



**Fingerprint Quality Standards Specialist Group (FQSSG)**

**Notes of the meeting held on 10 June 2015  
at FSRU, 5, St Philip's Place, Colmore Row, Birmingham B3 2PW**

**1.0 Welcome**

1.1 The Chair, Gary Pugh, welcomed all to the meeting, in particular Lisa Hall, Metropolitan Police Service (MPS), who was presenting on testing done by the MPS on the Morpho Automated Fingerprint Identification System (AFIS), and David White, Home Office Biometrics and Geoff Whittaker, Home Office CAST (Centre for Applied Science and Technology), who were taking part for the FQSSG work stream items on AFIS, image capture and enhancement. A full list of attendees and apologies is at Annex A.

**2.0 Fingerprints Guidance Launch**

2.1 This was the first FQSSG meeting following the launch of the Fingerprints Standard (the Appendix to the FSR Codes of Practice and Conduct) on 24<sup>th</sup> March 2015. Having completed this work, it had been decided to retain the FQSSG, to look at broader fingerprint areas, after which the Fingerprints Standard would be revised and extended. The FSR, Gill Tully, supported this approach. The composition of FQSSG for the future would be discussed later in the meeting.

2.2 ACC Mark Hopkins, the National Police Chiefs' Council (NPCC) forensics portfolio lead, had presented at the fingerprints launch, supportively commenting that other areas of policing such as firearms have risks, which paralleled the situation with risks in the fingerprint processes. Police forces now needed to achieve the standards for processing of fingerprints that were set out in the fingerprint appendix.

2.3 In the week of the launch, the Fingerprints Standard was also presented at the Fingerprint Society, where Karen Stow gave a president's address on the subject. Ideally the Fingerprint Society could be the forum for fingerprints standards, and some academics did attend, but the meeting was otherwise poorly attended by practitioners. The Society lacked funding, and the younger element of the fingerprints community did not engage with it. However, Karen Georgiou was a member of the Quality and Performance Group, and the Quality Managers Network, and was sighted on this.

2.4 The Chair invited feedback from members on the fingerprints launch event. One force had now been through pre-assessment for fingerprints accreditation. It was reported from the Quality Managers meeting that these

colleagues were supportive of the standards, but lacked leadership in their organisations. There was thus a caucus of people supporting the approach.

### **3.0 Feedback on fingerprints guidance**

3.1 Following the fingerprints guidance launch, two pieces of feedback had been received. One was on the FSR Codes of Practice and Conduct, from the United States, relating to agreement or disagreement between practitioners being disclosed. The other was on the appendix, relating to counting certain fingerprint features as two characteristics in close proximity, instead of one characteristic. On the first feedback item it was agreed unnecessary to reissue the codes. In relation to the second comment, other fingerprint terms would be added to the fingerprint terminology document later, to be in line with version 2 of the standard. Fingerprint evidence was presented to court in a holistic non-numerical fashion. The feedback was relevant if fingerprint characteristics were counted, but this was not done in practice. The comments received demonstrated the wide reach achieved with the documents.

**Action 1: The fingerprints guidance documents would be left to stand, following the two feedback items received.**

### **4.0 Comparison of Morpho AFIS with current IDENT1 system**

4.1 The chair wanted to share initial findings from tests of the Morpho Automated Fingerprint Identification System (AFIS) algorithm. The standards regulatory issue was that the algorithm needed to be validated for its specific use. There were also fingerprint workflow discussions needed, firstly on whether finger marks could be automatically processed throughout, and then for other systems to process fingerprints. However, other policing groups would consider these issues.

4.2 On testing and validating the Morpho AFIS algorithm, Lisa Hall of MPS, presented the pilot research that had been carried out there.

4.3 The pilot objectives were to:

- Compare the capability of the two algorithms (Morpho and IDENT1) to identify the known source of the fingerprint ridge detail.
- Compare the precision of the algorithms to respond to the correct source.
- Establish the optimum operating method of the Morpho system, i.e. manual encoding versus auto encoding.
- Establish whether the quality of the questioned ridge detail impacted on the effectiveness of the algorithm.
- Identify possible limitations or performance anomalies of the MBSS (Morpho Biometric Search Services) algorithm results.

4.4 The marks were taken from the known source database. They represented all development mediums used by the Metropolitan Police Fingerprint Bureau, including variations in lighting, marks that were enlarged

by ten percent, two-year-old marks, all capture techniques, all areas of ridge detail and all quality gratings, with movement and superimposition and so on. All marks were graded by several examiners on their quality, number of characteristics observed and difficulty in interpretation. Grade 1 marks were the easiest to interpret, and Grade 5 were highly likely to be unsuitable for search or comparison. All known source donors were recorded using different ink capture live-scan, NAFIS forms and elimination forms, to reflect current ten-print submissions. These donor sets were added to a current live database containing over one million ten-print sets. 41 marks were deemed by the fingerprint examiners to be unsuitable for search, either because of poor quality, or because they originated from the phalange area, in which ridge detail cannot be searched. 8 marks were filed but not submitted for search, and deleted from the system by an unknown error. This left 199 marks added. The examiners were given a set of instructions, being told to file the marks as if they were launching a fingerprint search.

4.5 The two AFIS systems (Morpho and IDENT1) were then used to undertake five types of searches, four types using the new Morpho algorithm, and one using the old IDENT1 algorithm. The five searches were:

1. Examiner encoding and examiner finger allowance, new algorithm.
2. Examiners finger allowance, auto encode (no user encoding), new algorithm.
3. Examiners encoding (submitted as all fingers for allowance), new algorithm.
4. Auto encode (submitted as all fingers for allowance), new algorithm.
5. Examiner encoding and examiner finger allowance, old algorithm.

4.6 The significance of the five types of searches were:

- Searches 1 and 5 represented maximum fingerprint examiner input using the two different algorithms.
- Searches 2 and 3 represented minimum examiner input, operating with the system.
- Search 4 represented no examiner input, similar to a “lights out” scenario.

4.7 The results showed that the new Morpho algorithm’s performance was superior, and produced more identifications than the current algorithm. They also demonstrated the precision of the Morpho algorithm to generate the known source within the top three respondents. The findings also proved that the auto encode function of the system did not perform as well as the fingerprint examiners in interpreting the characteristics present within the areas of ridge detail, and generating the correct source within the respondent list.

4.8 The principle of these tests was the use of a database that was sufficiently large and comprehensive to “hide” the test marks. These marks needed to represent case work, and some types of marks responded better than others. The test tried to establish the limitations of the algorithms and the

search process. Testing the algorithm at the limits of its performance capability allowed the fingerprint community to understand the system, and adapt their application and processes to establish optimum working practices. It proved complex to design an effective test, partly because of the possible limitations within the entire fingerprint process that had to be considered. For example if an examiner orientated the mark fifteen degrees either way from the filed donor set, then even though the mark was of good quality the algorithm failed to respond. This would be a factor for a lights-out process with non-examiners launching searches on the system.

4.9 The results of this AFIS testing would be compared with the Federal Bureau of Investigations (FBI) work. Home Office biometrics colleagues had found similar results on their tests. On ten-prints they found that IDENT1 failed on 2 out of 500 prints, whereas the new Morpho algorithm succeeded on all 500. On search 4 (lights-out) the new AFIS had proved 12% to 13% better than the existing one.

- Use of the new algorithm also offered new options in configuring fingerprints workflows.
- There was an issue of not using the fingerprints examiners opinions on “idents” for these tests.
- CAST were apparently not validating AFIS systems.

4.10 The quality regulation “lever” would be used to help procure the appropriate AFIS system for police forces. Thus this work assessing AFIS systems needed to be fed into the relevant Home Office board.

## **5.0 Fingerprint Image Capture**

5.1 Neil Dennison had volunteered to chair the image capture sub- group, and its Terms of Reference had been agreed. Nick Marsh of MPS had given a presentation to FQSSG, and presented to Karen Georgiou’s group. These presentations demonstrated that scanning fingerprints was an unwise procedure. The image capture sub group had met Home Office CAST and Metropolitan Police in the week of 1<sup>st</sup> June. Members of the FQSSG believed that operational fingerprint colleagues were needed on it, to challenge CAST perceptions. The group should then feed back to FQSSG. June Guinness was to contact Neil Dennison to arrange this, and to facilitate the next image capture group meeting.

**Action 2: Members asked to nominate colleagues for the fingerprint image capture sub-group.**

## **6.0 Fingerprint Enhancement**

6.1 Lisa Hall had volunteered to chair the fingerprint enhancement sub group, and reported the progress made to date. A draft appendix on fingerprint enhancement standards was circulated to the meeting. The sub group had invited Helen Bandy from CAST and Helen Earwaker to assist, on decisions in fingerprint enhancement laboratories. They had attempted to

contact Emily Burton as the policing fingerprint enhancement lead, sending her a formal invitation, and sought help from Amanda Harrison. Further, they had asked individuals in fingerprint enhancement laboratories, which already had ISO/IEC 17025 2005 certification, for relevant issues.

6.2 FQSSG reviewed the draft appendix. The comments made would be followed up by the enhancement sub group.

## **7.0 FQSSG Terms of Reference**

7.1 The Terms of Reference (ToR) for FQSSG had been published earlier, with the FSR's authority. Specific updates to the ToR were needed, and there were several general issues. In particular, FQSSG was an independent advisory group, and so did not have a role in enforcement of standards. The chair invited comments on the FQSSG remit, to be shown in the ToR.

- FQSSG covered all aspects of fingerprint examination.
- ENFSI (European Network of Forensic Science Institutes) were drafting best practice standards, so FQSSG needed to be mindful of international developments.

7.2 The ToR composition section needed updates. FQSSG membership would include:

- NPCC Fingerprint Portfolio,
- the Chair of the Fingerprint Expert Network,
- Fingerprint Bureaux used by police forces,
- Fingerprint practitioners,
- Crown Prosecution Service (CPS) and
- United Kingdom Accreditation Service (UKAS).

7.3 Representation of FQSSG would normally be as individuals, not on behalf of organisations, and there was an option to co-opt colleagues. Police Service of Northern Ireland (PSNI) would be consulted on membership, and forensic services at Scottish Police Authority (SPA) would continue to be included.

7.4 For academia, Jim Fraser would be thanked for his earlier work on FQSSG, and a new colleague nominated instead, to provide an academic view. The FSR had suggested Christophe Champod from Lausanne, whose work was recognised worldwide, but his use of Bayesian techniques was an issue, because these had not been adopted by the UK, and therefore were not relevant. Alternatively the academic involvement could be ad hoc. Dave Charlton, King's College or University College London were possible candidates. June Guinness and Gary Pugh were to make soundings on possible academics to join FQSSG.

**Action 3: Members to provide views on potential academics to join FQSSG to June Guinness.**

**Action 4: FQSSG Terms of Reference to be updated for the next FQSSG meeting.**

**8.0 Minutes and matters arising**

8.1 All actions from the previous meeting on 14<sup>th</sup> January 2015 had been completed or were agenda items, except:

- Action 1: The CPD (Criminal Practice Directions) guidance document was completed and would be circulated with the current minutes
- Action 3: Nick Marsh reported that the image capture presentation was only visual and would not be useful. However FQSSG felt that it was still required, so could be followed up.
- Action 4: These references and sources of information for fingerprints were no longer required, so the action was closed.
- Action 10: It was assumed that the finger-mark submission decision making and image capture presentations by Helen Earwaker could be used by UKAS, so June Guinness would provide those.

**Action 5: Members to send edits for and comments on the previous minutes of 14 January 2015 to the Secretary.**

**9.0 Fingerprint Primer**

9.1 The Lord Chief Justice did not currently need the fingerprint primer, seeking instead primers on DNA and gunshot residues. However, fingerprint primer work continued, and within the draft the FSR had requested that the descriptions of fingerprint match outcomes be removed, because they were not accepted internationally. Also forces that had not yet implemented reporting of these outcomes, although they were otherwise UK practice.

**Action 6: June Guinness to approach the FSR on including the fingerprint match outcomes, as UK practice.**

9.2 In the primer section on fingerprint examination, which explained that this process was “subjective”, a sentence was to be added to state that the opinion “was based on the information that the fingerprint examiner could discern”.

**Action 7: June Guinness to update the draft fingerprint primer**

**10.0 Fingerprint Proficiency Testing exercise - Update**

10.1 The previous report on fingerprint Proficiency Testing had been amended and circulated to the group. FQSSG fed back that the Proficiency Testing carried out by HO Centre of Applied Science and Technology (CAST), involving Jonathan Vaughan and Richard Case, might in fact be Competency

Testing. For example CAST had used trials which were intended to be blind, and reported the outcomes of their tests as “idents” that were missed.

10.2 The Proficiency Testing was commissioned by the Fingerprint Board (which was now the Fingerprint Governance Group), and the Food and Environment Research Agency (FERA) had reviewed the results. FQSSG agreed to first provide their findings on the Proficiency Testing work. Then, as the FSR would be attending the next NPCC standards and performance meeting, Karen Georgiou could provide them with a definition for Proficiency Testing. Thus FQSSG would provide learning on Proficiency Testing for the national police structures. Otherwise there was a risk of police forces presenting an incorrect version of Proficiency Testing to UKAS during their accreditations.

### **11.0 Fingerprints Accreditation – Update**

11.1 UKAS reported that they had carried out fingerprints assessments, with a police force being pre-assessed. Fingerprint enhancement laboratory assessments were on schedule. There would be accreditation training awareness days on 12<sup>th</sup> and 22<sup>nd</sup> June. UKAS would also make unannounced visits to forensic organisations.

11.2 Two workshops were planned:

- 9<sup>th</sup> July: UKAS Forensic Technical Assessor workshop. This would cover general updates including the UKAS Restructure, updates re: assessment of ILAC (International Laboratory Accreditation Cooperation) G19 and FSR Codes of Practice and Conduct; TPS (Technical Policy Statement) 47 and PT update; PoFA (Protection of Freedoms Act), and technical break out groups.
- 28<sup>th</sup> July: UKAS Fingerprint Technical Assessor workshop, covering pre-assessments, with a discussion on the potential need for a related UKAS document and its possible contents.

### **12.0 AOB**

12.1 No further issues were raised. The chair commented that FQSSG had made good progress. Members were requested to send proposals for substantive issues for presentation at the following meeting to the chair. The remainder of the agenda at the following meeting would be feedback on ongoing fingerprints issues.

### **13.0 Date of Next Meeting**

13.1 The date of the next meeting is 11<sup>th</sup> November 2015, at Greater Manchester Police Headquarters in Manchester.

Annex A

**Present:**

Gary Pugh, Chair	Director of Forensic Services, Metropolitan Police Service
June Guinness, Scientific Lead	Forensic Science Regulation Unit
Iain Borthwick	Greater Manchester Police, Forensic Services Branch
Lisa Hall	Metropolitan Police Service
Kath Monnery	United Kingdom Accreditation Service
Richard Small	West Midlands Police
Gary Holcroft	Scottish Police Authority
Karen Georgiou	Bedfordshire Police
Geoff Whittaker	Centre for Applied Science and Technology, Home Office
David White	Home Office Biometrics
Mike Taylor, Secretary	Home Office Science Secretariat

**Apologies:**

Apologies were received from:

Ian Elkins	Crown Prosecution Service
Neil Denison	West Yorkshire Police
Ambika Suman	Centre for Applied Science and Technology, Home Office