



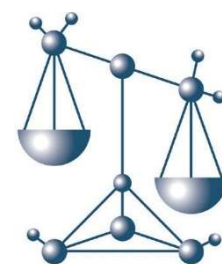
# MINIMUM REQUIREMENTS FOR FACIAL IDENTIFICATION

Incorporating both Facial Recognition System use and Facial Image  
Comparison

A document for emerging laboratories

International Forensic Strategic Alliance

Version 1



**IFSA**

International Forensic Strategic Alliance

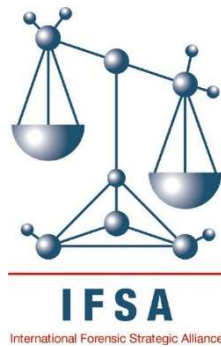


# INTERNATIONAL FORENSIC STRATEGIC ALLIANCE

## MINIMUM REQUIREMENTS FOR FACIAL IDENTIFICATION, INCORPORATING FACIAL RECOGNITION SYSTEM USE & FACIAL IMAGE COMPARISON

A document for emerging laboratories

IFSA MRD 10



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## INTRODUCTION

The International Forensic Strategic Alliance (IFSA) has developed this document to be the recommended minimum requirements which will enable emerging forensic providers and Law Enforcement agencies to provide Facial Recognition (FR) services to the Criminal Justice System.

The purpose of this document is to establish a baseline or starting point that it is strongly recommended be followed in order to achieve reliable results. Forensic providers and Law Enforcement agencies should build on this foundation and strive to continually improve the quality of services provided.

This document describes the recommended minimum requirements for facial identification, incorporating both the use of facial recognition systems and facial image comparison (FIC) processes.

It addresses the following framework:

1. Overview of Facial Identification.
2. Competence of Personnel.
3. Equipment and Consumables.
4. Collection, Analysis, Interpretation, Reporting.
5. Procedures, Protocols, Validation.
6. Quality Management.





## FOREWORD

The International Forensic Strategic Alliance (IFSA) is a multilateral partnership between the six regional networks of operational forensic laboratories:

- the American Society of Crime Laboratory Directors (ASCLD)
- the European Network of Forensic Science Institutes (ENFSI)
- the National Institute of Forensic Science Australia New Zealand (NIFS ANZ)
- la Academia Iberoamericana de Criminalística y Estudios Forenses (AICEF)
- the Asian Forensic Sciences Network (AFSN)
- the Southern Africa Regional Forensic Science Network (SARFS).

IFSA works closely with its three strategic partners, Leverhulme Research Centre for Forensic Science, United Nations Office on Drugs and Crime (UNODC) and INTERPOL.

IFSA recognises the importance of a quality management framework in forensic laboratories to provide quality and standardised results, be it procedures undertaken in the field or in the laboratory.

In February 2012, at the special IFSA meeting hosted by UNODC and convened in Vienna to discuss the needs of the emerging forensic laboratories in developing countries, a decision was taken to create a set of minimum requirement documents (MRD) filling the gap in recommendations available for the current management of these laboratories.

In October 2014, the first series of three MRD documents were created. These documents have focused on the critical quality areas, using simple terms and illustrations. They were followed by other documents covering different forensic science areas. Further MRDs are still being written and the possibility for new MRDs are constantly considered and evaluated. Documents are being translated to other languages by IFSA membership as well. A glossary to explain common terms used in the document has also been included when appropriate.

These MRDs are meant to act as a start-up guide for emerging forensic laboratories to quickly establish their quality management system and scientific/technical capabilities. Once achieved, the laboratories should continue to build on this foundation and strive to continually improve the quality of services through undergoing accreditations to established standards.

In the drafting of these documents, scientific working groups and experts from the six regional forensic science networks, as well as IFSA strategic partners, made valuable contributions during the various rounds of consultation. The final MRDs presented in this series would not be possible without the involvement of all.

It is IFSA's hope that these documents will play an important role for emerging forensic laboratories in their journey towards building quality forensic services.

IFSA Board

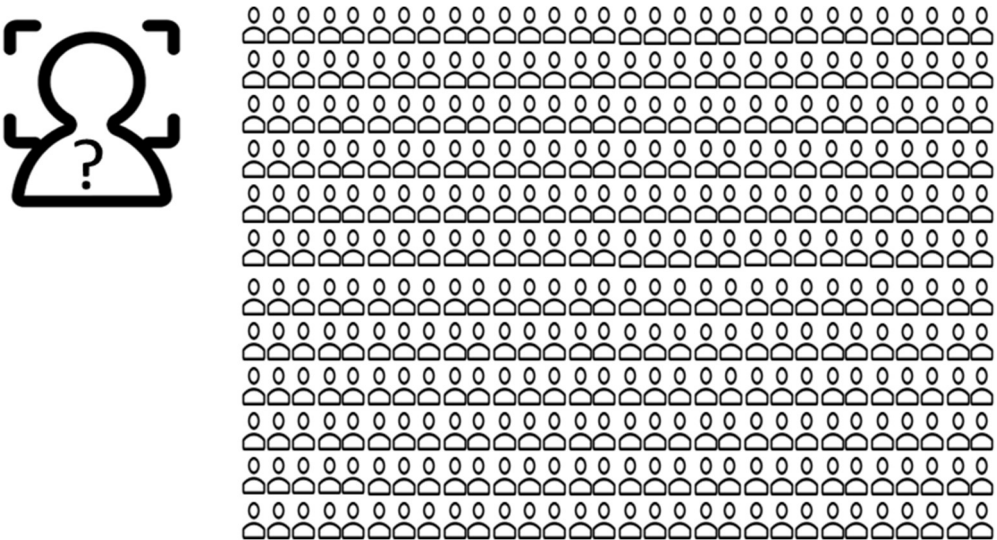
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# 1. OVERVIEW OF FACIAL IDENTIFICATION

Facial Identification incorporates the use of computer based facial recognition systems followed by the manual comparison of facial images by suitably trained staff.

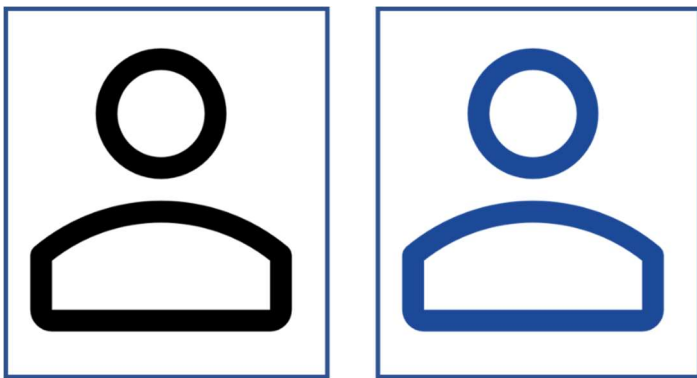
Within a law enforcement context, facial recognition systems are computerised systems used to search and compare faces of unknown individuals, extracted from images or videos, against a database of facial images, referred to as one to many or 1:N comparison. Facial recognition systems are generally deployed in an investigative context and the purpose of the search is to identify potential candidates for further investigation. These systems help us address the question, 'who is this person?'



The database of facial images should be composed of reference known subject images collected under controlled conditions, such as law enforcement 'mug shot' images. Whilst it is possible to have other sources of imagery in a facial recognition database, the scope of this document is constrained to the identification of subjects against a reference subject database.

Careful consideration should be given to each stage of the deployment of facial recognition systems from both policy, ethics and legal entitlement to privacy [1] as well as technical perspectives [2] [3].

The manual comparison of facial images, referred to as one to one facial image comparison, is undertaken on pairs of images and helps address the question 'do these images depict the same person?'



The Facial Identification Scientific Working Group (FISWG) [4] describes different facial image comparison roles including Facial Reviewer and Facial Examiner. For the purposes of this document, the relevant roles are:

**Facial Reviewer:** Performs a comparison of image(s)-to-image(s) generally resulting from the adjudication of a candidate list generated by a facial recognition system. The comparison results are often used in either investigative and operational leads or intelligence gathering applications.

**Facial Examiner:** Performs a comparison of image(s)-to-image(s) using a rigorous morphological analysis, comparison, and evaluation of images for the purpose of effecting a conclusion, often used as forensic evidence.

It should be noted that organizations or laboratories may undertake one or both of these tasks; i.e. organizations may operate a facial recognition system for investigative use but do not provide evidential facial examinations. Conversely, it is possible to provide a one to one facial image comparison service for evidential purposes, without making use of a facial recognition system.

Throughout this document, references have been included to provide more in-depth information on each requirement. It is strongly recommended that these referenced documents are also reviewed.

## 2. COMPETENCE OF PERSONNEL

All laboratory and relevant organization staff shall have a clear understanding of their duties and responsibilities and should always fulfil these according to a code of ethics/professional practice/conduct<sup>1</sup> (see the examples in the footnote below) adopted by the laboratory. A code of ethics, specific to facial identification should also be considered [5].

This section recommends minimum education and training required for staff to carry out the roles of facial reviewer and facial examiner, as defined in Section 1 of this document.

### 2.1 PRE-ASSESSMENT

Regardless of whether the comparison of facial images is undertaken for review or examination purposes, it should be recognized that human performance can have an impact on the reliability of results in facial comparison [6]. Therefore selection, training and testing of staff requires careful consideration [7]. It is recommended to run a pre-assessment of innate face matching ability during the selection process, as innate ability may contribute to facial image comparison performance [7] [8]. The assessment should be based on material representative of casework [9].

### 2.2 EDUCATION

All laboratory and relevant organization staff shall have education, skills and abilities commensurate with their role and responsibilities. Higher education requirements for facial reviewers should be based on the nature and complexity of tasks being performed. Staff preparing facial examinations for evidential use should have a degree or equivalent qualification in a relevant scientific or technical subject [4].

### 2.3 TRAINING

The laboratory or organization should have a documented and structured training program for new staff that includes the required standards of performance, competency and criteria for assessment. The training should be delivered by competent and experienced staff.

The training program shall include all procedures that will be employed in the course of casework, as well as teach and assess the technical skills and knowledge required to perform the role [7] [10]. Training programs should be evidence-based and incorporate exercises that have been demonstrated to improve facial comparison performance, for example working in pairs, receiving feedback on test facial comparisons, and the use of decision aids, such as facial feature checklists [8].

Training may be augmented by participation in external courses or workshops. However, laboratories and organizations should be aware that short, one-off facial identification training courses have been demonstrated to be largely ineffective at improving facial comparison performance, when used in isolation [11].

Prior to assuming independent casework, all staff should be assessed as competent to carry out the specified task. Competency assessment ensures that the required skills and knowledge have been acquired during training. Competency shall be assessed against pre-defined acceptance criteria, assessments of competency may include completion of training plans, satisfactory performance in test cases, direct observation by competent staff, and written and/or oral exams [12].

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<sup>1</sup> Examples of Code of Ethics adopted by regional forensic science networks:

- The American Society of Crime Laboratory Directors (ASCLD) – [www.asclcd.org](http://www.asclcd.org)
- The European Network of Forensic Science Institutes (ENFSI) – [www.enfsi.eu](http://www.enfsi.eu)
- The National Institute of Forensic Science Australia New Zealand (NIFS ANZ) – [www.anzffss.org](http://www.anzffss.org)
- La Academia Iberoamericana de Criminalística y Estudios Forenses (AICEF) – [www.aicef.net](http://www.aicef.net)
- The Asian Forensic Sciences Network (AFSN) – [www.afsn.asia](http://www.afsn.asia)

As part of the training program laboratories or organizations shall also include a mentoring program as a component of training, provided by competent staff within the relevant role of facial examiner or facial reviewer [13]. The duration and components of the mentoring program should be commensurate with the role.

All competent staff should participate in ongoing proficiency testing, and the results should be recorded as part of the quality management system [7].

A program for continued training and professional development should be established to ensure staff remain up-to-date with scientific advances and developments in facial identification. This program may include attendance at conference, seminars and training courses, reviews of scientific literature, and other methods of self-learning.

### 2.3.1 Role-specific training requirements

There are many common elements to the task of facial review and facial examination. However, the level and extent of training required for a facial reviewer and a facial examiner will differ due to the intended purpose of the task, as well as the source, quality, quantity, and complexity of the images that are being analyzed [4].

As the task of a facial examiner is, typically, to provide an evaluative opinion on a facial image comparison that can be used as evidence, facial examiners must draw on a larger foundation of knowledge, skills, and abilities than a facial reviewer. This requires a more advanced level of training, in-depth knowledge of the application of available tools and the ability to articulate the scientific validity of the examination. Detailed requirements for the training of facial examiners can be found in the ENFSI Best Practice Manual for Facial Image Comparison [10] and the FISWG Guide for Facial Comparison Training of Examiners to Competency [14].

Facial reviewers typically provide results for use as investigative leads, therefore the training requirements for facial reviewers are not as extensive as those for facial examiners. Detailed requirements for the training of facial reviewers can be found in the FISWG Guide for Facial Comparison Training of Reviewers to Competency [15].

## 3. EQUIPMENT AND CONSUMABLES

### 3.1 FACILITIES

Workplaces should incorporate generally accepted good practice and procedures with respect to secure access and management of evidential material.

The working environment for the use of a facial recognition systems and/or to undertake facial image comparison should have appropriate lighting, and there should be no light sources (either internal or external) that adversely impact (e.g. glare) on the ability to review material on the monitor.

### 3.2 EQUIPMENT

IT hardware and software are utilized for the capture, viewing, processing and possible enhancement of imagery for search and storage in facial recognition systems and/or for facial image comparison. Such hardware and software should be fit for purpose.

There is a wide range of software and hardware that can be used for facial identification, these can be broadly defined as:

#### 3.2.1 Hardware

- Computer hardware;
- Storage and archiving system;
- Graphical output devices (e.g. displays or printers); and
- Graphical input devices for analogue media if appropriate (e.g. scanners, digital cameras, video capture cards).

#### 3.2.2 Software

- General purpose image viewing tools;
- General purpose image processing tools; and
- Facial recognition system.

The laboratory should keep an up-to-date list of all hardware and software used including identifying information such as the version or build number of software and the serial number of hardware [10].

### 3.3 CONSUMABLES

Not Applicable



## 4. COLLECTION, ANALYSIS, INTERPRETATION AND REPORTING

### 4.1 COLLECTION

#### 4.1.1 Image Capture

A key aspect to the successful implementation of a facial identification service is the quality of the images used for facial recognition systems or facial image comparison. For most law enforcement operations, controlled reference facial images, often referred to as mugshots, are captured when a person is detained by the police. Environmental, imaging and subject factors can all impact on image quality and should be considered when capturing mugshots [16] [17].

Note that the query (or probe) images may come from uncontrolled sources such as documents, social media posts or video recordings.

#### 4.1.2 Collection of reference images

Improved results for recognition and comparison are achieved when reference images are collected under controlled circumstances. A designated area for capture of controlled images should be available that includes, at a minimum;

- A plain background against which the subject is placed (18% greyscale background is recommended);
- Sufficient room to site a camera 1.5 - 2m from the subject;
- A tripod to stabilize the camera;
- Appropriate lighting to ensure that the face of the subject is evenly illuminated; and
- A digital camera.

The subject should be looking directly at the camera, with a neutral expression and with their full face & ears exposed. The head should occupy approximately 2/3 of the image and the distance between the centre of the eyes should be 90 - 240 pixels, depending on the usecase. There should be even illumination across the subject's face to avoid areas of over exposure or shadowing [18].

As a minimum a frontal image shall be captured but left & right 90° profile images and 45° angled images can also be useful for the comparison process.

For Facial Image Comparison, it may be necessary to collect additional images of the suspect that reflect the imaging conditions (for example pose, lighting, camera) under which the probe/query image was captured [10].

#### 4.1.3 Collection of probe / query images

It is recommended that, where available, the imagery in its original format is used to minimize quality loss. When the provided material is video, extraction of several frames from the original footage is advised. Some facial recognition systems can directly use video or search multiple images. Where this function is available, it is recommended that it is used as the system will attempt to either select the image(s) most suitable for searching or will create the template from multiple images.

The manual extraction of images from video (e.g. CCTV) for one to many or one to one comparison should be done in accordance with best practice [19] and by suitably trained and competent staff. Training requirements for extracting still images from video is outside the scope of this document.

## 4.2 ANALYSIS

### 4.2.1 Facial Recognition Systems

The probe image should initially be enrolled in the Facial Recognition system in its original format. If necessary, limited image processing such as face cropping or correcting aspect ratio may be undertaken on a copy of the image to improve the search.

The first step in automated facial recognition is face detection. The algorithm may provide information about the quality of the image such as the pixel distance between the eyes and will typically display the automatically determined eye positions. If these obviously deviate from the correct positions, the reviewer should adjust the eye position correctly according to the technical specifications of the facial recognition system.

After enrolment, a one to many search can be run by the facial recognition system against one or more selected reference database(s). The algorithm compares the template generated from the face of the probe image to the templates of the reference facial images in the database, calculates a similarity score and returns a candidate list of images. The FR system outputs a list of the candidate images, where usually, the image with the highest similarity score to the probe image is at rank 1. However, some systems generate a difference score, so that the rank 1 position has the lowest score and there may also be user specific requirements, where the rank and/or score are not displayed in order to avoid bias. The candidate list may be affected by the quality of the probe image and reference images as well as the overall size of the reference database.

The analysis of the candidate list by a trained practitioner should include an initial assessment to exclude candidates, followed by a facial image comparison of the remaining prospective candidates using the morphological method. It should never be presumed that the correct identity will be at the top of the candidate list even if they exist in the database [7].

### 4.2.2 Facial Image Comparison

The facial image comparison procedure comprises the following steps: Analysis, Comparison, Evaluation, and Verification (referred to as ACE-V) [20]. It should be noted that, depending on the purpose of the comparison (i.e. review to generate an investigation lead or examination for evidential purposes) the level of documentation of the process will be different. When facial image comparison is undertaken for evidential purposes, detailed notes should be taken. Generally, less documentation is required when the process is undertaken to generate an investigative lead [21].

The recommended comparison method is a systematic morphological comparison, where the visible facial components and sub-components are compared [22]. It is recommended that a standard facial feature list is used to ensure a complete and consistent comparison. The list should include the following features and their sub-components:

- Skin appearance;
- Face/head outline;
- Face/head composition;
- Hair line, distribution and density;
- Forehead;
- Eyebrows;
- Eyes;
- Nose;
- Ears;

- Mouth;
- Chin and jawline;
- Neck;
- Facial hair;
- Facial lines;
- Scars;
- Facial marks; and
- Alterations (such as piercings or tattoo).

A detailed description of this list, including graphical illustrations is provided in the FISWG document 'Facial Image Comparison Feature List for Morphological Analysis' [23].

### 4.3 INTERPRETATION

When evaluating the outcome of a comparison of the facial features between two images, any factors that might have an impact on the appearance of an individual must be considered. These include imaging and environmental conditions; resolution, pose, occlusions, sharpness, lighting, compression, contrast, artefacts, noise, distortion and image manipulation [24], [25] and the physical stability of features due to subject factors; expression, health, weight change, ageing and intentional alteration [26].

The practitioner must weigh up the observed similarities and differences and make a final conclusion with respect to:

- One to many (1:N) review; whether a candidate image returned by a facial recognition system is a potential candidate match; or
- One to one (1:1) examination; the evidential weight expressed as a level of support that the images under consideration depict the same person or that they depict different people.

It is recommended that an opinion scale be used to report the outcome of one to one facial image comparison examinations. This scale should:

- Be bi-directional, i.e. include levels of support for identity as well as levels of support for exclusion;
- Centre around a zero level which indicates an inconclusive outcome, where the practitioner can neither exclude nor provide a level of support for identity; and
- Have a sufficient number of levels to facilitate a graded range of opinions [10].

The number of levels on the scale will be specific to the discipline and laboratory policies and the necessary criteria to form an opinion for each level used in the scale shall be defined [27].

Regardless of whether the outcome is for an investigative lead or evidential purposes, it is recommended that a peer review (verification) and critical findings check is undertaken by another trained practitioner. The peer review for investigative lead generation may be blind (where the second practitioner does not know the outcome of the first practitioner) or unblind, where the second practitioner reviews and verifies the results of the first practitioner. It is recommended that the peer review for evidential purposes is always blind [7] [10].

## 4.4 REPORTING

The level of detail documented in a report depends on nature and complexity of the task performed, e.g. the reporting of the morphological analysis, comparison, and evaluation of images for the purpose of effecting a conclusion by an examiner, will require more detail than an investigative lead report by a reviewer.

For an investigative lead, the result must be reported as a 'potential candidate' and that this does not indicate a positive identification of the individual. It may not be necessary to provide a report of the morphological comparison and evaluation for an investigative lead report as this is not generally intended to be used as evidence in court proceedings.

Where a report is intended for evidential purposes to provide a level of support as to whether the images depict the same person or not, a more detailed report is required that should include [21]:

- Case details; identifier, date received, examination dates source of images & image identifiers, date of image capture (if available), practitioner name, relevant case information (if available);
- Analysis: Image suitability for comparison, any image limitations, image processing applied;
- Comparison; Either the full feature and sub feature list or a summary documenting the observed similarities & dissimilarities, evaluation of observations under the applicable environmental, imaging and subject factors;
- Evaluation; The opinion scale used, final opinion/conclusion of the practitioner; and
- Additional information (where applicable according to laboratory standard practice); Agency specific information, practitioner qualifications, facial recognition software and version.

It is recommended that annotated images are included within the report to assist with illustrating observed features, taken into consideration in the comparison [28].

## 5. PROCEDURES, PROTOCOLS AND VALIDATION

### 5.1 PROCEDURES AND PROTOCOLS

Procedures and protocols are important to ensure the accuracy and reliability of a method. Additionally, in the absence of formalized procedures, reviewers and examiners may be particularly susceptible to sources of cognitive bias, such as contextual information, potentially increasing the risk of error.

Documented procedures shall be in place for the use of a facial recognition system and facial image comparison, for review and examination purposes. Procedures should describe a step-by-step process in sufficient detail to ensure the repeatability of the analysis.

Protocols and procedures should be continuously tracked and controlled. Significant changes should be verified, documented and approved by an authorized person before use. Detailed guidelines for developing procedures for the use of facial recognition systems and facial image comparison can be found in [7] and [10] respectively.

Any in-house developed procedure or method should be validated to ensure it produces acceptable results with adequate known reference materials prior to implementation.

### 5.2 VALIDATION

Validation is a key part of quality management. All methods and equipment for facial recognition system use or facial image comparison should be validated to demonstrate that they are fit for their intended purpose, meet the requirements of the end-user, and that any limitations of the method are known. *Staff who are competent in the method should participate in the validation, especially in specifying the use cases, requirements on test data and acceptance criteria, as well as in carrying out any manual steps of the methodology.* General guidelines for validation [29]:

- A procedure for the planning, carrying out, reporting and approval of the validation exercise (i.e. acceptance criteria) should be documented prior to starting the validation.
- To ensure that the FR or FIC process is fit for purpose, agencies should consider carrying out an end-to-end validation of the entire process. This should also include proficiency testing of staff who perform facial identification.
- Use ground truth material, representative of the types of images that will be encountered in cases [7].
- The procedure and results of the validation shall be documented in a report.
- Update and finalize the method based on the validation results.

Any major changes to a method may require all or part of the validation to be repeated.

#### 5.2.1 Hardware

Graphical output devices, such as display monitors, should be calibrated to determine the accuracy of the outputted image [10].

Where it is necessary to scan a document containing a facial image prior to undertaking a facial recognition search or a one-to-one comparison, it is essential that a good quality scanner is used and calibrated and that the settings are such that the image is captured at sufficient resolution [30].

#### 5.2.2 Image viewing and processing software

The software used to view and process digital imagery should be validated insofar as possible for its intended purpose. Imagery should be checked to determine whether the applied processing leads to a loss of visual detail or introduces artefacts into the displayed imagery.

### 5.2.3 Facial Recognition System

Regular Biometric Assurance Testing (BAT) should be implemented as part of system operation [31]. At a minimum, the facial recognition algorithm provider should provide guidance on appropriate default settings, including quality and similarity score thresholds. However, default settings may not be appropriate or correct for all systems as they are dependent on the types of images utilized. Therefore, additional testing may be necessary to update the system threshold configuration.

When testing facial recognition systems operational or operationally representative data should be used. Where necessary, quality and similarity score thresholds should be set or modified in order to meet the concept of operations of the system and balance available resources [32] [33] [34].



## 6. QUALITY MANAGEMENT

The objective of the forensic service and law enforcement agency, hereafter referred to as ‘the provider’ is to provide high quality forensic analysis and results. As such, the provider shall establish and maintain a quality framework for the management and processing of facial recognition searches and facial image comparison casework. The quality management system shall cover all procedures and reports related to these activities. This includes handling of imagery, management practices, analysis and reporting. Quality should be built in at each step of the process and should reflect continuous improvement. The quality system shall be reviewed regularly to ensure it is up to date.

There should be documented procedures/programs and maintenance of records in the following areas:

- Personnel responsible for implementing and maintaining the quality management policy & procedures;
- Staff training, competency, responsibilities and continual professional development;
- Version control of Standard Operating Procedures;
- Biometric Assurance Testing of systems to ensure that proper performance is maintained;
- Monitoring of imagery to ensure its integrity including the chain of custody on receiving, transfer, processing, storage and return of exhibits;
- Analytical procedures for facial identification, validation of methods and systems and reporting of results;
- Regular proficiency testing, laboratory audits and any corrective actions;
- Documentation of results, reports and system audit logs; and
- Court Testimony (where applicable)– testimony monitoring to ensure that the results of facial image comparisons are properly qualified and appropriately communicated by the examiners, to include the evaluation process.

## 7. GLOSSARY

For ease of reading, the terms used throughout this guideline are described below and may differ to but align with ISO standards. 'Note-to-entry' refers to the relevant ISO standard documents

Accuracy	A measure of how well the facial identification process performs in terms of false positive and false negative errors. It should be noted that the facial identification process combines the automated FR system and the human review.
Audit trail	A chronological record or set of records that provide documentary evidence of the sequence of activities that have affected a specific procedure, material, system, analysis or decision.
Candidate list	List of images returned by the FR system, ranked according to similarity score. The number of candidates shown will depend on system configuration settings such as threshold and/or a defined candidate length.  <i>Note-to-entry: The corresponding ISO/IEC 2382-37 term is biometric candidate list: <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.06.05">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.06.05</a></i>
Cognitive bias	A broad term that includes a variety of processes that may lead to inaccurate judgments or interpretations; cognitive biases can affect memory, reasoning, and decision-making.
Confirmation bias	A type of cognitive bias, whereby a facial examiner test hypotheses by looking for confirming evidence rather than for potentially conflicting evidence.
Critical findings check	A competent facial examiner reviews the ACE-V process of the examination and checks the findings of the examination to ensure they are consistent with the documented process.
Cumulative Match Characteristic (CMC)	CMC summarizes the accuracy of mated searches and plots the proportion of mated searches returning the mate at rank R or better.  <i>Note-to-entry: The corresponding ISO/IEC 19795-1 term can be found in Clause 3.29 in: <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:19795:-1:ed-2:v1:en">https://www.iso.org/obp/ui/#iso:std:iso-iec:19795:-1:ed-2:v1:en</a></i>
Deep convolutional neural network	A class of machine learning based on artificial neural networks, most commonly applied to analyse imagery.
Enrolment	The process of localizing and aligning the face from an image or video and encoding the facial features to generate a template.  <i>Note-to-entry: The corresponding ISO/IEC 2382-37 term is biometric enrolment: <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.05.03">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.05.03</a></i>
Facial Examiner	A trained facial comparison practitioner that conducts the task of facial examination (see Facial image comparison).
Facial image comparison	a manual process undertaken by a human to identify similarities and differences between facial images. Facial image comparison is used in different applications, involves different levels of evaluation according to the purpose of the comparison: <ul style="list-style-type: none"> <li>• Examination: Detailed and methodological process to compare one image of a face to another (one to one) in accordance with scientific recommendations for the purpose of effecting a conclusion. It is often used in forensic applications.</li> <li>• Review: is a comparison of image-to-image often used in either investigative or operational lead generating applications. Review encompasses a broad range of purposes and levels of rigor involved in the analysis. An independent technical review or verification by at least one additional reviewer should be conducted.</li> </ul>

Facial Recognition system (FR system)	<p>Software, which is able to detect, enroll and compare faces from digital images or a video frame against a database of enrolled reference facial images:</p> <ul style="list-style-type: none"> <li>• Identification (1:N): The automated comparison of an unknown biometric sample against a database of (N) reference images in order to return a corresponding identity. <i>Note-to-entry: The corresponding ISO/IEC 2382-37 term is biometric identification: <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.08.02">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.08.02</a></i></li> <li>• Verification (one to one): The automated comparison of a biometric sample against the reference biometric sample corresponding to the claimed identity, resulting in a computer-evaluated similarity score. <i>Note-to-entry: The corresponding ISO/IEC 2382-37 term is biometric verification: <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.08.03">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.08.03</a></i></li> <li>• Clustering (NxM): The automated grouping of biometric samples, for example, represented within a collection of facial images, based on computer evaluated similarity.</li> </ul>
Facial Reviewer	A trained facial comparison practitioner that conducts the task of facial review (see Facial Image Comparison; Review).
False positive	<p>When an FR algorithm and/or human reviewer incorrectly associates (matches) two faces together, but the ground truth is that the two faces belong to different individuals (referred to as non-mated search).</p> <p><i>Note-to-entry: The corresponding ISO/IEC 2382-37:2017 "Information technology - Vocabulary - Part 37: Biometrics", 2022.term is biometric false acceptance: <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.06.05">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.06.05</a></i></p>
False negative	<p>When an FR algorithm and/or human reviewer fails to associate (match) two faces of the same person, but the ground truth is that the two faces are the same individual (referred to as mated searches).</p> <p><i>Note-to-entry: The corresponding ISO/IEC 2382-37 term is biometric false rejection: <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.06.06">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.06.06</a></i></p>
False negative identification rate (FNIR)	<p>The proportion of the total number of mated searches where the true mate is not returned as a potential candidate. This may be because it is found below a configured threshold, outside the top rank candidates or not selected as a potential candidate by the human reviewer.</p> <p><i>Note-to-entry: The corresponding ISO/IEC 19795-1 term can be found in Clause 3.22 in: <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:19795:-1:ed-2:v1:en">https://www.iso.org/obp/ui/#iso:std:iso-iec:19795:-1:ed-2:v1:en</a></i></p>
False positive identification rate (FPIR)	<p>The proportion of the total number of non-mated searches where one or more potential candidates are returned as a mate.</p> <p><i>Note-to-entry: The corresponding ISO/IEC 19795-1:2021 "Information technology - Biometric performance testing and reporting - Part 1: Principles and framework", 2021term can be found in Clause 3.23 in: <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:19795:-1:ed-2:v1:en">https://www.iso.org/obp/ui/#iso:std:iso-iec:19795:-1:ed-2:v1:en</a></i></p>
Holistic comparison	The innate human ability of comparing faces by looking at the face as a whole without specifically considering the component parts in isolation.
Image enrolment quality	<p>An algorithm or supplier proprietary metric of 'photo acceptance', that provides a measure of subject characteristics (for example pose, expression) and environmental/capture characteristics (for example illumination, resolution, focus).</p> <p><i>Note-to-entry: The corresponding ISO/IEC 2382-37 term is quality: <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.09.14">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.09.14</a></i></p>
Intra-variability	Differences in [biometric] samples taken from the same capture subject.
Inter-variability	Differences in [biometric] samples taken from different capture subject.
Metadata	Additional (non-biometric) alpha-numeric information associated with the facial images. Common examples of metadata include gender, age / date of birth, offence type, date of image capture.
Morphological comparison	The direct comparison of class and individual facial characteristics without explicit measurement. It is the method of facial image comparison in which the characteristic and components of the face are compared.
Potential candidate	An individual in the candidate list that is judged by the facial reviewer to show significant similarities to the subject depicted in the probe image.

Probe image	Imagery in which the identity of the depicted subject is unknown. The probe image may be captured under either controlled or uncontrolled conditions. Other terms used as synonyms for probe image are questioned image and query image.
Rank	The position of a reference image in the candidate list as based on the similarity score, where rank 1 is deemed by the FR system to have the highest level of correspondence to the probe image.
Reference database	The combination of reference imagery and associated biographic and other relevant information (such as name, date of birth, crime reference etc.) <i>Note-to-entry: The corresponding ISO/IEC 2382-37 term is biometric reference database:</i> <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.03.17">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.03.17</a>
Reference image	Imagery in which the identity of the depicted subject is usually known and has been verified. Reference imagery is often captured under controlled conditions, for example mugshot images.
Similarity score	The degree of correspondence between two facial templates as judged by the FR system. The range of possible similarity scores are proprietary to the algorithm. This is sometimes just referred to as 'comparison score'. <i>Note-to-entry: Some FR system report a dissimilarity score (i.e. a distance score), which is a comparison score that decreases with similarity.</i> <i>Note-to-entry: The corresponding ISO/IEC 2382-37 term is similarity score:</i> <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.03.35">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.03.35</a>
Template	A digital representation, created by the FR system, of features extracted from a biometric (face) sample. Templates are specific to the algorithm. <i>Note-to-entry: The corresponding ISO/IEC 2382-37 term is biometric template:</i> <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.03.22">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.03.22</a>
Threshold	Configurable setting of the minimum image enrolment quality metric or similarity score which must be reached in order for the FR system to return a candidate. <i>Note-to-entry: The corresponding ISO/IEC 2382-37 term is threshold:</i> <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.05.14">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.05.14</a>
True negative identification rate (TNIR):	The complement of the FPIR.
True mate	Two images that are taken from the same individual. Another term used as a synonym for true mate is true source. <i>Note-to-entry: The corresponding ISO/IEC 2382-37 term is mated:</i> <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.05.14">https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:-37:ed-3:v1:en:term:37.05.14</a>
True positive identification rate (TPIR)	The complement of FNIR giving a positive statement of how often mated searches are successful. <i>Note-to-entry: The corresponding ISO/IEC 19795-1 term can be found in Clause 3.25 in:</i> <a href="https://www.iso.org/obp/ui/#iso:std:iso-iec:19795:-1:ed-2:v1:en">https://www.iso.org/obp/ui/#iso:std:iso-iec:19795:-1:ed-2:v1:en</a>
Verification	The review and/or independent analysis of the search by another FR system operator. <ul style="list-style-type: none"> <li>• Blind verification: A type of verification in which the subsequent examiner(s) has no knowledge of the original examiner's decisions, conclusions or observed data used to support the conclusion.</li> <li>• Non-blind verification: A type of verification in which the subsequent examiner has access to the original examiner's decisions, conclusions or observed data used to support the conclusion.</li> </ul>

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