

Information

Fingerprint Research and Development Considerations

FSR-I-409

ISSUE 1

© Crown copyright 2020

The text in this document (excluding the Forensic Science Regulator's logo and material quoted from other sources) may be reproduced free of charge in any format or medium, providing it is reproduced accurately and not used in a misleading context. The material must be acknowledged as Crown copyright and its title specified.

Forensic Science Regulator - Fingerprint Research and Development

INFORMATION – INFORMATION – INFORMATION – INFORMATION – INFORMATION – INFORMATION –

CONTENTS

1.	INTRODUCTION	3
1.1	Background.....	3
2.	PURPOSE AND SCOPE	3
2.1	Identification of Research and Development Opportunities for the Fingerprint Community.....	3
3.	MODIFICATION.....	4
4.	IDENTIFIED THEMES/QUESTIONS	4
4.1	Theme 1: Bias, Blind Verification, Sequential Unmasking, and the Influence of Human Factors (Relevant to Fingerprint Practitioners, Policing, Judiciary)	4
4.2	Theme 2: Discriminatory Strength of Fingerprint Characteristics – Linked to Themes 3 and 7 (Fingerprint Practitioners, Judiciary, Crime Scene Investigators).....	6
4.3	Theme 3: Quantification of Suitability or Sufficiency – Linked to Themes 2, and 7 (Fingerprint Practitioners, Policing, Judiciary, Crime Scene Investigators).....	8
4.4	Theme 4: Marks in Blood – Linked to Theme 5 (Fingerprint Practitioners, Policing, Judiciary, Crime Scene Investigators)	11
4.5	Theme 5: Transfer, Persistence and Recovery – Linked to Theme 4 (Fingerprint Practitioners, Policing, Judiciary, Crime Scene Investigators)	12
4.6	Theme 6: Permanence of Ridge Detail (Fingerprint Practitioners, Policing, Judiciary)	15
4.7	Theme 7: Ability to Discriminate Adventitious Matches (Close Non-Matches) – Linked to Themes 2 and 3 (Fingerprint Practitioners, Judiciary).....	17
5.	ACKNOWLEDGEMENTS.....	18
6.	REVIEW.....	18
7.	REFERENCES	18
8.	ABBREVIATIONS	19
9.	FURTHER READING	19

1. INTRODUCTION

1.1 Background

1.1.1 With the expansion of accreditation for fingerprint recovery and examination, there is a need for research that would be beneficial to the ongoing underpinning and development of fingerprint examination for practitioners.

1.1.2 The Regulator’s Fingerprint Quality Standards Specialist Group (FQSSG) has considered areas of research that would be relevant to the wider fingerprint community.

2. PURPOSE AND SCOPE

2.1 Identification of Research and Development Opportunities for the Fingerprint Community

2.1.1 The aim of this document is to publicise areas of potentially relevant research that would be beneficial to the continuing underpinning and development of fingerprint examination for the wider Criminal Justice System. The document is intended to identify areas for prioritising research and further professional development.

2.1.2 The topics outlined are intended to cover crime scene to court. They include models for interpretation of comparisons as well as identifying limitations in what can be expected from a comparison.

2.1.3 Areas for potential research have been categorised as themes and questions along with the particular branches of the overall fingerprint community to which they seem to most closely relate; these have been confined to Policing, Fingerprint Practitioners, the Judiciary and Crime Scene Investigators. The themes are presented without any order of priority and in the format of ‘The community welcomes ...’.

2.1.4 It is hoped that the themes set out can be explored further within the research and fingerprint communities. It is for those communities to consider the relevance and viability of these topics, to determine priorities and to identify any gaps, but some potential community-specific viewpoints are outlined in the form of questions associated with each theme.

3. MODIFICATION

3.1.1 This is the first version of this document.

4. IDENTIFIED THEMES/QUESTIONS

4.1 **Theme 1: Bias, Blind Verification, Sequential Unmasking, and the Influence of Human Factors (Relevant to Fingerprint Practitioners, Policing, Judiciary)**

4.1.1 The community welcomes studies to assess how any potential bias in interpretation at the comparison stage might be minimised. Such studies might include, for example:

- a. how a given mark might be interpreted differently by the same examiner in different case circumstances and different significance of mark (for example, type of mark, knowledge of it being the only mark);
- b. a consideration of sequential unmasking in interpretation – which information to consider relevant and which is misleading; and
- c. a determination/assessment of what information an examiner needs to have access to, to enable them to carry out their comparison without risking the introduction of subconscious bias.

4.1.2 Such studies could result in guidance for submitting police officers on what may or may not be appropriate information to include on fingerprint submission paperwork and throughout the examination process. This will mitigate the risk of bias.

4.1.3 The topics noted above at 4.1.1 are related to one another and considering them overall will provide a means of minimising practitioner observer effects in interpretation. It is not intended that a fingerprint comparison should be carried out in isolation, devoid of any of the context in which the mark was recovered. Some information relevant to the mark, and the circumstances under which it was made, will help the examiner to formulate an appropriate and robust conclusion. Other information relating to, for example, the suspect or the victim, may have a subconscious bearing on the approach of the expert to the comparison that has been requested.

4.1.4 Studies on the human or environmental factors involved in the tasks carried out by fingerprint examiners could consider whether human factors such as natural eyesight/movement, fatigue, mental/emotional states can contribute to unintended bias, loss of efficiency or diminished ability. Also, a consideration as to whether such factors might contribute to errors or variable decisions, for example, when using digital on-screen comparison compared to manual photographs and paper.

Q1: Fingerprint Practitioners

4.1.5 Consider the following questions regarding the information related to the questioned mark that is necessary for a robust and reliable comparison, and interpretation of that comparison, to be carried out.

- a. Do you generally receive more or less information than is necessary, or just sufficient to carry out your comparison?
- b. How do you extract just the necessary information from that submitted, or request any information that is missing?
- c. How do you implement a shielding mechanism and a sequential unmasking process?
- d. What contextual information do you provide to your blind verification checker at the outset of the verification process?
- e. Would there be a benefit in terms of efficiency gains, as well as consistency of approach, to developing a 'Critical Success Factors' form or similar to ensure a uniformity to the information provided to the expert and checker, thus minimising the risk posed by any potential accusation of bias?
- f. Which processes are more sensitive to, or influenced by, certain human or environmental factors?
- g. How can processes be developed that minimise adverse effects on humans and hence increase staff well-being and reliability of their decisions?

Q1: Policing

4.1.6 Consider the following questions regarding the information you provide to a fingerprint expert when requesting a comparison.

- h. Are you aware of what the expert needs to carry out the task requested effectively or do you, for example, either adopt a straightforward ‘compare A with B’ or provide full case circumstances?
- i. Could a guidance document (in whatever form) from the fingerprint community on what information to provide to obtain robust results from the comparisons you request be of benefit?

Q1: Judiciary

4.1.7 Consider the following questions regarding a case involving fingerprint comparison evidence.

- j. What case-related information would you anticipate a fingerprint expert being given in order that you could be confident that any suggestion of the influence of subconscious bias could be minimised?
- k. Would there be a benefit to having pre-hearing sight of (or influence on) the specific information that any interpretation/conclusion is based on?
- l. If the answer to (4.1.6i) is yes, then would that better inform the process as a separate document or should it be included in the expert’s report (either as body text or appended to it)?
- m. Does wording to easily understand bias need to be developed?

4.2 Theme 2: Discriminatory Strength of Fingerprint Characteristics – Linked to Themes 3 and 7 (Fingerprint Practitioners, Judiciary, Crime Scene Investigators)

4.2.1 The community welcomes studies to determine the evidential significance of characteristics in relation to fingerprints to answer the following questions.

- a. How rare is a given general pattern (i.e. level 1 details)?
- b. How might an objective measure of the strength associated with these features (for example, general pattern, ridge counts, ridge tracing) be provided?

- c. What is the relative frequency and spatial distribution of other fingerprint features such as minutiae or creases (i.e. level 2 details) or shapes (i.e. level 3 details)?
- d. What is the prevalence of certain features on certain digits?
- e. How are features distributed between fingers and palms?
- f. Are differences observed in features/distribution due to gender or ethnic origin?
- g. Are there other features that can be identified on a ridge to improve discrimination?

4.2.2 A study to assess how unusual general pattern characteristics will allow a determination of relative frequency of certain features on a finger, or sequences of finger and how they depend on the digit considered, gender or ethnicity. It will provide practitioners with data that will allow for the interpretation of friction ridge detail where only level 1 detail is apparent.

4.2.3 A study to assess the spatial distribution and relative frequencies and combinations of fingerprint features (such as minutiae types, scars, creases and shapes of ridges or pores) can be used to inform and underpin an examiner's interpretation and feed into automated interpretation systems. This will address overall accuracy and impact upon future real-time decision-making systems.

4.2.4 This theme is intended to provide information allowing an assessment of the significance of the presence of certain characteristics and patterns in fingerprints/marks.

Q2: Fingerprint Practitioners

- a. Considering the general pattern, is there any correlation between patterns and location on a digit or palm?
- b. Based on the general pattern of the mark(s), can the best finger (or combination of fingers) to search for its source or information regarding gender or ethnicity be predicted?
- c. Considering level 1, level 2 and level 3 details, is there any correlation between feature types and location on a digit or palm?

- d. Could a limited area of clarity in a mark contain characteristics that are more commonly seen on, for example, a right index finger or left thumb?
- e. Could such statistical data assist fingerprint examiners in their decision-making process?

Q2: Judiciary

- f. Would it assist in the presentation of both prosecution and defence evidence in court if it were known that certain characteristics can be seen X% of the time amongst fingerprints taken from various groups/populations and Y% at specific locations of the hand in a specific group/population?
- g. Would lawyers consider the provision of information such as ethnicity or gender based on fingerprints as a welcome addition to the Criminal Justice System (CJS)?

Q2: Crime Scene Investigators

- h. Would it assist in a search, location, recovery scenario if there were information available to indicate what digit(s) were represented by a certain mark in isolation?
- i. If, during a scene examination, it was the case that only limited areas of detail were initially revealed, but these areas contained characteristics of known significance, would that knowledge inform the decision as to whether or not to examine the remaining parts of the scene?

4.3 Theme 3: Quantification of Suitability or Sufficiency – Linked to Themes 2, and 7 (Fingerprint Practitioners, Policing, Judiciary, Crime Scene Investigators)

4.3.1 The community welcomes studies to determine the minimum amount of detail that is required in a mark to retain it as of value in order to carry out a meaningful comparison. Is suitability dependent on the digit, or anatomical source or does it only depend on the extent of detail present in the mark?

- a. What is the minimum area of ridge detail required to reach a given conclusion between a mark and a print?

- b. What features (or combination thereof) are required and in what amount to support an 'identification' conclusion?
- c. At which point will an observed difference be enough to conclude to an exclusion?
- d. Could evidence be provided in the form of non-categorical support when a categorical opinion of exclusion or identification cannot be reached?

4.3.2 The purpose of this research strand is to provide some parameters to reduce the subjectivity in the current examiner assessments. It will increase transparency and potentially allow non-categorical evidence obtained from limited marks being introduced in the CJS.

4.3.3 Studies to determine the feasibility and approach of combining different biometric modalities with fingerprints, for example, facial matching or DNA, could explore methodology for combining such data to provide higher detection rates.

Q3: Fingerprint Practitioners

- a. What is the key factor in determining the reliability of a comparison and its associated conclusion? Is it, for example:
 - i. the clarity of the mark;
 - ii. the extent of the mark; or
 - iii. the features within the mark?
- b. Is it more beneficial to the comparison to have:
 - i. a small, sharply defined area of ridge detail displaying a small number of definite level 2 and level 3 details; or
 - ii. an expansive area of more poorly defined ridge detail displaying multiple, but uncertain features?
- c. Is there a way for a practitioner to determine suitability, measure sufficiency or express the expected evidential value of collected fingermarks prior to comparison by assigning numerical values to clarity, extent and selectivity of the features represented?

- d. Is there a lower limit to such a value, below which the comparison would be unlikely to yield any meaningful evidential value? Could such studies address whether uniformity could be brought to measures of the quality of marks and their expected evidential contribution to the CJS?
- e. Could a sufficiency value identify or enable a means to improve the 'threshold' for searching to reduce returned candidate lists or for searching large lists of close/near matches?
- f. For poor marks could lower cut-off levels be used to search these to produce potentially meaningful candidate lists out of a search on the Automated Fingerprint Identification System (AFIS) system?
- g. Could such measures be used to determine the minimal image quality that enables a level of confidence on the appropriateness to extract and process images from social media applications, such as YouTube?

Q3: Policing

- h. Could information based on fingerprint evidence of less than categorical strengths contribute effectively to successful prosecutions and the deterrence of crime?
- i. Would information derived from the combination of fingerprint and other biometric data be of value to provide rapid high-value intelligence for investigations and/or evidence for court?

Q3: Judiciary

- j. Is sufficiency an issue for the judiciary as long as the comparison and conclusion reached can be demonstrated, described and defended?
- k. Would combining biometric modalities assist with the presentation of the evidence in court and be acceptable to courts?
- l. Would it help with evidence impact assessment if a fingermark were to be given a sufficiency rating and that rating made known?
- m. Is it desirable to provide evidence based on fingerprint comparisons of less than categorical opinions?

Q3: Crime Scene Investigators

- n. Would it assist in a search, location, or recovery scenario if information were available to indicate what digit(s) were represented by a certain mark in isolation by consideration of the general pattern represented?
- o. If, during a crime scene examination, it was the case that only limited areas of detail were initially revealed, but these areas contained characteristics of known significance, would that knowledge inform the decision as to whether or not to examine the remaining parts of the scene?

4.4 Theme 4: Marks in Blood – Linked to Theme 5 (Fingerprint Practitioners, Policing, Judiciary, Crime Scene Investigators)

4.4.1 How to record, recover, enhance and interpret marks in blood in a reliable manner?

4.4.2 The community welcomes studies to investigate the peculiarities and difficulties associated with these marks to better understand their deposition mechanisms and inform the comparison stage. These studies should consider aspects such as recording, recovering, enhancing, comparing and interpreting these types of marks and supporting fingerprint examiners at each of the examination stages. They may also help to identify consumables requirements such as packaging to ensure that an item stays fixed in transit to minimise potential detail loss by abrasion.

Q4: Fingerprint Practitioners

- a. Enhancement – techniques for developing blood components to get clarity of mark and provide non-destructive blood confirmation.
- b. Image capture – as d above for crime scene investigators.
- c. Comparison of ‘blood marks’ – identification of artefacts, understanding of blood fluid dynamics, parameters to aid interpreting mark deposition and the attributes of these marks and their reproducibility.
- d. Is it possible to sample blood ridge detail for DNA profiling and account for substrate DNA content? Can the presence of blood be confirmed while maintaining the integrity of the impression?

Q4: Policing

- e. What is the relevance of the blood mark to the incident (age, deposition, location)?
- f. Is activity reconstruction possible to address the issue of potential involvement or not in the incident of interest?
- g. Is the blood forming the mark (friction ridge detail) from the relevant party/parties?

Q4: Judiciary

- h. Clarity of what 'blood mark/mark in blood' means.
- i. As per policing e, f and g.

Q4: Crime Scene Investigators

- j. Relevance to incident – for example, what parameters to consider in identifying and selecting blood marks relevant to the timing of an incident?
- k. Image capture – what imaging/capture conditions could assist with determining the deposition mechanism?
- l. Surfaces – how blood marks behave when left on surfaces?
- m. Recovery – is preservation and handling of removable items without altering the blood mark possible? If not, what in situ enhancement and image capture processes maximises the information required for comparison (see a and b below)?

4.5 Theme 5: Transfer, Persistence and Recovery – Linked to Theme 4 (Fingerprint Practitioners, Policing, Judiciary, Crime Scene Investigators)

4.5.1 How to determine the possibility of finding and recovering fingermarks in various circumstances and assess when they were deposited or the circumstances of their deposition?

4.5.2 The community would welcome studies to investigate:

- a. how/why some surfaces/substrates accept fingermarks more readily than others; and

- b. how persistent those marks are found to be under different typical handling and storage regimes.
- 4.5.3 A study aimed at determining the age of marks (or time since deposition) generated from natural or contaminant residues and their relevance to the incident would also be of value to the community. Can the efficiency of any visualisation techniques aid with establishing a time frame for deposition?
- 4.5.4 Secondary transfer to a surface via an intermediate could also be considered, for example, can a mark transfer through direct contact of another medium post-deposition, such as pages, papers or magazines stacked? If a subject touches the adhesive of a 'Post-it' pad and puts the 'Post-it' note on the wall, if a mark is left can it be left elsewhere if the 'Post-it' is reused? Could a mark, or set of marks, be deliberately transferred in a similar fashion by an offender to place an innocent individual at a particular place?
- 4.5.5 This study could also provide an opportunity for input into the Defence Science and Technology Laboratory's solvent reformulation and fingermark detection projects, providing persistence and transfer data to support the development of examination strategies and opinion evidence on activity.
- 4.5.6 A project to determine new or adapted methodologies to visualise fingermarks on surfaces where success is currently limited at best would benefit scene investigation and enhance recovery rates.

Q5: Fingerprint Practitioners

- 4.5.7 Transfer and persistence will have a bearing on a case assessment and interpretation strategy. If a fingermark is discovered on a rarely handled item, how can the examiner be sure that it is relevant to the incident under investigation?
- 4.5.8 Can a reliable method be devised to determine the time since the deposition of a fingermark?
- a. What level of similarity is there in the components of latent fingermarks from different people? Whilst a process to determine components in a mark might be beneficial, could it raise the question of targeting (an

individual or group) and bias by choosing which chemical component was selected for development? Marks are currently developed more holistically because it is not known who has left what on an item.

- b. Is there a set rate at which the components making up the latent mark deteriorate?
- c. If the marks are made in a certain extraneous substance, does that substance change appreciably over time?

Q5: Policing

4.5.9 Considerations of transfer and persistence will have similar relevance to the policing community as to the fingerprint practitioners. There is a need to understand the relevance of the mark in question in the context of the investigation at hand. This might inform an interview strategy, allowing time frames to be corroborated or refuted.

4.5.10 It appears that the question(s) asked of crime scene investigators and fingerprint practitioners would also address the policing requirement.

- a. Can consideration of transfer and persistence be incorporated into a case assessment and interpretation model for fingerprint practitioners?
- b. Should relevance be incorporated (possibly as standard text) in a streamlined forensic report?

Q5: Judiciary

4.5.11 As with policing, the judiciary is concerned with the relevance of a mark as well as the reliability of the comparison carried out on it.

Q5: Crime Scene Investigators

4.5.12 Transfer – a survey to determine which surfaces rarely yield detected fingermarks even when such marks are known to be present. These marks might be latent, or they may be visible but non-recordable. This would lead to a piece of work considering novel recovery methods to be used on those surfaces. This information could be compiled into a reference library, which would likely need regular reviews and updates as manufacturing processes and materials used change over time.

- 4.5.13 Secondary Transfer –a study to determine whether secondary transfer, either accidental or deliberate, is feasible. Is there some characteristic about the mark or its surroundings that might indicate that it has been transferred there from elsewhere?
- 4.5.14 Persistence – a study to determine how well a fingermark might survive in different circumstances will inform a visualisation/recovery strategy. Marks on items that have been undisturbed for some time could be considered, as could marks on regularly handled items, this last to determine how quickly and effectively a mark can be disrupted during general handling. Are there some circumstances where it is more difficult to obscure/remove fingermarks than others? Determining when a mark might be considered to be fragile and vulnerable to disruption might also influence recovery, transportation and storage guidelines; possibly similar considerations to blood marks at 4.4.2c and 4.4.2d.
- 4.6 Theme 6: Permanence of Ridge Detail (Fingerprint Practitioners, Policing, Judiciary)**
- 4.6.1 How permanent and reproducible are friction ridge skin pattern details over time or depending on the substrate touched or on the matrix of the marks?
- 4.6.2 The community would welcome studies to measure reproducibility of features due to the rolling process of taking prints and how prints from an individual might vary as the individual ages, for example, the changing appearance of pores or incipient ridges. The practicalities of such studies would mean comparing duplicate sets of data from known sources but some appreciable time apart.
- 4.6.3 This strand of research will inform the comparison process when differences are observed between a mark and print, and the examiner considers that the elapsed time might constitute an explanation for these differences. It is particularly relevant in cold case scenarios. The research output will explore changes in a mark/print over time. If it can be shown that there is some variance over time, then does that introduce a shelf life to the database as it now stands?

4.6.4 A second line of inquiry stems from the fact that the appearance of features on a mark may vary in appearance between different media or substrates. This issue was touched upon in relation to blood marks, but the problem of the reproducibility of features impact all marks. The change in appearance can represent an interpretation issue that is currently dealt with by examiners without any firm research basis.

Q6: Fingerprint Practitioners

- a. How do you know whether a perceived difference between a mark and a print is an actual difference, or an artefact caused by the way in which the mark or the print was produced?
- b. Can the production method for prints introduce apparent differences between successive prints, even when the same method is used?
- c. Do general patterns and other fingerprint features change over time, other than by injury?
- d. If there is variation with age, and should that be a relatively short time frame, then how to compile and maintain a contemporary database?

Q6: Policing

- e. If an individual stands trial for a historic crime on the basis of newly discovered fingerprint evidence, then would any comparison be reliable if a variation of some features with time had been shown and there were no prints from the suspect, contemporary with the time of the offence?

Q6: Judiciary

- f. How to consider any non-permanence of ridge detail (particularly in historic crime) in the context of the following arguments.
 - i. Could these fingerprints be from someone other than the suspect?
 - ii. What if the suspect's fingerprints, whilst initially similar to those recovered from the scene, have changed in the 50 to 60 years since the crime and now, and they correspond purely by chance?

4.7 Theme 7: Ability to Discriminate Adventitious Matches (Close Non-Matches) – Linked to Themes 2 and 3 (Fingerprint Practitioners, Judiciary)

4.7.1 How to ensure regular and consistent identification of adventitious matches, i.e. ‘close non-matches’?

4.7.2 The community would value studies to determine whether improved fingerprint comparison AFIS matchers tend to produce a high number of ‘close non-matches’ and how this will affect the reliability of fingerprint examiners. Such studies will help to define the criteria for sufficiency in the context of AFIS searches. In addition, the systematic search for ‘close non-matches’ will enable the provision of proficiency test (PT) sets that will allow examiners to be confronted with the ‘worst case scenarios’. This would go some way to mitigating any adverse effects on efficiency and output caused by the increase in numbers of such comparisons. A dataset of known ‘close non-matching’ marks could be produced for training, collaborative exercises and PTs.

4.7.3 A study such as this would give confidence to the wider CJS that the process used by the examiner minimised and managed the possibility that ‘close non-matches’ were being misinterpreted as matches.

Q7: Fingerprint Practitioners

- a. To show ongoing ability to discriminate ‘close non-matches’ requires a set of ground truth data to allow that ability to be demonstrated.
 - i. How to compile a ‘close non-match’ reference collection of ground truth data (GTD)? ‘Non-match’ as a category is unlikely to be difficult, but how and who to determine what is, or is not, ‘close’?

Q7: Judiciary

- b. How often is it to be expected that the specifics of the closeness of a non-match will be a matter of note in a case?
- c. Would you request a second opinion for a stated ‘close non-match’ and, if so, would knowledge of an expert’s successful participation in a ‘close non-match’ PT exercise make such a request less likely?

5. ACKNOWLEDGEMENTS

5.1.1 The Forensic Science Regulator is grateful to the Fingerprint Quality Standards Specialist Group, members of the fingerprint community and the Forensic Science Regulation Unit for their contributions in producing this document.

6. REVIEW

6.1.1 The Forensic Science Regulator welcomes comments. Please send them to the address as set out at: www.gov.uk/government/organisations/forensic-science-regulator, or email: FSREnquiries@homeoffice.gov.uk

7. REFERENCES

Forensic Science Regulator Cognitive bias effects relevant to forensic science examinations, FSR-G-217. Birmingham: Forensic Science Regulator. Available at: www.gov.uk/government/publications/cognitive-bias-effects-relevant-to-forensic-science-examinations [Accessed 16/03/2020].

Forensic Science Regulator Fingerprint Comparison, FSR-C-128. Birmingham: Forensic Science Regulator. Available at: www.gov.uk/government/publications/fingerprint-comparison [Accessed 16/03/2020].

Forensic Science Regulator Fingerprint Examination – Terminology, Definitions and Acronyms, FSR-C-126. Birmingham: Forensic Science Regulator. Available at: www.gov.uk/government/publications/fingerprint-examination-terminology-definitions-and-acronyms [Accessed 16/03/2020].

Forensic Science Regulator Fingerprint Visualisation and Imaging, FSR-C-127. Birmingham: Forensic Science Regulator. Available at: www.gov.uk/government/publications/fingerprint-visualisation-and-imaging [Accessed 16/03/2020].

8. ABBREVIATIONS

Abbreviation	Meaning
AFIS	Automated Fingerprint Identification System
BV	Blind Verification
CJS	Criminal justice system
DNA	Deoxyribonucleic acid
ENFSI	European Network of Forensic Science Institutes
FQSSG	Fingerprint Quality Standards Specialist Group
GTD	Ground Truth Data
PT	Proficiency Test

9. FURTHER READING

ENFSI Best Practice Manual for Fingerprint Examination. Available at: enfsi.eu/documents/best-practice-manuals/ [Accessed 16/03/2020].

INTERPOL 18th International Forensic Science Managers Symposium 2016 Review Papers. Available at: www.interpol.int/en/How-we-work/Forensics/Forensic-Symposium [Accessed 16/03/2020].

INTERPOL 19th International Forensic Science Managers Symposium 2019 Review Papers. Available at: www.interpol.int/en/How-we-work/Forensics/Forensic-Symposium [Accessed 16/03/2020].

Forensic Science Regulator - Fingerprint Research and Development

INFORMATION – INFORMATION – INFORMATION – INFORMATION – INFORMATION – INFORMATION –

Published by:

The Forensic Science Regulator

5 St Philip's Place

Colmore Row

Birmingham

B3 2PW

<https://www.gov.uk/government/organisations/forensic-science-regulator>

ISBN: 978-1-78655-906-7