MODULES IN A FORENSIC SCIENCE PROCESS

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FURTHER INFORMATION

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1. INTRODUCTION

1.1 Preamble

This document is based upon the ILAC (International Laboratory Accreditation Cooperation) document ILAC_G19_06_2022 *Modules in a Forensic Science Process*. On the transfer of the role of ILAC to the Global Accreditation Cooperation (Global ACI), the text has been reformatted to be a Global ACI document without any substantive change to the text.

ILAC G-19:2002 Guidelines for Forensic Science Laboratories (withdrawn), was published in 2002, with the purpose of: "... provide guidance for laboratories involved in forensic analysis and examination by providing application of ISO/IEC 17025." In October 2007, the IAF and ILAC Joint General Assembly resolved that a single top level document that approaches the forensic science process as a whole and provides common guidance for both ISO/IEC 17020 and ISO/IEC 17025 in areas where the activities overlap should be drafted, and that the guidance should be based on the guidance document to ISO/IEC 17020 for crime scene investigation, already prepared by the European co-operation for Accreditation (EA) and the European Network of Forensic Science Institutes (ENFSI) (EA-5/03 withdrawn), and on ILAC G19 for forensic laboratories.

The requirement that there is a single document, that deals with the forensic science process as a whole, and that it provides common guidance for both ISO/IEC 17020 and ISO/IEC 17025 in areas where the activities overlap, means that the normal format of clause-by-clause guidance is not the most appropriate approach in this instance. Providing guidance is further complicated because there is no clear and consistent distinction in forensic practice between the activities conducted at a scene of crime and those conducted in a forensic laboratory, nor is there always a clear and consistent distinction in the administrative location of personnel involved in the activities. Thus, testing may be conducted at a scene and general examination of materials recovered from a scene may be conducted in a forensic laboratory. Equally staff conducting scene of crime examinations may be part of the forensic laboratory or may be located within a separate administrative entity.

Finally, accreditation bodies can choose, as appropriate, to have accreditation programs which are based on ISO/IEC 17025 and/or ISO/IEC 17020 for different parts of the forensic science process. However, the accreditation body should clearly describe which standard they intend to use for which parts of the forensic science process and ensure that this is made clear to any organisations applying for accreditation. Appropriate applications of ISO/IEC 17020 and ISO/IEC 17025 should be made by accrediting bodies based upon the presence or absence of examinations/tests in the segment of the forensic science process in question.

The word ‘shall’ has been used in this document where there is a corresponding requirement in ISO/IEC 17020 and ISO/IEC 17025; the word ‘should’ has been used to indicate a recommendation that is generally accepted practice in the forensic science process.

1.2 Purpose

This document is intended to provide guidance for laboratories, scene of crime investigation units and other entities, hereafter called forensic units, involved in examination or testing in the forensic science process by providing guidance for the application of ISO/IEC 17020 and ISO/IEC 17025.

Reference to ISO 15189 has been included in the correlation charts in Annex C to assist in the application of ISO 15189 in a forensic context, for example, forensic toxicology conducted in medical laboratories or forensic examination or testing conducted at sexual offence centres.

However, the remainder of this document has not been updated to reflect the specific requirements of that standard.

1.3 Scope

This document outlines the series of steps within the forensic science process from the time a forensic unit is notified of an incident until the presentation of results and observations together with a description of the activities that take place at each step.

This document does not specify which International Standard should apply to the work being conducted by the forensic unit. This is a matter for the conformity assessment body, in this circumstance this is the forensic unit, and the accreditation body concerned.

Any examination/test conducted as part of scene of crime investigation shall be carried out according to documented procedures and ISO/IEC 17020 may cover these procedures provided that the relevant clauses of ISO/IEC 17025 are considered (see Annex D).

The forensic unit may undertake a combination of activities to which this document contains guidance. The accreditation to be granted shall be based on the activities for which the forensic unit applies for accreditation and the accreditation body shall apply the guidance which is related to those activities only.

The activities may include the examination or testing of a wide range of items and substances and require technical expertise in multiple disciplines. A table is provided in Annex A listing some of the forensic disciplines being undertaken by forensic units.

The techniques adopted in the examination or testing of forensic material cover a broad range; from visual examination to sophisticated instrumental procedures.

The forensic science process

The forensic science process includes, but is not limited to:

- initial discussion regarding scene of crime attendance
- undertaking initial actions at the scene of crime
- developing a scene of crime examination strategy
- undertake scene of crime examination
- assess scene of crime results and observations and consider further examination or testing
- interpret and report results and observations from the scene of crime
- examination and testing (including appropriate case assessment)
- interpretation of the results of examinations/tests
- reporting from examination or testing including interpretation of results

This document is formatted based on the activities which may occur during the stages above and does not define the sequence or timelines for the completion of an activity. It was developed to provide additional guidance for specific sections within ISO/IEC 17020 and ISO/IEC 17025 and does not repeat the requirements of these standards, where the given explanations are sufficient. It endeavours to provide interpretation or clarification and should be read in parallel with ISO/IEC 17020 and ISO/IEC 17025 as appropriate.

A forensic unit can have one single management system to cover all of its activities and all the competence standards to which it works, i.e. ISO/IEC 17020 and ISO/IEC 17025.

2. TERMS AND DEFINITIONS

Many concepts of significance in the forensic science process are described by terms or are defined in ways that are not consistent across jurisdictions. This document therefore defines these for the purpose of providing a common understanding of the meaning of terms used in this document.

2.1 Competence

Competence is the demonstrated ability to apply knowledge and skills and, where relevant, demonstrated personal attributes.

2.2 Contamination

Contamination is the undesirable introduction of substances or trace materials to or between items at any point within the forensic science process.

2.3 Contract

A contract may be any written or oral agreement to provide forensic services.

Note: a contract does not necessarily involve payment for the services and may be mandated by law and may need to be in accordance with local, regional or national legal requirements.

2.4 Critical Findings

Observations and results that have a significant impact on the conclusion reached and the interpretation and opinion provided. In addition, these observations and results cannot be repeated or checked in the absence of the item or sample, and/or could be interpreted differently.

2.5 Customer

The customer is normally the organisation and/or a person asking the forensic unit to perform all or a specific part of the forensic science process. This also includes the term ‘client’. This may be an internal customer. If work is requested via legal mandate (e.g., court order) or if the results of examination or testing are to be provided to a member of the judicial system, then the judicial system may be considered to be the customer.

2.6 Equipment

Equipment refers to all, but not limited to, tools, instruments, software, reagents and chemicals that are used as part of the forensic science process which need to be monitored and controlled.

2.7 Examination/Test

Examination/test has been used in this document to refer to sampling, analysis, visual inspections, comparisons, and interpretations.

In this context an examination/test is one which, having been documented and validated (and if necessary, verified for proper performance), is under control so that it can be demonstrated that all appropriately trained staff will obtain the same results within defined limits. These defined limits can relate to expressions of degrees of probability as well as numerical values.

Visual examination, qualitative examinations, comparative examinations, enhancement, recovery, and computer simulations are included in the definition of examination/test, for

example, examination of damage, presumptive blood tests, toolmark comparison, fingerprint enhancement and recovery, extraction of data from mobile phones.

2.8 Facility

Facility is any physical environment used to protect the integrity of items, conduct examination, testing or inspection activities, or support any other aspect of the forensic science process, for example, permanent premises, offices, tents, storage area, mobile office, mobile laboratory, vehicles of the forensic unit.

2.9 Forensic Investigator

A person, however named, trained to perform scene of crime examinations and/or investigations. Other names used for this function are, for example, Scene of Crime Officer, Crime Scene Investigator, Scene of Crime investigator and Scene of Crime Examiner.

2.10 Forensic Report

A forensic report (however named) includes the results and interpretations of forensic examinations/tests. Such reports may be hard copy or electronic and may be in a format prescribed in relevant legislation. Forensic reports may be submitted to law enforcement investigators, members of the judiciary and other interested parties.

2.11 Forensic Unit

A forensic unit is a legal entity or a defined part of a legal entity that performs any part of the forensic science process.

2.12 Impartiality

Actual and perceived presence of objectivity.

The forensic unit shall undertake all activities impartially; some examples of the aspects of the forensic science process related to the demonstration of impartiality are the use of alternative hypotheses when developing strategies for scene of crime or laboratory examination or testing (4.3 and 4.7.2), the provision of background information (4.4.1 and 4.7.1) and the use of balanced scales of opinion (4.9).

Note 1: Objectivity means that conflicts of interest do not exist or are resolved so as not to adversely influence subsequent activities of the forensic unit.

Note 2: Other terms that are useful in conveying the element of impartiality are: objectivity, independence, freedom from conflicts of interest, freedom from bias, lack of prejudice, neutrality, fairness, open-mindedness, even-handedness, detachment, and balance.

2.13 Item

An item is an object, substance or sample recovered as part of an investigation. This includes everything recovered in the forensic science process including, whole objects, and debris and may include derived samples such as swabs, casts of footprints, and finger mark lifts. Items may sometimes be referred to as exhibits or evidence.

2.14 Non-conforming Examination or Testing

Non-conforming examination or testing refers to any aspect of the forensic unit's work, including, activities conducted at either the scene or laboratory, sampling, examinations/tests, results or expert witness testimony that do not conform to the forensic unit's policies, procedures or the agreed requirements of the customer. Examples are using equipment that is out of specification, misidentifying a drug or incorrectly interpreting a blood pattern.

2.15 Reference Collection

Reference collection is a collection of stable materials, substances, objects or artefacts of known properties or origin that may be used in the determination of the properties or origins of unknown items.

2.16 Reference Material

A reference material is a material from a known source, sufficiently homogeneous and stable with respect to one or more specified properties, which has been established to be fit for its intended use in a measurement process. Some reference materials may be certified reference materials in that the reference material is characterised by a metrologically valid procedure for one or more specified properties accompanied by a certificate that provides the value of the specified property, its associated uncertainty and a statement of metrological traceability.

2.17 Sampling

Sampling is a defined process whereby a part of a substance, material or product is taken to provide for examination or testing. For the purpose of examinations/tests to determine the attributes of the whole, the process should be based on statistically valid techniques.

In forensic science, 'sample' is also used to describe physical objects collected as items, or sub-sets of these. These items may be collected using criteria other than conventional statistical criteria, for example, samples collected at a scene of crime. In this document the term sampling will be used for both purposes.

2.18 Scene of Crime

The term 'scene of crime' is used to identify a scene of incident prior to establishing whether a criminal or illegal action has taken place or not. The scene of crime is not solely restricted to the location of the incident (primary scene of crime), but also includes areas where relevant acts were carried out before or after the incident (secondary scene of crime). In addition to the obvious scenes of crime this may also include accident investigations, suspicious fires, vehicle accidents, terrorist attacks, and disaster victim identification.

Note: The forensic science process is not restricted to situations in which the incident and purpose refer to the investigation of a crime. Other examples include civil litigation, parentage determination, environmental protection and control of gaming and other gambling-related activities. Where applicable, a victim could also be considered as a scene of crime.

2.19 Subcontractor

A subcontractor is a legal entity that is not part of the forensic unit and that is contracted to do work for the forensic unit within the subcontractor's own legal entity and under the subcontractor's own management system.

2.20 Validation

Validation is the confirmation by the provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

3 GENERAL GUIDANCE COMMON TO ALL ACTIVITY MODULES IN THE FORENSIC SCIENCE PROCESS

3.1 Document Control

The requirements for the accessibility and control of documents apply to permanent facilities and also to all sites or locations where work is performed, e.g. scene of crime.

3.2 Complaints

Responses to any complaints shall include evaluation of the potential impact on any work that has been undertaken by the forensic unit. In the event that it is shown that there could have been an impact on any work this shall be dealt with through the non-conforming work process.

Complaints may be received from many sources including customers, victims of crime, police forces, other departments within the same organisation e.g., laboratory, scene of crime unit, law enforcement investigation unit and the judiciary.

In addition, when a court decision is successfully challenged, and this reflects on any work performed by the forensic unit, this shall be handled through the complaints process or other improvement processes.

3.3 Competence

The forensic unit shall ensure that all staff working in the forensic unit are competent and authorised to perform the work required, and where their role requires it, to report the work.

The management system shall define each role in the forensic unit and its limitations and specify requirements for qualifications, training, experience and knowledge for the tasks assigned to each role. Having qualifications, training and experience neither guarantees practical competence nor sound judgement. Therefore, management or responsible persons shall be able to demonstrate with objective evidence that all personnel are competent, by carrying out assessments of their knowledge and skills against defined criteria.

The forensic unit shall ensure that temporary staff are competent and work in accordance with the unit's management system.

In assessing the competence of an individual, the forensic unit shall ensure that appropriate staff have relevant understanding of the technology behind the crime e.g., firearms, and the technology used to investigate the crime e.g., fingerprints, DNA profiling, blood pattern analysis.

They shall also have sufficient competence and experience to recognise the significance of anything unusual, for example, a staged burglary or altered items.

Training shall follow an up-to-date, defined training program and the assessment of competence shall take place at every level of professional development for the person involved. Where examination/test or technique specific training is given, acceptance criteria shall be assigned to demonstrate the effectiveness of the training e.g., observation of the relevant examinations/tests or analyses by an experienced officer, satisfactory performance in the analysis of quality control/quality assurance samples, correlation of results with those obtained by other trained staff. Where necessary, training programs should also include training in the presentation of evidence in court.

The assessment of competence may take a variety of forms, dependent on the task(s) performed e.g., written and/or oral exams; practical exercises; or direct observation by a qualified person. In many cases, some combination of competency assessment will be the most appropriate approach.

Each forensic unit shall maintain an up-to-date record of the training that each member of staff has received. These records shall include academic and professional qualifications, external or internal courses attended and relevant training (and retraining, where necessary). Records shall be sufficiently detailed to provide evidence that each member of staff has been properly trained and that their competence to perform a task or examination/test has been formally assessed. These records should be retained for an appropriate defined period according to the expectations of the customer and/or the legal system.

A procedure shall be in place for introducing employees into the forensic unit and should define the training and the supervision required. This procedure or process may vary depending on the ability, qualifications and experience of those being trained. An individual's training programme shall be based around their expertise, specialist knowledge and their experience.

The forensic unit shall also have procedures for the on-going training and maintenance of competence, skills and expertise.

When employing staff from another organisation (including a forensic unit) their competence shall be verified by the forensic unit.

3.4 Additional Considerations Relating to Personnel

A Code of Conduct (however named) for the forensic unit should be in place that addresses ethical behaviour, confidentiality, impartiality, personal safety, relationships with other members of the forensic unit and any other issues needed to ensure appropriate conduct of all staff. The Code of Conduct should be applicable to all personnel, permanent, temporary and contract personnel.

3.5 Records

The forensic unit shall have documented procedures to create, coordinate, maintain and retain records relating to each case undergoing examination or testing. The information that is to be included in case records shall be documented appropriately and may include, but not be limited to, records of any communication with the customers (verbal or written), contract review, examination or testing requested and agreements with customer, item receipts, descriptions of items including packaging and seals, subpoenas, records of examination/test results and observations, reference to procedures used, diagrams, print-outs, photographs, digital images and videos. The procedure in place should ensure that all of the components, both hard copy

and electronic, are coordinated such that they are identified as a part of the case record and their locations are defined. In determining the retention period of the records associated with the forensic activity the forensic unit shall consider the legal requirements and customer expectations of the applicable economy or region. See ISO/IEC 17025 7.11 for more information regarding data and information management.

The records shall be sufficient to provide an auditable trail.

Records shall be made at the time of the examination/test or observation, or as soon as practicable thereafter, and these shall include, where applicable, who carried out the scene of crime examination, who performed the examination/test and or sampling, the date, the location, who carried out each stage of the process, the examination/test results, quality checks and conditions of examinations/tests. Where instrumental analysis is conducted, operating parameters should be recorded.

If records are stored electronically, controls shall be in place to prevent unauthorised access, loss of files/data and to ensure the continued integrity of the records.

In general, records should be made in a permanent manner, for example, handwritten notes in permanent ink. Exceptions can be made when environmental conditions prevent the use of ink.

The recording method chosen will depend on the aspect of the forensic science process being carried out at the time. Records can be obtained by e.g., drawing or writing, diagrams, photocopies, computer, sound recording, voice recording, photographs, digital images, video, and 3D laser scanning.

Any changes made to records shall be retained so the original information can be reviewed whether this is in hard copy form or electronic.

When an examination/test result is rejected, the reason(s) shall be recorded, along with the date and an identification of who has rejected the result.

The records required to support conclusions shall be such that in the absence of the original member of staff, another competent member of staff could evaluate what had been performed, interpret the data and, if necessary, repeat the activity.

It is not always possible to preserve potential evidence, for example, if it is necessary to remove part of a blood pattern for DNA analysis. In such a situation, the potential evidence shall be documented and/or measured using suitable recording techniques prior to its removal.

Manual calculations and data transfers that do not form part of a validated electronic process should be checked by a second person. The case record should include an indication that such checks have been carried out, by whom and when.

Each page of every document in the case record should be traceable to the case, or an equivalent system for electronic records. There should be a mechanism by which the integrity of the documentation is maintained. This means, for example, that it should be easy to detect if a document is added to the file at a later date or goes missing from the file. Hard copy records generated by the forensic unit, used as part of the case file, should be paginated using a page numbering system that indicates the total number of pages.

‘Chain of custody’ records that detail each person or organisation that takes possession of an item shall be maintained from the receipt of the items through processing to storage and where applicable to return to submitting client, or disposal. The acceptable definition and procedure for

'chain of custody' needs to be adapted to the legal provisions of each country. Any transfer of material shall be recorded. Records relating to the 'chain of custody' shall be retained in accordance with the requirements for other case records.

Electronic equivalents of handwritten initials or signatures are acceptable provided the forensic unit can demonstrate that the electronic initials or signature can only be applied by the individual represented by the electronic initials or signature.

Where technical abbreviations are made in records, these abbreviations should be clearly defined and readily understood.

3.6 Risks and Opportunities

In order to ensure that the management system and technical activities of the forensic unit remain appropriate, continue to support the purpose and objectives of the forensic unit and achieve improvements, the forensic unit shall consider the risks and opportunities associated with its activities.

Risk-based thinking is a proactive approach to reduce potential undesired effects through early identification, planning and action. Some examples of risks to consider within a forensic context include:

- adverse environmental conditions creating a risk of item degradation or loss of evidence (see 3.11).
- effective cleaning regime for equipment in order to eliminate cross-contamination of items or scenes (see 3.12).
- planned and effective maintenance of equipment in order to minimise equipment failure (3.12).
- consideration of the health and safety of personnel, for example, related to hazards at a scene (e.g., sharp objects, bloodborne pathogens, armed suspect at large).
- establishing equipment calibration intervals based on the stability of the equipment, cost associated with calibration and the impact to casework if the equipment fails a calibration or intermediate check (verification).
- establishing the format and frequency of the evaluation of the on-going competence of staff, including infrequently performed activities (see 3.3).
- management of consumables and kits to ensure they are appropriate at the point of use. For example, starting with the selection of suppliers (which could include a consideration of compliance of the supplier with ISO 18385:2016 Minimising the risk of human DNA contamination in products used to collect, store and analyse biological material for forensic purposes — Requirements) through to stock management (including the management of expiry dates of kits etc.) and any appropriate quality control checks e.g., positive controls for test kits.
- risk to impartiality, for example, based on relationships/familiarity of persons involved in the investigation process or those involved in an incident under investigation.
- consideration of the extent and frequency of quality control/quality assurance mechanisms throughout the forensic science process to give confidence in the output, for example, use

of positive and negative controls, critical findings checks, peer review, proficiency testing and/or interlaboratory comparisons.

- suitability of packaging materials to prevent deterioration or loss of evidence.
- suitability of the type and use of Personal Protective Equipment (PPE) to manage potential contamination and to assure the health and safety of staff.
- management of a scene of crime to ensure effective recovery of samples in terms of sequence and separation to maximise the recovery, assure the integrity and minimise the detrimental impact.

3.7 Internal Audits

The internal audit program shall, where relevant, include scene of crime examination or testing activities, laboratory examination or testing activities, interpretation processes, and reporting.

The evaluation of the implementation of the forensic unit's procedures shall include direct observation of the examinations/tests undertaken on-site or in the laboratory.

3.8 Witnessing Scene of Crime Activities

The forensic unit should have a witnessing program to ensure that the persons working in the organisation have the necessary level of competence.

Factors to be considered when deciding on the approach to be taken to witnessing include, but are not limited to:

- the degree of complexity of a particular scene in order to confirm competence
- frequency of attendance at different scenes
- scope of accreditation
- experience of the personnel
- frequency at which a suitable scene appears, for example, terrorist incidents. Scenes which are infrequently encountered may require other means by which to confirm competence, e.g., mock incident or other types of simulations.
- other activities which take place for the purpose of confirming competence

The person who performs the witnessing shall have the appropriate competence. Witnessing should not only cover the procedural part of the work but also go into the depth of the technical competence of the staff and their ability to take relevant decisions at the scene of crime.

3.9 Non-conforming Examination or Testing

The forensic unit shall have policies and procedures to identify non-conforming work and, in addition, policies and procedures that are implemented when non-conforming work is identified. Ongoing monitoring can be carried out in a number of ways, e.g., by peer review, proficiency tests and collaborative exercises, auditing and customer complaints.

Initially the significance of a non-conformity in relation to the validity of examination/test results shall be evaluated and its root cause identified. This shall include thoroughly investigating the

review of casework already reported. The policies and procedures shall ensure that there are designated defined responsibilities for the management of non-conforming work and actions that shall be taken. This may include withdrawing or withholding forensic reports, informing the customer, halting examination or testing, re-examination or re-testing, modifying the procedures or methods or re-training.

The corrective action once identified and approved shall be implemented promptly. The designated authority shall then decide when work can resume. It is important to ensure that non-conforming work is effectively identified and associated corrective actions are implemented in all relevant areas of the forensic unit.

Where it is found that the forensic unit has issued a report containing non-conforming work that is deemed to significantly affect the result, the customer shall be notified immediately, the work or report recalled (where possible) and additional work or report issued by the forensic unit.

Where it has been identified that the non-conforming work could recur, appropriate corrective action shall be implemented. This shall include the potential review of casework already reported prior to the non-conforming work being identified and implications for other cases and other sections in the forensic unit as well as implications for the forensic unit's own internal policies and procedures, for example, through a review of the risks and opportunities.

The non-conforming work and all actions taken shall be recorded.

3.10 Methods and Method Validation

All methods shall be fully documented including procedures for quality control, and, where appropriate, the use of reference materials.

Irrespective of whether the forensic unit implements ISO/IEC 17025 or ISO/IEC 17020, methods of examinations/tests shall be fit for purpose. In demonstrating this, the forensic unit will need to refer to appropriate validation or verification data.

Validation studies are required for all methods including comparative methods. Validation studies can be conducted by the scientific community (as in the case of standard or published methods) or by the forensic unit itself (as in the case of methods developed in-house or where significant modifications are made to previously validated methods).

When developing their processes, forensic units shall show with objective evidence that they have assessed the factors that can influence the results and have recorded these. Examples of such processes are the strategy building process when arriving at the scene of crime, protection and preservation of items, identification of relevant items, and the interpretation process. The purpose of this is to ensure reproducibility and repeatability of the process thus ensuring that different persons arrive at compatible results.

When a method has been validated in another organisation the forensic unit shall review validation records to ensure that the validation performed was fit for purpose. It is then possible for the forensic unit to only undertake verification for the method to demonstrate that the unit is competent to perform the examination/test. Any validation or verification procedure conducted in-house shall be documented and validation or verification records shall be kept.

Where practicable, technical procedures used by a forensic unit shall be validated or verified before being used on casework or applied at a scene of crime. An instance of when this would not be practicable would be when a new substance is found, for example, a new drug. In any circumstance the technical procedures used shall be validated or verified before any results are

reported. Methods may be validated by comparison with other established methods using certified reference materials (where available) or materials of known characteristics. In validating methods, the following issues (among others) may need to be determined, as appropriate, for example, if the method is quantitative or qualitative:

Scope of the method

- intended purpose and limitations

Sampling

- sampling strategy

Sample preparation

- sample homogeneity

Examinations/Tests

- accuracy
- precision
- measurement uncertainty
- matrix effects
- interference
- limit of detection
- limit of quantification
- linearity range
- stability of measured compounds
- specificity and selectivity
- repeatability
- reproducibility
- robustness

Interpretation

- reproducibility
- robustness
- performance characteristics
- hypothesis and/or scenarios
- databases

- statistical Evaluation
- limitations of conclusions
- scientific literature

In demonstrating the suitability of a non-analytical discipline e.g., fingerprint enhancement, marks comparison, the forensic unit will need to review the list above and determine which aspects are appropriate to consider, whether there are additional considerations and how these would be evaluated for the method that they are reviewing. For example:

- range – does the technique work for typical items and/or surfaces
- accuracy – can the technique capture and/or reproduce the item to the required level of detail for future use
- repeatability – do all examiners get the same outcomes (within defined and acceptable limits)
- robustness – does the technique work as effectively in different conditions, types of scenes
- limitations – are there scenarios when the technique could not or should not be used, are there potentials for false positives and/or false negatives

Interpretations of results and observations shall be based on robust studies and documented procedures. In cases where no robust studies are available, the interpretation shall at least be supported by a documented body of evidence (records).

Forensic units should have a procedure to identify infrequently performed examinations/tests. For these examinations/tests, there are two methods of demonstrating competence, either of which would be equally valid. These are:

- regular use of control samples and control charts even when casework samples are not being analysed; or
- re-verification before the examination/test in question is performed on a casework sample involving at least the use of an appropriate reference material, followed by replicate examination or testing of the real sample.

3.11 Environmental Conditions

The environmental conditions within laboratory premises, or any location where examinations /tests are performed, shall be defined if the conditions are critical for the outcome of the results. The specified conditions shall be monitored and recorded. When significant environmental conditions are not possible to control, e.g., weather conditions at a scene of crime, the actual conditions shall be recorded. The effects of the environmental conditions shall be considered to avoid loss or deterioration of items.

Special care is needed in forensic units involved in the determination of trace levels of materials, for example, DNA and gunshot residue analysis. Physical separation of high-level and low-level work, for example, bulk and trace drugs, is required as is a high awareness of contamination issues by all the personnel in the forensic unit. Appropriate personal protective equipment shall be worn to ensure items and personnel are protected. Access to laboratory facilities with special

requirements concerning contamination issues shall be restricted and controlled. Environmental monitoring could be necessary for equipment, work areas, clothing and consumables.

Where possible the forensic unit should be able to identify potential contamination and its sources. This may require collecting background information which can be searched against if unusual results are obtained (e.g., DNA, fingerprint or footwear database of staff and/or visitors).

The access to the scene of crime should be controlled.

Item integrity shall be a key consideration throughout the forensic science process. The storage conditions shall be such as to prevent loss, deterioration and contamination and to maintain the integrity and identity of the item. Where perishable items are stored any degradation of the samples shall be minimised.

3.12 Equipment and Measurement Traceability

3.12.1 General

The forensic unit shall define and document its procedures for the selection and use of purchased external services, equipment and consumable supplies that affect the quality of its service. There shall be procedures and criteria for acceptance, rejection and storage of equipment and/or materials, for example, consumables used at the scene, during analysis and personal protective equipment.

Appropriate quality records of external services, supplies and purchased products shall be established and maintained for a period of time, as defined in the management system.

3.12.2 Equipment

The forensic unit shall operate a program for the maintenance and calibration of equipment that can influence the results; this shall allow for the demonstration of measurement traceability, where appropriate.

Equipment which influences the quality of the examinations/tests shall be labelled or in other ways identified. Equipment may be owned by the laboratory, borrowed, rented, hired, leased or provided by another source. The responsibility for the calibration status and overall suitability of the equipment used lies solely with the forensic unit.

Where software is used it shall be demonstrated as being fit for purpose. This may be a verification check of the software functionality, for example, the use of a spreadsheet to calculate values, or could be as part of the more wide-reaching validation of the forensic science process in which the software is used, for example, the use of databases for matching specific characteristics.

The forensic unit shall have written policies and procedures defining the conditions under which equipment can be used. Policies and procedures shall also be in place for the use of disposable equipment to ensure that such equipment does not contribute to contamination through misuse or re-use.

The facilities and equipment shall only be used by authorised personnel. Where equipment not under the direct control of the forensic unit is used, the unit shall verify that the equipment meets all relevant requirements before each use. Typical measures would include visual inspection, functional checks and/or re-calibration. The verification procedure shall be documented, and verification records shall be kept.

Some pieces of equipment used at the scene of crime have self-checks, some are not subject to effects of transportation and require only verification and others may require use of a reference material that validates the calibration and function status as shown to be satisfactory. Verification of equipment performance shall be conducted by staff with the recognised competence to operate and verify the equipment.

Equipment that could be re-used at another scene should be cleaned after use, the rationale for the cleaning regime should be based on the potential risk to contaminate subsequent items and/or scenes.

3.12.3 Equipment records

Records shall be maintained of each piece of equipment and its software that could influence the activities conducted, for example, forensic light sources and cameras, or the examinations/tests performed, for example, measurement and analytical equipment.

It is expected that the records held by all forensic units would be in accordance with the requirements specified in ISO/IEC 17025 6.4.13.

3.12.4 Reference collections

Reference collections of data or items/materials representative of those encountered in casework which are maintained for identification, comparison or interpretation purposes e.g., mass spectra, motor vehicle paints or headlamp lenses, drug samples, typewriter print styles, wood fragments, bullets, cartridges, DNA profiles, frequency databases, shall be fully documented, uniquely identified and properly controlled.

3.12.5 Consumables

Consumables, for example, swabs, chemicals, gel lifts, glassware, PPE, scalpels, scissors, packaging etc., shall be demonstrably suitable, stored correctly and monitored (if required). Consideration could be given to the compliance of the supplier of relevant supplies with *ISO 18385:2016 Minimising the risk of human DNA contamination in products used to collect, store and analyse biological material for forensic purposes — Requirements*.

3.12.6 Reagents, reference materials, control materials and calibrators

The quality of reagents, reference materials, control materials and calibrators shall be fit for purpose for the procedure used. Lot and/or batch numbers shall be recorded. All critical reagents shall be tested for their reliability.

Reagents, reference materials, control materials and calibrators should be labelled with:

- name;
- concentration, where appropriate;
- date of receipt, preparation, and/or expiry;
- identity of preparer;
- storage conditions, if relevant;
- hazard warning, where necessary:

- the date it was placed in service.

4 ACTIVITY MODULES IN THE FORENSIC SCIENCE PROCESS

This section identifies the different activities in the forensic science process as separate modules and gives guidance which can be applied independent of whether ISO/IEC 17025 or ISO/IEC 17020 is being implemented. See Annex C for a correlation chart.

It is acknowledged that the modules described here may seem to describe a time line. However, this is not necessarily the case and the order in which activities are performed will vary depending on the circumstances, and some may be repeated.

4.1 Initial Discussion Regarding Scene of Crime Attendance

This is the stage when the forensic investigator receives an assignment. At this stage the forensic investigator will need to receive specific information from the ‘customers’ and may also need to give instructions to the ‘customers’. This is also the stage when the forensic unit assigns clearly defined authority and responsibility for scene of crime examination and each individual scene. Aspects of the standards, which may be involved here, are contract review, subcontracting and appointing responsible persons.

4.1.1 Contract review

Due to the nature of the investigation the scope of an assignment is not always clear before the scene of crime examination has been started.

It is the responsibility of the forensic unit to make sure that any work it undertakes is within its scope of competence.

The forensic unit should have a system that ensures that upcoming assignments are reviewed promptly and either managed appropriately or, where necessary, rejected according to defined policies and procedures.

When deciding on the scene of crime examination process the following issues shall be considered:

- the required expertise and technical knowledge of forensic investigators.
- the extent and particular conditions of the assignment in question, insofar as these are available and understood, to enable clear instructions to be issued.
- the use of suitable resources, facilities and equipment.

There may be a need for the forensic unit to reassess its assignments and tasks to ensure that the issues identified above remain appropriate.

In addition, the forensic unit should review completed assignments to ensure that they fulfil the customer requirements.

For routine or repeat work requests, review may be limited to considerations of time and human resources and an acceptable record in such cases would be a signed acceptance by an appropriately authorised person.

For any specific scene the following aspects shall be considered:

- jurisdiction
- integrity of the scene of crime
- environmental conditions
- need for any special equipment or special competencies
- health and safety issues
- size and complexity of the scene(s) of crime and need for additional resources
- assignment of responsibility for one scene of crime and coordination responsibility for several
- involvement of any other forensic units such that appropriate communication and coordination can be achieved (see 4.3.5)

In situations where verbal agreements are acceptable, the organisation shall keep a record of all requests and instructions received verbally, dates and the identity of the customers' representative.

The return or disposal of items and retained materials shall be agreed with the customer and recorded in writing. Any variation from what has been agreed during the initial contract review shall be recorded.

4.1.2 Instruction to the customer

In some circumstances, it may be appropriate for the forensic unit to give some instruction to the customer on how best to preserve the scene of crime, this should be recorded. However, the amount of knowledge concerning the scene of crime at hand may be very limited and therefore it may be difficult to give exact instructions.

4.1.3 Subcontracting and other technical support

Forensic units encounter situations where additional resources are needed. The needs may be met by the use of contracted or other technical support personnel or subcontracting the work.

In all cases where contracted or other technical support personnel (working under the forensic unit's own managements system) are engaged the forensic unit shall retain appropriate records of their competence for their assigned tasks.

In all cases of subcontracting (where the subcontractor is working under their own management system), the forensic unit shall retain appropriate records of the subcontracted body's competence, such as accreditation certificate or records of evaluation performed by qualified personnel according to appropriate procedures.

4.1.4 Assignment of responsibility

The forensic unit shall have a clear policy and procedure for appointing and assigning personnel with the responsibility for the scene of crime examination. An appropriate competent person, however named, shall be assigned as responsible for the case depending on:

- legislation and/or policy,
- type of crime: volume crime versus major crime,
- the character of the case, the complexity or other conditions at the scene.

The principal responsibility for each scene of crime examination rests with the forensic investigator assigned to be in charge of the case, which shall be documented in the case file. At all stages responsibilities shall be clearly identified, in particular if personnel from different organisational units are involved.

4.2 Undertaking Initial Actions at the Scene of Crime

This is the stage when the forensic unit arrives at the scene of crime and takes action to protect the integrity of the scene of crime and to assess it.

4.2.1 Initial discussions at the scene of crime

The discussions at the scene of crime will be held with the appropriate people depending on the legal system in the country, for example, police, medical examiner, judge, magistrates, prosecutors.

If the initial visit at the scene shows that the assumptions of the contract review were not fully in line with the situation at the scene then the relevant steps of the contract review may need to be repeated.

4.2.2 Coordination with other forensic units or subcontractors

The forensic unit may not always have the specific competence or the capacity to perform all of the necessary examinations/tests. In that case it may need to use other resources than its own. These may, for example, be other forensic units or experts from other forensic units. In these cases there may be need for coordination of all resources involved in the scene of crime examination.

In that case the following should be considered:

- coordination of sequence of activities to maximise item protection
- prevention of contamination or cross-contamination of items
- clarification of roles and responsibilities.

4.2.3 Control and preservation of the scene of crime

Maintaining the integrity of the scene and evidential items within it is essential. Personal protective equipment, such as wearing gloves and face masks, and limiting access to personnel with examination or/ testing duties, are examples of steps taken to prevent contamination, and the use of tents to protect from rain is an example of preventing degradation.

However, the procedures that are implemented to maintain scene integrity depend on the nature of the crime and its scene. Volume crime scenes, such as burglaries, can be processed by a forensic investigator with only basic protective equipment and without the need for access control, but large outdoor scenes may require more

demanding perimeter control and procedures for recovery and preservation of evidence than is the case with indoor scenes.

The scenes of what are generally referred to as ‘major crime’ such as rape or murder require stringent attention to control and preservation. Access to the scene of crime should be controllable and limited, achieved by creation of at least one access cordon; in some cases a second inner cordon may be used. A record should be retained of all persons entering and leaving the scene of crime. All personnel entering the scene shall wear personal protective equipment that ensures that they do not contaminate the scene. The forensic unit shall dispose of relevant consumables used or worn at the scene of crime in a timely manner, to ensure that items recovered from other scenes of crime are not compromised.

If the crime scene is not controlled by the customer, and it is not possible to be controlled by the forensic unit, any issues with security and uncontrolled access should be recorded in the examination notes.

4.3 Developing a Scene of Crime Examination Strategy

This is the stage where the strategic plan will be determined, and this may encompass the following questions:

- what has happened?
- where did it happen?
- when did it happen?
- how did it happen?
- who was involved?
- why did it happen?

The forensic unit shall determine what constitutes the scene of crime it is assigned to examine and aim at determining the requirements of the investigation. In doing this they should consider alternative hypotheses, including those that might be presented by the customer. It will also have to decide on the sampling plan, techniques and/or equipment required, determine the samples that need to be taken and then decide on the sequence of sampling and/or examinations/tests. All these aspects shall be recorded.

4.3.1 Determine the crime type

The determination of the type of the crime has normally been decided by the customer before the forensic unit is assigned to conduct the examination.

The forensic unit should have a policy that will indicate different levels of scene of crime examination in relation to the type of crime, such as to distinguish between ‘volume crime’ and ‘major crime’ or using other kinds of designation. This policy should include a written indication of the required competencies, methods, equipment, techniques and resources depending on the type of crime

4.3.2 Assessment of the scene and determining the requirements of the investigation

Once assessment of the scene of crime has been performed, which includes any discussions with the law enforcement investigator or first responder, it is acceptable that the forensic unit may determine a different scope of examination than what was initially defined (see 4.4.1 in this document). In that case, this shall be clearly recorded, clarified and, where appropriate, authorised by the customer. At this stage a search pattern may need to be decided.

4.3.3 Sampling

Sampling in this context includes the selection, recovery, and prioritisation of materials for examination or testing from scenes of crime. Typically sampling is carried out for a number of reasons including the following: selection to target potential evidence; units too large to be submitted to the laboratory as a whole item; to answer relevant questions by examination or testing of a portion of the population; to minimise the total number of required analytical determinations while assuring that all relevant legal and scientific requirements are met.

In order to identify the samples that need to be taken, and the sequence of performing different sampling and/or examinations/tests, a sampling method and sampling plan are required.

The sampling method shall ensure appropriate samples are taken in a manner that assures their integrity and the validity of any subsequent examinations/tests. In addition, the sampling method shall include the manner in which samples are selected, and the mechanisms for acquiring an appropriate sample, including any preparation or treatment.

In determining the sampling methods and sampling plans to be used the following factors should be considered:

- the request and/or requirements of the customer
- the background information available
- prioritising the question(s) that need to be answered
- the generation of relevant hypotheses and their refinement throughout the scene of crime investigation
- the type of forensic examination/test that is relevant
- the need to employ statistical sampling
- any special considerations to be taken into account such as weather, health and safety considerations, location of items, possibility of contamination, possibility of items being tampered with, interference with other items, lack of homogeneity of the sample etc.
- the necessity to sequence the sampling that is to take place, for example, if you have a fingerprint in blood is it necessary for the fingerprint examiner to examine the print first prior to removing the blood for DNA profiling

- the necessity to consult all relevant experts and/or personnel
- the necessity to establish an interagency strategy to ensure appropriate samples are taken
- legal requirements
- policies of the organisation

When sampling at scenes of crime, emphasis is placed on the competence of the staff. Therefore, the training and competence of staff in these activities is of prime importance. All aspects of sampling at scenes of crime shall be covered during training, and competence assessed initially and on an on-going basis.

When a forensic unit is working under the direction of another organisation, which has already determined the sampling plan then the forensic unit needs only to follow its own sampling method.

4.3.4 Determine the facilities, techniques and/or equipment required

The forensic unit shall have policies and procedures to ensure that they have the appropriate equipment, facilities and techniques available. In determining this, the following should be considered:

- the scene of crime location: interior or exterior
- the condition of the item: either fragile or stable
- weather conditions that might affect the scene of crime or items within
- scene of crime management considerations which may alter or contaminate the item
- additional processing techniques that may need to be conducted at the scene of crime with specialised personnel

The policy and procedure should also include the actions needed when it is determined that the forensic unit could not perform the requested scene of crime service.

4.3.5 Coordination with other forensic units or subcontractors

A forensic unit with primary responsibility for a scene of crime may find it necessary, in some circumstances, to solicit the support of other forensic units or subcontractors to adequately process a scene of crime. Coordination among forensic units and/or subcontractors is absolutely essential to ensure the integrity of the scene and the value of all items from the scene. A clearly designated representative of the primary forensic unit responsible for the scene of crime should be assigned overall responsibility for the scene of crime and for coordinating the work completed by any other forensic units or subcontractors.

Any forensic unit or subcontractor responding to a scene of crime should first inquire about the involvement of any other forensic units or subcontractors. If any are identified, communications should occur with the other forensic units or subcontractors before any scene of crime activity commences.

The integrity of the scene of crime, the ‘chain of custody’ of items gathered from the scene of crime, and the unintentional destruction of available items are all important considerations in coordinating the efforts of multiple forensic units or subcontractors.

4.4 Undertake Scene of Crime Examination

This is the stage where:

- the scene of crime is documented,
- the scene of crime is searched and/or examined,
- on-going interpretation of the scene of crime takes place,
- items are recovered, labelled, documented and collected,
- samples are taken, sampling is recorded,
- strategies and plans may be reviewed.

4.4.1 Scene of crime examination procedures

The forensic unit shall conduct scene of crime examination in accordance with the processes and procedures stipulated in their management system.

In certain circumstances, the customers provide additional or background information, which should be considered or explicitly examined at the time of the scene of crime examination. If such additional or background information is used, the information shall be recorded. Additionally, the provision of this information should not compromise the impartiality of the forensic unit.

Before items are recovered, the forensic unit should consider the conditions encountered on-site to ensure that the items can be recovered and documented with as little disruption as possible. Where necessary and depending on the technical options, the items are prepared for the sample taking process. Consideration should be given as to the sequence in which samples are taken.

4.4.2 Documentation of the scene of crime

Documentation of the scene of crime shall be made before the examination starts and throughout the examination. Documentation can be made, for example:

- in writing and/or drawing,
- by voice recording,
- by photographs and/or digital imaging using cameras, drones, mobile phones,
- electronically, by using e.g., tablets, laptops,
- in video
- by 3D laser scanning.

4.4.3 The scene of crime examination

This includes the following steps:

- search
- locate
- assess relevance
- document
- collect
- identify (label)
- preserve and protect
- package
- transport

All conducted activities, results, observations, and conclusions reached during the scene examination shall be recorded. The records shall be sufficient so that another competent person could understand and evaluate the scene of crime examination.

The forensic unit should perform a search pattern according to a structured procedure, at least in the area of major crime. Records of this should be maintained.

The collection of items shall be conducted in accordance with the processes and procedures in the management system.

The collected items shall be clearly and uniquely identified to enable systematic evaluation. Items collected and the locations at which they were found shall be documented or characterised using suitable procedures e.g., measurements, plans, diagrams, photography, photogrammetry, so that the items can be identified at all times and the locations at which they were found can be determined. The identity for items shall correlate with the report.

Appropriate precautions and procedures are required and shall be observed when dealing with potentially dangerous substances and items.

For legal purposes, the forensic unit shall maintain a ‘chain of custody’ record for items whilst under its control. This record shall detail each person or organisation who takes possession of an item or alternatively the location of that item (e.g., if in storage).

The acceptable definition and procedure for ‘chain of custody’ should be adapted to the legal provisions of each country. The forensic unit shall take appropriate precautions to ensure that the identified items taken for further examination or testing are recovered, stored and transported without loss or contamination (from the environment, weather, people etc.).

Normally, it would be expected that forensic personnel will continually review the plan and strategy for the scene of crime examination. Any revisions shall be recorded.

4.4.4 Examinations/tests

See also guidance in 3.12 of this document, generic guidance to equipment.

The forensic unit may be undertaking examinations/tests, including but not limited to quantitative measurements and presumptive or screening tests, as part of a scene of crime examination. If the unit is accredited to ISO/IEC 17025 then relevant requirements are covered in that particular standard. However, if a body is accredited to ISO/IEC 17020 and its inspection activity contains examinations/tests then it should meet the relevant requirements of ISO/IEC 17025, for example, measurement traceability, validation, quality assurance. See Annex D.

4.4.5 Equipment used at a scene

Some examples of portable equipment used at the scene that needs calibration or checking according to a prescribed maintenance program before taken to the scene are the following:

- digital cameras (white balance calibration),
- electrostatic lifters (dust print lifters),
- forensic light sources, for example, for detecting biological evidence

  (UV and IR light sources),
- detectors for gas, explosives, fluids/accelerators,
- laser telemeter, rulers, micrometers and measurement devices for recording distances and dimensions,
- thermometers,
- sound meter,
- GPS for site identification/logging,
- calliper,
- photo ionisation detector,
- data-loggers used for recording weather information (for palynology and entomology).

Some examples of critical consumables that shall be tested to demonstrate that at their subsequent use, at a scene of crime, they would be reliable are the following:

- test kits for: blood e.g., peroxidase tests, semen e.g., acid phosphatase, drugs e.g. Marquis,
- detecting and enhancement chemicals e.g., Luminol, Leuco Crystal Violet.

The result of the test shall be recorded.

Equipment in mobile laboratories used at the scene shall meet the same requirements as equipment in stationary laboratories.

4.5 Assess Scene of Crime Results and Observations and Consider Further Examination or Testing

This is the stage where the forensic unit determines if the purpose of the examination or testing has been fulfilled, if further examinations/tests are necessary and are possible or whether the scene of crime examination or testing has been completed. At this stage the forensic unit will also decide whether samples need to be sent away for further examination or testing.

4.5.1 Review scene of crime results and observations in the context of the request and the strategy

Abnormalities and irregularities are results and observations at the scene of crime that do not fit into the general expectation of the scene of crime, for example, attendance at a theft of a motor vehicle and the discovery of a body in the back of the car. Irregularity of an item could be that an item is missing, that there is an unsealed item or that there is doubt as to the suitability or integrity of the item.

Abnormalities or irregularities at the scene of crime which are shown to or identified by the investigation team, shall be recorded and should be clarified before the scene of crime examination itself commences. These could influence the subsequent direction of the examination or require an on-site procedure which differs from the standard management system procedures. If doubts arise as to whether the item can be properly recovered in the conditions encountered, before the examination activities commence, the superior body (e.g., court, judge, prosecutor) or the customer should be consulted about whether and how the available resources should be used.

4.5.2 Determine what should be examined further and assurance of the integrity of items

When the forensic unit is responsible for the transportation and storage of the items prior to further examination or testing they shall ensure that the identified items are recovered, stored, and transported without contamination (from the environment, weather, people etc.), deterioration and with due regard to the integrity and the ‘chain of custody’ of the items. Where perishable items are handled any deterioration of the items shall be minimised.

If the forensic unit is handing over the items to the customer or other organisation for the transportations and storage of the items prior to further examination or testing the forensic unit shall make them aware of any issues with respect to the aspects indicated above.

If the forensic unit is responsible for determining which items are sent on for examination or testing, they should have an agreement regarding this with their customer. This may include coordination with:

- subcontractors,
- different law enforcement agencies,

- other organisations e.g., the medical examiner giving and receiving information.

The forensic unit should also consider the aspects detailed above if they are responsible for obtaining, or directing another organisation to obtain, some or more of the following:

- information from other sources like mobile phone companies
- recovery of CCTV (closed circuit television)
- samples from potential suspects or from victims
- samples for the purpose of elimination e.g., DNA or fingerprints

4.6 Interpret and Report Results and Observations from the Scene of Crime

This section refers to any interpretation and reporting of results and observations, which may take place directly after the scene of crime examination.

The report should contain all the results of examinations/tests and observations and, where appropriate and admissible, conclusions arrived at from these outputs. The report should contain any information on which an interpretation might be made.

Outcomes from the scene of crime may be available to customers via an internal database rather than through more formal reports or customers may request a simplified report. It is important that the extent of any simplification does not lead to ambiguity in reporting, and the records held by the forensic unit shall be such that a comprehensive report could be produced if later required.

The forensic unit will need to develop its own format and list of contents for its reports.

For general principles of interpretation and reporting please see sections 4.8 and 4.9.

4.7 Examination and Testing

This is the stage where the forensic unit personnel determine an examination or testing strategy, choose methods and procedures and decide on the sequence of sampling and examinations/tests. This will be done in agreement with the customer as part of the contract review.

4.7.1 Contract review and exchange of information

The person who is going to undertake the examination or testing may not necessarily have prior knowledge of the case. It is therefore important to have a documented contract review defining the purpose of the examination or testing to be performed.

Where the person undertaking the examination or testing has been provided with any background information, the provision of this information should not compromise the impartiality of the examiner.

4.7.2 Examination or testing strategy

In defining the examination or testing strategy the forensic unit should consider, where appropriate, the following:

- customer requirements
- the ability of the forensic science examinations/tests to help address the identified issues
- urgency and priority of customer requirements
- appropriate background information
- alternatives to the propositions which have already been provided by the customer
- resources available to the forensic unit
- experts that may need to be consulted prior to examinations/tests
- the examinations/tests that have the potential to provide the most information in response to the various propositions and alternatives
- issues that could affect the integrity of the items under examination or testing
- constraints that may exist e.g., the need to preserve material for other purposes or cost
- examinations/tests or activities that may have a destructive effect on subsequent examinations/tests
- co-ordination of multiple disciplinary examination or testing to determine the sample(s) that need to be taken and the sequence of performing sampling or examinations/tests
- examination or testing services that are currently available in laboratories
- consideration of anti-contamination precautions appropriate for the examinations/tests under discussion and all evidence types that potentially may be available
- on-going review of examination or testing strategy in light of new and significant information
- what is technically possible and worthwhile to meet the customer’s requirement, including the defence.

Other elements may also be considered in the examination or testing strategy.

4.7.3 Facilities, techniques and equipment required

Access to the operational area of the laboratory shall be controllable and limited. Visitors shall not have unrestricted access to the operational areas of the laboratory. A record shall be retained of all visitors to the operational areas of the laboratory.

Storage areas for items shall be secure to prevent theft or interference and have their access limited and controlled. The storage conditions shall be such as to prevent loss, deterioration and contamination and to maintain the integrity and identity of the item. This applies both before and after examinations/tests have been performed. Where perishable items are handled any deterioration of the items shall be minimised.

4.7.4 Coordination of multidiscipline examination or testing

Determining an examination or testing strategy, choosing appropriate methods, and deciding on the appropriate sequence requires an overall working knowledge of current forensic science capabilities. To ensure an appropriate level of service to customers and to protect against the unintentional loss of evidence, all personnel in a forensic unit responsible for making such decisions shall have at least general training in the examination or testing capabilities of available forensic science disciplines. Updated training should be provided to forensic unit personnel periodically to maintain a current awareness of available forensic science capabilities – including the concept of non-destructive vs. destructive examinations/tests.

Appropriate consideration of potential further examinations/tests shall be given when determining the most appropriate packaging and storage of items; which samples need to be taken for examination or testing; and the appropriate sequence for examinations/tests. When items in a case require multidiscipline examination or testing, an arrangement should be in place to ensure that each item requiring examination or testing is subjected to the appropriate examinations/tests, and that the sequence of examinations/tests does not, unintentionally, preclude additional examinations/tests.

In all cases, each person performing sampling, examination or testing shall be held accountable for handling, processing, sampling, and the examination or testing of each item in the most appropriate manner and sequence.

4.7.5 Critical findings check

The records of the checks on critical findings shall indicate that each critical finding has been checked and by whom the checks were performed and when. This may be indicated in a number of ways, including entries against each critical finding, entry on a summary of critical findings or a statement to this effect in the records. The records shall indicate if the critical finding has been agreed, or the action taken if this was not the case.

Where a critical findings check is the only quality control procedure, such as blood pattern analysis, footwear comparison, fire scene interpretation or damage identification and interpretation, then this check shall be performed without knowledge of the original result and this independence shall be identifiable from the records.

4.7.6 Sampling

Selection, recovery, prioritisation and sampling of materials from submitted test items are important parts of the forensic science process. Laboratories shall ensure that there are documented procedures and training programs to cover this aspect of their work and that detailed competency and training records are kept for all staff involved. See also 4.3.3 of this document.

4.7.7 Perform examinations/tests

4.7.7.1 Handling of items

For legal purposes, forensic units shall be able to demonstrate that the items examined and reported on were those submitted. A ‘chain of custody’ record shall be maintained from the receipt of items which details each person who takes possession of an item or alternatively the location of that item (e.g., if in storage).

Where items are generated in the forensic unit e.g., fibre tape lifts, microscope slides, a ‘chain of custody’ record shall be started and included in the case records.

There shall be documented procedures which describe the measures taken to secure items in the process of being examined which are left unattended.

4.7.7.2 Ensuring the validity of results

The performance of examination or testing shall be monitored by operating quality control schemes that are appropriate to the type and frequency of examinations/tests undertaken by a forensic unit.

The range of quality control activities available include the use of:

- reference collections;
- certified reference materials and reference materials;
- statistical tables;
- positive and negative controls;
- control charts;
- replicate examinations/tests;
- alternative methods;
- repeat examinations/tests;
- spiked samples, standard additions and internal standards;
- independent checks (verification) by other authorised personnel.

Depending on the particular examination or testing being performed, the forensic unit may make use of one or several of these examples to demonstrate that the examination/test remains valid. The quality control (QC) procedures necessary in any particular area of work shall be determined by the forensic unit responsible for the work, based on best professional practice. The procedures shall be documented, and records shall be retained to show that all appropriate QC measures have been taken, that all QC results are acceptable or, if not, that appropriate corrective action has been taken.

An effective means for a forensic unit to monitor its performance, both against its own requirements and against the performance of peers, is to regularly take part in proficiency testing programs. When participating in proficiency testing programs, the forensic unit’s own documented examination/test procedures should be used. Performance in the programs shall be reviewed regularly and where necessary, corrective action shall be taken. Proficiency testing records should include:

- full details of the examinations/tests undertaken;
- results and conclusions obtained;

- an indication that performance has been reviewed;
- details of the corrective action undertaken, where necessary.

4.8 Interpretation of the Results of Examinations/Tests

This is the stage where the unit performing the examinations/tests evaluates and interprets the results of the examinations/tests based on the request and the information supplied during the process.

4.8.1 Making an interpretation

Interpretation is when the conclusions drawn are based on more than just the result of the examination/test at hand, for example, conclusions drawn from observations at a scene of crime.

Interpretations shall be based on robust studies. In cases where this is not possible, the interpretation shall at least be supported by a documented body of evidence (records).

A hypothesis based on the available information should be defined. Alternative hypotheses should also be considered.

When interpretations are made the limitations of the examinations/tests used shall be fully considered. For example, definitive conclusions shall not be drawn from presumptive testing.

Staff at the forensic unit should have access to complete, comprehensive and accurate examination/test results and observations and consult relevant reliable sources of information to support the interpretation. Interpretation of results and observations in the context of the case is possible when enough information about the case is available.

The consideration of one or more alternative hypotheses allows an organisation to demonstrate its impartiality.

When necessary, the customer should be asked to provide sufficient information about the items and the circumstances at the scene of crime. Lacking this information may limit the possibility for an appropriate interpretation, however, the provision of such information should not compromise the impartiality of the forensic unit.

4.8.2 Peer review

Peer review should be practised in cases of interpretation of results and observations, as this should be treated as a critical finding. Peer review shall be performed by an authorised person with the appropriate competence in the technique in order to confirm the validity of the results and/or to assess that there is an appropriate and sufficient basis for the conclusions and/or opinions.

4.8.3 Competence

Personnel interpreting results shall have been assessed and deemed competent before reporting statements including interpretation and opinions of results and observations.

There needs to be a clear definition of the competence requirements/criteria for interpretations.

4.9 Report of Examinations/Tests Including Interpretation of Results

This is the stage where the organisation reports the results of its examinations/tests. Upon request from the customer, the forensic unit may submit preliminary reports verbally or through e-mail. In cases where the work is stopped on request of the customer a report need not necessarily be issued.

All reports, on all types of media, shall meet the reporting requirements of ISO/IEC 17020 or ISO/IEC 17025 as appropriate.

When the legal system dictates the format and/or information that must be included in a forensic report such that the forensic units may not be able to include all of the elements that are detailed in sub-clause 7.8 of ISO/IEC 17025 or sub-clause 7.4.2 of ISO/IEC 17020 then the forensic unit may adopt one or more of the following, or an equivalent, means of meeting the requirements:

- the preparation of a forensic report which includes all of the information required by ISO/IEC 17025 or ISO/IEC 17020 as appropriate;
- the preparation of an annex to the forensic report which includes any additional information required by ISO/IEC 17025 or ISO/IEC 17020 as appropriate;
- ensuring that the case record relating to a specific case contains all the relevant information required by ISO/IEC 17025 or ISO/IEC 17020 as relevant.

The type and amount of information required in the report may depend on the legal system. However, in all cases, it shall be clear which parts are background information, which are results or observations and which are interpretations or opinions.

Outcomes from examinations/tests may be available to customers via an internal database rather than through more formal reports or customers may request a simplified report. It is important that the extent of any simplification does not lead to ambiguity in reporting, and the records held by the forensic unit shall be such that a comprehensive report could be produced if later required.

The output given to the customer shall not in any way be misleading.

The report should contain all the results of examinations/tests and observations and, where appropriate and admissible, conclusions drawn from these results.

The reports issued by the forensic unit shall be complete and shall contain the information on which an interpretation might be made.

The forensic unit shall have a procedure and criteria to decide when and to what extent a peer review of a report needs to be performed. Peer review should be performed by a qualified person with the appropriate competence to confirm the validity of the results. Conclusions shall be properly qualified.

It shall be clear in the report to the customer on what an interpretation and/or opinion is based, including the results and observations, also the available information at the time of the evaluation presented in the report. Opinion scales shall be designed to demonstrate impartially, for example, that they are sufficiently balanced and should be communicated within the report and/or be available to the customer.

The forensic unit may give an oral report, if required by the customer and permitted by laboratory policy and, where applicable, by legislation. An oral report should only be given by suitably competent staff and should always be recorded and followed by a written report.

Where at all possible, any critical findings conveyed in the oral report should be checked. Where the information being reported has not been peer reviewed, or the examination/test is incomplete prior to orally informing the customer, the oral report shall be qualified with a caveat that the results are provisional. It shall be clear to the customer that provisional results will have to be confirmed by further examinations/tests, if required by forensic unit procedures and that the examinations/tests and report shall be peer reviewed before a written report can be issued.

For oral results, the identity and appropriateness of the recipient shall be established.

All oral reports shall be recorded in a traceable manner, including:

- the customer's name, the date and time the oral report is conveyed, and identification check (if relevant).
- the information conveyed in the oral report relevant to the case.

5. AMENDMENT TABLE

Section	Previous Version	Summary Of Changes
All	ILAC_G19_06_2022	Initial issue of Global Accreditation Cooperation Incorporated (Global ACI) document

ANNEX A: EXAMPLES OF DISCIPLINES UNDERTAKEN BY FORENSIC UNITS

The table below lists **only some** of the forensic disciplines but **does not preclude additional activities** being undertaken by a forensic unit. Even if some forensic disciplines may not be mentioned here, they may still be included in the scope of this guidance document.

Audio, Video and Computer Analysis

- Speech, audio, and video analysis
- Computers (hardware and software)
- Image processing
- Mobile computerised devices including phones
- CCTV
- Facial recognition
- Recovery of information from electronic devices and media

Controlled/Non-controlled Substances

- Botanical material
- Related chemicals and paraphernalia
- Controlled pharmaceutical and drugs

Entomology, Botany, Archaeology, Anthropology

- Pollen analysis

Friction Ridge Detail

- Fingerprints and finger marks (development and comparison)
- Palm prints and palm marks (development and comparison)
- Footprints and foot marks (development and comparison)

Firearms and ballistics

- Bullets and cartridges
- Range of fire determination
- Firearms
- Stun Guns

Forensic Medicine

- Cause of death determination
- Pathology
- Examination of injuries
- Odontology

Hairs, Blood, Body Fluids and Tissues

- Animal DNA profiling
- DNA profiling
- Parentage testing
- Body fluid identification
- Mitochondrial DNA profiling

Handwriting and Document Examination

- Copiers and copied material
- Handwriting
- Inks and printing materials
- Printers and other printed objects
- Indentations
- Paper
- Security marks

Marks and Impressions

- Damage examination
- Footwear marks and impressions
- Tool marks and impressions
  - Tyre marks and impressions

Scene Investigation

- Accident investigation and reconstruction
- Blood pattern analysis
- Fire investigation
- Scene of crime investigation
- Bullet trajectory
- Photography
- Chemical, Biological, Radioactive, Nuclear, Explosives (CBRNe)

Toxicology

- Alcohol
- Drugs
- Pharmaceutical products
- Poisons

Trace Evidence

- Acids
- Alkalis
- Botanical material (excluding controlled substances)
- Dyes and pigments
- Fibres and hairs
- Food
- Glass
- Lachrymatory chemicals
- Manufacturers marks (including serial number restoration)
- Oils and greases
- Paints
- Pyrotechnic devices
- Adhesives
- Accelerants and Fire debris
- Clothing/garments
- Corrosives
- Cosmetics
- Electrical devices and components
- Explosives and explosion debris
- Fertilisers
- Gunshot residues
- Hydrocarbon fuels
- Lubricants and spermicidal agents
- Metals and alloys
- Plastics

Vehicles

- Component failures
- Electrical failures
- Speed calculations
- Trajectory determination
- Car immobiliser systems
- Tachographs
- Tyre examination

ANNEX B: BIBLIOGRAPHY

ISO/IEC 17020:2012 Conformity assessment – Requirements for the operation of various types of bodies performing inspection

ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories

ISO Guide 30:2015 Reference materials - selected terms and definitions

Global ACI-TECH-1-008(M) Policy for Participation in Proficiency Testing Activities

ISO 15189:2012 Medical laboratories - Requirements for quality and competence

Global ACI-TECH-2-002(G) Guidance on measurements performed as part of an inspection process

ISO 18385:2016 Minimising the risk of human DNA contamination in products used to collect, store and analyse biological material for forensic purposes - Requirements

ANNEX C: (INFORMATIVE): CORRELATION WITH ISO/IEC 17025:2017, ISO/IEC 17020:2012 AND ISO 15189:2012

The following tables illustrate the conceptual relationship between Global ACI-TECH-1-004(G), ISO/IEC 17025:2017, ISO/IEC 17020:2012 and ISO 15189:2012.

Table C.1 — Correlation between Global ACI-TECH-1-004(G) and ISO/IEC 17025:2017, ISO/IEC 17020:2012 and ISO 15189:2012

Global ACI-TECH-1-004(G)	ISO/IEC 17025:2017	ISO/IEC 17020:2012	ISO 15189:2012
1.3 Scope			
2 Terms and definitions			
3 General guidance common to all activity modules in the forensic science process			
3.1 Document control	8.3	8.3	4.3
3.2 Complaints	7.9 7.10.1 c)	7.5 7.6	4.8 4.9 c)
3.3 Competence	6.2.1 6.2.2 6.2.3 6.2.5 b), c), f)	6.1.1 6.1.3 6.1.6 a), b), c) 6.1.7 6.1.8 6.1.10	5.1.2 5.1.4 5.1.5 b) 5.1.6 5.1.8 5.1.9 a), b), f), g), h)
3.4 Additional considerations relating to personnel	4.1 4.2	4.1 4.2	4.1 5.10
3.5 Records	7.3.1 7.3.3 7.4.1 7.4.2	7.1.2 7.1.7 7.3.1 8.4.1	4.13 5.4.4.3 f) 5.4.6 5.4.7

Global ACI-TECH-1-004(G)	ISO/IEC 17025:2017	ISO/IEC 17020:2012	ISO 15189:2012
	7.5.1 7.5.2 7.8.5 8.4.2	8.4.2	5.5.3
3.6 Risks and opportunities	8.5	6.2.1 7.1.9	4.14.6 5.1.4
3.7 Internal audits	8.8.1	8.6.1 8.6.3	4.14.5
3.8 Witnessing scene of crime activities	6.2.5 f)	6.1.8	5.1.6
3.9 Nonconforming examination or testing	7.10.1 7.10.2 7.10.3	6.2.14 7.4.1 7.4.4 7.4.5 8.7.1 8.7.2 8.7.3 8.7.4	4.9 4.10 c), e)
3.10 Methods and method validation	7.2.1.1 7.2.1.2 7.2.1.3 7.2.1.5 7.2.2.1 7.2.2.2 7.2.2.3 7.3.1 7.4.1	7.1.1 7.1.2 7.1.3	4.1.2.3 5.4.2 k) 5.4.6 5.5.1.2 5.5.1.3 5.5.3 5.6.2

Global ACI-TECH-1-004(G)	ISO/IEC 17025:2017	ISO/IEC 17020:2012	ISO 15189:2012
	7.4.2 7.5.1 7.7.1 a) 7.8.7.1 8.3.1		
3.11 Environmental conditions	6.3.1 6.3.2 6.3.3 6.3.4 a), c) 7.3.3 f) 7.4.1 7.4.2 7.4.4	6.2.1 6.2.2 6.2.11 c) 6.2.12 7.2.4	5.2.2 a) 5.2.6 5.4.6 a) 5.4.7 5.5.3 h)
3.12 Equipment and measurement traceability	6.2.3 6.2.6 6.3.4 a) 6.4.1 6.4.3 6.4.4 6.4.6 6.4.12 6.4.13 6.5.1 6.5.2 6.5.3 6.6.2	6.1.1 6.1.4 6.2.1 6.2.2 6.2.3 6.2.4 6.2.5 6.2.6 6.2.7 6.2.11 6.2.13 6.2.15 8.4.1	4.6 4.13 5.1.6 5.2.2 a) 5.3.1.2 5.3.1.3 5.3.1.4 5.3.1.5 5.3.1.7 5.3.2.1 5.3.2.2 5.3.2.3 5.3.2.7

Global ACI-TECH-1-004(G)	ISO/IEC 17025:2017	ISO/IEC 17020:2012	ISO 15189:2012
	8.4.2		
4 Activity modules in the forensic science process			
4.1 Initial discussion regarding scene of crime attendance	7.1.1 a), b) 7.1.2	7.1.5 a), b)	5.4.3
4.1.1 Contract review	7.1.1 7.1.8 7.3.1 7.3.2	7.1.5	5.4.3
4.1.2 Instruction to the customer	7.1.2 7.1.8	7.1.5 b)	5.4.2
4.1.3 Subcontracting and other technical support	6.2.5 c), f) 6.6.2	6.1.10 6.3.1	4.5.1 5.1.9 f), g)
4.1.4 Assignment of responsibility	7.1.5 7.1.6 7.5.1	7.1.5 b)	4.4.1 a)
4.2 Undertaking initial actions at the scene of crime	7.3.1		
4.2.1 Initial discussions at the scene of crime	7.1.4	7.1.5 a), b)	5.4.3
4.2.2 Coordination with other forensic units or subcontractors	6.6.3 a), b)	6.3.1, 6.3.3	4.5.1 4.5.2
4.2.3 Control and preservation of the scene of crime	7.3.1	7.1.2	5.3.1.5
4.3 Developing a scene of crime examination strategy	7.1.1	7.1.5	5.4.3
4.3.1 Determine the crime type	7.1.1	7.1.5	5.4.3

Global ACI-TECH-1-004(G)	ISO/IEC 17025:2017	ISO/IEC 17020:2012	ISO 15189:2012
4.3.2 Assessment of the scene and determining the requirements of the investigation	7.1.5 7.1.6 7.1.8	7.1.5	4.4.2
4.3.3 Sampling	6.2.2 6.2.3 6.2.5 f) 7.3.1	6.1.1 6.1.3 6.1.8 7.1.2	5.1.5 5.1.6 5.4.4
4.3.4 Determine the facilities, techniques and/or equipment required	6.3.1 6.4.1 7.1.1 d) 7.1.4 7.1.6	6.2.1 7.1.5	4.4.1 b), e) 5.2.1 5.2.2 c) 5.3.1.1
4.3.5 Coordination with other forensic units or subcontractors	6.6.3 a), b)	6.3.1, 6.3.3	4.5.1 4.5.2
4.4 Undertake scene of crime examination			
4.4.1 Scene of crime examination procedures	7.1.8 8.1.1	7.1.6 8.1.1 8.1.2	4.1.2.1 4.4.1
4.4.2 Documentation of the scene of crime	7.5.1	7.1.7	4.13
4.4.3 The scene of crime examination	7.3.3 g) 7.4.1 7.4.2 7.5.1 7.8.2.1 g) 8.1.1	6.2.1 6.2.11 c) 7.1.7 7.2.1 7.2.4 7.3.1	4.1.2.1 4.13 5.1.5 5.4.3 5.4.4.1 5.4.5

Global ACI-TECH-1-004(G)	ISO/IEC 17025:2017	ISO/IEC 17020:2012	ISO 15189:2012
	8.5.1 c) 8.5.2	7.4.2 d) 8.1.1 8.2.1	5.4.6 5.4.7 5.8.3 d), f), g)
4.4.4 Examinations/tests		7.1.1 7.1.2	
4.4.5 Equipment used at a scene	5.4 6.4.4 6.4.13 c)	6.2.1 6.2.3 6.2.15	4.1.1.1 5.3.1.1 5.3.2.3 5.1.3.7 h), j)
4.5 Assess scene of crime results and observations and consider further examination or testing	7.1.8	7.1.5 d)	
4.5.1 Review scene of crime results and observations in the context of the request and the strategy	7.5.1	7.1.7	4.13
4.5.2 Determine what should be examined further and assurance of the integrity of items			
4.6 Interpret and report results and observations from the scene of crime	7.8.1 7.8.3 7.8.7	7.4.1 7.4.2	5.8.1 5.8.2 5.8.3
4.7 Examination and testing			
4.7.1 Contract review and exchange of information	4.1.1 7.1.1 a)	4.1.1 7.1.5 b)	4.1.1.3 a) 4.4.1 a)
4.7.2 Examination or testing strategy	7.1.1 7.4.1	7.1.5 a), b)	4.4.1 a), b), c), d)
4.7.3 Facilities, techniques and equipment required	6.3.4 a) 7.4.1	6.2.2 6.2.3 6.2.11	5.2.2 a), b) 5.2.3 5.4.7

Global ACI-TECH-1-004(G)	ISO/IEC 17025:2017	ISO/IEC 17020:2012	ISO 15189:2012
		6.2.12 7.2.4	
4.7.4 Coordination of multidiscipline examination or testing	6.2.2 6.2.3 7.4.1	6.1.1 7.2.4	5.1.2 5.4.4.1 5.4.4.2 c) 5.4.7
4.7.5 Critical findings check	7.7.1 g), i)	6.1.8	5.7.1
4.7.6 Sampling	6.2.2 6.2.5 c), f) 7.3.1	6.1.1 7.1.2	5.1.5 5.4.4.1
4.7.7 Perform examinations/tests			
4.7.7.1 Handling of items	6.3.4 a) 7.4.1 7.4.2	6.2.2 6.2.11 7.2.1 7.2.4	5.2.6 5.4.6 a) 5.4.4.1 5.4.6 5.4.7
4.7.7.2 Ensuring the validity of results	7.7.1 7.7.2 7.7.3		5.6.2.1 5.6.2.3 5.6.3.1
4.8 Interpretation of the results of examinations/tests			
4.8.1 Making an interpretation	7.2.2.3 7.8.7.1	7.1.1 7.1.2	5.5.1.1 5.5.3
4.8.2 Peer review	6.2.6	6.1.8	5.7.1
4.8.3 Competence	6.2.6 b), c)	6.1.5	5.7.1
4.9 Report of examinations/tests including interpretation of results	4.2.1	4.2.1	5.8.1

Global ACI-TECH-1-004(G)	ISO/IEC 17025:2017	ISO/IEC 17020:2012	ISO 15189:2012
	7.1.8 7.7.1 i) 7.8.1.2 7.8.2.1 e), j) 7.8.7.1	7.4.2 b), g) 7.4.3 7.4.4 8.4.1	5.8.2 5.8.3 j), l) 5.9.1 c), e)

Table C.2 — Correlation between ISO/IEC 17025:2017 and Global ACI-TECH-1-004(G)

ISO/IEC 17025:2017	Global ACI-TECH-1-004(G)
1 Scope	
2 Normative references	
3 Terms and definitions	
4 General requirements	
4.1 Impartiality	3.4 Additional considerations relating to personnel 4.7.1 Contract review and exchange of information
4.2 Confidentiality	3.4 Additional considerations relating to personnel 4.9 Report of examinations/tests including interpretation of results
5 Structural requirements	4.4.5 Equipment used at a crime scene
6 Resource requirements	
6.1 General	
6.2 Personnel	3.3 Competence 3.8 Witnessing scene of crime activities

ISO/IEC 17025:2017	Global ACI-TECH-1-004(G)
	3.12 Equipment and measurement traceability 4.1.3 Subcontracting and other technical support 4.3.3 Sampling 4.7.4 Coordination of multidiscipline examination or testing 4.7.6 Sampling 4.8.2 Peer review 4.8.3 Competence
6.3 Facilities and environmental conditions	3.11 Environmental conditions 3.12 Equipment and measurement traceability 4.3.4 Determine the facilities, techniques and/or equipment required 4.7.3 Facilities, techniques and equipment required 4.7.7.1 Handling of items
6.4 Equipment	3.12 Equipment and measurement traceability 4.2.3 Control and preservation of the scene of crime 4.3.4 Determine the facilities, techniques and/or equipment required 4.4.5 Equipment used at a scene
6.5 Metrological traceability	3.12 Equipment and measurement traceability
6.6 Externally provided products and services	3.12 Equipment and measurement traceability 4.1.3 Subcontracting and other technical support

ISO/IEC 17025:2017	Global ACI-TECH-1-004(G)
	4.3.5 Coordination with other forensic units or subcontractors
7 Process requirements	
7.1 Review of requests, tenders and contracts	4.1.1 Contract review 4.1.2 Instruction to the customer 4.1.4 Assignment of responsibility 4.2.1 Initial discussions at the scene of crime 4.3 Developing a scene of crime examination strategy 4.3.1 Determine the crime type 4.3.2 Assessment of the scene and determining the requirements of the investigation 4.3.4 Determine the facilities, techniques and/or equipment required 4.4.1 Scene of crime investigation procedures 4.7 Examination and testing 4.7.1 Contract review and exchange of information 4.7.2 Examination or testing strategy 4.9 Report of examinations/tests including interpretation of results
7.2 Selection, verification and validation of methods	
7.2.1 Selection and verification of methods	3.10 Methods and method validation
7.2.2 Validation of methods	3.10 Methods and method validation 4.8.1 Making an interpretation
7.3 Sampling	3.5 Records 3.10 Methods and method validation

ISO/IEC 17025:2017	Global ACI-TECH-1-004(G)
	3.11 Environmental conditions 4.1.1 Contract review 4.3.3 Sampling 4.4.3 The scene of crime examination 4.7.6 Sampling
7.4 Handling of test or calibration items	3.5 Records 3.10 Methods and method validation 3.11 Environmental conditions 4.4.3 The scene of crime examination 4.7.2 Examination or testing strategy 4.7.3 Facilities, techniques and equipment required 4.7.4 Coordination of multidiscipline examination or testing 4.7.7.1 Handling of items
7.5 Technical records	3.5 Records 3.10 Methods and method validation 4.4.2 Documentation of the scene of crime 4.4.3 The scene of crime examination 4.5.1 Review scene of crime results and observations in the context of the request and the strategy
7.6 Evaluation of measurement uncertainty	
7.7 Ensuring the validity of results	3.10 Methods and method validation 4.7.5 Critical findings check 4.7.7.2 Ensuring the validity of results 4.8.2 Peer review

ISO/IEC 17025:2017	Global ACI-TECH-1-004(G)
	4.9 Report of examinations/tests including interpretation of results
7.8 Reporting of results	
7.8.1 General	4.6 Interpret and report results and observations from the scene of crime 4.9 Report of examinations/tests including interpretation of results
7.8.2 Common requirements for reports (test, calibration or sampling)	4.4.3 The scene of crime examination 4.9 Report of examinations/tests including interpretation of results
7.8.3 Specific requirements for test reports	4.6 Interpret and report results and observations from the scene of crime
7.8.4 Specific requirements for calibration certificates	
7.8.5 Reporting sampling – specific requirements	3.5 Records
7.8.6 Reporting statements of conformity	
7.8.7 Reporting opinions and interpretations	4.6 Interpret and report results and observations from the scene of crime 4.8.1 Making an interpretation 4.9 Report of examinations/tests including interpretation of results
7.8.8 Amendments to reports	
7.9 Complaints	3.2 Complaints
7.10 Nonconforming work	3.9 Nonconforming examination or testing
7.11 Control of data and information management	
8 Management system requirements	
8.1 Options	
8.1.1 General	4.4.1 Scene of crime examination procedures

ISO/IEC 17025:2017	Global ACI-TECH-1-004(G)
	4.4.3 The scene of crime examination
8.1.2 Option A	
8.1.3 Option B	
8.2 Management system documentation (Option A)	
8.3 Control of management system documents (Option A)	3.1 Document control 3.10 Methods and method validation
8.4 Control of records (Option A)	3.5 Records 3.12 Equipment and measurement traceability
8.5 Actions to address risks and opportunities (Option A)	3.6 Risks and opportunities
8.6 Improvement (Option A)	
8.7 Corrective actions (Option A)	3.9 Nonconforming examination or testing
8.8 Internal audits (Option A)	3.7 Internal audits
8.9 Management reviews (Option A)	

Table C.3 — Correlation between ISO/IEC 17020:2012 and Global ACI-TECH-1-004(G)

ISO/IEC 17020:2012	Global ACI-TECH-1-004(G)
1 Scope	
2 Normative references	
3 Terms and definitions	
4 General requirements	
4.1 Impartiality and independence	3.4 Additional considerations relating to personnel 4.7.1 Contract review and exchange of information

ISO/IEC 17020:2012	Global ACI-TECH-1-004(G)
4.2 Confidentiality	3.4 Additional considerations relating to personnel 4.9 Report of examinations/tests including interpretation of results
5 Structural requirements	
5.1 Administrative requirements	
5.2 Organisation and management	
6 Resource requirements	
6.1 Personnel	3.3 Competence 3.8 Witnessing scene of crime activities 3.12 Equipment and measurement traceability 4.1.3 Subcontracting and other technical support 4.3.3 Sampling 4.7.4 Coordination of multidiscipline examination or testing 4.7.5 Critical findings check 4.7.6 Sampling 4.7.7.2 Ensuring the validity of results 4.8.2 Peer review 4.8.3 Competence
6.2 Facilities and equipment	3.6 Risks and opportunities 3.9 Nonconforming examination or testing 3.11 Environmental conditions 3.12 Equipment and measurement traceability 4.3.4 Determine the facilities, techniques and/or equipment required 4.4.3 The scene of crime examination

ISO/IEC 17020:2012	Global ACI-TECH-1-004(G)
	4.4.5 Equipment used at a scene 4.7.3 Facilities, techniques and equipment required 4.7.7.1 Handling of items
6.3 Subcontracting	4.1.3 Subcontracting and other technical support
7 Process requirements	
7.1 Inspection methods and procedures	3.5 Records 3.6 Risks and opportunities 3.10 Methods and method validation 4.1.1 Contract review 4.1.4 Assignment of responsibility 4.2.1 Initial discussions at the scene of crime 4.3 Developing a scene of crime examination strategy 4.3.1 Determine the crime type 4.3.3 Sampling 4.3.4 Determine the facilities, techniques and/or equipment required 4.4.1 Scene of crime examination procedures 4.4.2 Documentation of the scene of crime 4.4.3 The scene of crime examination 4.4.4 Examinations/tests 4.5.1 Review scene of crime results and observations in the context of the request and the strategy 4.7 Examination and Testing 4.7.1 Contract review and exchange of information

ISO/IEC 17020:2012	Global ACI-TECH-1-004(G)
	4.7.2 Examination or testing strategy 4.7.6 Sampling 4.8.1 Making an interpretation
7.2 Handling inspection items and samples	3.11 Environmental conditions 4.2.3 Control and preservation of the scene of crime 4.4.3 The scene of crime examination 4.7.4 Coordination of multidiscipline examination or testing 4.7.7.1 Handling of items
7.3 Inspection records	3.5 Records 4.4.3 The scene of crime examination
7.4 Inspection reports and inspection certificates	3.9 Nonconforming examination or testing 4.4.3 The scene of crime examination 4.6 Interpret and report results and observations from the scene of crime 4.9 Report of examinations/tests including interpretation of results
7.5 Complaints and appeals	3.2 Complaints
7.6 Complaints and appeals process	3.2 Complaints
8 Management system requirements	
8.1 Options	4.4.1 Scene of crime investigation procedures 4.4.3 The scene of crime examination
8.2 Management system documentation (Option A)	4.4.1 Scene of crime investigation procedures 4.4.3 The scene of crime examination
8.3 Control of documents (Option A)	3.1 Document control
8.4 Control of records (Option A)	3.5 Records

ISO/IEC 17020:2012	Global ACI-TECH-1-004(G)
	3.12 Equipment and measurement traceability 4.9 Report of examinations/tests including interpretation of results
8.5 Management review (Option A)	
8.6 Internal audits (Option A)	3.7 Internal audits
8.7 Corrective actions (Option A)	3.9 Nonconforming examination or testing
8.8 Preventive actions (Option A)	

Table C.4 — Correlation between ISO 15189:2012 and Global ACI-TECH-1-004(G)

ISO 15189:2012	Global ACI-TECH-1-004(G)
1 Scope	
2 Normative references	
3 Terms and definitions	
4 Management requirements	
4.1 Organisation and management responsibility	3.4 Additional considerations relating to personnel 3.10 Methods and method validation 4.4.1 Scene of crime examination procedures 4.4.3 The scene of crime examination 4.4.5 Equipment used at a scene 4.7.1 Contract review and exchange of information
4.2 Quality management system	
4.3 Document control	3.1 Document control
4.4 Service agreements	4.1.4 Assignment of responsibility 4.3.4 Determine the facilities, techniques and/or equipment required

ISO 15189:2012	Global ACI-TECH-1-004(G)
	4.4.1 Scene of crime examination procedures 4.7 Examination and testing 4.7.1 Contract review and exchange of information 4.7.2 Examination or testing strategy
4.5 Examination by referral laboratories	4.3.5 Coordination with other forensic units or subcontractors
4.6 External services and supplies	3.12 Equipment and measurement traceability 4.1.3 Subcontracting and other technical support
4.7 Advisory services	
4.8 Resolution of complaints	3.2 Complaints
4.9 Identification and control of nonconformities	3.9 Nonconforming examination or testing
4.10 Corrective action	3.9 Nonconforming examination or testing
4.11 Preventive action	
4.12 Continual improvement	
4.13 Control of records	3.5 Records 3.12 Equipment and measurement traceability 4.4.2 Documentation of the scene of crime 4.4.3 The scene of crime examination 4.5.1 Review scene of crime results and observations in the context of the request and the strategy
4.14 Evaluation and audit	3.7 Internal audits
4.15 Management review	
5 Technical requirements	
5.1 Personnel	3.3 Competence

ISO 15189:2012	Global ACI-TECH-1-004(G)
	3.6 Risks and opportunities 3.8 Witnessing scene of crime activities 3.12 Equipment and measurement traceability 4.1.3 Subcontracting and other technical support 4.3.3 Sampling 4.7.4 Coordination of multidiscipline examination or testing 4.7.6 Sampling
5.2 Accommodation and environmental conditions	3.11 Environmental conditions 3.12 Equipment and measurement traceability 4.3.4 Determine the facilities, techniques and/or equipment required 4.7.3 Facilities, techniques and equipment required 4.7.7.1 Handling of items
5.3 Laboratory equipment, reagents and consumables	3.11 Environmental conditions 3.12 Equipment and measurement traceability 4.2.3 Control and preservation of the scene of crime 4.3.4 Determine the facilities, techniques and/or equipment required 4.4.5 Equipment used at a scene
5.4 Pre-examination processes	3.5 Records 3.10 Methods and method validation 3.11 Environmental conditions 4.1.1 Contract review 4.1.2 Instruction to customer

ISO 15189:2012	Global ACI-TECH-1-004(G)
	4.2.1 Initial discussions at the scene of crime 4.3 Developing a scene of crime examination strategy 4.3.3 Sampling 4.4.3 The scene of crime examination 4.7.3 Facilities, techniques and equipment required 4.7.4 Coordination of multidiscipline examination or testing 4.7.6 Sampling 4.7.7.1 Handling of items
5.5 Examination processes	3.5 Records 3.10 Methods and method validation 4.8.1 Making an interpretation
5.6 Ensuring the quality of examination results	3.10 Methods and method validation 4.7.5 Critical findings check 4.7.7.2 Ensuring the validity of results
5.7 Post-examination processes	4.8.2 Peer review 4.8.3 Competence
5.8 Reporting of results	4.4.3 The scene of crime examination 4.6 Interpret and report results and observations from the scene of crime 4.9 Report of examinations/tests including interpretation of results
5.9 Release of results	4.9 Report of examinations/tests including interpretation of results
5.10 Laboratory information management	3.4 Additional considerations relating to personnel

ANNEX D: THE USE OF ISO/IEC 17025 IN SITUATIONS WHERE EXAMINATIONS/TESTS FORM PART OF AN INSPECTION ACTIVITY

The forensic science process (as detailed in this document) includes several stages from the initial discussion regarding scene of crime attendance through to the reporting of examinations/tests conducted in a laboratory environment. Accreditation Bodies have opted to have accreditation schemes based on ISO/IEC 17020 and/or ISO/IEC 17025 for different parts of the forensic science process. Consequently, the same activity conducted at a specific part of the forensic science process could be assessed using different standards by different Accreditation Bodies, and the same activity could be assessed by the same Accreditation Body under different standards depending on where in the overall forensic science process it takes place e.g., presumptive testing of blood at a crime scene or in a laboratory. Therefore, to ensure that equal confidence can be applied to all activities irrespective of the stage of the forensic science process at which they are conducted or if accredited by different Accreditation Bodies using different standards, consistent expectations are required. This document indicates, in the Scope, that any examinations/tests conducted as part of scene of crime investigation shall be carried out according to documented procedures and ISO/IEC 17020 may cover these procedures provided that the relevant clauses of ISO/IEC 17025 are considered. Examples of examination or testing activities that can be conducted at scenes include detection and recovery of body fluids, enhancement and recovery of footwear or finger marks, and determination of blood pattern analysis. The table below outlines the key relevant areas of ISO/IEC 17025 that should be met by the forensic unit if they are completing examinations/tests as part of an inspection activity.

Issue	ISO/IEC 17025:2017 reference	Comments
Metrological traceability of measurement results	6.5	This should be considered for relevant equipment and in relation to reference collections and databases used for identification, comparison and / or interpretation purposes.
Validation of methods	7.2.2	Data to support the fitness for purpose of the examinations/tests is required irrespective of where in the forensic science process they are conducted. In doing this an assessment of the factors that could influence the result is required, for example, the impact of the environment where examinations/tests are conducted, and an understanding of the limitations of a technique e.g., the potential for false positives and false negatives.
Ensuring the validity of results	7.7	Mechanisms by which the ongoing suitability of the method and implementation by the organisation need to be identified.

		Participation in available proficiency testing, or generation of collaborative exercises gives independent demonstration of the suitability of procedures.
Facilities and environmental conditions	6.3	The facilities used for examinations/tests shall be such that they do not adversely affect the validity of the results. This shall include consideration of access and prevention / management of contamination, including cross contamination between and within scenes. The impact of environmental conditions on examinations/tests, both within a laboratory and at a scene, shall be understood such that appropriate mitigation / consideration of any limitations, is considered.
Evaluation of measurement uncertainty	7.6	Contributions to measurement uncertainty shall be identified, and an estimation made.