U.S. Department of Homeland Security

SCIENCE AND TECHNOLOGY DIRECTORATE

**Remote Identity Validation Rally
Selfie Match to Document**

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We are the Department's Science Advisor and research and development arm.

Since 2003, the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) has provided sound, evidence-based scientific and technical perspectives to address a broad spectrum of current and emerging threats.

RESEARCHING FOR THE DHS MISSION

INNOVATING THROUGH TECHNICAL CAPABILITIES

COLLABORATING WITH A DIVERSE RANGE OF PARTNERS

DEVELOPING THE WORKFORCE OF THE FUTURE

Science and Technology

Biometric & Identity Technology Center

S&T conducts foundational research to ensure advancements in science and technology are harnessed for cutting-edge solutions to new and emerging operational challenges.

- ☑ Drive biometric and identity innovation at DHS through research development, test and evaluation (RDT&E) capabilities

- ☑ Facilitate and accelerate understanding of biometrics and identity technologies for new DHS use cases

- ☑ Drive efficiencies by supporting cross cutting methods, best practices, and solutions across programs

- ☑ Deliver subject matter expertise across the DHS enterprise

- ☑ Engage industry and provide feedback

- ☑ Encourage innovation with industry and academia

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Remote Identity Validation

- Remote Identity Validation (RIV) technology is a tool to authenticate documents and verify the identity of users remotely

- These systems are complex, with multiple subsystems, and are increasing in popularity and adoption

- It is difficult for individual companies to test the effectiveness of these systems and industry performance benchmarks currently are not well defined

- To address this need and spur industry innovation, DHS S&T carried out the Remote Identity Validation Technology Demonstration (RIVTD)
  - Comprehensively demonstrated performance of commercial RIV subsystems
  - Informed NIST digital identity guidelines
  - Identified metrics, performance gaps, and achievable performance benchmarks

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Remote Identity Validation Technology Demonstration (RIVTD)

Remote Identity Validation Technology Demonstration (RIVTD)

Remote Identity Validation Rally (RIVR)

- **Building on RIVTD Insights**: RIVTD identified key areas where RIV vendors should focus improvements, shaping the next phase of evaluation.

- **Establishing Achievable Benchmarks**: RIVR sets industry-informed performance benchmarks based on RIVTD results, providing clear targets for improvement.

- **Encouraging Innovation & Retesting**: Vendors have the opportunity to refine their technologies and participate in re-evaluation.

- **Confidential & Industry-Driven**: Vendor names are aliased, allowing companies to self-attest participation while fostering industry-wide progress.

Remote Identity Validation Rally

MdTF

RIVR Tracks

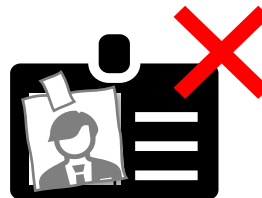**Selfie Match to Document**

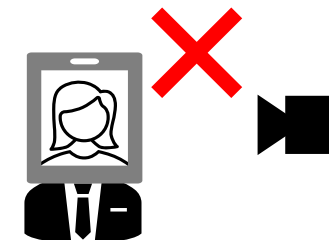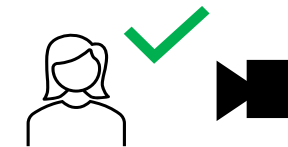- 1:1 Verification
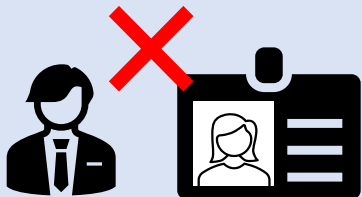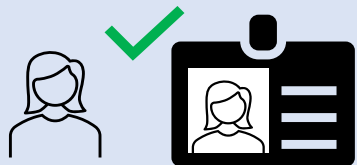
Today!

ID Validation

- Information Check
- Tamper Check
- Security Check

Summer 2025 (Planned)

Presentation Attack Detection (PAD)

- Reject screens and printouts
- Reject masks and other PAs

Fall 2025 (Planned)

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Selfie Match to Document Track

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Selfie Match to Document

- Leverage a large and growing collection of:
  - Genuine U.S. State-issued ID cards (e.g., driver's licenses)
  - Selfie photo images
- RIV Selfie Match to Document (SMTD) systems will demonstrate their ability to determine if a **selfie image** is the same person as pictured on a **U.S. State-issued ID cards**.

- Sample Images:
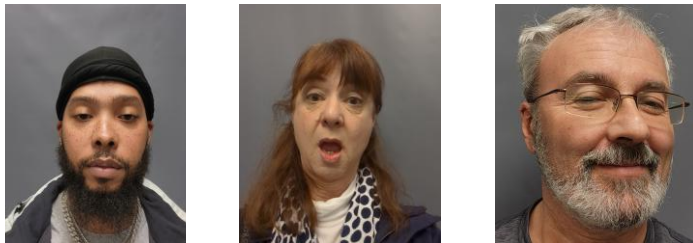
All volunteers shown here consented to have their images used in government presentations.

Note – Sampling of driver's license not shown for privacy reasons.
Sample driver license's taken from:
What do the new Maryland driver's licenses look like? (wbaltv.com)

match
not match

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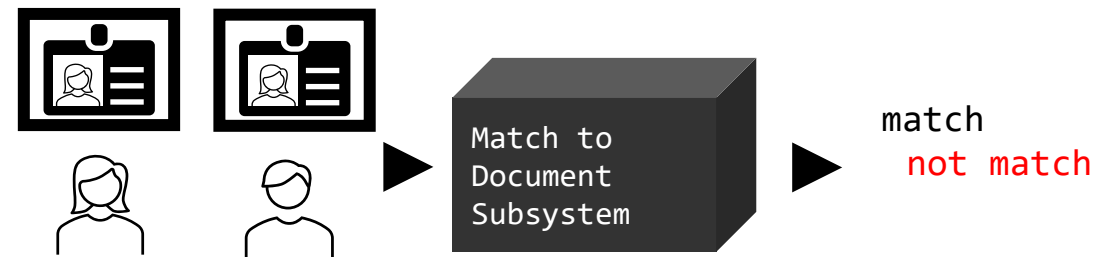
Identity Document – Image Properties

- Genuine document images, controlled and uncontrolled selfies

- Images captured with a selection of modern mobile phones

- JPEG or PNG encoding

- Reasonable efforts to ensure quality

- Optical perspective distortions may be present
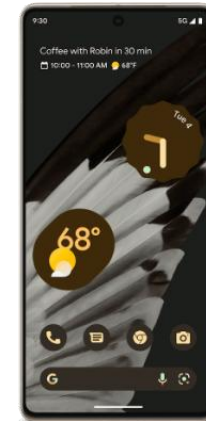
- Images provided as base64 encoded strings

Note: Document images may be rotated -180 to 180 degrees.

Google Pixel 7

Apple iPhone 14

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Selfie Match to Document API, Overview

- The API for this evaluation is available at https://github.mdtf.org

- The API for this evaluation has three endpoints

- Technically very similar to RIVTD Match-to-Document API

API details may change – Refer to https://github.mdtf.org for current API information.

The Maryland Test Facility Match-to-ID Interface 0.0.1

OAS3

This document specifies the API requirements for MdTF testing of algorithms that match facial biometric samples to identity document images (``match-to-id''). Match-to-ID testing at the MdTF is supported by the Department of Homeland Security, Science and Technology Directorate (DHS S&T) as part of the Remote Identity Validation Technology Demonstration (RIVTD). For more information please visit https://mdtf.org and https://www.dhs.gov/science-and-technology/BI-TC

The MdTF - Website
Send email to The MdTF
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Biometric Operations

POST /v1/create-template Generate a template from the provided facial biometric sample or the identity document image.

POST /v1/compare-list Compare a single template to a list of target templates.

Algorithm Information

GET /v1/info Returns basic information for the algorithm.

Selfie Match to Document API, Generate Template

- **`/v1/create-template`** (POST)
  - Accepts: Individual (single) base64 encoded PNG or JPG image bytes
  - Returns: Template in the form of bytes
  - Note:
    - Same endpoint will be sent **selfie images AND document ID images**
    - Subsystem must distinguish and process accordingly

```
{
    "ImageData": "iVBORw0KGgoAAAANSUhEUgAAAAEAAAABCAIAAACQd1PeAAAAEElEQVR4nGJiYGAABAAA//8ADAADcZGLFwAAAABJRU5ErkJggg=="
}
```

POST   **`/v1/create-template`**   Generate a template from the provided biometric image

```
{
    "Template": "dGhpcyBzZW50ZW5jZSBpcyBhbiBleGFtcGxlIHRlbXBsYXRlLi4K"
}
```

API details may change – Refer to https://github.mdtf.org for current API information.

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Selfie Match to Document API, Compare Template

- **/v1/compare-list** (POST)
  - Accepts
    - A single template as returned from **/v1/create-template**
    - A target list of templates as returned from several **/v1/create-template** calls
  - Returns: A list of scores comparing the single template to the target list of templates
  - Note: Returned list must be same length and order as target list

```
{
  "SingleTemplate": {
    "Template": "dGhpcyBzZW50ZW5jZSBpcyBhbiBleGFtcGxlIHR1bXBsYXR1Li4K"
  },
  "TargetTemplateList": [
    {
      "Template": "dGhpcyBzZW50ZW5jZSBpcyBhbiBleGFtcGxlIHR1bXBsYXR1Li4K"
    }
  ]
}
```

API details may change – Refer to https://github.mdtf.org for current API information.

POST /v1/compare-list Compare a single template to a list of templates

(this is a JSON list)

```
[
  {
    "Score": 8734
  }
]
```

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Selfie Match to Document API, Algorithm Info

- **`/v1/info`** (GET)

  - Algorithm name and version will be used in validating your system
    - Please version appropriately

  - Validity of supplied thresholds will be assessed
    - Set FMR thresholds appropriately
    - False Non-Match Rate (FNMR) will be reported at FMR = 1:1e4

GET **`/v1/info`** Returns basic information for the algorithm.

```
{
  "AlgorithmName": "AlwaysTrue",
  "AlgorithmVersion": "1.0.1",
  "AlgorithmModality": "Face",
  "CompanyName": "MdTF",
  "TechnicalContactEmail": "john@mdtf.org",
  "RecommendedCPUs": 0.5,
  "RecommendedMem": 512,
  "Test": "MDTF_RIVTD_TRACK2",
  "Thresholds": {
    "1:500": "7543",
    "1:1e3": "8730",
    "1:1e4": "9321",
    "1:1e5": "9863",
    "1:1e6": "9972"
  }
}
```

(i) API details may change – Refer to https://github.mdtf.org for current API information.

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Selfie Match to Document Subsystem

- Match to Document API will be implemented via an **HTTP server**

- Deployed inside a **docker** container

- Delivered via a **.tgz** uploaded to the **MdTF web console** (***new*** limit 5GB)

- ***new*** Provide three test images to produce "match" and "no match" scores (1:1e4 threshold)

- Docker containers will be automatically assessed for API compliance and security

- Issues will be automatically flagged and sent to console users


```
docker save ${COMPANY_NAME}-rivr-mtd-system:latest |
gzip > ${COMPANY_NAME}-rivr-mtd-system.tgz
```

Match-to-ID subsystem
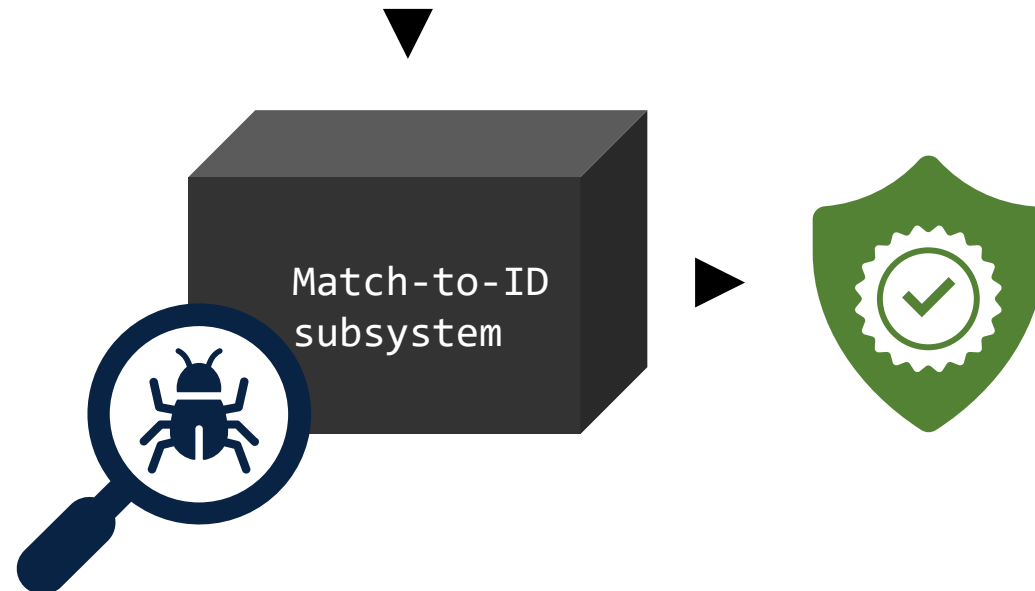
Selfie Match to Document Subsystem

- Additional requirements:
  - Subsystems shall consist of a **single** docker container, started via a docker run command
  - Subsystems shall be **Linux** based docker containers
  - HTTP servers shall be hosted on **port 8080**
  - Subsystems shall be less than **5 GB** in size
  - Subsystems shall require **no outside functionality** and will be run on internal machines without access to the internet
  - If subsystems require a **license to operate**, that license shall be time bounded to operate, without restrictions (usage, machine portability, etc.) for at least 1 year from the RIVR Selfie Match to Document submission deadline

Selfie Match to Document Metrics (ISO Standard)

- **Failure to Extract Selfie ($FTXR_{selfie}$) –** proportion of selfie images that fail to extract a template for biometric matching

- **Failure to Extract Document ($FTXR_{doc}$) –** proportion of document images that fail to extract a template for biometric matching

- **False Non-Match Rate (FNMR)** – proportion of ID document templates that do not match to templates from mated selfie images
  - Computed and reported at the supplied FMR = 1:1e4 setting
  - **Threshold: 0.05, Goal: 0.01**

- **False Match Rate (FMR)** – proportion of non-mated templates that match – for validation of supplied thresholds
  - **Threshold: 0.0005, Goal 0.0001 at the FMR = 1:1e4 setting**

- **Disaggregated by factors of interest:**
  - Smartphone type
  - Threshold

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Benefits of Participation

- Demonstrate the technical maturity of your product

- Inform government and other customers regarding your system's performance in an operationally relevant demonstration

- Understand performance of your system relative to others in the industry

- Returning systems can gauge performance improvement over time

- Form an ongoing Cooperative Research and Development Agreement (CRADA) with DHS S&T
  - Protects your intellectual property
  - Provides mechanism for ongoing dialog and collaboration with DHS S&T
  - Provides opportunity for data sharing

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Application Package Requirements

- Provide an application package (limit 5 pages), in the form of a white paper addressing each of the following:

    1. Description of the company
    2. Description of selfie match to document subsystem commercial deployments
    3. Describe subsystem technology and attest it will align with the MdTF API
    4. Provide measurements of the performance characteristics of the system

- Submit application package to RIVR@mdtf.org by **11:59pm (ET) April 11, 2025**

These webinar slides and detailed application package instructions will be made available at https://mdtf.org/rivr

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What's next?

- Application package is due April 11, 2025
- Notification of participation is April 18, 2025
- Docker Portal for SMTD systems opens April 22, 2025
- Initial Docker submission is due May 9, 2025
- Docker submission deadline is May 23, 2025 (Phase 1)

- Docker submission requires executed CRADA with DHS S&T
  - CRADA execution requires signature of authorized company representative

- Stay tuned for:
  - RIVR ID Validation Track Announcement
  - RIVR Presentation Attack Detection Track Announcement

Questions & Answers

- Contact information
  - Programmatic: peoplescreening@hq.dhs.gov
  - Technical: RIVR@mdtf.org

- Visit our websites for additional information
  - To see additional work DHS S&T supports, visit www.dhs.gov/science-and-technology
  - For information about this and other DHS S&T technology evaluations, visit https://mdtf.org

Remote Identity Validation Rally

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