Institute of Work Psychology

A Human Factors Analysis of The Hillsborough Disaster

Prepared for the
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A. INTRODUCTION

On April 15th 1989, the worst football disaster in UK history occurred. Liverpool and Nottingham Forest fans travelled to Hillsborough, Sheffield Wednesday's ground, to watch their teams play in the FA Cup semi-final – as they had the previous year. In 1989, however, a sequence of errors and failures led to ninety-six individuals losing their lives as a result of severe over-crowding in the west terrace.

Many factors contributed to the disaster at Hillsborough, several of which could be localised in the police control room. Due to its significance in the sequence of events, the police control room will be the focus of this report.

In the southwest corner of the ground, the three seated policemen in the control room had good views of the west perimeter fencing where the crushing occurred. Sergeant Goddard manned the radios, PC Ryan operated the telephone and PA system, and Superintendent Murray, in charge of the control room, advised Chief Superintendent Duckenfield, who stood behind him. Duckenfield was the commanding officer for the event that day. At the back of the room PC Bichard monitored activity inside and outside the stadium on five CCTV screens. The five cameras had excellent zoom facilities affording PC Bichard detailed close-ups of areas of interest, including the Leppings Lane entrance and the west stand.

Data concerning entry figures at the thirteen turnstiles servicing the west stand and west terrace was gathered in the *club* control room in a separate location. There was no capacity data in the police control room.

B. A SYSTEMS APPROACH TO DISASTERS

The organisational and individual errors that culminated in fatal overcrowding at Hillsborough can be identified using Reason's (1991, 1995) systems approach. It can thereby be used to propose recommendations protecting against a repeat incident.

Organisational errors are committed by decision-makers far removed in time and place from the accident. These seemingly innocuous blunders at the organisational level travel down either of two pathways to reach the negative outcomes (see figure 1).

Taking the *active* pathway, errors are transmitted to the workplace where they create conditions that increase the likelihood of individual level errors at the 'sharp end'. Organisational failures conveyed along the *latent* pathway lie dormant until unsafe acts in the workplace trigger their operation (Wagenaar et al 1990).

In most cases, defences prevent sharp-end errors from ending in disaster but they are weakened by latent pathway failures. A disaster happens when a particular sequence of errors is executed that slips through the defences.

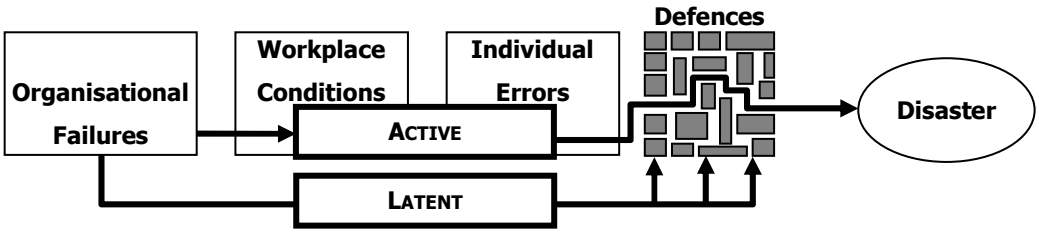

FIGURE 1: REASON'S MODEL OF ORGANISATIONAL ACCIDENT CAUSATION

C. APPLYING THE MODEL

Events at Hillsborough can be categorised into organisational failures, workplace conditions and individual errors as follows:

ORGANISATIONAL FAILURES

Active Pathway

It was a mistake to make a Chief Superintendent responsible for policing the match with no thorough training or knowledge of the ground.

The Operational Order on the day focussed on crowd control rather than crowd safety in that issues of over-crowding and crisis management were largely ignored in the safety briefing and training of all officers. This meant that police officers had a false hypothesis (Davis, 1958) that fans would find their own level and would tend to misbehave in a crowd. Since police communication was dominated by hierarchy, little challenge was made to top-level decisions (Weick, 1990).

The existence of two separate control rooms meant that neither had a complete picture of what was happening, e.g. the turnstile information was sent to the Club control room and the CCTVs were monitored in the police control room.

Latent Pathway

Failure to learn from the 1981 disaster, failure to amend the Club's safety certificate, the vague Green Guide specifications and a highly restrictive kick-off policy can all be classified as latent failures.

Following crushing at the 1981 Cup semi-final, police suggested that the capacity figure of 10,100 for the Leppings Lane terraces was too high. Dr Eastwood recommended a layout which would enable each area to be monitored numerically via new turnstiles, to ensure that maximum capacity was not exceeded. These views were communicated to the Club but were not pursued. Green Guide specifications regarding stadia capacity were vague and had no legal force, they were unrelated to individual pens and were unrealistic.

The stadium's Safety Certificate was sluggishly revised by the City Council, taking three years to update. The final draft was not received by the club until sixteen days before the disaster. It contained no maximum figures for individual pens therefore no sanctions were in place to focus attention on the need to limit entry to the pens by numbers.

The police's restrictive kick-off policy stated that kick-off would only be delayed if there was a major external factor such as fog on the Pennines or motorway delays, not for spectators turning up late.

WORKPLACE CONDITIONS

The most obvious workplace problem was communication. Radio contact between police operated on a small number of channels and suffered from occasional transmission loss. The radio system was such that simultaneous broadcasts led to garbled speech resulting in further communication breakdown and confusion. Limited space and poor room design, including inadequate soundproofing, meant that the CCTV could only be manned by a single officer and that loud crowd noise could be heard in the control room.

Effects of police anxiety due to the circumstances, could not be counteracted as turnstile data and warning signals were lacking in the police control room. This meant crowd behaviour seemed stereotypical and threatening (Hudlicka and McNeese, 2002), contributing to their false hypothesis that the crowd was attempting to invade the pitch.

INDIVIDUAL ERRORS

Errors can be categorized as decision-making errors and communication errors. Decision-making was slow and ineffective, stemming from the anxiety mentioned above. In particular, Mr Duckenfield decided not to fill the pens sequentially and not to delay kick-off on the assumption that the crowd would make it in on time. Moreover, he ordered 'gate C' to be opened without considering that the tunnel should be closed off first.

Communication errors were at the core of the disaster. These included the tardiness of the control room in responding to messages from ground police; the lack of information exchange between control rooms; a delayed and unclear request for emergency services; a failure to inform all security personnel of the situation; an overdue request for medical assistance from the crowd; and a delayed public address informing the crowd of the situation.

Violations of procedure on the day included failure to direct fans upon entering the turnstiles and not adhering to the emergency services' Major Disaster Plan more closely.

DEFENCES

A number of defences were in place that should have prevented events from spiralling out of control as they did. These included: standby radio equipment; warning signals in the *club* room to alert officials to capacity limits in the stands; and the fitting of police officers with earpieces to enable them to communicate in noisy conditions. In addition, police presence should have acted as a safeguard against public disorder and overcrowding, and the provision of pens facilitated crowd dispersion. Unfortunately, many of these barriers were weakened by latent pathway failures.

D. PRACTICAL EVALUATION OF THE MODEL

While Reason's model initially appeared simple to apply, difficulties were encountered in placing certain causes within the model - for example, the failures of the Green Guide could be classed as an organisational error or a workplace condition. Once it had been classified as an organisational error, a similar problem arose in deciding whether it should follow the active or latent pathway to the workplace. Green Guide guidelines had an effect on those making decisions close to the accident *and* acted on the defences. That each cause has multiple meanings depending on where in the model it is placed is indicative of how two very different interpretations of the accident could be derived.

Reason's uni-directional pathways imply a linear progression of events. Some events, however, affect others preceding them in the model. So for example, the model is very clear on how the false belief about fan behaviour at the organisational level led to the police's anxiety in the workplace. In

turn this led to poor decisions at the individual level. The consequences of a single bad decision, however, is likely to feed back into the anxiety of the police, which is problematic to explain using the model.

On the other hand, a major advantage of taking Reason's systems approach to the Hillsborough disaster is that it promotes learning from experience by discouraging a blame culture. Central to this approach is the reluctance to attribute blame to any one party; emphasising that 'sharp end' operators the inheritors rather than instigators of an accident.

E. RECOMMENDATIONS

Through the application of Reason's model the following areas have been identified as priorities for change.

1. LATENT FAILURES

The Safety Certificate, which was not updated following design changes to the pens in 1985, should be amended to stipulate maximum capacities for each pen using guidelines from the Green Guide, where it is stated that that crowd density should not exceed 54 persons per $10m^2$. It is recommended that this figure be reduced by fifteen percent to further improve the safety margin. The monitoring of these capacities should also be stipulated in the design of the stadium (i.e. introduction of separate turnstiles and electronic monitoring equipment).

It is recommended that a written agreement be drawn up between the football club and police to specifically define the roles of each party and highlight the importance of crowd safety.

Postponement of kick-off is best left in the hands of the most senior officer and crowd safety must be considered in making a decision to delay. This needs to be formalised in a written document.

2. POLICE TRAINING

It is recommended that all officers receive specific training in the policing of football matches giving serious consideration to issues of over-crowding and crisis management. All officers should be made aware of matters arising from previous experiences (e.g. following over-crowding in 1988 they shut off the tunnel). The commanding officer should be well acquainted with the layout of the stadium. Finally, all officers in the control room should be trained in the interpretation and use of turnstile and CCTV data and empowered to make their own decisions.

3. COMMUNICATION

A pre-match briefing session should include all Police and Club staff and outline the strategy and management issues of the day, who is in charge and contingency plans; as failure to do so can be seen as paving the path to tragedy (Elliott and Smith, 1993).

There should be sufficient numbers of operators in the control room to receive and answer all radio transmissions. The radio system should give operators in the control room priority over, and the capacity to override, those using the same channel. There should be established protocol for the dissemination of information to all staff.

Prior to every match the control room should liase with the emergency services to communicate details of the event, i.e. location, time, number of spectators, routes of entry and exit and any anticipated difficulties.

There should be a public address system to communicate with the crowd, with important announcements preceded by a loud signal to catch their attention despite high noise levels; this code should be advertised on all match programmes. Illuminated advertising boards should also be utilised. Delayed and poor warnings, with the intent of avoiding panic, are self-fulfilling in the sense that flight or panic behaviour is the only logical response when the situation gets out of control (Sime, 1999).

4. Control Room Design

The control room is in clear need of redesign and some guidelines for this can be found in recent design literature. For optimum performance, and to minimise communication problems, the police and club control rooms should be combined and enlarged to a minimum of $15m^2$ (John and Sherd, 1994), which may necessitate relocation. An authority-holding member of the club should be present to aid larger numbers of police and security in decision-making (Myers, 1990). Finally, all information and controls should come through this single sound-proofed room - monitoring equipment, internal and external phone-lines, audio and visual public address and all other communication and technological systems. This is the only way that integrated and informed emergency response can occur (John and Sherd, 1994).

The equipment itself should be designed to draw attention to any problems, taking into account beliefs and emotions that may cloud judgement in an emergency. Warning signals for full pens and presentation of CCTV can and should be used to prevent misinformed and heuristic-led decision-making (Hudlicka and McNeese, 2002). Where emergency and precautionary information would not be immediately visible, appropriate training should be given.

F. CONCLUSION

Using Reason's Model of Organisational Accident Causation, this report has categorised the organisational failures, workplace conditions, individual and team errors and the weak defences that accumulated to cause the Hillsborough disaster of 1989. The aim of this model is not to attribute blame, but to highlight how an almost infinite number of factors are inextricably linked in the process of disaster causation. By examining the structure and culture of the organisation using a blame-free framework Reason (1995) strives to ensure that learning occurs within it. Further, Pauchant & Mitroff (1988) suggest that the identification of latent errors leads to the creation of a more robust, crisis prepared organization.

It is recommended that technological improvements are needed in the control room but the culture of technocracy (Fischer, 1991) can easily lure organisations into a false sense of security. Canter (1989) warns that once the issue of crowd safety and control is seen as a technical problem, then the mind set becomes one that seeks only technical solutions. While convincing in the wake of a disaster, these are inadequate in the long-term as elements of the organisation such as culture, communication and configuration, need to be addressed. 'Solutions' that fail to change the core values, behaviour and assumptions of the organisation only serve to create a climate of disaster incubation.

In recommending greater top-level safety commitment and laying down clearer guidelines as to responsibilities and capacity regulation, it is hoped that the adverse consequences of organisational errors can be avoided in the future. The football industry, and Sheffield Wednesday in particular,

owes it to those who have lost their lives, that further loss-of-life events are prevented by making changes at the core rather than at the periphery (Elliott & Smith, 1993).

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