



**METROPOLITAN
POLICE**

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METROPOLITAN POLICE SERVICE

DIRECTORATE

OF

FORENSIC SERVICES

SUBMISSION

TO

SCOTTISH FINGERPRINT ENQUIRY

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METROPOLITAN POLICE SERVICE SUBMISSION TO THE FINGERPRINT ENQUIRY - SCOTLAND

<u>INDEX</u>	<u>Page</u>
Introduction	3
The Basis of Fingerprint Identification in the Metropolitan Police Service (MPS)	6
Training, Development and Competency Assessment of Forensic Practitioners in Fingerprint Examination	7
MPS Quality Management System	13
Research	16
MPS Directorate of Forensic Services response to the questions posed by The Fingerprint Enquiry - Scotland	21

METROPOLITAN POLICE SERVICE SUBMISSION TO THE FINGERPRINT ENQUIRY - SCOTLAND

1. INTRODUCTION

- 1.1 This paper is prepared in response to a request from The Fingerprint Inquiry - Scotland to set out the operation of the Metropolitan Police Service (MPS) fingerprint department and respond to some specific areas of interest to the Inquiry. In responding to this request the MPS does not put forward its fingerprint examination process or basis of operation to be any different or superior to the many hundreds of fingerprint departments across the world. We also ask the Inquiry to recognise that we are not familiar with the criminal justice system in Scotland and our submission is largely referenced to the adversarial criminal justice system in England and Wales.

- 1.2 We respond to the issues raised by the Inquiry in detail but as a matter of record the MPS does not consider fingerprint examination to be an “exact science”, error free or infallible. We do, however, encourage the Inquiry to recognise that fingerprint examination like many other branches of forensic science has evolved as an integral part of the investigation of crime and the administration of justice and the need to implicate the guilty and exonerate the innocent. In this respect fingerprint examination is not a branch of science in that it is a product of scientific discovery and endeavour that has resulted in scientific laws or principles. Forensic disciplines across medicine, science and technology have developed through the application of science combined with professional judgement and experience to provide an expert opinion to the court. There have been long standing concerns about the lack of a theoretical basis or fundamental laws of forensic science; Professor Kirk’s paper¹ in 1963 is probably the seminal paper on this topic. The recent US National Academy of Sciences Report highlights in a comprehensive and thorough way similar issues.

- 1.3 The MPS is not complacent in recognising the lack of a theoretical evidence base for many forensic science disciplines but we believe the role of the expert witness and how they interact with criminal justice systems is a key factor in determining the reliability of forensic evidence in whatever form. This is particularly so for the subset of experts who give a definitive opinion on what we could call identification. Included in this group are fingerprint, footwear, tool mark and firearms examination where the expert will give a definitive opinion as to the identity of an individual,

whether a shoe made a footwear mark, a tool made a mark through physical contact and whether a cartridge case or bullet was fired by a particular gun. These are well established branches of forensic science and experts have been providing definitive opinions to the courts on these matters for many decades. Of these fingerprint examination can be the most impactful as it identifies an individual. This highlights the critical need to ensure that expert evidence of fingerprint identification is reliable and valid. Reliability relates to whether there is an underlying basis for arriving at a definitive opinion, in the case of fingerprint examination this is based on the assertion that every fingerprint is unique and that when a finger mark is left at a crime scene and compared with a set of prints that there is sufficient information to conclude that the mark was made by the person who provided the fingerprint and no other. The first part although not scientifically proved is general accepted in that the possible combinations of ridge detail is infinite and that no two fingerprints have ever been found to be the same for over a hundred years of the practice of fingerprint examination. We do not regard the lack of a theoretical basis for fingerprint identification as fatal or undermining the provision of fingerprint evidence which we firmly believe to be soundly based. The critical issue is that an expert opinion can and should be open to challenge and the courts should be able to be reassured that the opinion and expert evidence given by fingerprint examiners is reliable.

- 1.5 To underpin the provision of expert fingerprint evidence the MPS has focussed on developing a system that is robust and to explore what more we can do to understand how a fingerprint examiner arrives at a definitive opinion and to underpin their decisions. On the system this is a combination of competence, process and culture. The training for fingerprint examiners has always been very rigorous in the MPS but we have taken this a step further and devised a competency framework and assessment process that demonstrates the initial and continued competence of fingerprint examiners. The process that operates in the MPS involves laid down procedures within an overall Quality Management System that is certified to the ISO 9001 standard. On culture there has to be a working environment in which individual experts take decisions and there is no organisational or peer pressure to arrive at a conclusion or to change a conclusion. This was reflected in the code of practice that was used by the defunct Council for the Registration of Forensic Practitioners (CRFP) but will form part of our internal requirements of fingerprint examiners.

The system encompasses not only how fingerprint examination should be undertaken but deals with disputed identifications and technical errors, it also importantly includes the three stage verification process that is the primary safeguard to the courts that a wrong identification will not be made. It is through the effective operation of this overall system that the MPS provides reliable expert evidence to the criminal justice system. In our experience when errors are made in fingerprint examination it is a result of one or more of the factors of competence, process and culture failing rather than a fundamental flaw in fingerprint examination.

- 1.6 In respect of understanding how a fingerprint examiner arrives at a definitive opinion and to look for an underpinning explanatory model we have embarked on conducting some experiments using a group of MPS fingerprint examiners. This is still in its early stages but we have formed alliances with academic organisations and found that current thinking in decision making theory as applied to medical and other fields has many parallels with fingerprint examination. We are optimistic that this will provide a better framework for explaining how fingerprint examiners arrive at decisions, support a consistency in decision making and provide a basis for recruitment and competency testing.

2. THE BASIS OF FINGERPRINT IDENTIFICATION IN THE MPS

2.1 Fingerprint examination in the MPS is based on the following;

- The principle that no two fingerprints are the same and that each person's fingerprints are in effect unique.
- The fingerprints of an individual do not change throughout their lifetime
- It is possible for a fingerprint expert to make a comparison between a latent finger mark and a print and establish a definitive identification or elimination.
- Fingerprint examiners need to demonstrate competence and operate within a recognised system and use processes that ensures all results presented to the courts are accurate and reliable

2.2 The underlying process that is used in the MPS is based on the Analysis, Comparison, Evaluation and Verification (ACE-V) methodology. The ACE-V methodology codified the thought process and approach of fingerprint examiners in the MPS.

2.3 To effectively operate the ACE-V methodology the MPS recognises and fully supports the introduction of external accreditation for fingerprint examination, the demonstration of competence and the need to meet the requirements and standards of the Forensic Science Regulator. We have developed a competency framework for fingerprint examination that leads to an externally accredited Foundation degree and we have achieved ISO 9001 for fingerprint examination. The next two sections describe these in detail.

3. TRAINING, DEVELOPMENT AND COMPETENCY ASSESSMENT OF FORENSIC PRACTITIONERS IN FINGERPRINT EXAMINATION

Background

3.1 Around five years ago the MPS recognised that workplace development and structured training courses in fingerprint examination were being delivered in isolation, this approach potentially missed valuable learning opportunities and did not support the achievement of competence in fingerprint examination in a structured and documented way. We set about developing a more robust learning programme that provides structured progression and assessment towards achievement of competence as a fingerprint examiner ensuring that skills and knowledge are applied and demonstrated in the workplace. This is achieved through;

- **Academic recognition**
- **Professional Development Team**
- **Training Development Profiles**
- **Assessments**
- **Individual development**
- **Performance Development Review (PDR)**
- **ACE V**
- **Broader Foundation Knowledge**

Academic Recognition

3.2 A Foundation Degree has been developed in partnership with Teesside University. Foundation Degrees are work based learning programmes which combine academic standards for learning with practical skills required in the workplace. The Foundation Degree in Forensic Practice (Fingerprint Identification) has ten modules. A structured progress plan set out at Appendix A outlines the programme, setting out all ten modules, and the required assessments. Guidelines are provided on timescales to support the line manager and monitor trainee progress. For a module to be “signed off” all the required elements need to be successfully completed and evidenced. Completed modules are overseen by University progression boards.

The modules also map to National Occupational Standards (NOS) fingerprint examination, these describe the expectation of performance and relate to both activities and behaviours. The modules contain some or all of the following elements.

- a. Initial structured training. This is delivered by trained forensic staff who are accredited trainers based at the MPS Crime Academy; this combines the knowledge and recent experience of current practice in fingerprint examination together with consistency of training delivery. All lessons are regularly assessed by the MPS Crime Academy who have the Skills Mark recognition. Course review and validation is undertaken by the a MPS Forensic Services development team in partnership with the MPS Crime Academy, this is documented and reported to the University programme board.
- b. Workplace development. We are currently developing a process to ensure workbase samples, divided in to three levels of complexity are completed and documented capturing work place development. This gives a framework and clear benchmark of progress assisting the line manager in supporting individual development. It also provides evidence for the University. Standard operating procedures for fingerprint examination are available on the MPS intranet to support work place development and to ensure correct processes are followed.
- c. Moderated Assessment. Fingerprint examination moderated assessments are marked independently and this process is overseen by two external assessors appointed by the University. They ensure consistency in marking and that assessments meet the required level. This provides scrutiny and independent audit. The learning from this supports continuous improvement not only for individual practitioners but for the training and development programme in its entirety.
- d. Feedback. This is a vital aid to learning and a culture that supports development is fundamental to the success of the programme. Throughout the training programme group feedback, individual feedback and documented feedback are provided, which allows open dialogue and

supports development. To support staff who deliver feedback a mandatory mentoring and line managers programme has been delivered.

- e. Training Development Profiles. Training Development Profiles (TDPs) are written at the conclusion of every formal training course; they describe the overall performance on the course and highlight any development points. We recognise the opportunity to build on these profiles, integrating them fully with the MPS Performance Development Review (PDR), aligning them to the workplace learning. The TDP is forwarded to the line manager at the end of the formal training course so that any identified development can be followed up.

Professional Development Team

- 3.3 The professional development team consists of a group of experienced fingerprint examiners, management and support staff, who support workplace development and manage the Foundation Degree Programme. The team are responsible for the processes and quality of the programme and coordinating the partnership with Teesside University. Members of the team also hold responsibility for contributing at national meetings, working with the National Police Improvement Agency (NPIA) to define and review the National Learning Programme for fingerprint examiners. Professional Development Managers within this team have a key role in supporting the line manager with the development needs of staff; they oversee trainee progress to ensure consistency. These are practitioners of long standing who have all been assessed against the framework for developing others, and are required to achieve accredited trainer status.

Assessments

- 3.4 There are two types of assessment; Formative and Summative. Formative assessments highlight development needs and guide progress, summative assessments test competency to an agreed level. The formal courses included in the Foundation Degree all contain summative assessments. These assessments are moderated and overseen by the external assessors appointed by the University.

At key stages in the programme technical assessments are undertaken, there are five technical assessments in total in the MPS Foundation Degree Programme. Each fingerprint technical assessment is based on known samples at different levels of complexity. The fingerprint technical assessments are conducted by allocating a period of time to analyse a latent mark without the print before any comparison work is undertaken. This supports the ACE-V methodology and allows assessors to understand the trainees thought process. To achieve expert status there are four summative assessments, these consist of a theory paper, a technical assessment, a paper application and their ability to articulate evidence for the judiciary system.

Individual Development

3.5 When considering any training and development programme an important consideration is how the diversity of learning will be managed, the MPS ensures an inclusive approach which accommodates the different ways and different speeds to which individuals learn. Supporting a culture which makes the most of people's differences whilst maintaining consistency of standards is a fundamental part of the programme. Managers have the responsibility to recommend trainees for formal training courses or assessments. Any specific learning requirements are managed, this is supported by a development meeting between the individual, line manager and if required a member of the development team. An individual development plan is agreed with timescales for review.

Performance Development Review (PDR)

3.6 The MPS operate an individual performance review process as a tool for setting development objectives and assessing competency, they are linked role profiles and National Occupational Standards. Everyone has a PDR, and the input and responsibility for maintaining progress is both individual and collective. Personal responsibility is an essential behaviour in reaching competency, supporting staff to identify and document their own development needs, ensuring they fully understand the importance of their contribution and role within the criminal justice system, increases their awareness of their own accountability.

Analyse Compare Evaluate Verify (ACE-V) Submissions

- 3.7 Throughout the Foundation Degree each trainee is required to produce a minimum of 15 ACE-V submissions. At the beginning of a trainee's career an ACE-V assessor is appointed to aid the trainee's development in this area. The assessors role is to discuss and guide the trainee in their decision making process. The assessors are experienced fingerprint examiners with a minimum of three years as a practising expert. There is documented and verbal feedback for the benefit of the trainee. ACE-V assessors are appointed out of line management, and generally stay with the same trainee through to their achievement of competence. The ACE-V assessor works with the trainee and line manager this provides the individual with the maximum opportunity to broaden their development.
- 3.8 The ACE-V completion is a valuable development tool that demonstrates the individual's approach, level of knowledge and thought processes in reaching their conclusions. The 15 ACE- V's required include:
- Ten print comparisons
 - Elimination impressions
 - Chemical impressions
 - Powdered impressions
 - Light Source impressions

All of these will be a variety of positive and negative comparisons. The trainee is also required to identify the surface the development medium, pressure distortion, clarity, and problem areas. Within the overall body of the ACE-V report the trainee will give an evaluation of all of the above. The trainee is required to present three of the ACE V submissions to a nominated panel at an appropriate point in their development. With the introduction of the Foundation Degree summative assessments for the presentations and a number of the ACE V will be introduced.

Broader Foundation Knowledge

- 3.9 The fingerprint examiners will also undertake modules that expose them to the criminal justice system, with court visits that enables them to see their role in context.

Current Practice

- 3.10 The Foundation Degree represents the current and future development of fingerprint examiners in the MPS. Of the 170 active fingerprint examiners in the MPS forty are now enrolled on the foundation degree programme and will use the structure described to achieve competence and Foundation degree status. For the remaining fingerprint examiners they will be required to achieve and demonstrate competence by completion of a module based on the Foundation Degree and will be assessed. All staff participate in a proficiency testing programme that monitors competency and is part of our management system described below.

4. MPS QUALITY MANAGEMENT SYSTEM

- 4.1 The MPS Directorate of Forensic Services has established a Quality Management System (QMS) for the provision of fingerprint services. This management system was independently assessed and certificated by British Standards Institute (BSI) in April 2007 to the International Standard ISO 9001. In order to confirm continuing compliance, BSI conduct twice yearly surveillance visits. Since certification, the QMS has been assessed and certification retained. The scope of the MPS Directorate of Forensic Services ISO 9001 certificate has expanded since 2007 as more areas are assessed. The current scope of the ISO 9001 certificate is set out in Appendix B.
- 4.2 The Directorate has a quality manual which sets out how the fingerprint operation in the MPS meets the requirements of the ISO 9001 standard. The manual is a controlled document, available to all staff. At the heart of the quality management system is the quality policy which provides a framework for establishing and reviewing quality objectives and confirms senior management commitment to continual system improvement in meeting customer requirements.
- 4.3 Measurable quality objectives are established through an annual business plan in line with the quality policy. The focus is on effective delivery to the police, the public and the criminal justice system. Quarterly management review meetings are chaired by the Director of Forensic Services to review the performance of the quality management system to ensure its continuing suitability, including the quality policy and business objectives.
- 4.4 Data from internal/external audit results, customer feedback and process performance is collected on MPS fingerprint services on a continuing basis. This data is analysed and the information is presented by the quality management team at the management review meetings. Decisions taken at these meetings aim at improving the effectiveness of the quality management system and its processes. A quality management unit, staffed by professional quality managers, is headed up by the quality and performance improvements manager. The unit is responsible for ensuring that the quality management system is working effectively whilst ensuring that the requirements of the international standard ISO 9001 are met in full.

Processes

- 4.5 Within the quality management system, the work-related processes of the fingerprint bureau and corporate organisational activities such as internal audit are documented and controlled. All documents, including records, required by the quality management system are controlled to allow up-to-date versions to be available to all members of staff. Graphics are used for process flowcharts with drop-down procedures including further details as required. These facilitate ease of access for new trainees and established members of staff alike.
- 4.6 There are currently 26 processes within fingerprint services, ranging from “Processing crime scene marks” to “Control of records.” A list of the operational processes within Fingerprint Services is included in Appendix C. Each process has a nominated process owner who is a senior member of staff responsible for the accuracy and effectiveness of the processes. It is the responsibility of the process owner to review the process, oversee changes and ensuring that the process remains effective and engenders an efficient way of working.
- 4.8 The Quality Managers conduct two cycles of independent internal audits of all processes per year. Internal audits focus on identifying areas of conformity, where staff are working to correct procedures, as well as documenting any non-conformances found and agreeing corrective actions. The aim is to test the effectiveness of the system and also seek opportunities for improvement. In addition to the assessment of the management system, the internal audit programme has introduced assessment of the technical competence of the fingerprint examiners.
- 4.9 Any technical errors found are dealt in accordance with the technical error procedure. This procedure sets out the steps to be followed following the discovery of a technical fingerprint error. It is applicable to all staff. Technical errors are defined as comparison miss, wrong identification and administrative wrong identification. All erroneous comparisons must be reported to a senior manager and recorded by the line manager. Failure to do is regarded as a disciplinary matter and treated accordingly.

4.10 Technical error record sheets detail the type of error, dates, photographs of the lift/photo in question, summary of discussions, reasoning and agreed action / development plans. All action / development plans created are fully documented and overseen and signed by the Head of Profession. A list of all work completed is maintained and regular documented reviews held. For a fingerprint examiner a fingerprint work based sample must be undertaken and successfully completed before they can resume fingerprint work. For a trainee fingerprint examiner a fingerprint work based sample must be undertaken and successfully completed, they will then continue their progression within the competency framework.

5. RESEARCH

5.1 The MPS Directorate of Forensic Services is keen to encourage and facilitate research within the domain of fingerprint Identification. In 2005 an initial research programme was formulated to examine the fundamental basis for fingerprint examination and the expert opinion that derives from it. The aim was to encourage debate amongst the fingerprint fraternity thereby challenging and improving our working practices within the field of fingerprint analysis and consequent presentation of evidence. The research group consisting of fingerprint experts, occupational and cognitive psychologists initially tackling three key areas:

- To investigate and test the ‘theory’ of fingerprint analysis and examine explanatory models of fingerprint identification. With the aim to improve understanding and provide a narrative to be utilized by experts in the witness box to explain how they have arrived at their decision.
- To examine contextual affects the fingerprint decision process of fingerprint experts.
- To develop a technical aptitude test for new trainee practitioners.

5.2 In order to examine explanatory models of identification it was necessary to articulate the decision making process of fingerprint experts and to try to identify the variables that may impact on these processes and to ascertain the extent of the impact on the experts’ decisions. These variables can be simply classified as either internal or external. Internal includes the individuals’ emotional, cognitive, personality and demographic characteristics. External factors are identified as contextual, task difficulty, task type and experience.

5.3 An initial experiment was designed to research the actual point of an identification decision; this was termed the ‘tipping point’. This research aimed to show the difference between novice and expert interpretation, the impact of task difficulty on the final decision, in addition to measuring the extent of consistency between a group of experts. Individual differences, for example gender, age, experience and personality could also be explored. The research broached the concept of “sufficient uniqueness” in a finger mark, by analyzing the factors that influence the expert’s interpretation and the threshold of detail required for an interpretation and the subsequent decision.

Research into the ‘tipping point’

- 5.4 The tipping point was defined as *‘the hypothesized moment of identification, when the fingerprint expert decides that there is “sufficient uniqueness” in a finger mark to establish a positive identification that can be presented at court’*.

The three selected independent tasks or variables were identified as pressure, rotational movement and superimposition of a finger mark. Seven marks from a known source, varying in quality and difficulty within each task were presented to 79 volunteer experts from the MPS fingerprint department. The general results illustrate that task type (rotational movement, pressure and superimposition) and task difficulty (quality of mark) had a significant effect on the number of matching characteristics and the number of available characteristics and therefore the number of matching characteristics decreased as the task became more difficult. The proportion of experts making an identification decreased as the task became more difficult and the proportion of experts concluding the marks were insufficient to make a comparison increased for the most difficult marks within each task. There was commonality between experts on all the less difficult marks but there were disagreements between experts on the most difficult rotational movement marks. The results of this exercise have been shared with an academic partner and we are now looking to publish the findings.

Contextual effect

- 5.5 There have been several publications referring to the emotional or contextual bias suffered by examiners when making finger mark comparisons. Researchers have stated that volunteers were affected by emotional context and this has influenced their decisions. The MPS conducted its own experiment to examine whether the crime type context affects the decision process of fingerprint experts. For the purposes of the experiment a mark was presented from either the scene of a murder, representing the high emotional context or from the scene of a forgery case representing the low emotional context.

The mark was from a known source and was of a poor quality that lay at the boundaries of practitioner interpretation and thus presented a challenge to individualize.

- 5.6 Seventy experts volunteered, 35 were given the low context and 35 were given the high emotional context. In addition the participants were given a set of reference prints to make a comparison and all supporting documentation and the external stimulus was representative of that typically considered by experts. Individual demographic data and personality data (by means of a 16PF personality questionnaire) was also recorded. Participants then answered a series of questions pertaining to the mark and/or the status of the comparison, for example their initial opinion, their opinion after a comparison accompanied with their observations and reasoning, and whether they would present the mark as evidence at court.
- 5.7 The results showed that there was no significant difference in the decision outcomes made by the experts. There was no relationship between emotional context and presenting the mark as evidence for judicial proceedings. The research and findings were published in *Forensic Science International* ^{2'3'4}. Further analysis of the results showed that there was no significant difference within the demographic data presented, i.e. gender, years of experience, age and only one statistically significant difference on the 16PF personality scale. Experts who were able to establish identity scored significantly lower on the abstractedness scale compared to the other groups. Interestingly practitioners who established identity were characterized as being more practical, paying more attention to concrete information rather than abstract observations.

Design of the Aptitude test

- 5.8 The aim of the aptitude test is to identify candidates with a natural ability or previously developed skill necessary to perform the technical aspect of the fingerprint examiner role. The test has been specifically designed requiring no fingerprint training and little instruction. To facilitate the design of an appropriate test it was first necessary to identify the skills used by the fingerprint examiner and concentrate on those that could be tested. Some of these skills taken into consideration are listed below:-
- Good working memory - The test mimics the process of a manual comparison where the fingerprint examiner analyses and remembers small points of detail within the test mark and transposes the information on to each of the question images. Moving back and forth from image to image.

The test mark is separated from the question samples in order to force this cognitive process. If the candidate struggles to stimulate the working memory or struggles to translate the information quickly the candidate is more likely to return to the test image more often and thus take longer to complete the test.

- Pattern recognition- the test uses patterns with geometric shapes before introducing any basic fingerprint patterns.
- Ability to interpret the contrasting black and white lines. i.e. The ridges and furrows.
- Ability to ignore the background information and only interpret relevant information.
- Ability to perceive and measure/count differences in intervening ridges/line.
- Ability to mentally rotate information without overlaying images.
- Ability to concentrate for over an hour on technical comparisons.
- Ability to look beyond the predominant visual information to look for smaller detail to help in identification for example interpretation of characteristics and their association with each other.
- Ability to perceive an identification/match despite the images appearing different. This highlights the individuals tolerance capacity.

5.9 Historically there has been a tendency to severely underestimate the natural abilities of the general population and as a result all previous recruitment tests have been too easy or have not included any fingerprint comparisons. To improve the design of this test members of the public have been interviewed to ascertain their abilities prior to training and they were introduced to the complexity scale of marks developed within the tipping point study. Some of these marks were selected for inclusion in the latter stages of the aptitude test.

The majority of the non-fingerprint volunteers were able to correctly identify the clearest mark in each scale. The mark subjected to rotation movement caused the most disparity between the novice and expert groups. The second mark within the scale was identified by all fingerprint experts and only some of the non-fingerprint volunteers.

5.10 The test uses geometric patterns, fingerprints, areas of palm and crime scene finger marks. Some images are an exact replica match, some require a greater level of interpretation as they are subjected to the normal distorting factors that would impact on the quality of a crime scene mark and as a result the images, although a match, do not appear as exactly the same. Some of the images have also been rotated. This Aptitude test has been introduced alongside conventional recruitment tools to assess its value and predictive validity. The initial results are promising and we are closely monitoring the performance and capability of the trainees recruited using this tool.

6. MPS DIRECTORATE OF FORENSIC SERVICES RESPONSE TO THE QUESTIONS POSED BY THE SCOTTISH FINGERPRINT INQUIRY

1. ACE-V

i. Is the ACE-V methodology applied?

Yes, as highlighted below the ACE-V methodology is key to the training, development and delivery of expert opinion on fingerprint identification in the MPS. The ACE-V process encapsulates the thought processes of a fingerprint examiner whilst making a fingerprint identification and is always applied when carrying out fingerprint comparisons within the MPS.

ii. If so, what degree of definition is prescribed in relation to the practices required at each of the phases of the ACE-V methodology?

The following describes the MPS definition and operation of each stage of the ACE-V process;

Analysis

Fingerprint examiners in the MPS are trained in the first instance to analyse the latent mark (unknown) using an holistic approach. On completion, the same process is repeated for the controlled print (known). There are several factors to be considered during analysis, each has the potential to distort the latent print, these factors are:

- Substrate - the surface upon which the mark or print was left.
- Matrix - what is the mark or print is made up of
- Development medium - what was used to develop the mark deposition
- Deposition pressure - how hard the mark or print was placed down
- Pressure distortion - relates to lateral pressure / movement
- Problem Areas - problem areas within either impression e.g. lines, scratches, air bubbles and superimposition (the over laying of ridge detail, from the same or different impressions).

Using the holistic approach the mark is analysed in its entirety to identify

- 1st Level detail - pattern type and ridge flow
- 2nd Level detail - type of feature, relative position and location
- 3rd Level - the appearance and location of ridge edges and pore structures

Enhanced imaging technology between the mark and the print will always be considered. This includes obtaining optimum quality finger / palm prints.

Comparison

When the latent mark and the controlled print have been analysed independently, features of both are compared systematically to determine if they are similar or dissimilar. In most cases 1st or 2nd level detail will be sufficient to individualise or exclude. The decision is based upon identifying the same features, in the same order and bearing the same relationship to each other, with sufficient in agreement and no unexplained features in disagreement. This is referred to as the coincident sequence. If there is insufficient detail at 1st and 2nd level then 3rd level detail will be explored.

Evaluation

The evaluation is the amalgamation of all the information contained within the comparison. This encompasses all the features available from the analysis including pattern & ridge flow, digit determination, ridge tracing count, creases, scarring, ridge characteristics and any possible features available in the ridge structure.

Verification

The MPS operates as a minimum a three stage verification process for all positive identifications. This involves;

- The first stage is the outcome of the original examination where a fingerprint examiner makes a positive identification based on the ACE-V methodology.
- The second stage is undertaken independently by a fingerprint examiner who has expert status and will have access to the print and latent mark but will

receive no information on the features identified in the first stage and he/she is expected to reach an independent conclusion as to identification based on the ACE-V methodology

- The third stage of verification is completed by one of a pool of nominated senior fingerprint examiners, all of whom have expert status and have demonstrated that they possess the relevant skills to assess all marks for their suitability to be presented as court evidence. He/she will have access to the print and latent mark but will receive no information on the features identified in the first stage and is expected to reach an independent conclusion as to identification based on the ACE-V methodology.

On marks with low levels of disclosed detail and no unexplained features in disagreement a fourth verification is undertaken. If at any stage of the verification process the identification is disputed it is referred to an assessment panel; consisting of three senior fingerprint experts. Enhanced imaging technology, between the mark and print, will be used as and when required, before a final decision is made. Each member of the panel independently reviews the disputed identification in its entirety. Identity is only established if all three members of the panel independently verify the identification.

All identifications are established using the ACE-V methodology. At each stage of the verification process, an independent decision is made by all fingerprint examiners, who are personally held accountable for their decisions. If guidance is sought at any stage during the verification process, this immediately excludes the advising fingerprint examiner from further involvement in this process. The initial verification of all identifications must be processed by the original finder to eliminate all peer pressure. If for whatever reason, they are unable to complete this first verification, they are excluded from any further involvement in the verification process. Throughout their training, fingerprint examiners are made aware of the importance of their personal responsibility, accountability and integrity.

iii. Assessment: In what order do fingerprint experts assess marks? Do they begin with the latent? Is it permissible to take into account in the comparison stage a characteristic first observed in the known print?

We describe above the analysis(assessment) stage of the ACE-V process in which fingerprint examiners are trained to initially analyse the latent mark then the known print. When carrying out a comparison, the known print may add clarity to some features that are less well defined in the latent mark. The MPS recognises that a blind testing approach that only allows for features that are identified in the latent mark to be used in the comparison could be regarded as a more objective approach. However, in practice this would significantly reduce the number of fingerprint identifications and eliminations, due to the complex process that the human brain assesses images and makes comparisons.

iv. Evaluation: Are there any standards in determining the “quality” of characteristics? Are there any standards applied in determining whether the presence of a certain number of common characteristics is “sufficient” for a unique identification?

There are no documented standards within the MPS in determining the “quality” of characteristics or whether the presence of a certain number of common characteristics is “sufficient” for a unique identification. As we set out in detail above the fingerprint examiner uses the ACE-V methodology to examine a latent finger mark and print and to arrive at a conclusion.

v. Verification - What is required in regard to the validation by later examiners? To what extent are the later examiners independent? Are the same procedures followed whether the mark in question is considered to be complex or not?

The verification process is described above and we highlight that at all three fingerprint examiners involved in the verification process will use the ACE - V methodology and will not know the features that each other relied on to make an identification, each individual is expected to arrive at an independent decision.

