

Evaluation of Fire Investigation Activities for the Purpose of Accreditation against ISO/IEC 17020

20th February 2020

Executive Summary

In order to assist the Forensic Science Regulator (FSR) to confirm the appropriate quality framework and timeframes for fire investigation activities, and for UKAS to determine an assessment approach, UKAS has undertaken a Dry Run Exercise of a Fire Investigation Unit (Fire Service or Forensic Provider). The scope of the exercise was the determination of the origin and cause of a fire. The Dry Run exercise followed the standard assessment approach to confirm the applicability of ISO/IEC 17020 and also determine an appropriate approach to assessments (including witnessing fire investigation activities). The outcome of the Dry Run Exercise was:

- ISO/IEC 17020, ILAC G19 and FSR Codes of Conduct and Practice are applicable for the assessment of fire investigation activities.
- UKAS Publication RG 201 is applicable and does not require any specific updates for fire investigation and there are no conflicting requirements.
- It is possible for organisations to implement a quality management system capable of supporting fire investigation activities. However, the fire investigation community may benefit from some centralised help and guidance in what is required in the system.
- It was possible to confirm the technical competence of a unit by reviewing a number of completed cases and witnessing a mock fire scene.
- Validation data still need to be produced but it was felt that there are a number of sources which could be used to demonstrate the validity of the reference material and verify that a unit's method can reliably identify the origin and cause of a fire.
- Further clarity will be required to assist organisations and UKAS in the expected requirements for a number of areas identified during this exercise (including validation, critical findings checks, reporting). The FSR is considering developing an Appendix to the FSR Code of Practice to provide clarity regarding expectations.
- The initial scope of accreditation will cover "Source level" opinions (e.g. flame, smouldering or electrical source) in relation to the cause of a fire. "Activity level" opinions (e.g. what actions could have led to the fire – accidentally knocking over a candle) will be considered once the FSR appendix on development of evaluative opinions is published.
- A mock fire scene (test burn) was seen as the most appropriate mechanism to confirm competence of an organisation (Fire Investigation Unit). A mock scene would be required for initial assessment and then at least once in a four-year cycle supported by a sub-set of small-scale test exercises (e.g. excavation exercise, debris analysis) during the surveillance cycle.
- Additional costs may be incurred by the Fire Investigation Unit to demonstrate the validity of their method, competence and ongoing quality assurance. These would be from commissioning test burns and PT exercises.

Some centralised access to mock scenes would be beneficial for Fire Investigation Units.

- UKAS is satisfied with the assessment approach and could undertake assessments. Once a draft appendix is produced UKAS would be able to progress applications without a further pilot. UKAS will need to ensure there is a mechanism to review the consistency of the tranche of assessment and have the options to go back and request further evidence if required.

Background

The Forensic Science Regulator (FSR) has a remit to ensure that the provision of forensic science services across the criminal justice system is subject to an appropriate regime of scientific quality standards. The expected quality standards for a range of forensic activities are listed in the Statement of Requirements within the "Codes of Practice and Conduct for forensic science providers and practitioners in the Criminal Justice System". The Statement of Standards and Accreditation in issue 4 of the Codes of Practice and Conduct (the Codes) stipulates that any organisation undertaking fire investigation activities is required to gain accreditation to ISO/IEC 17020 by October 2020; the FSR has indicated that the date by which compliance will be required will change to October 2021 in issue 5 of the Codes. UKAS published a call for interested parties to be part of a pilot exercise in November 2017. After an expression of interest meeting in February 2018, four organisations signed up to pilot terms of reference and submitted applications for accreditation. A pre-assessment workshop was run for the participants to enable them to understand the accreditation process and discuss how they intended to meet the requirements. The FSR attended this workshop and much of the discussion was around method validation.

After the workshop pilot participants were asked to provide plans for demonstrating the validity of their fire investigation methods. The participants and community were unclear on how to do this and based their evidence heavily on a number of publications to support the validity of their methods. It was confirmed with the FSR that verification is required to demonstrate the applicability of the literature being used along with the verification that the organisations could get the right results from known scenarios.

UKAS provided some guidance on the type of evidence which might be applicable, however progress by the fire investigation community has been slow in this area. With the limited progress of the fire investigation community in moving towards accreditation and the progress of other pilot participants stalling, it was agreed with the FSR that some level of assessment was required to confirm the applicability of the standard for accreditation, determine an assessment approach and also review a proposed way of demonstrating the validity of fire investigations. As a result, a Dry Run Exercise was undertaken whereby UKAS could gain an understanding of the assessment approach and enable information to be communicated back to the FSR and the community over how to demonstrate the validity of the processes. The outcome of the Dry Run Exercise would not result in any award of accreditation.

Outcome of Dry Run Exercise

The objective of the Dry Run Exercise was to confirm that ISO/IEC 17020, ILAC G19, FSR Code and UKAS RG 201 are an appropriate set of quality standards to accredit fire investigation activities. In addition, the exercise would help determine the potential approach by UKAS to undertake a robust assessment. A fire investigation unit was identified who had developed their own management system with the quality assurance processes mainly being undertaken internally. However, there was an option to use external resource if required.

The outcome of the Dry Run Exercise confirmed that ISO/IEC 17020, ILAC G19, RG 201 and the Forensic Regulator Codes of Conduct are an appropriate set of quality standards for assessment. UKAS believes the fire investigation unit would be able to implement a management system capable of supporting the fire investigation activities. In addition, the review of a limited number of cases, witnessing a mock fire scene and the potential use of Virtual Reality simulations during the visits provided a suitable assessment approach to confirm the technical competence of an organisation. There were a number of gaps or potential issues identified through the visit which will require consideration by the fire investigation community prior to any future assessments, these were:

Personnel – Ongoing Competence

ISO/IEC 17020 requires on-site monitoring, the guidance in RG 201 would be a consistent mechanism for the scene of crime service to meet the requirements. Further work is required on how fire investigation unit will demonstrate ongoing competence annually if they are only monitoring on-site once in a four year cycle. Potential options are :

- Evidence of outcome of critical findings checks
- Mock fire Scenes
- Use of Virtual Reality to demonstrate determination of origin
- Small scale exercise with debris which needs excavating to demonstrate ability to find potential causes of fire.
- More regular witnessing at scenes

Personal - Security Clearance

The FSR Code of Conduct states that a unit shall ensure appropriate background verification checks (e.g. security checks) have been completed on all candidates for employment and contractors in accordance with relevant laws, regulations and ethics. These checks shall be proportional to the business requirements, the classification of the information to be accessed and the perceived risks.

For other areas of Forensics staff who routinely have unsupervised access to casework material are cleared to SC level. In collaboration with the police, there will need to be an assessment of the level of security clearance required and how this could be achieved.

Anti-contamination - Accelerants

The fire investigation unit will need to provide assurance that their processes do not contaminate a scene. Evidence to demonstrate the suitability of anti-contamination procedures to prevent accelerants being transferred between scenes will be required. Some consideration will be required as to the level of and frequency of testing to demonstrate that cleaning process of clothing, equipment and vans are accelerant free.

Anti-contamination – DNA/Fingerprints

Fire Investigators do not take DNA or fingerprint precautions during their examination. The scene is normally under the control of a Crime Scene Manager who will make the judgement of whether DNA/Fingerprints should be done first. A risk-based analysis of trace evidence contamination needs to be undertaken in relations to the typical scene (and control measures) investigation to determine if staff are required to be on any elimination databases.

Quality assurance – Critical Findings Check

The typical quality assurance check in a fire investigation case is the peer review process. This peer review process generally involves a checker reviewing the content of the casefile, evidence and statement. The current peer review process is not independent as the checker is aware of the initial conclusion of the investigator due to exposure to the conclusion prior to their review. Fire Investigation will need to implement a mechanism whereby the peer review process is compliant with the requirements in ILAC G19 4.7.5.

Fire Investigation Units should also consider a periodic independent check from outside their unit to provide assurance that there is no internal biases or error, especially if individuals routinely check each other's work.

Proficiency Testing

There are currently no schemes available to all fire investigation units. On the Dry Run exercise a virtual reality (VR) training package was shown which potentially could be used as an external assurance process as it involved a mocked scene with known outcomes. The package is designed for training therefore results will be known. A mechanism could be found by the fire investigation units to restrict the answer until people have undertaken the exercise.

There is a limitation to the VR exercise as it will only provide assurance on the ability to identify the origin of the fire. Cause determination requires the ability to excavate and locate relevant artefacts and then determine the cause of the fire.

The FSR is also looking into the value of VR and what could be provide to fire investigation unit.

Case Assessment and Interpretation

UKAS's understanding from a limited sample of forensic investigation units is the general approach taken by fire investigators is to consider all potential causes of the fire. Once no other hypothesis can be considered the Fire Investigator will then state the most likely cause. From a review of limited number of casefiles across units it is not clear from notes and statements that all hypothesis considered are recorded and often they are not included in the statement. As a result, this approach may be considered as not transparent and it could also be seen as a "leap of faith" to the final conclusion. The assessment model within fire investigation does not follow the approach generally used in other forensic disciplines with regards to case assessment.

All hypothesis should be stated and the evidence evaluated against each propositions and reported. This methodology is likely to be compliant with the evaluative opinion appendix to the Codes being produced by the FSR.

The FSR is considering commissioning a piece of work to review fire investigation statements to determine if any further guidance is required.

Case Assessment and Interpretation - Activity level interpretation

For the majority of the cases reviewed it was not possible to identify the exact cause of the fire therefore the conclusions were normally at a "source level" (flame, smouldering or electrical source). However, some cases may include "activity level" (e.g. what actions could have led to the fire) conclusions which are not supported by scientific facts. Without a formal interpretation model UKAS will scope the accreditation to Source level in the first instance. Once the FSR publishes an evaluative opinion appendix to the Codes, UKAS will consider widening the scope to include "activity level" interpretations.

Please note that if opinions are not supported by scientific fact then investigators should make it clear in their statement that it is only a personal opinion not supported by science.

Validation

Validation will need to be provided in the format detailed in the FSR Code of Conduct. Some general discussion within pilot participants and community identified that some units had :

- undertaken literature review across a wide range of publications. The reviews generally confirmed common evidence between literature sources with some being able to verify the literature with internal tests (historic and not formally documented). The reviews did identify some conflicting literature sources, these need to be documented along with the justification as to why they were not deemed reliable.

- Historic mock scenes with known outcomes have been set up and examined. These exercises need to be written up but in theory demonstrated the suitability of the unit's methods and competence of staff.
- A large number of test burns may have been carried out to support training activities. While the test burns may have been assessed independently there were a lack of records to support the evaluation and review due to fact that their initial intend use was only for training purposes. The scenes were generally the same so may not be challenging in terms of demonstrating the limitations of the methods.
- VR software has been developed to assist with the training of Fire Investigators. This software has real fire burns and known situations which Investigators can examine. It would only provide assurance on the determination of the Origin of the fire, and only assuming that the answers do not become known in the organisation or community.
- Small Scale Excavation Test – Setting up small scale debris exercises where Staff can demonstrate the method and their ability to find relevant debris.

Overall, the conclusion was that a body of evidence could be pulled together to demonstrate the reliability of the literature used and the method employed (use of a number of test burns, VR, small scale individual tests).

Some further guidance could be documented in a potential FSR appendix after some consensus views from the community.

Reference Material

Some fire investigation units will have a reasonable library of literature which they use to confirm reliable information and identify conflicting information. It is reported that some units may only have access to 1 or 2 source such as NFPA 921 or Kirks. In this case the fire investigation unit may find it difficult to demonstrate the reliability of literature if they don't have access to other literature to identify commonality or difference of opinions. In addition, the fire investigation units need to consider how they will be-able to meet CPS requirements of disclosing conflicting scientific views? It may be possible for a central review to be undertaken of literature, if so mechanism for continued review and update of the literature needs to be established.

Next Steps

The Dry Run exercise has enabled UKAS to confirm that the standards are appropriate and determine a way forward with the assessment approach. There are a number of areas which further guidance is required from the Fire Community

(e.g. NFCC/UK-AFI) and FSR before UKAS can open up applications without the need for a further pilot exercise, these are:

- Guidance for fire investigation units on how to set up a good mock scene to prevent exercise being worthless and incurring unnecessary costs.
- A mechanism for Fire Investigation Units to gain access to Mock Scenes.
- Guidance to be provided on Validation
- Determine if there is a centralised way of carrying out literature review initial and on an ongoing basis
- Establishment of an independent ILC or PT scheme
- Consideration of approach in using current VR software to support Fire Services
- A review of sample fire investigation statements to provide guidance on assessment process and reporting.