnson, 2008, Smith et al., 2009; Qiu and Hu, 2010; Zhou et al., 2010; Wang et al., 2013; Liu et al., 2016) our interviewees involved in the design and planning stages of crowd organisation reported only limited use of pedestrian flow modelling tools. This finding of lack of use concurs with Wijermans et al. (2016), who concluded this was in part due to the complexity and diversity of crowd situations and the competencies needed to apply and interpret models. Where pedestrian flow modelling is used, it is not the 'silver bullet' some of our interviewees anticipated. Still (2013) highlighted the utility of pedestrian flow modelling in predicting the behaviour of crowd users, but flagged important influences that cannot be incorporated at present when using crowd simulation techniques, such as the impact of crowd mood, aggression, music and the weather on crowd behaviour.

4.5 Attention to factors important for crowd participant experience

The interviews generally revealed an organiser focused, rather than participant centred approach to the design, planning, management and operational aspects of crowd situations. Factors important in achieving a good experience for crowd participants were often not given explicit attention. There was sometimes a limited appreciation of the experience of being in a crowd and an absence of empathy for crowd participants. Consideration given to physical design, crowd movement, communication and comfort were often based on the previous experience of the organisers, without an evaluation or feedback process in place to inform this. Poor decisions regarding the amount and layout of the crowd space, along with provision of insufficient welfare facilities and food and beverage outlets, for example, will all impact on crowd participant experience.

Queuing is an inevitable part of many crowd situations, a feature our research has found to be important to crowd participants but that is often not well managed (Filingeri et al., 2017). Other authors (Nosek and Wilson, 2001) have argued that understanding queuing theory in service operations would be to the advantage of customers, employees and management. The interviewees in this study approached queuing from primarily a health and safety perspective, with limited attention to the impact of queuing on the experience of participants in the crowd. There was no mention in the interviews of attempting to make queuing an enjoyable experience. One explanation for this could be that although queuing has been studied extensively from different disciplinary perspectives (e.g. Mann, 1969; Kogi, 1979; Nosek and Wilson, 2001), difficulties exist applying the findings of this academic research in practice. Crowd guidance documentation contains surprisingly little information on the design of queuing systems for crowd events (e.g. SGSA, 2008; EIF, 2016). The guidance that does exist, approaches this as a safety consideration (e.g. HSE, 2010) and is often imprecise, requiring crowd organisers to interpret and extrapolate to their particular crowd situation.

4.6 Involvement of police and private security

Maintaining public order is a consideration in the organisation of larger crowd situations, but also smaller gatherings of a nature where emotions may run high. Public

order bears directly on crowd participant experience. Attention at the design and planning stages can be effective in avoiding potential problems, e.g. by providing adequate facilities for participant numbers; implementing effective queuing arrangements. With the crowd situation itself, police and private security, including marshals, have an important role to play.

Private security and police interviewees in this study highlighted differences in their approach. Private security organisers indicated that their management of security within a crowd was more '*ad-hoc*' with less structured planning compared with the police. Whereas the police are highly trained, there is considerable variation in the level of training of private security personnel, which may be a factor in this.

Interviewees also discussed the importance of adapting deployment in line with changes in the behaviour of the crowd. Over dominant security can be counterproductive, both in terms of provoking unrest but also impacting negatively on the experience of crowd participants. Adaptable deployment strategies are in line with research findings, which demonstrated the importance of displaying trust in the majority of crowd users, whilst reserving distrust for individuals who are under surveillance as a result of intelligence or their behaviour on the day (Hylander and Guva, 2010; Rosander and Guva, 2012).

Increased financial constraints, leading to increased use of private security in place of police officers in crowd situations, suggest that greater emphasis ought to be placed on private security using intelligence and strategies established over many years within the police (Ratcliffe, 2002). This requires attention to how such information can best be collected, collated and disseminated, whilst adhering to requirements for individual privacy.

There was awareness among some security interviewees, but not all, of how the security presence can enhance the experience of crowd participants. This may happen through officers giving information and advice, for example, or simply by being welcoming and friendly. Marshals, by the nature of their role, may be perceived as less officious than police or security officers and therefore able to establish a rapport with crowd participants more readily. Au et al. (2004), for example, described the pivotal role played by marshals in maintaining a good atmosphere at sporting events in a football stadium.

4.7 Limitations

The study and the interview questions were guided by the findings of our previous research with crowd participants (Filingeri et al., 2017). Although the coverage of the interviews was wide ranging, with the opportunity for interviewees to comment on anything they considered relevant, the use of the existing framework has the possibility that issues not covered by the framework may not have been fully explored. Although the purposive sampling ensured that the investigation covered a wide range of organiser roles and crowd situations, the convenience sample of 41 interviewees bears on the generalisability of the research findings. The study was unable to encompass all possible crowd situations, for example. This may have influenced findings such as the emphasis on finance and health and safety found with this investigation.

The interviewees for this study were based in the UK. There are international differences in physical infrastructure, culture, customs and the weather that affect crowds and their organisation. Our previous research (Filingeri et al., 2017) observed crowds in the UK, mainland Europe, Middle East, USA and South America. Insufficient attention to aspects important for participant experience was a common finding regardless of country. This suggests that crowd organisers internationally could do better in this respect. It should also be acknowledged that although this study has recorded interviewees' accounts of how they approach their crowd organising activities, what they do in practice may differ from what they reported in the interviews. Further prospective research, observing the work of organisers would be needed to verify this.

5. Conclusions

The aim of the study reported in this paper was to improve understanding of how organisers approach the design, planning, management and operational aspects of crowd situations. Interviews with a wide range of crowd organisers provided rich, qualitative information on how they approach their role. The investigation found that organisers interviewed for this study prioritise finance, security and health and safety considerations but give less attention to other factors important for the experience of crowd participants. It is not surprising then that participant experience of crowd situations is highly variable.

In order to achieve a more systematic approach to crowd organisation, resulting in high quality crowd participant experience, there needs to be education, training and effective guidance and tools available to organisers. Organisers need better understanding of the sociotechnical complexity of crowds and appreciation of the factors that affect the positive experience of participants. Guidance and tools need to be derived with research rigour and designed to support crowd organisers decision making and crowd management requirements, rather than being a repository of unevaluated wisdom. Guidance and tools need to be fit for purpose and usable.

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7. Tables

Table 1 Framework for interview schedule (derived from Filingeri et al., 2017)

Theme	Area	Considerations
Physical design of crowd spaces and facilities	Venue layout	Organisation of crowd, sectioning, one-way or contra flow system, exit routes, view, car parking
	Space available	Sufficient personal space
	Goal achievement	Able to fulfil intended purpose, conflicting goals, barriers to goal achievement, competition between crowd member
Crowd movement	Time constraints	Time considerations, presence of rushing/hurrying
	Control	Being in control of the situation; crowd participant confusion, choice, discretion
	Individual factors	Physical height, age, special needs
	Encumbrances	Trolleys, wheelchairs, pushchairs, bags, luggage
Communication of information	Navigation	Ability to find way around, disorientation, losing people
	Communication	Signage, information availability, language barriers
Welfare and wellbeing	Welfare facilities	Seating, toilets, refreshments
	Environmental factors	Weather, heat, lighting, noise, pollution, odours, ventilation
	Stress	Presence of crowd participant anxiety, frustration, vulnerability, intimidation and claustrophobia
	Motivation	Participant desire to be in the crowd, enjoyable purpose, functional purpose
	Preconceptions	Crowd participant prior experience and expectations, familiarity with surroundings, cultural norms and stereotypes
	Avoidance	Involvement at participants' discretion, unavoidable experience of a crowd
	Distraction	Presence of factors that distract from the crowd situation, positive and negative
	Company	Groups of crowd participants, individuals isolated in crowd
Public order	Safety and security	Feeling safe, fall risk, trampling risk, violence, other hazards
	Behaviour	Appropriate, antisocial, pushing, jostling, competition
	Mood	Good mannered, boredom, hostility, excitement, anticipation, atmosphere

Table 2 Interviewee classification

Interviewee area of responsibility	Description	Number (n)
Design, planning, management:		
Physical environment	Developing the structure of the venue (architects, human factors specialists, pedestrian flow modelling)	5
Event planners	Planning, management of events, scheduling, booking, budgeting, coordination, communications)	14
Health and safety	Individuals involved in meeting and maintaining health and safety standards	4
		23
Operational:		
Ground staff	Frontline personnel (stewards, marshals, volunteers) responsible for guiding and assisting crowd participants	4
Private security	Privately funded security: maintaining order among participants, crowd management, protecting crowd participants	10
Police	Government funded police force: maintaining public order, crowd management, crowd control, protecting crowd participants	4
		18
TOTAL		41

Table 3 Interviewee experience of different crowd types

Crowd type		Number
Music event	Large music festival,	20
Sporting event	Football stadium, basketball, ice-hockey	15
Theatre event	Musical theatre, comedy event	2
Participatory event	English defence league demonstration, marathon events	18
Tourist event	Art gallery, museum	5
Conferences and exhibitions	Academic conference, exhibition centre, book launches	14
Retail	Shopping mall	3
Transport hub	Railway stations, London underground	3
Total		80

Table 4 Organiser priorities and examples of their mode of operation

Organisers		Large-scale / regular crowds	Small-scale / infrequent crowds
Physical environment	Priorities	<ul style="list-style-type: none"> • Health and safety • Maximum capacity limits • Commercial considerations (adherence to budget; profitability) 	<ul style="list-style-type: none"> • Not always involved (budget limitations; not deemed necessary) • Health and safety • Maximum capacity limits • Commercial considerations (adherence to budget; profitability)
	Mode of operation	<ul style="list-style-type: none"> • Qualified professionals • Drawing on expertise and experience • Learning from previous crowd situations • Guidance developed/used • Suitable venue • Use of modelling tools • Facilities and amenities matched to crowd participant requirements • Use of signage strategies (e.g. consideration of viewing envelopes) 	<ul style="list-style-type: none"> • Unqualified, limited experience • Staff redeployed from other duties • Planning information not always documented - trial and error • Non-use of guidance; not aware of guidance available • Having to work with venue constraints • Simple capacity estimations • Simple estimates for facilities and amenities provision • Walk around approach to check placement/clarity of signage 'by eye'
Event planners	Priorities	<ul style="list-style-type: none"> • Commercial considerations (adherence to budget; profitability) • Safe level of occupancy • Quality of attraction/entertainment • Create a successful event 	<ul style="list-style-type: none"> • Commercial considerations (adherence to budget; profitability) • Safe level of occupancy • Quality of attraction/entertainment • Create a successful event
	Mode of operation	<ul style="list-style-type: none"> • Experience from past crowd situations • Limited use of guidance • Learning/experience captured and documented • Debriefing undertaken 	<ul style="list-style-type: none"> • Judgement and 'common sense' • Non-use of guidance; not aware of guidance available • Learning/experience not captured • ad hoc debriefing

Organisers		Large-scale / regular crowds	Small-scale / infrequent crowds
Health and safety	Priorities	<ul style="list-style-type: none"> • Complying with legal requirements • Professional management of health and safety 	<ul style="list-style-type: none"> • Complying with legal requirements • Bringing in external consultants when considered necessary
	Mode of operation	<ul style="list-style-type: none"> • Qualified specialists • Professional practices • Modelling used to determine safe capacity • Meaningful risk assessment • Suitable controls implemented • Physical risks considered but psychological risks overlooked • Proper documentation • Acting in the interests of health and safety but not other aspects important for crowd participant experience 	<ul style="list-style-type: none"> • May be undertaken by non-specialists or external agency • Reliance on venue to determine safe capacity • Superficial risk assessment • Not all physical risks identified • Superficial controls incomplete • Incomplete documentation • Motivated by need to comply with the law
Ground staff	Priorities	<ul style="list-style-type: none"> • Health and safety • Keeping things moving • Satisfactory experience for crowd participants 	<ul style="list-style-type: none"> • Health and safety • Keeping things moving • Satisfactory experience for crowd participants
	Mode of operation	<ul style="list-style-type: none"> • Specialist, trained personnel • Crowd monitoring across venue from central location (e.g. CCTV) • Crowd monitoring on the ground, integrated with central monitoring • Monitoring occupancy against capacity, not crowd participant comfort • Frequent communication; team briefings throughout event • Feedback solicited to improve future events (but not always implemented) 	<ul style="list-style-type: none"> • Redeployed staff; use of volunteers • Good practice not always brought forward from previous occasions • Crowd monitoring on the ground ('by eye') • Monitoring occupancy against capacity, not crowd participant comfort • Ad hoc communication • Feedback not always captured or used

Organisers		Large-scale / regular crowds	Small-scale / infrequent crowds
Private security	Priorities	<ul style="list-style-type: none"> • Maintaining satisfactory experience for the majority • Preventing anti-social behaviour 	<ul style="list-style-type: none"> • Not always involved (budget limitations; not deemed necessary) • Maintaining satisfactory experience for the majority • Preventing anti-social behaviour
	Mode of operation	<ul style="list-style-type: none"> • Specialist, trained personnel • Cooperation with police • Contribution to planning variable in extent and quality of contribution • Some limited access to 'intelligence' on potential trouble spots, troublemakers • Active communication and coordination • Monitoring of crowd behaviour • Proportionate response to problems 	<ul style="list-style-type: none"> • Limited training, inexperienced • Staff redeployed from other duties • Little contribution to planning • Ad hoc communication and coordination • Reactive approach responding to problems
Police	Priorities	<ul style="list-style-type: none"> • Maintaining public order • Preventing anti-social behaviour • Preventing crime 	<ul style="list-style-type: none"> • Not usually involved • Maintaining public order • Preventing anti-social behaviour • Preventing crime
	Mode of operation	<ul style="list-style-type: none"> • Police forces with high level of expertise and experience • Well trained at all levels: command and control, on the ground • Involved and contributing to planning stages • Intelligence on trouble spots, trouble makers • Active communication and coordination • Strategic monitoring of crowd behaviour • Operate to create a good atmosphere, encouraging good crowd behaviour • Adaptable, proportionate response to problems 	<ul style="list-style-type: none"> • Called upon only when necessary: emergency, disorder, crime committed