CRIME-SCENE MANAGEMENT, SYSTEMS

Contents

Continental Europe

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Introduction

The term "continental system" of crime scene management suggests the possible existence of a system that is followed uniformly throughout continental Europe. Obviously, this is not the case.

In contrast to the Anglo-Saxon systems, it seems possible to identify some specific continental approaches to crime scene management. There is an international consensus about the important role of crime scene management in the initial inquiry and the need to utilize specialists at the crime scene.

Hearsay evidence or that provided by weak or antagonistic eye-witnesses does not constitute strong evidence – judicial systems increasingly consider scientific evidence as more acceptable. Detectives and prosecutors employ forensic physicians and scientists not only to collect various samples, including blood stains, at the crime scene but also to give their technical advice on crime scene management.

Significant changes have occurred in the way investigations are carried out. Conventional police investigators, who inquire into circumstances and collect, from the scene of crime, as many "proofs" as they

can, should be contrasted with the "scientific police" – specialists working in closed-door laboratories. Contemporary procedures used to investigate suspicious deaths involve several experts in medicolegal investigations. A coherent collaboration between technical and scientific police is essential in order to establish clear connections between crime scenes and laboratories, including quality assurance requirements. Magistrates who direct the judicial procedure not only require a basic level of knowledge of criminalistics but must also be assisted by forensic physicians and forensic scientists as scientific advisors.

A Short Definition of the Crime Scene

Some Anglo-Saxon definitions of the crime scene are rather broad. For example, "crime scenes" refers to different places that may have been linked to a homicide (e.g., place of attack, place of burial). The definition extends to places where accidental deaths occurred.

The law, mainly used in continental European countries, does not give a definition of the crime scene. In French penal and penal procedure codes, the term "crime scene" is not used as such but rather it is referred to as the scene of a crime or an offense.

The crime scene is the main focus of criminalistics. On the basis of observations, photographs, enquiries, and samples, the laboratory fulfills both a scientific and an operational role in allowing the magistrate to reconstruct the events leading to a crime. A possible definition of crime scene is that it represents all places and persons linked to a crime or an offense that needs a judicial inquiry. So, crime scene includes several places (e.g., of an attack, of a burial, a car used to carry a dead body) and victims, close witnesses, and suspects.

The Judicial Framework

A large part of continental Europe has been influenced by the Napoleonic code, just as common law spread far beyond England. In spite of various similarities, the two systems differ significantly, and a unified system of continental law does not really exist. Differences exist, for example, between northern European countries (Sweden and Germany), countries with an inquisitorial system (France, Netherlands, Spain, Portugal), and other countries, such as Italy, that have turned their procedures to a more adversarial mode.

Consider the French, German, and Dutch judicial systems. In the continental system, rules are clearly established (by means of codes) that define the role of police investigators and the judicial procedures to be followed from the very beginning of the process. Magistrates appreciate the modes of police action. If needed, they can accompany detectives from the crime scene to the end of the initial inquiry procedure. In the Netherlands, the Public Ministry plays a prominent role in the treatment of penal affairs. The Queen's Prosecutor directs the penal inquiry.

In France, investigators and crime scene technicians from the police or gendarmerie are under the direct authority of the Public Prosecutor (Procureur de la République) and report directly to this authority. Some have considered that this link could sometimes allow some investigators to be overconfident. On the other hand, forensic physicians and court experts are considered to be justice auxiliaries, and do not have a hierarchic link with the Public Prosecutor or magistrates.

In France, different legal frameworks are used to investigate a crime scene. Briefly, investigators and crime scene technicians can work within the "preliminary inquiry," "obvious crime or offense," or the "search for the causes of death" procedures.

The crime scene is legally protected and any prosecutor can be assigned to the case. The existing laws place conservation of crime scenes under the authority of the police.

Although investigators and crime scene technicians are under the authority of the Public Prosecutor, they have real autonomy in conducting the initial inquiry. Investigators can require a qualified person to give them advice, e.g., a crime scene technician or a forensic physician. A statement (technical or medical report) is prepared in a form that can be used as evidence.

If the case seems important enough, in the French system, the Public Prosecutor can open a judicial inquiry. Then another magistrate (juge d'instruction) takes charge of the inquiry and directs it, including the technical requirements. The magistrate orders court experts to complete further investigations and observations in order to finish the initial work of the crime scene technicians. The experts are required to produce their results in the form of statements which they can support in court.

In Germany, the first examinations carried out by crime scene technicians and further examinations by experts could indeed be quite different. In the Netherlands, only the crime scene technician and the doctor produce expert statements.

In the continental system, magistrates and investigators create all kinds of hypotheses. They study witness reports and ask crime scene technicians, scientists, and experts to study samples and provide medical reports to verify their hypotheses.

However, in France, the fact that suspects can only be kept in custody for short periods (48 hours, followed by two 24 hour extensions) limits the use of scientific methods in custody.

Professionals on the Crime Scene

In the continental system, crime scene sampling and observation are managed by police technicians, whereas in the UK these specialists are often civilians. Police staff used as crime scene technicians take a special training course for a few weeks, during which they learn how to sample, observe, and manage a crime scene.

For example, in France, local police units are responsible for the first investigations at any crime scene. They ask crime scene technicians, belonging to special units of judicial police, to make precise observations and search and collect useful samples and stains. These technicians are familiar with the correct packaging of judicial seals and their dispatch to laboratories. They counsel the inquiry director and the magistrate about examinations required, validity of results and samples, and questions and analyses to be completed by experts or expert laboratories.

In France, for important crime scene investigations (e.g., Concorde air crash, sect mass suicide, Mont Blanc tunnel fire), some laboratories such as the Gendarmerie Criminal Research Institute (Institut de recherche criminelle de la gendarmerie nationale) can send in specially trained technicians to sample and use special materials and protocols. In Germany, the KTI (Kriminalteschnischesinstitut) Institute for Criminal Investigation Techniques from the centralized BKA (Bundeskriminalamt) works in a similar way. In the Netherlands, forensic technical researchers handle investigations at crime scenes. They can meet, if necessary, with the National Forensic Institute experts to discuss any further examinations, without referring to the magistrate.

In the continental system, especially in France, technical investigations and procedures are not directed by a crime scene manager, a crime scene coordinator, or a specialist adviser sent by a centralized laboratory. What is now being debated in France is how to create a reinforced body of specialists in criminalistics able to manage and direct the first steps of any crime scene investigation for crime scene technicians and police officers as well as to counsel magistrates in charge.

The first step of this process has been accomplished in France by the police force. If necessary, a crime scene investigation team, having followed a complete course and become familiar with the special techniques and equipment useful at the crime scene, can be provided to any investigator.

No suspicious-death scene can be correctly managed without the help of a qualified forensic physician. The doctor should visit the scene of the death before the body is removed, to relate it to the surroundings and obtain a general impression of the circumstances, including an estimation of time of death and an interpretation of postmortem changes. The physician can also provide initial advice about the possible cause of death and help make body identifications.

Advice on the collection of trace evidence and recording of external appearances by photographs is helpful to the multidisciplinary team in charge of judicial investigations.

The French Society of Forensic Medicine has recently stressed the need for close and permanent cooperation between all specialists in forensic sciences. In most countries, irrespective of their judicial system, there is a shortage of qualified forensic physicians. In France, emergency forensic units that can provide qualified physicians at any moment to investigators, only function in large urban areas. This leaves large parts of the country without qualified doctors able to attend scenes of death.

Owing to the lack of qualified personnel or facilities, crime scene investigators often use general physicians to examine a body or undertake for an external examination when the body has been carried to a city morgue. This can lead to unfortunate situations, as a poorly performed external examination of a decedent may be worse than no external examination at all.

In contrast, the forensic physician must be able to assist the crime scene team at the crime scene. Helping the crime scene technicians in their observations and samplings, the forensic physician can also carry out blood and urine samplings in some circumstances, helping to obtain accurate results in the shortest possible time.

When the body is removed from the crime scene, a complete examination must be carried out, with photographs at each step of clothing removal. Information obtained from the postmortem examination can guide investigators in their further observations and trace evidence collection. On the one hand, knowledge of criminalistics and forensic science is required for a forensic physician to be fully qualified, according to European Union requirements for all qualified physicians in Europe. On the other hand, specialists in forensic sciences and criminalistics must be able to follow the observations of the forensic pathologist and seek more precise details, before carrying out a medicolegal autopsy.

Operational Methods at the Crime Scene

Although there are fewer specialists and coordinators in the continental system than in the Anglo-Saxon one, the operational methods employed at crime scenes appear to be similar. The best intervention schedule is the following one:

- securing and controlling the death scene
- taking account of the scene
- formulating hypotheses and searching for trace evidence
- sampling fragile stains and samples
- limiting access
- managing the body
- discussing hypotheses.

Trace evidence can be divided into two groups: fragile trace evidence (e.g., footprints, biological stains, microtraces, gunshot residues, toxicological samples) and nonfragile trace evidence (e.g., weapons, documents, explosives, fire materials, tools traces, visible traces and stains, insects).

Operating modes, samplings, and trace evidence search all follow certain protocols and checklists. In Germany, the police force have available a leaflet describing searching and collecting trace evidence. In France, crime scene technicians have a similar brochure.

It is necessary to maintain permanent links between investigators and crime scene technicians in order to direct sampling according to proposed hypotheses. This helps to optimize the order of intervention at the scene and synthesizes the collection of data in the quickest way.

In the Anglo-Saxon system, continuity of proof and validity of the trace evidence are of prime importance. Therefore, any lack or failure in this procedure means that the trace evidence must be rejected.

In France, judicial procedure is not as strict and the magistrate may decide whether some trace evidence can be considered valid even if they have not been collected following a well-defined procedure. Police officers who present trace evidence are under oath to tell nothing but the truth. In contrast, packaging protocols for samples are strictly codified. Sealed trace evidence of any kind can be sent to different specialists and laboratories.

In Germany, protocols exist only for the sealing of some documents and samples (blood samples). The nature and quality of various seals depend on the authority which has collected the sample. In the Netherlands, collected trace evidence is not sealed but is listed on an inventory.

The Use of Electronic Data (Databases)

The technology used in crime scene management is constantly improving. As soon as possible, the latest improvements must be taken up by investigators at crime scenes. The use of databases, including DNA databases, firearm characteristics, foot/shoeprints, drugs, and paints (especially car paints), is a powerful means of linking different activities and identifying suspects.

Concerning DNA, continental legislation is far more restrictive than in the UK, from the viewpoint of the criteria of file registration and file access. Investigators in the UK can directly consult DNA files. In France, investigators must refer to a magistrate, but the new law on interior security in place from March 18, 2003 has simplified the means of access to DNA files of past criminals and sexual offenders.

Links to Laboratories and Central Organizations

The presence of the laboratory personnel at the crime scene is far less frequent in the continental system than in the UK. In France, technicians, investigators, and magistrates must be advised of advances in the technical capacity to treat any trace of evidence. For this purpose, a continuous-education program is necessary. In the Netherlands, a front-desk concept has been introduced by the Netherlands Forensic Institute (NFI). According to this concept, police technicians and investigators can come to NFI to discuss with laboratory experts technical possibilities relating to a specific case and samples.

Most countries have developed systems that can provide tools to manage the crime scene. If the British HOLMES system seems advanced, the French police can now work on similar ANACRIM software.

Finances

In the UK, the police have an annual budget for technical and scientific police and pay laboratories for their analysis and results. In contrast, in most continental countries, laboratories dedicated to forensic science are often public laboratories, whose analyses are not directly paid for, since they receive an annual budget for their activity and staff. Some authors believe that the latter system ensures a better quality of forensic inquiry.

European Collaboration

Working groups of the European Network of Forensic Sciences Institutes (ENFSI) and OISIN programs of the European Union have allowed scientific links

between European countries and tend to unify the technical process.

Recommendations for good practice of crime scene management have been formulated. The role of crime scene manager has been defined and stressed. Recommendations for correct forensic medicine protocols have also been delineated.

Criticisms, Conclusions, and Prospects

In criminalistics, scientific advances are rapid and sensitive techniques can be developed for fragile traces of evidence and samples. Software tools are also available that help with crime scene management.

How to observe, what and how to sample, which priorities to give to some samples, how to package the various samples, when and how to refer to the laboratory are questions that can be best answered if the scientist and the forensic physician are present at the crime scene. This is becoming quite common. Technology obviously has a prominent place, in contrast to those judicial aspects that were so significant in the past. This is more evident in the continental systems than in the Anglo-Saxon one, and is beginning to be translated to parts of continental Europe. The judicial continental systems are quietly moving from an inquisitorial system to an accusatorial one, following the enhanced use of scientific search for evidence.

See Also

Crime-scene Management, Systems: United Kingdom; United States of America

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United Kingdom

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Introduction

The purpose of crime-scene management is similar throughout the world, irrespective of the crime or jurisdiction. Despite the enormous range of incident types, from homicide to terrorist offenses, the aims in most cases are to ensure that the best intelligence and evidence is obtained from the scene. It is also essential that the process by which this is achieved meets the standards of the particular jurisdiction. However, differences in legal systems, police procedures, and scientific methodologies all mean that there are large variations in the detail of the approach.

In the UK there are over 50 police organizations with varying responsibilities and powers. These organizations operate within a number of distinct common-law jurisdictions and therefore there is no single agreed upon system of crime-scene management. Despite this, there is a great deal of consistency in terminology, practice, and standards throughout the UK. This article provides an overview of crime-scene management in serious and major crime in the UK and some of the background to how it has developed.

For the sake of simplicity, the terminology and illustrations used derive mainly from the English legal system.

Particular Aspects of Crime-Scene Management in the UK

There are a number of particular factors that have resulted in distinctive approaches to crime-scene management in the UK. Many of these relate to England and Wales but their influence generally extends beyond this jurisdiction, often to the entire UK.

The increase in importance of forensic evidence in police investigations and a desire on the part of the courts to have more objective and probative evidence is a growing trend. This is partly due to increased expectations of police investigators and the courts due to major scientific developments. Good examples of such technological developments are the intelligence databases in the UK, which are of significance to crime-scene management. The largest of these is the national fingerprint identification system (NAFIS), which has over 5 million sets of fingerprints from individuals. DNA databases are the next most significant. In England and Wales the national DNA database has over 2 million samples from individuals and 200 000 samples from crime scenes. Both these databases are linked to the police national computer that retains all criminal records and other relevant intelligence. Legislation in England and Wales allows the retention of all legally taken DNA samples and fingerprints from individuals, irrespective of whether they have been convicted. This is not the case in Scotland and Northern Ireland. There is little doubt that the huge growth in the national DNA databases is a consequence of the funding provided by central government specifically for this purpose. The most recent addition to intelligence databases is the national firearms forensic intelligence database, which is still in its early stages of use.

In recent years, there has been a concerted drive to set and improve standards in many aspects of forensic work including crime-scene management. The bulk of training in crime-scene management is carried out by Centrex, which is the national police training organization in England and Wales. There are also a number of other organizations involved in setting standards, including the Police Skills and Standards Organization and the Forensic Science Society. In addition, the Council for Registration of Forensic Practitioners (CRFP) was created in response to miscarriages of justice caused in part by poor standards of forensic work. The aim of CRFP is to develop a register of competent experts in order to improve standards and public confidence. This includes all forensic practitioners "from crime scene to court."

The National Crime and Operations Faculty (NCOF), part of Centrex, provides expert advice and assistance to all UK police forces in investigative and forensic matters. The NCOF maintains the National Injuries Database and a directory of experts from a wide range of highly specialist fields such as behavioral profiling. NCOF has extensive experience in investigative and forensic reviews of homicides and serial offenses. The NCOF, together with the Association of Chief Police Officers (ACPO), has also been involved with other parts of Centrex in publishing standards and guidance in relation to investigation and crime-scene management. The *Murder Investigation Manual* (1998) was the first publication of its type in the UK and it is intended to be a manual of good practice that is regularly updated. The manual includes chapters of particular relevance to crime-scene management including forensic awareness, forensic strategies, and the use of expert witnesses. Another key ACPO publication is the *Manual of Standard Operating Procedures for Scientific Support Personnel at Major Incident Scenes*. This was first published in 2000 and includes detailed guidance on the principles and practice of crime-scene management. There are also specific chapters on the management of bomb scenes, shooting incidents, deaths in police custody, and major disasters.

Traditionally, fingerprints and forensic science are dealt with separately in the UK. Police organizations, for the most part, carry out fingerprint examinations whereas scientific analysis is predominantly done outside the police service in professional laboratories. In Scotland, all of the forensic laboratories are in police organizations but in England and Wales most of these laboratories are, or soon will be, private organizations.

The Roles of Crime-Scene Manager and Coordinator

In the UK a system has been developed to provide professional management to support forensic science investigations using the designations crime-scene manager (CSM) and crime-scene coordinator (CSC). In most UK police forces these roles are carried out by police staff rather than sworn police officers, although in the Metropolitan police, for instance, the CSC is often an experienced detective. The CSM is normally a senior scene investigator supported by a team of crime-scene investigators (formerly scenes of crime officers or SOCOs). In many police forces the CSC is a principal CSI or head of department. Most UK forces have a scientific support manager (SSM) whose role varies greatly with the size of the force. In smaller forces this person will some-

times perform the functions of CSC. This is less common in larger forces, where the SSM role is usually managerial rather than operational. Although there is variation in terminology, it is important to stress that the individuals who carry out the roles of CSM and CSC do so on the basis of expertise and knowledge.

The senior investigating officer (SIO) has overall responsibility for the conduct of the investigation, including crime-scene management, but this is normally delegated to the CSM. The SIO leads a team of experienced detectives and other specialists working together as part of an incident room.

Crime-Scene Manager

A CSM is always appointed to the main scene in any major inquiry and will be supported by a CSC in cases involving multiple scenes or scenes that are complex or high profile. In the case of multiple scenes, a CSM is often appointed to each scene or aspect of the investigation. As an additional guideline to the level of response in any particular case there are nationally agreed categories of investigation:

- category AA: major crime of grave public concern, such as the murder of a child, multiple homicide, or the murder of a police officer
- category B: major crime where the offender is not known
- category CA: major crime where the identity of the offender(s) is known.

A CSM is responsible for:

- assessment of, planning, and agreeing on the forensic approach, including the specific sequence of examinations in individual scenes
- determining and allocating appropriate numbers of suitably trained personnel to individual aspects of the scene examination
- managing welfare of staff
- health and safety risk assessments and implementation of control measures
- planning and managing the forensic aspects of postmortem examinations
- briefing scene personnel and communicating findings from scene to investigation team
- advising the SIO on the investigative potential of different forensic evidence types generally and specifically
- advising the SIO on the value of using experts in particular fields such as ballistics, blood patterns, and fire investigation
- coordination of individual experts within the overall scene examination
- agreeing on the forensic strategy with the SIO
- maintaining ongoing communication between forensic laboratories, individual experts, and the investigation team.

A CSC will usually be appointed in the following circumstances:

- multiple scenes or complex/high-profile investigations
- serial offenses
- mass disasters.

The CSC is appointed to oversee and control the forensic investigation of a case in liaison with the SIO.

The Scene

If there are casualties present they must take priority and if there are fatalities then death must be certified as soon as possible. The initial function of a CSM is to ensure the integrity and preservation of a crime scene. This is achieved by ensuring that scene cordons and logs are in place and that access to the scene is limited to those with a need to attend. A common approach path is implemented and used by all personnel entering the scene. This should be positioned, if possible, away from any route used by a suspect. Active scene preservation may be needed should inclement weather or other factors require evidence to be protected or recovered quickly.

Following an assessment of the scene, the CSM defines the extent of the scene to be examined and sets search and examination parameters. In some instances there may be conflicting forensic opportunities at the scene that require specialist knowledge to evaluate. In these circumstances, decisions are made based on the recovery of evidence that is likely to be of most value to the investigation. The examination strategy is also based upon any intelligence or information known.

The CSC works closely with the SIO as part of the senior management team of the investigation. This creates an effective communication link between the SIO and the forensic specialists, including CSIs, the CSM, and any other experts or advisers. Both the CSC and CSM attend daily briefings and form part of the SIO's forensic management team that may also include a specialist adviser from a forensic laboratory and an exhibits officer. The exhibits officer is responsible for managing all exhibits and ensuring chain of custody. The CSC also monitors the submission of exhibits to external forensic science laboratories. Police experts would normally deal with fingerprints. The CSC is the main communication link between the incident room, the SIO,

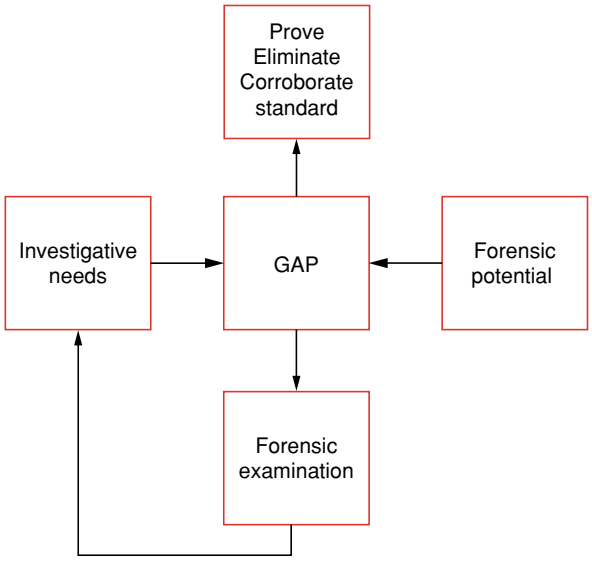

Figure 1 Schematic diagram of gap analysis.

and all other forensic agencies involved. Routine systems are used to avoid cross-contamination between scenes, victims, and suspects. The CSC or CSM keeps records to show what actions have been taken to prevent this possibility.

Forensic Strategy and the Forensic Management Team

CSMs and CSCs are trained and qualified practitioners in their field and act as advisers to the investigating officer who retains overall responsibility. The benefits of this approach are that specialist skills of the CSM can be brought to bear on investigative problems using an array of approaches and techniques with which the CSM will be familiar. The main drawback of this approach is that more individuals are involved in an already complex process and there is the possibility of a fragmented approach or poor communication. The purpose of the forensic management team (FMT) and the forensic strategy is to ensure that the problems outlined above do not occur. The aim of the forensic strategy is to ensure that

- all forensic opportunities are brought to the attention of the FMT for their consideration
- forensic opportunities are considered in the light of investigative requirements
- all relevant expertise is engaged in developing a forensic strategy
- time scales for forensic outcomes such as DNA results are adhered to
- financial matters are considered
- information regarding forensic and investigative issues is communicated
- the forensic strategy is agreed upon, recorded, and regularly reviewed
- a team-based, problem-solving approach is used.

The FMT should consist of all of the relevant individuals and expertise to ensure that the forensic strategy fulfills its objectives. The composition of the FMT typically includes the SIO, deputy SIO, CSC, CSMs, exhibits officer, and one or more scientific advisers. These advisers may be individual experts such as pathologists or may represent larger laboratories and advise on a wide range of forensic matters.

Figure 1 provides an illustration of how gap analysis can be used to develop a forensic strategy. This approach is as follows. Given the current context of the investigation (witness information, intelligence, and evidence), what is the gap between what is known (or can be proved) and what is required? Defining the investigative needs can be achieved by addressing the following questions:

- What do I need to prove?
- What do I need to eliminate?
- What do I need to corroborate?
- What standard of proof is required for each of the above?

Having addressed the investigative needs, the forensic potential (DNA, fingerprints, etc.) from the crime scene is then considered. This can be explored in conjunction with the investigative requirements in order to close the gap by the quickest, most cost-effective, and lowest-risk options.

Examples of the types of questions the forensic management team would consider when setting a strategy are:

- Is there any material at any of the scenes that may lead directly to identifying the offender, such as body fluids of any type or fingerprints?
- Is there any material that could potentially connect the offender with the scene, such as shoemarks, fibers, or other trace evidence?
- In cases where it is known that the offender was at the scene, are there any materials that are incriminating due to their particular location in the scene?
- How were premises entered – is there an identifiable point of entry?
- Can a sequence of events at the scene be identified using forensic evidence such as blood patterns?
- Is there information available at the scene to support or refute hypotheses considered by the investigation team (hypothesis testing)?

- What type of search is required at the scene – is documentation from bank accounts, telephone records, and vehicles needed urgently?
- How should the information be relayed to those who need to know? Should the examination be stopped for briefing purposes or is the examination more urgent?
- What staffing levels are required to carry out the strategy in a realistic timescale?

Resources and Priorities

In all crime investigations time and resources are limited. During the Stephen Lawrence Inquiry in the UK, Sir Paul Condon, Metropolitan Police Commissioner at the time, commented: "In any given scenario, there is potentially an enormous number of items that could be seized for forensic examination. Difficult choices have to be made and this calls for judgment, experience, and expertise. The advent of increasingly complex and expensive scientific tests increases the number of ways items can potentially be tested for forensic evidence. However, it must be acknowledged that the law of diminishing returns means that some tests will not justify the expense incurred, and sound judgment is required to target resources effectively in the search for forensic evidence."

It follows therefore that sometimes difficult decisions need to be made that balance the use of public money against an effective and appropriate investigation.

The order in which forensic examinations are carried out will often create conflicts between different searches, for example, using chemical enhancement techniques for fingerprinting may well damage or destroy any DNA present. It is important therefore that examinations are conducted in the optimum order in an effort to gather the most effective evidence for that investigation. These priorities may also change, for instance, in cases such as kidnapping, where the priority is to locate the victim as soon as possible. The strategy in such cases may be to carry out a search for documentation that could provide lines of urgent enquiry before more conventional forensic techniques are brought to bear on a scene.

It is vital that control of a scene examination rests with one person. Implementation of a strategy requires consistency and planning. Handovers from more than one CSM to another are to be avoided if possible to prevent mistakes or gaps in the examination. Communication of all aspects of the investigation is vital. There is little point in setting a forensic strategy if it is based on incomplete information or if those involved in laboratory examinations are unaware of the relevant circumstances of the case and the significance of the examinations they have been requested to conduct. Evidence from a forensic science expert is invariably based upon some element of interpretation given the particular circumstances of the case. If any information on which the examination is based changes, the interpretation of the findings may be affected. All those involved in the forensic examination will work to an agreed hypothesis, constantly monitoring and updating their approach in relation to changing circumstances, new information or intelligence. This methodology does not stop once the scene examination is concluded and is a continuing process throughout the course of an investigation up to and including the presentation of evidence in court.

With the creation of the roles of CSM and CSC the professional management of crime scenes continues to improve. Training and continued professional development are becoming an expected requirement of the role, together with registration with CRFP. Membership of a relevant professional body is likely to be the next step in developing the profession.

Use of Forensic Experts

A key element of crime-scene management in the UK is dealing with forensic experts from a wide range of disciplines. Whilst the SIO in major inquiries has ultimate responsibility for this issue, the CSM generally has wider knowledge of the potential expertise available and more experience in the use of experts. The key issues for a CSM with respect to forensic experts are:

- From an initial scene assessment, is there a need to call experts to the scene?
- What experts are required and at what stage should they be contacted?
- What information will the expert need before and after the scene examination?
- Should the expert be part of the forensic management team?
- How should items be selected and prioritized for examination?
- What costs, if any, are involved in the use of particular experts or laboratories?

The CSM generally acts as the link between the investigation team and individual experts and forensic laboratories. This includes ensuring that the expert is fully briefed on the case circumstances, that items for examination are submitted for analysis promptly, and the priority examinations are clearly identified. Consultation between the CSM and the relevant ex-

pert establishes any particular needs that the expert has in order to carry out the examination. This may include scene measurements, plans, photographs, and witness statements. Typically in the UK, most forensic examinations are sent to a single laboratory that provides a wide range of specialist expertise. In such instances there is normally a formal process of submission that is fully documented and recorded. In England and Wales all such analyses are paid for by individual police forces.

In an article of this nature it is not possible to deal with the extensive range of experts that may be used, therefore we will confine ourselves to a single example of the type of case which requires a number of experts. When firearms have been used in a suspected murder or unlawful killing it is recommended practice in England and Wales for a pathologist, a ballistics expert, and often a blood-pattern expert to attend the scene. Each expert has a different contribution to make. Examination of the bodies *in situ*, establishing the trajectory of bullets, and interpretation of blood patterns are likely to provide the best opportunity for accurate reconstruction of the incident. Failure to take this approach is likely to compromise the investigation significantly. It is the role of the CSM to coordinate this process, to provide each expert with the relevant briefing, and integrate the outcomes of each specialist examination with the overall investigation. This process can be time-consuming and requires the CSM to maintain a constant focus on the needs of the experts and the needs of the investigation.

See Also

Crime-scene Investigation and Examination: Collection and Chain of Evidence; Major Incident Scene Management; Recovery of Human Remains; Suspicious Deaths

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The Manual of Standard Operating Procedures for Scientific Support Personnel at Major Incident Scenes (2000) Association of Chief Police Officers.

United States of America

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Introduction

Importance

However "crime scene" is defined, it remains that only the crime scene provides physical evidence to establish the commission of a crime. Both witness statements and confessions remain mere hearsay accounts, which demand either support or refutation through some type of physical evidence. Without such physical evidence, whether direct or circumstantial, police investigators, medical examiners, forensic scientists, prosecutors, defense attorneys, and ultimately, the courts, would be left with little if any professional work to accomplish in criminal cases. For this reason alone, a systematic approach to any crime scene remains the most vital of all tasks facing criminal investigators in their sworn pursuit of justice, both for the victims of crime, and for those accused of its commission. Indeed, processing the crime scene remains the essential link between crime and science, giving both crime laboratories and medical examiners the necessary grist for their scientific mills.

Definition

Attempts to define crime scene often become mere enumerations of different types of crime scene by simple illustration. Such enumerations, while useful to help us classify different types of crime scenes, fail to provide a robust definition. Many have argued that "crime scene" represents a necessarily elastic notion with myriad instances and plural nuances, even some, perhaps, as yet unimagined. But some lexical definition, capturing both its essential link to physical evidence and its necessarily metamorphic nature, can be useful to help focus the roles of forensic science and forensic medicine in the investigation of physical evidence.

In the USA, the words "crime scene" are used to mean any identifiable physical location potentially supplying physical evidence relevant for adjudicating hypotheses concerning a given crime. While perhaps overly inclusive, this usage entails that appropriate crime scenes may include the entire forested area where a homicide victim's body lies; any roads or trails providing access to the area; the body itself; the site where the victim met the perpetrator such as a vehicle, an apartment, a truck stop, or a bar; any site

where the initial assault took place; and the site where the victim died: anything, in short, which supplies a location for existing physical evidence documenting the contact between victim and perpetrator. In common use, this may include the body, and items located near it – each being a mini crime scene unto itself.

This definition leaves the exact scope of the crime scene itself, that is, how much of the forested area, which roads, and which other sites, entirely to the individual investigator's professional discretion. In the USA, the exact nature and scope of specific crime scenes depend upon informed human judgments rather than upon lexical rigidity for both their physical and conceptual boundaries.

Scope

The definition entails that we may find crime scenes within crime scenes: each macroscopic crime scene contains multiple microscopic crime scenes, ranging from a bedroom to the victim's clothing to the microscopic traces on the clothing. While this may at times invite confusion by calling some strange locations crime scenes, it rests upon the most basic postulate of forensic science, Edmund Locard's principle of exchange – that every contact between two distinct items transfers part of one on to the other. In this manner, Locard's principle justifies the expectation of physical evidence at crime scenes and explains its potential significance.

Processing Crime Scenes

The Practical Preservation of Evidence

Before any physical evidence can be examined by forensic scientists, it must be recognized as potential evidence and, where relevant, collected and preserved in an uncontaminated state. This must occur during the initial crime-scene investigation since many such locations cannot be maintained under official control for indefinite periods. Crime scenes may involve public places, roadways, apartment buildings, or private homes, which exist to serve ongoing purposes precluding any sustained control by investigators.

They may be outdoors and subject to weather or other deleterious environmental effects, or they may involve temporally dependent evidence such as footprints in melting snow, muddy tire tracks in a rainstorm, or even odiferous vapor clouds which exist only fleetingly. Nor do shrinking budgets and limited personnel resources permit the additional drains involved in the perpetual control of most typical crime scenes. This underscores the importance of documenting the crime scene to ensure its continued existence and thereby enable its continued investigation – representative notes, films, drawings, and collected evidence remain held under rigid protection in perpetuity.

Crime-Scene Processing Personnel

Practical problems and limitations also affect crime-scene processing among the many independent jurisdictions in the USA. A paucity of trained personnel provides a potential roadblock in the movement of evidence from the crime scene to the forensic laboratory or medical examiner's office. The lack of trained crime-scene personnel may even prevent the very recognition that a crime has been committed in the first place. Regardless of the scientific prowess of crime laboratory or medical personnel, if they fail to visit the crime scene to collect their own evidence, then they must depend upon the skills of the assigned crime-scene personnel for all the evidence that they examine. If crime-scene personnel fail to recognize the evidence, fail to collect it, or fail to collect it properly, then the operations of forensic science and forensic medicine, and the integrity of the justice system itself, suffer immeasurable damage.

As a remedy, crime-scene technicians, who are not trained forensic scientists or experienced forensic medical investigators, function simply to document the crime scene as thoroughly and completely as possible and to collect items of potential evidence according to one of many well-developed crime-scene processing protocols. Documentation protocols provide guidelines for measuring, drawing, photographing, and videotaping scenes while collection protocols provide guidelines to help uncover potential evidence, and, for example, to lift latent fingerprints and retrieve weapons, projectiles, cartridge cases, or blood and other biological evidence. They also teach the proper packaging and transporting of these items of physical evidence to the appropriate agencies, while preserving legal chain-of-evidence requirements, guaranteeing that the evidence remains protected and uncompromised.

Processing Protocols

In theory, with such protocols adopted, potential evidence has a better chance of being preserved. Of course one merit of the approach remains that only after considerable study does the scientist begin to distinguish significant from insignificant data. The practical merit allegedly remains the preservation of scarce budgetary and personnel resources by training lower-paid technicians to handle crime-scene processing. Advocates of this approach assume that the chance of significant data being both documented

and collected outweighs the chance that data will be missed entirely, or even partially compromised by oversight or omission.

The practical effects of this overall management method remain an ongoing concern in the scientific investigation of crime and in the rigorous assessment of its evidence in courts of law. Many forensic professionals believe that quality crime-scene processing must be done by personnel more extensively trained in both the natural sciences and scene investigation. Given the multijurisdictional nature of investigative agencies processing crime scenes in the USA, the debate over alternative models of crime-scene management will not resolve soon. Nor will one particular approach emerge as "the standard" to be embraced by all jurisdictions regardless of size, location, or financial resources.

Basic, General Stepwise Protocols

First responders and securing the scene The protection of a crime scene becomes law enforcement's first priority. The goal remains to prevent any accidental transfer of items to the scene, which may confuse or compromise the "slice in time" that the scene represents. Steps must be taken to keep unnecessary visitors away from the crime scene. Police establish physical barriers of some type to block entrance and to segregate the area from the public. Usually one officer becomes the scene security officer responsible for maintaining scene security.

No crime scene remains pristine – neither relatively protected indoor crime scenes, nor relatively exposed outdoor crime scenes. Seldom are crime-scene personnel the first to discover the scene. Even before the crime's discovery, proper first responders may include emergency medical technicians, firefighters, residents, relatives, hikers, construction workers, or even nonhuman visitors such as dogs, cats, mice, rats, birds, local fauna, and of course insects. Each visitor, regardless of scene, leaves some mark of his/her presence.

The official duty of securing the scene includes documenting who or what visited the scene as a so-called "first responder." (The documentation continues beyond first responders to include a visitor's sheet, recording the date and time that anyone, including crime-scene technicians, medical personnel, and detectives, enters or leaves the scene.) For many scenes, documenting first responders is handled by collecting ambulance or firefighter run sheets, and by asking first responders to report their movements at the scene. If necessary, shoe prints, hair, clothing samples, blood, and even DNA may be collected for later laboratory elimination purposes.

The task becomes more complex when securing outdoor scenes. A scene involving a hiker's discovery of disarticulated skeletal remains, which has enjoyed varied company over some period of time, falls beyond the scope of such simple documentation. The hiker's movements must still be documented, but documenting the activities of other first responders requires the expertise of forensic anthropologists, forensic entomologists, and even forensic botanists.

As the data at crime scenes become more scientifically diverse, many processing protocols in the form of activity lists exhibit inherent shortcomings. Many scientific disciplines have a narrow focus, which remains unfamiliar to crime-scene technicians. The lack of specific scientific knowledge and experience can result in missing data otherwise available at such scenes, thereby inducing hardships upon investigators working the case.

Many crime-scene technician training programs cover the recognition, collection, and preservation of entomological and botanical data as well as information about the habits of indigenous birds, mammals, and fish. Some jurisdictions hire outside consultants to help with cases requiring specific and narrow expertise. Depending upon budget and cases, coroner's or medical examiner's offices may employ a forensic anthropologist to assist in the identification and recovery of human skeletal remains as well as to help law enforcement and the public distinguish human from nonhuman artifacts.

Human bodies as evidence In virtually all jurisdictions, the body of any deceased person and its scientific inspection remains the sole province of the coroner or the medical examiner. Human remains exist outside the crime-scene technician's province, despite popular television portrayals to the contrary. For this reason, the crime-scene technician is joined by a deputy coroner, medical examiner's representative, or a trained medical investigator. This representative may perform the duty of evidence recognition, documentation, and collection with respect to a human decedent. This evidence is then evaluated by the forensic pathologist to identify the decedent, and to establish both the cause and manner of death. Each official must work together closely and cooperatively for such a team effort to be both scientifically productive and legally successful.

Limitations to this medical version of the crime-scene technician become obvious when cases demand more of the medical technician than his/her lack of knowledge and experience can supply. Jurisdictions unable to afford trained medical investigators may simply function as a removal service, waiting until detectives release the body from the scene, and then

merely transporting it to some preestablished location for analysis. The only personnel requirements for such positions appear to be a strong back and an equally strong stomach.

The legal and scientific prowess of such systems when faced with challenging cases remains at best questionable. As with crime-scene processing models, the best model to adopt for scientific death investigation remains a much-discussed topic among forensic professionals. However, in both areas, continuing education and robust educational requirements have led to promising certification programs designed to teach practitioners to seek help from those with more training and experience in relevant areas.

Survey the scene Once secured, with appropriate personnel in place, the next step involves some type of reconnoitering, or a "walk-through" to establish the scene's potential scope and peculiar working requirements. This involves both crime-scene and medical personnel who work together at the scene with detectives. The walk-through should establish basic parameters by noting each avenue of entry and exit, while specifically noting any hazards requiring supplemental measures, ranging from additional protective equipment to a call for additional security. The walk-through should provide a clear understanding of the equipment, personnel, and time required for the tasks at hand, and an initial prioritization of those tasks.

Document the scene Priorities for crime-scene processing depend both on the scene's peculiar circumstances and on the specific methods of various sciences. The general principle becomes to arrange the evidence-processing and collection activities from the least invasive or destructive to the most invasive or disruptive of the scene's current protected status. The most benign task becomes providing an accurate documentation of the entire scene as it initially presents itself to investigators.

This remains the most important step to aid future analysis of the scene's elements when various investigative hypotheses are formed and tested. Usually elements not believed to be relevant at the scene may become supremely relevant later on as further information develops. Thus the proper, complete, and orderly documentation of the crime scene becomes the primary task for the crime-scene technician.

The forms of documentation This documentation assumes several forms. Notes cover data from listing personnel, notification, and arrival times to a thorough description of key scene elements ranging from the victim to the surrounding environs, including the structure, its furniture, and even the contents of ashtrays, refrigerators, and dressers. The notes must follow a clear, logical order, usually moving from descriptions of the larger toward details of the smaller; or from the overall to the specific depending upon the scene. The same logical principles apply regardless of whether the crime scene is in the woods, or in a housing project.

Measurements and both rough and scale drawings are developed to map the scene, giving detailed numerical distance relationships among items in three-dimensional space. A crime scene is not flat: coordinate systems with x-, y-, and z-axes are most practically used to locate items in space and capture their essential features. While not commonly used, three-dimensional coordinate systems are powerful tools in the analysis and documentation of, for example, blood stains or bullet holes which necessarily occur at some height as well as at some two-dimensionally fixed location.

Three basic measurement methods for locating items two-dimensionally include triangulation (locating an object by measuring its distance from two fixed points), baseline (locating an object by measuring its distance at 90° from a straight line between two fixed points), and polar coordinate methods (locating an object using a transit or compass by determining its north–south–east–west angle and distance from a fixed point). The choice depends upon the nature of the scene and the ease with which items can be relocated in the same space years after the scene has been abandoned. Each method identifies two fixed starting points judged to be relatively permanent in both nature and location, and develops the corresponding locations of all evidence in specific relation to these two fixed points.

Videotape photography also captures the scene according to these logical principles, for example, noting roads, orienting north–south–east–west directions, the weather, time, temperature, and other physical phenomena. No detail at the scene can be considered inconsequential or unworthy of inclusion in the taped record. The videotape of a crime scene does not include an audio track. Such a track might inadvertently record irrelevant comments by investigators, not properly a record of the scene itself. Exceptions might include the need to record unusual noises or sounds, which are an integral part of its nature, and therefore must be included for a complete understanding of its varied elements.

Still photography must capture the entire scene, again moving from overall shots showing the orientation of various items toward specific, examination-quality photos documenting each element. Standard practice captures items first without identifying num-

bers or measuring devices, then with such identifiers and scales present. A consistent numbering or lettering system identifies the items in both photos and drawings. Systems usually come as "tents," like triangular signboards, with numbers or letters in black script on a white or yellow background. Long after items of evidence are collected, these numbers, visible in the photos, provide an orientation of the item along with other items of evidence similarly documented at the scene.

Evidence discovery and collection Disciplined scene searches help ensure that no items of potential significance are missed as the crime-scene processing progresses. Different search techniques, such as establishing a logical linkage among items, line searches, zone searches, and wheel, spiral, or grid searches, can be applied, depending upon the type of location being processed. In many cases, logical linkages among items provide the most useful approach. For example, if six spent cartridge cases appear at a scene, the linkage search technique implies that investigators search for evidence of six bullets and their associated trajectories at the scene. Even if six bullets cannot be accounted for, this too provides useful information about the crime which must be considered in any eventual reconstruction of events leaving these effects.

Other search patterns are based upon geometric patterns: some, such as the line search, may apply more usefully to larger outdoor scenes. Often some combinations of these search techniques develop as a reasoned response to the peculiarities of the specific situation under investigation. The choice of technique remains part of a thoughtful response to the uniqueness of the specific scene and there is no single search pattern that can be applied blindly in all circumstances. Search techniques as basic tools of crime-scene processing are chosen by investigators to best attain the objectives dictated by the case at hand.

Once the scene has been revealed as completely as possible, evidence collection and preservation techniques remove items of evidence for further analyses, to be completed by specialists, usually in the crime laboratory. While there is no rigid order for the collection of evidence, usually the most fragile, easily lost, and transient items are first collected. This ensures that such items remain uncontaminated. Different types of evidence require different collection and packaging techniques.

Collection principles are based upon the logic mirrored in search patterns. For example, fingerprints are lifted from various surfaces which are chosen based on logical linkages – one might ask, for instance, which surfaces would be touched by anyone gaining entry to the scene and producing the effects observed during the scene's investigation? These locations, then, provide the most logical places to attempt latent fingerprint lifts. If all surfaces at a crime scene were blindly dusted for prints, little else would be accomplished. Sound evidence collection depends vitally upon the logical sagacity of the crime-scene technician working the scene.

Once collected, evidence must be consistently marked, packaged, and sealed to avoid contamination and to preserve the chain of custody. Usually one person is assigned evidence collection and packaging responsibilities. This ensures uniformity and consistency, while preventing needless duplication of effort if each investigator collected evidence independently. Packaging is chosen to best preserve the evidence. For example, bloody evidence is sealed in paper bags to allow the items to dry and to prevent deterioration of the evidence by condensation, or biological activity, which would be encouraged if such items were sealed in plastic. In appropriate packaging, the items are sealed with evidence tape, documented in the evidence log with their number and a brief description, and then signed and dated by the collection technician.

Whenever packaged evidence is opened and examined by laboratory or other personnel, the item is resealed using the identical protocol – it is resealed with evidence tape, resigned, and redated by the new analyst. This ensures that the chain of custody is preserved by providing a record of the item's disposition at all times, under all circumstances. While much of this scientific analysis occurs away from the actual crime scene, some types of evidence may require that the forensic scientist conduct his/her analyses at the crime scene itself.

Scientific Evidence Analysis at Crime Scenes

In most cases, crime-scene personnel are thought to have the training needed to document all scene data, if not to provide the scientific analysis and interpretation of its significance. However some data at crime scenes may demand that trained scientists (with expertise beyond that of the crime-scene technician) visit the scene in order to provide a scientific analysis of data, which cannot easily be separated from the location. In these cases, trained forensic scientists or forensic pathologists must visit the crime scene in order to provide their analyses and interpretations and to release crime-scene technicians from difficult, if not impossible, documentations needlessly risking the inadvertent distortion of valuable data.

Crime-Scene or Event Reconstruction

Characterization

An anecdotal recitation of personal opinion, regardless of source, is not a crime-scene reconstruction. A properly developed crime-scene reconstruction links a series of scientific explanations to illuminate the events leaving physical evidence. This process involves proposing, testing, and evaluating explanatory connections among the physical evidence related to these events. The purpose of the analysis is to determine their best explanation.

Example

Upon entering a room, one sees a yellowish-fluid puddle on the white linoleum floor. A small puppy wiggles submissively as it runs up to greet you at the room's entrance. The logic relevant to crime-scene reconstruction also licenses an explanation of the puddle on the floor. The scientific process involves discovering evidence to support or refute your proposed claim. The same logical process justifies more scientifically complex crime-scene reconstructions. While no reconstruction can explain every element of a scene, the explanations must minimally withstand sustained logical and scientific scrutiny.

Conclusions

As important as the crime scene remains in the investigation of crime, often scant attention is paid in the USA to the need for a systematic approach to crime-scene management, processing, and documentation. No better evidence can be supplied than to examine the miniscule budgets for training crime-scene technicians, crime laboratory personnel, medical examiner's personnel, or especially, for training police officers both in the basics of crime-scene protocols, and in the scope and limit of current forensic science and forensic medical practice. Much misinformation exists among law enforcement personnel concerning forensic enterprises ranging from fingerprints and their significance to DNA and its limitations. Improved training provides the best remedy.

Often the quality of equipment available to actors playing forensic scientists on television far exceeds the equipment available to real scientists and technicians charged with processing and documenting actual crime scenes. Until these matters change significantly, crime-scene processing will continue to lack substantial uniformity and will remain of varying quality among the many jurisdictions charged with this vital task in the USA.

See Also

Crime-scene Management, Systems: Continental Europe; United Kingdom

Further Reading

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