The Examination of Post-blast Scenes

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Bomb scene, or blast scene examination has traditionally formed a component of the general training and awareness undertaken by Crime Scene Investigators (CSIs).[1] While the environments of operation (potentially widely dispersed fields of disrupted or detonated debris), nature of the examination (the prospect of large numbers of casualties) and the surrounding investigative concerns of a high-profile investigation with wide-ranging political ramifications all conspire to distance the post-blast scene from the general experience of most CSIs, the application of their core technical disciplines remains as important throughout the scene examination as with more routine examinations. Indeed, the requirement to provide exhaustive photographic and locational documentation is even greater, given the chaotic nature of such scenes and the importance of reconstructing the distribution of debris at a later date for the courtroom, for understanding the relative position of affected individuals, or for modelling the nature and placement of the charge. As a consequence, it is crucial to understand the 'standard' model of training and approach to scenes adopted by CSIs in order to understand how adaptations to post-blast scenes might be managed.

Crime Scene Investigators working for UK police forces are now almost entirely a body of civilian specialists operating in a niche role. The shift away from warranted police officers began as early as the late 1960s in some police forces, but this small number greatly expanded following the publication of the recommendations of the Touche Ross Report in 1987 [1]. A further expansion of civilian specialists followed as a consequence of the growing importance of DNA evidence, as the required level of technical knowledge increased beyond the general forensic awareness of most warrant-holding police officers. By contrast, Bomb Scene Managers (BSMs) who to some extent supersede the role of the Crime Scene Manager on the post-blast scene are much more likely to be warranted police officers who do not engage in the core CSI training outlined below, but rather gain their training and experience through specialised roles within Counter-Terrorism posts.

In what was the National Police Improvement Agency (NPIA), and is now the College of Policing (CoP) model, CSI training is designed

[1] Crime Scene Examiner (CSE), Crime Scene Investigator (CSI) and Scenes of Crime Officer (SoCO) are different titles for the same role used in different police forces in England and Wales, referred to in this piece as CSIs.

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to continue over an extended period, beginning with a two stage initial course, in which each stage consists of a phase of pre course learning, a formal residential training course and the subsequent completion of a Professional Development Portfolio [2]. Following this initial training, CSIs would complete 2 years of work before reattending Harperly Hall to complete a two-week Development Course. Beyond this, further specialist training is delivered within specific courses (i.e., fire investigation, crime scene management), and continuing CSI development is underpinned by the provision of Refresher Courses, designed to be attended by operational CSIs every 5 years. Scenes of Crime (SoC) training is competency based, with a framework of skills demonstrated in class and their successful use being evidenced on return to operational duty in force. These competencies are coordinated through the National Occupational Standards (NOSs) via Skills for Justice [3], and their successful implementation within the workplace forms the basis of a CSI's annual Performance Development Review with their line manager.

As a consequence of this centralised structure, which has been challenged in recent years by the issue of lessening training budgets, a generally standardised approach to major scenes can be expected, implemented by the Crime Scene Manager (CSM) or Bomb Scene Manager (BSM) depending on the nature of the scene.

The confirmation of suspected scenes of major crime, in which post-blast scenes might be considered, will initially be the responsibility of uniformed police response teams, who in relation to this role are referred to as the first officers attending (FOA). The role of the FOA entails not only the confirmation of the suspected major offence but also the initial identification of obvious foci of forensic attention (the presence of a body or weapon, for example), the administering of emergency first aid, the identification of obvious risks to health and safety and the recording of details relating to witnesses still present at the scene. The fulfilment of these duties should ideally be completed in a non-invasive manner that does not jeopardise the forensic potential offered by the scene,[2] but clearly in relation to any wide-ranging disruption such as the aftermath of a blast, this would be an impossible task, and initial disturbance of elements of the scene is an inescapable fact. Any intervention an FOA is forced to undertake in the commission of their duties (such as forcing a door to reach the body of a victim thought to still be alive) should be recorded in detail and that record be made available to the incident room at the earliest opportunity. In the example of a blast scene of magnitude, this is likely to comprise the actions of numerous first responders including police, ambulance and fire and rescue assets, and the recording synthesis and reconstruction of the timings and position of their initial actions is an important and time-consuming duty for investigating officers.

Initial attendance at the major scene and ongoing examination would generally be completed by CSIs. Any CSIs deployed to a major scene would be managed directly by a CSM or BSM who has a responsibility to ensure that a forensic strategy is complied with, and that findings from the crime scene are communicated back to the Incident Room (See Fig. 7.1). Whilst the CSM is deployed to the scene with CSIs, the Crime Scene Coordinator[3] has overall responsibility for deploying staff to scenes[4], coordinates the examination strategies of numerous CSMs and ensures integration between the forensic strategy and the overall investigation directed by the Senior Investigating Officer (SIO).

[2] The preservation of life is recognised as the one FOA responsibility that takes precedence over scene preservation.

[3] It is routine for a major crime to feature more than one crime scene. A murder might entail the examination of a body deposition site, a separate kill site, a victim, numerous suspects and their associated addresses and vehicles. Whilst only the more complex of these scenes might require a CSM, best practice dictates that separate staff should be used for separate but linked scenes wherever possible.

[4] The role of CSC might be filled by any suitably trained individual within the Scientific Support Department, from Senior CSI to Head of Scenes of Crime, depending on the size of the police force, the complexity of the forensic investigation and the wider public impact of the offence.

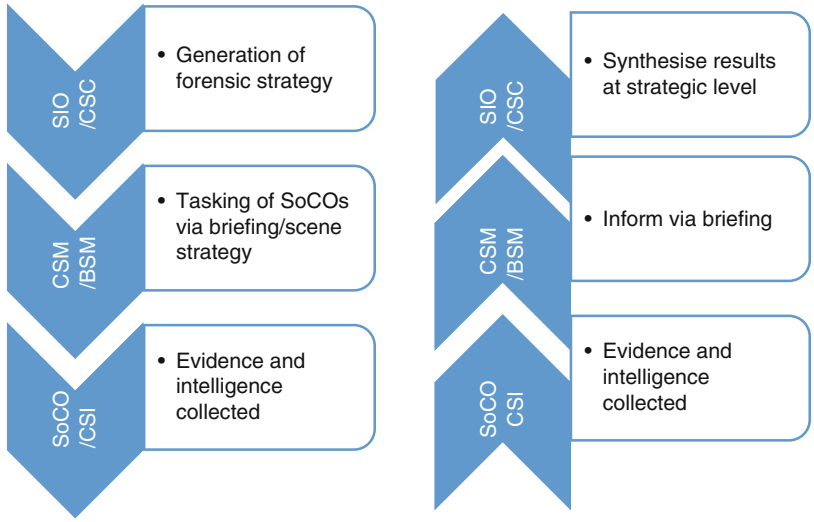

Fig. 7.1 Flows of information and tasking at a major crime scene

Because of the close relationship between the SIO and CSC, there is an expectation that crime scene coordination should be managed from the Incident Room. As such there is generally no requirement for CSCs to deploy to crime scenes, as this would compromise their pivotal management role.

Whilst the methods of scene examination can be adapted depending on the requirements of the investigation, the general commanding concept is that of unrepeatability; a crime scene can be revisited, but it can be examined in its entirety only once, hence there is a duty on the CSM or CSI to ensure the capture of optimum forensic evidence from the scene. The notion of 'optimum' rather than 'maximum' is crucial; any one scene examined in its entirety to the smallest degree might contain hundreds of items suitable for some form of recovery or analysis, which in turn might generate thousands, if not tens of thousands of fragments of forensic data (trace evidence, fingerprints, partial DNA profiles for instance). Consequently whilst it is important that a forensic examination maintains a degree of independence from the investigation, it must remain driven by an investigative strategy if it is to retain any form a focus that can bring meaning to the results of forensic examination. The gathering of data at the scene informed by initial briefings should result in the passage of that data back up the chain of strategic command to the CSC, who is best placed to interpret meaning behind the findings of a number of different scenes.

The concept of unrepeatability of examination and the requirement to optimise evidence gathering puts great emphasis on the sequence of examination. Generally speaking, whatever techniques of examination are required at a scene, they are undertaken in a sequence that begins with the least invasive and ends with the most disturbing or potentially destructive.

All major scenes are likely to see some adaptations from the general approach that form part of the written forensic strategy; such adaptations might be required by limitations of access to a scene (i.e., a body lying in a doorway to an otherwise inaccessible room), or environmental variations (i.e., impending rain forcing the prioritisation of the examination of the exterior of a property. Blast scenes are more likely than other major scenes to see the need to adapt an otherwise standard approach; initial scene and safety assessments must include a consideration of potential threats such as the presence of secondary devices and CBRN materials, or the risks associated with extensive structural damage to buildings – all of which can cause considerable delay to the forensic examination commencing.

Whilst perimeters need to be established for all crime scenes, control of access through extensive double cordons is frequently required for post-blast scenes together with large numbers of scene guards, and these might be located within highly populated urban areas with people's residences located within the cordoned area. The inner cordon encompasses the explosion area and has a radius of approximately one and a half times the distance from the explosion seat or centre to the furthest identifiable piece of evidence; only the BSM and their team can enter the inner cordoned area until the examination and evidence retrieval is complete. The outer cordon marks a perimeter which ensures public safety whilst preventing those who are not associated with the investigation from observing the examinations too closely, overhearing conversations pertinent to it or disturbing the scene; it also provides a safe working area within which members of the police and other emergency services can operate [4].

The dispersal of debris over a wide area will lead to complexes of material preserving multiple instances of forensic opportunities that would require the imposing of a sequence. Explosives officers from the 11th Ordnance Disposal Regiment (EOD) are often present to assist the BSM by providing invaluable advice regarding the cordoning and scene safety.

Just as 'standard' major scenes require the identification of a range of key scenes,[5] post-blast examination has similar specific challenges. The identification of the focus of the blast is crucial for both the sampling of material that might retain chemical traces of the explosive used [5, 6], but also to facilitate a reconstruction of material that might relate directly to the placement of a device. In terms of reconstructing events around the blast, the Bomb Scene Manager must consider a strategy of examination that seeks to identify material traces that assist in building a picture of events that extends prior to the placement of a device, the complex of activity around the blast itself, and the events that follow a blast which might disturb, subvert or modify conclusions built up around the nature of the event. The construction of a detailed map of initial evidential finds, surrounding vehicles, buildings and locations of bodies in relation to the central blast area can aid in the development of such a strategy.

Activities and events that predate the blast event itself are likely to include relatively simple considerations, such as the position and fabrics of fixings within the blast scene and a reconstruction of associated building layouts. Such 'backdrops' are essential for tying in events with recovered CCTV and recorded witness statements. In this manner, forensic traces might be utilised in order to confirm the intelligence offered by such sources.

The events immediately surrounding the blast are likely to include the placement of vehicles and moveable items around the scene, and the movement of people directly affected. The patterning of fatalities and types of injuries associated with these individuals are likely to assist in understanding the placement, size and nature of the blast, in addition to the dispersal of any associated debris. Additionally, the search of debris directly associated with the centre of the blast may reveal components of the device (timers, switches and batteries) that both assist with understanding the nature of operation (and hence potentially providing intelligence regarding the technical capability of the maker of the device), as well as providing forensic opportunities related directly to the identification of the makers or placers of a device.

The activities that follow a blast are almost certain to include the action of first responders discussed above, and the associated evacuation of casualties or the movement of walking wounded. The disturbance of debris associated with their activities might result in the contamination of items later found to be of forensic importance.

One of the key challenges that faces the BSM is that nature of identifying exhibits that might prove to be of significance, forensic or otherwise, amongst a vast quantity of scattered and

[5] In a standard murder investigation, the range of scenes to be identified might include a body deposition site, an attack site, offenders' and victims' home addresses and vehicles used as transport.

disordered debris. The standard means by which this is dealt with is by the zoning of the scene, and the grouping of debris collected by zone, to enable the rapid clearance of material, while still being able to trace an item back to a generalised location. Whilst zoning depends on the scene geography and the extent of debris field, this long-standing technique can now be supplemented with three-dimensional scanning techniques that assist in the reconstruction of scenes and the more specific location of items within zones. Liaison with the Forensic Explosives Laboratory, and if deemed necessary then the attendance of the scientists themselves at the scene, can also benefit the decision making process regarding evidence location, retrieval or best practice.

The identification of potential evidence items requires a teamwork approach and is initiated with a walk through of the scene, during which time, as is the case for other crime scenes, evidence marking, photography and recording are constant tasks. Each evidence item is collected into an appropriate sterile container (e.g., metal cans, glass containers, or paper, nylon or Tyvek bags) upon which details including a description of the item, its location, the date, time and name of the individual collecting it are recorded in order to originate the chain of custody. During post-blast investigation, upon 'clearing' a zone, all debris and loose material is then swept and either sieved at the scene or placed into bags or containers for further examination in the laboratory; the purpose of collecting such material being to single out component pieces of the device; a combination of coarse and fine mesh sieving can reveal very small components such as metal fragments of a device, detonator caps or wires [7].

The meticulous examination of the bomb centre or seat area is usually one of the most painstaking tasks, requiring swabbing of the area for trace explosive residues, measurement of crater dimensions, the removal of loose debris (which is treated as a single evidence exhibit), and further excavation of the crater with the use of digging tools in order to locate any embedded components of the device.

In addition to searches of the ground and the crater region, if one is obviously present, the examination of any secondary craters in the vicinity (formed by the penetration of a nearby structure, such as a wall or ceiling, by blast forces or fragments of the explosive device) can also be forensically lucrative. Furthermore, items in the vicinity of the central explosion area which are positioned perpendicular to the ground – such as signposts, the walls of buildings or nearby car doors if outside; or furniture or walls if indoors – may harbour pertinent forensic evidence (e.g., trace explosive residues) whether they exhibit signs of blast damage or not. Fragmented remains of a device and explosive residues can also become embedded within skin and tissue; intended and unintended victims of the incident are therefore also sources of evidence. The BSM must ensure that if casualties are involved, then investigating personnel are dispatched to hospitals to recover any evidence either with emergency room staff or pathologists.

There is an implicit challenge for the Bomb Scene Manager and investigating police in the recognition of important intelligence gathered from blast scenes. This recognition touches on the conflation that persists between concepts of forensic intelligence and evidence, and the tendency to regard only certain specific forensic evidence types as being suitable providers of intelligence (most specifically PACE DNA samples; [8]). By contrast, the experience of the security services and military over many years of gathering weapons intelligence from Improvised Explosive Devices (IEDs) is that devices and their placement locations represent rich loci of potential intelligence. Whereas some complex enquiries that might be led in some part by forensic intelligence in its broadest sense can be hamstrung by a syndrome of tunnel vision that directly equates the term 'intelligence' with biometric identification (an equation shared somewhat by military application of forensic exploitation), blast scene examination tends to benefit from a wider consideration of the value of associated intelligence.

Alongside the role of developing and delivering strategies to conduct a full methodological

forensic examination, it is the responsibility of the BSM to ensure the welfare and safety of the forensic team. All must be suitably equipped with the appropriate materials to do their job effectively, be supplied with sufficient food, drink and breaks during lengthy investigations and the required personal protective equipment, which during a post-blast investigation can include hard-hats to protect from falling debris (particularly glass when challenged with scenes in a built up city) and face masks to protect from noxious gases and dust which may be present in confined areas. It is also up to the BSM to consider the use of devices such as tents or screens which can be used to guard the examinations from prevailing weather conditions or to provide some privacy to the investigators, as well as to determine if and when it may be necessary to halt the investigations due to poor lighting for example (the use of flood lights can cause evidence to remain 'hidden in shadows' and it may not best to work through nights – this is often a judgement call which is made by the BSM).

One role of particular importance for the BSM is to maintain consultation and liaison with relevant parties throughout the investigation. If there are disruptions to the investigation, zone clearance can take many days, and throughout this time it is the duty of the BSM to regularly update the SIO as well as facilitate contact with the media in order to ensure the community and other interested agencies remain suitably informed about progress. The estimated length scale of the investigation and extent of damage needs to be communicated to the appropriate officers in order to keep the local community appropriately informed as well as to consider potential modes of further disruption – for example to that of public transport (such as the closure of nearby train stations), in which case the BSM would need to liaise directly with the British Transport Police. It is after all the one of the main objectives of the BSM – to facilitate recovery of evidence and return the scene to the public domain as soon as possible. Further to co-investigative personnel, the media must also be consulted and updated; the BSM has to manage the media, and work together with them in order to deliver public appeals and allow them to access vantage points from which they can record or photograph the scene.

As with any major crime scene, no bomb scene is the same as another, each varying substantially in size and impact. The roles, responsibilities and considerations outlined above are relevant to all scenes but investigative tactics in particular will vary depending on the unique set of challenges each post–blast scene presents to the personnel who attends, be they FAOs, BSMs, SIOs, emergency services or the forensic investigators. Moreover, that summarised above is predominantly applicable to civilian scenarios which are only time-gated by the pressure of closure of urban areas; for example, post-blast investigation in military contexts varies not only in the limited time allowed for the investigations but the potential lack of resources available as well as the demanding environment which needs to be worked in. In such circumstances, it is the vital basics of safety first and 'get what you can' which may have to make do.

Specialist systems of operation, and skillsets of specialist personnel, assist in distinguishing bomb and blast scenes from other major incidents. Despite this, the fundamental reliance on the core skills of scene examination are clearly present throughout the investigation process and the mindset of those involved. Combining incident and clinical data is crucial to forensic biomechanics in order to understand the pathophysiology of injuries.

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