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| **Version** | **Date** | **Changes Made** |
| 1.0 | 16/09/2024 |  |
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*Prepared by the Trustworthy Digital Infrastructure for Identity Systems Team*

*This work was supported, in whole or in part, by the Gates Foundation [INV- 057591]. Under the grant conditions of the Foundation, a Creative Commons Attribution 4.0 Generic License has already been assigned to the Author’s Accepted Manuscript.*

Standard Operating Procedure BIOMETRIC AUTHENTICATION: FACIAL DATA

AU.3.D - WITH RATIONALISATION

**Version Control**

**Guidelines for Maintaining the SOP Version Control Table:**

* **Version**: Assign a new version number for every update. Minor changes can be denoted by incremental changes in decimal (e.g., 1.1, 1.2), while major changes can increment the whole number (e.g., 1.0 to 2.0).
* **Date**: The date when the changes were finalised.
* **Changes Made**: A brief description of the changes or updates made.

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# 1. Purpose

This SOP outlines the standardised procedure for biometric authentication using facial data within the Digital Identity (DID) system. It ensures secure and accurate authentication through proper verification, encryption, and error handling.

# 2. Definitions and Abbreviations

**DID**: Digital Identity

**KM**: Key Manager

**KR**: Key Revocation

**HSM**: Hardware Security Module

**CA**: Certificate Authority

**IDA**: ID Authentication Database

**AC**: Access Control

**FTP**: First Time Password

**OTP**: One-Time Password

**2FA**: Two-Factor Authentication

**API**: Application Programming Interface

**HTTPS**: Hyper Text Transfer Protocol Secure

**SSL/TLS**: Secure Sockets Layer / Transport Layer Security

**IDS**: Intrusion Detection System

**IPS**: Intrusion Prevention System

# 3 Application

## 3.1 Ownership and Stakeholders

### 3.1.1 Digital Identity Service Providers (DISPs)

* **Ownership**: Oversee the facial authentication process.
* **Responsibilities**: Ensure secure and compliant authentication using facial data.

### 3.1.2 IT and Security Teams

* **Ownership**: Manage technical infrastructure and security protocols.
* **Responsibilities**: Maintain system security, data encryption, and infrastructure.

### 3.1.3 Compliance and Legal Departments

* **Ownership**: Ensure compliance with legal and regulatory standards.
* **Responsibilities**: Oversee compliance checks, documentation, and regulatory adherence.

## 3.2 Users and Benegfits

### 3.2.1 General Public

* **Users**: Individuals using facial authentication for their DID accounts.
* **Usage**: Provide facial data for secure authentication.

### 3.2.2 Government Agencies

* **Users**: Agencies requiring verified identities for services.
* **Usage**: Utilise verified identity information for secure service delivery.

### 3.2.3 Private Sector Companies

* **Users**: Businesses requiring high-security identity verification.
* **Usage**: Use secured identities for compliance and verification purposes.

# 4. Prerequisites

## 4.1 Assumptions

* Subscribers have provided consent for biometric authentication.
* Administrators are trained to handle the facial authentication process securely.
* Technological infrastructure meets current security standards.

## 4.2 Constraints

* The facial authentication process may be affected by system downtimes or regulatory changes.
* Secure devices and internet access are required for administrators and users.

# 5. Process Flow - Process and Procedures

## **5.1. Initiating Facial Authentication:**

* **Claimant/Subscriber Action:**
  + The claimant initiates the process offline by providing their consent (reference: AU.3.A).
  + The claimant provides their Unique Identification Number (UIN) and demographic data to the verifier.
* **Verifier Action:**
  + The verifier requests the UIN and demographic data from the claimant.
  + The verifier verifies the provided UIN and demographic data against system records.
* **Output:** Completion of initial identity verification.

## **5.2. Verification of UIN and Demographic Data:**

* **System Action (Client and Server):**
  + The UIN and demographic data provided by the claimant are encrypted using secure protocols (SSL/TLS) and sent for verification.
  + The server checks if the UIN and demographic data match existing records.
  + If a match is found, a notification of successful verification status is sent. If no match is found, a failure status notification is generated.
* **Output:** Determination of verification success or failure.

## **5.3. Facial Data Capture:**

* **Verifier Action:**
  + Upon successful verification of UIN and demographic data, the verifier requests the claimant to provide facial biometric data using a facial scanner.
  + The claimant positions their face in front of the facial scanner.
* **System Action (Client):**
  + The facial scanner captures the facial image.
  + The captured facial image is encrypted for secure transmission.
* **Output:** Facial image is captured and encrypted for authentication.

## **5.4. Facial Authentication:**

* **System Action (Server):**
  + The encrypted facial scan image is sent to the server for authentication.
  + The server checks if the facial scan matches the facial data stored in the claimant's UIN account with a match score threshold (≥ 95%).
  + If the facial data matches, a notification of successful authentication is generated. If not, failure notifications are sent, and exception handling is initiated.
* **Output:** Determination of facial authentication success or failure.

## **5.5. Handling Exceptions and Retries:**

* **System Action (Server):**
  + If the facial scan does not match or errors occur during scanning, the system triggers exception handling and allows up to three retry attempts.
  + If the retry count exceeds three, the process is terminated, and the claimant's UIN account is locked for 24 hours.
* **Output:** Management of error handling and retries, ensuring account security.

## **5.6. Logging and Status Update:**

* **System Action (Server):**
  + All activities, including successful facial authentication and any failures, are logged in the system.
  + Status updates are stored in the system logs for auditing, compliance monitoring, and future reference.
* **Output:** Creation of detailed logs and status updates for compliance and security monitoring.

# 6. Visualisation

A diagram of a process flow

Description automatically generated

Please refer to the [GitHub](https://github.com/alan-turing-institute/Standard-Operating-Procedures-for-Digital-Identity-Systems) repository for further information.

# 7. Rationalisation

|  |  |  |  |  |  |
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| **AU.3.D BIOMETRIC AUTHENTICATION: FACIAL DATA** | | | | | |
| **Step** | **Description** | **Action** | **Systems Involved** | **Security Measures** | **Standards and References** |
| 1 | Start Facial Authentication Process | User initiates the authentication process offline | User Device, Public Network | Ensure secure initiation of the authentication process, regardless of the mode (offline/online). | ISO 27001 Information Security Management, eIDAS Trust Services |
| 2 | Provide UIN and Demographic Data | User provides their UIN and demographic information | User Device | Data entry security | ISO 27001 Data Protection, NIST SP 800-63 Digital Identity Guidelines |
| 3 | Request Facial Scanning | User is prompted to provide a facial scan | Facial Scanner, Private Network | Biometric data collection | ISO 27001 User Access Management, GDPR for Biometric Data |
| 4 | Verify UIN and Demographic Data | Verification of UIN and demographic data | Server, Private Network | Data Matching, Secure Authentication Process | ISO 27001 Cryptography, FATF Digital Identity Guidelines |
| 5 | Facial Match Verification | Match facial scan with UIN account | Biometric System, Private Network | Biometric verification, Match score (>95%) | ISO 27001 Authentication Controls, NIST SP 800-63 Biometric Authentication Mechanisms |
| 6 | Encrypt Facial Scan Image for Authentication | Encrypt facial scan image before storage and transmission | Server, Private Network | Data encryption, Privacy preservation | ISO 27001 Cryptography, Emirates ID Data Security Standards |
| 7 | Receive Authentication Status | Notify user of facial authentication result | User Device, Notification System | Secure Notification Delivery | ISO 27001 Communications Security, Sing Pass Notification System |
| 8 | Handle Authentication Failures | Manage unsuccessful authentication attempts | Server | Error handling, Retry management | ISO 27001 Access Control Policies, NIST SP 800-61 Incident Handling |
| 9 | Terminate or Reset Process | Lock UIN account or reset process based on retries | Server | Account lockout, Process termination | ISO 27001 Access Control Policies, NIST SP 800-63 Authenticator Management |
| 10 | End Process | Log process completion and status | Server | Audit logging | NIST SP 800-53 Security and Privacy Controls, ISO 27001 Secure Audit Logging |

# 8. References

1. NIST. Digital Identity Guidelines: Age Verification Guidance. Available at: [https://pages.nist.gov/800-63-3/].
2. eIDAS. Identity Proofing Requirements. Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L\_.2014.257.01.0073.01.ENG].
3. ISO. 27001, Secure System Access Control. Available at: [https://www.iso.org/standard/27001].
4. Aadhaar. Account Creation and Management. Available at: [https://uidai.gov.in/en/my-aadhaar/about-your-aadhaar/aadhaar-enrolment.html].
5. SingPass. Account Creation and Management. Available at: [https://www.singpass.gov.sg/home/ui/assets/pdf/Singpass\_Registration\_Guide.pdf].
6. FATF. Digital Identity Guidance: Authentication Mechanisms. Available at: [https://www.fatf-gafi.org/en/publications/Financialinclusionandnpoissues/Digital-identity-guidance.html].
7. Estonia ID. Data Protection Practices. Available at: [https://toolbox.estonia.ee/asset-page/252494-e-estonia-guide-full-brochure].
8. Emirates ID. Available at: [https://u.ae/en/information-and-services/visa-and-emirates-id/emirates-id].